



BHARAT TEST SUITE MANUAL

CUSTOMER MANUAL

Operation, configuration and maintenance

Organized by application page, tab and inner tab

Raju Bros Softech Pvt Ltd

Industrial Test Control

Document revision 1.6 | 10 October 2026

Detailed procedures / fields / examples / recovery

Using this manual

Start with Device Configuration, then configure the model, test flow and Test Plan before production. Main chapters follow the sidebar; their tabs, inner tabs and task guides form the linked index. Use bookmarks or an index entry to jump to a specific workflow. Clicking the footer returns to the chapter directory.

A practical operating reference

Each task explains the relevant controls, save boundary, procedure, expected result and recovery path. Worked examples use generic names and illustrative measurements. They are not machine acceptance results or recipes approved for your fixture.

Access and machine readiness

A valid application license, feature entitlement, assigned role, page/action permission and supported hardware/provider may all be necessary. A bundle may already include a feature. The feature licensing summary describes requirements, not your activation status.

Before RUN, START, programming, output switching or calibration writes, confirm the device and fixture state against the approved machine procedure. A software status is not independent proof of physical state. Preserve the identity and evidence of a failed unit before another deliberate run.

Illustrations and verification limits

The retained screenshots are actual sanitized application captures from 07 October 2026, reviewed as representative control layouts. They were not recaptured for this branding revision. Earlier Login, About and Update pictures are omitted because they displayed the previous software branding; their written instructions remain. New branding, dialog and workflow captures are still missing. The written field references and procedures describe the reviewed source behavior. Role, license, hardware and installed-release differences can affect what is visible.

No physical hardware trial, network delivery acceptance, programming operation or installer acceptance test was performed to produce this document. Follow the site commissioning and change-approval process before using a revised configuration in production.

Edition record

Document revision 1.6 - 10 October 2026. This revision applies the BHARAT TEST SUITE software name and Raju Bros Softech Pvt Ltd developer display. It retains the complete customer topics, including group visibility, device mapping, model re-enabling and readable plan names. Established storage and integration names remain accurate. Source coverage, capture gaps and revision archives are maintained with the editable authoring files.

Feature licensing summary

License Required identifies a separately licensed feature. The label describes an access requirement, not the activation status of your installation. A purchased bundle may already include the feature. Child sections inherit their parent's notice unless a different requirement is stated.

FEATURE	REQUIRED ACCESS AND SCOPE
Vision License Required	Vision license. Covers vision sequences, image inspection and the Vision Camera Tool.
IR / Thermal Camera License Required	IR Camera access is required for thermal inspection in addition to Vision access. The IR Camera package also supplies Vision access; a Vision-only package does not unlock thermal inspection.
CAN License Required	CAN license for CAN device communication and test sequences. CAN Calibration and Full packages also provide CAN access.
CAN Analyzer / UDS License Required	Either CAN Analyzer or CAN access is accepted for this workspace. A second Analyzer license is not needed when CAN access is already included. This does not by itself unlock CAN Calibration.
CAN Calibration License Required	CAN Calibration license. This package also includes CAN access. CAN-only or Analyzer-only access does not unlock calibration methods.
LIN License Required	LIN license for LIN communication, sequences and cyclic groups.
General Programming License Required	General Programming license for the programmer workspace and linked programming steps. Device support, provider tools and Beta approval requirements still apply.
UDAQ Programming License Required	UDAQ Programming license for firmware programming. This requirement applies to the UDAQ programming page; ordinary relay sequences and manual I/O are separate workflows.

Feature licensing summary / 2

Select a feature name to open its instructions. Confirm your supplied package before ordering another feature license. Contact Raju Bros Softech Pvt Ltd for activation or package details.

FEATURE	REQUIRED ACCESS AND SCOPE
Printer / Label Printing License Required	Printer / Label Printing license for printing operations, label rules and linked print actions.
Data Link License Required	Data Link license for its profiles, sequences, assignments and execution. Confirm this feature separately when planning MES or customer-server integration through Data Link.
Custom CRC License Required	Custom CRC license for custom methods, validation, preview and linked execution. Using it inside CAN does not remove the Custom CRC requirement.
Quality Alerts License Required	Quality Alerts license for the notification workspace and scheduled or event-driven notifications.
Wiring Diagram License Required	Wiring Diagram license for the drawing workspace and its tools. Account permissions still determine which editing and management actions are allowed.
Smart Factory Monitoring License Required	Smart Factory Monitoring license for the monitoring link and its services.
RAJU BROS AI Assistance (Beta) License Required	RAJU BROS AI Assistance license for the sequence-assistance tab. This notice applies to that Beta feature; AI HELP / RBX is documented separately.
MES / Customer Server Confirm License Package	Confirm the MES / Customer Server entitlement in your supplied package with Raju Bros Softech Pvt Ltd. Data Link integration requires Data Link access. This manual does not claim that every MES settings screen is locked by a separate MES license.

Packages and access

Full feature packages include the features listed as License Required. A valid application license, appropriate account permissions and supported hardware or provider software are still needed. Provider software may have its own licensing terms. No label in this manual confirms a customer's activation.

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Feature licensing summary

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1 Device Configuration

Configure named hardware so sequences and maintenance tools use the same saved connection.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

The device list is a configuration register. A saved, enabled row tells the application which transport, protocol and identity to use; it does not prove that wiring or measurement is correct. Begin with a connection check, then verify one supported read in Maintenance before production.

Keep names stable because sequences and other settings refer to them. Use a named record for each independently selected instrument; a Modbus bus can address several slaves through one serial adapter.

Procedure

1. Identify the physical instrument and its manufacturer connection/protocol requirements.
2. Create the record, capture adapter identity, test the connection and save.
3. Verify a known read and confirm its response in the communication log.

Related instructions: [1.1 Screen overview, access and device list](#); [1.4 Device-Specific Connection](#); [1.5 USB Identity](#); [1.9 Worked device configurations and connection troubleshooting](#).

Screen reference

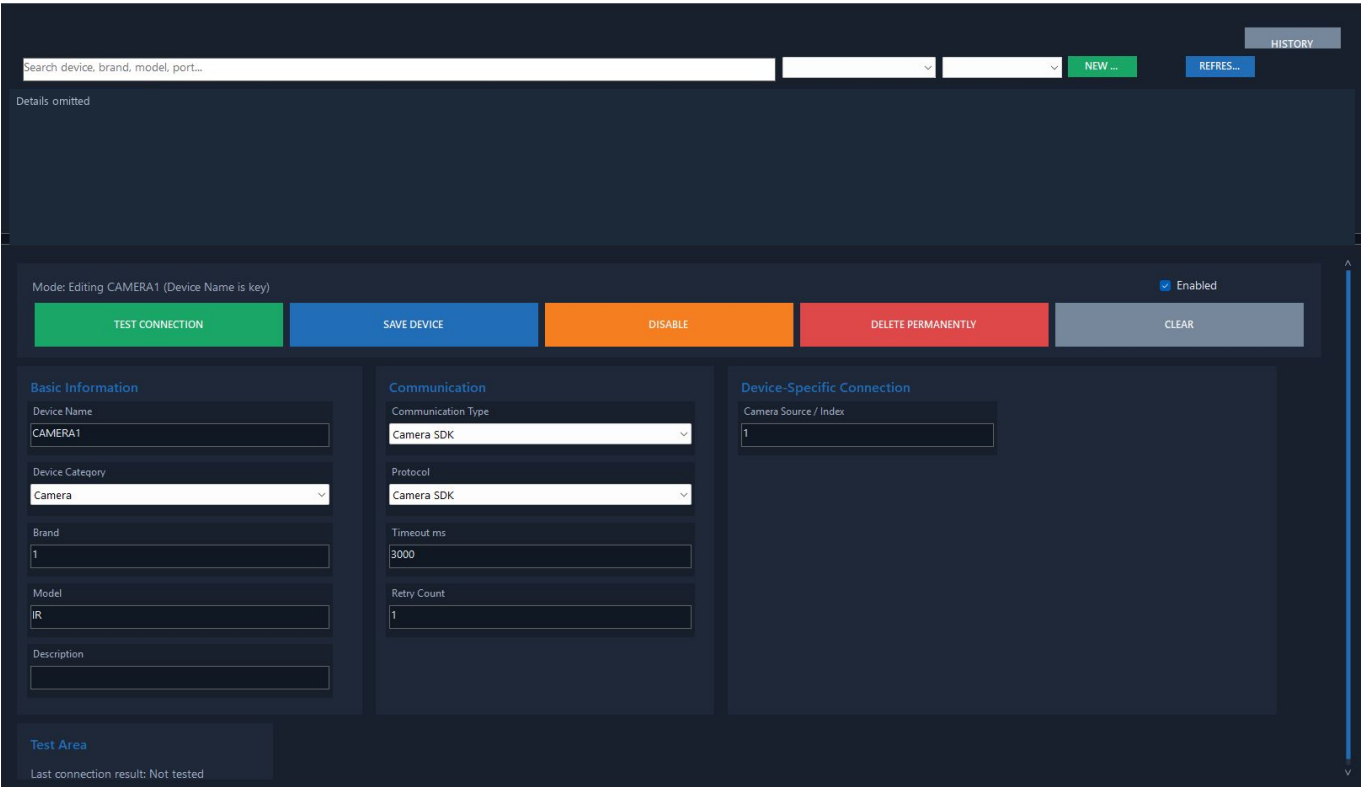


Figure 1 - Device Configuration: list and conditional camera settings. Reference capture: 07 October 2026.

1.1 Screen overview, access and device list

Find the exact device record before changing or testing it.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

The left list and search/category/status filters control which records are visible. The detail form represents the selected saved row or a new record; check its mode indication before saving. Filtering a row out does not disable it.

A virtual device has a separate simulated runtime lifecycle. Its connection test requires RUNNING status and identifies a virtual response. Treat that as simulation evidence.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Search / category / status	Narrow the list; clear filters to locate a disabled or differently categorized device.
Mode	Distinguishes add-new from editing a saved record.
Last connection result	Read the complete most-recent check result, not only its color.

Procedure

1. Clear filters if the intended row is missing.
2. Select the row and compare its name, endpoint and identity with the physical equipment.
3. Use the authorized action; page-action permissions can make individual actions unavailable.

Worked example

Illustrative: a disabled meter reappears when the status filter includes disabled records. It has not been deleted.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Device absent	Check filters and refresh. Missing hardware and a missing configuration row are different conditions.

Related instructions: [1.7 NEW DEVICE](#), [SAVE DEVICE](#), [DISABLE](#), [DELETE PERMANENTLY](#) and [CLEAR](#); [1.6.1 TEST CONNECTION](#) and [response interpretation](#).

1.2 Basic Information

Enter instrument identity before configuring its connection.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Basic Information contains Device Name, Device Category, Brand, Model and Description. Brand and Model are editable text, not catalog selectors. Category can set communication/protocol defaults and display family-specific controls. Recheck those choices after changing category.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Device Name	Unique stable name, for example DMM_MAIN.
Device Category	Actual equipment family; selection may change transport defaults.
Brand / Model	Real label information or verified values supplied by hardware discovery.
Description	Fixture purpose/location; exclude secrets.

Procedure

1. Enter name and category first.
2. Confirm brand/model and purpose.
3. Complete Communication, test and save.

Related instructions: [1.2.1 Device name, category, brand, model and description](#); [1.2.2 Supported device catalogue and editable Brand / Model fields](#); [1.3 Communication](#).

1.2.1 Device name, category, brand, model and description

Create a device record another technician can identify reliably.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Names are used in sequence and maintenance selectors. Distinct names distinguish two instruments with the same brand/model. Category selection does not establish physical identity; verify the endpoint separately.

Procedure

1. Press NEW DEVICE and enter a unique Device Name.
2. Select category and recheck automatic Communication Type/Protocol choices.
3. Enter Brand/Model from the equipment label and the fixture purpose in Description.
4. Complete connection setup, save, and reselect the row to verify persistence.

Worked example

Illustrative: Device Name DMM_MAIN; category Multimeter; Description Main fixture voltage measurement. Use the actual brand/model and endpoint; this example does not prescribe hardware or a COM number.

Expected result

The saved record clearly identifies one intended instrument.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong fields appear	Recheck category and communication type.
Duplicate name rejected	Select the existing row to edit it, or use a distinct name for new equipment.

Related instructions: [1.7 NEW DEVICE](#), [SAVE DEVICE](#), [DISABLE](#), [DELETE PERMANENTLY](#) and [CLEAR](#).

1.2.2 Supported device catalogue and editable Brand / Model fields

Understand editable Brand/Model values and the supported-device catalog.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

This Device Configuration form uses editable Brand and Model text boxes. It has no Brand/Model catalog dropdown and no DEVICES.XML import/management action. Category selection and adapter discovery can supply values, particularly for DAQ/camera equipment; verify them before saving.

Entering a brand/model name does not install a driver or add a communication implementation. Configure a supported transport/protocol and verify the actual hardware response.

Procedure

1. Read the physical equipment label and choose a supported category/protocol.
2. Keep accurate discovered values or type the label information.
3. Verify a supported read in Maintenance before sequence use.

Expected result

Brand/Model describes the equipment without implying automatic driver installation.

Related instructions: [1.2.1 Device name, category, brand, model and description](#); [1.4 Device-Specific Connection](#).

1.3 Communication

Select how the PC reaches the instrument and interprets commands.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Communication Type identifies the transport; Protocol identifies the driver/command family. A correct COM port with the wrong protocol is not a valid setup. Fields appear for the selected branch.

Timeout limits communication waiting. Retry Count is a preference; individual operations may apply stricter safety rules. Neither setting supplies the settling delay needed after switching power or a relay.

Related instructions: [1.3.1 Communication type and protocol](#); [1.3.2 COM port, baud rate, timeout and retry count](#); [1.4 Device-Specific Connection](#).

1.3.1 Communication type and protocol

Choose a compatible transport/protocol pair.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
COM / Serial or RS485	Serial endpoint and framing. RS485 is a physical bus; choose Modbus RTU only if the slave implements it.
LAN / TCP	IP Address and TCP Port plus supported protocol/framing.
USB or GPIB	Supported driver/VISA resource; USB does not automatically mean a COM port.
CAN / CAN FD / LIN	Discovered channel, hardware identity and bus rates; respective entitlements apply.
NI-DAQmx	Runtime discovery, physical binding and channel capabilities.
Camera SDK	Supported source; thermal camera uses the LAN branch.
Printer / Custom	Configured printer profile or supported custom transport; does not create an unknown SDK driver.

Procedure

1. Select Communication Type and Protocol.
2. Fill the displayed endpoint/framing fields.
3. Refresh appropriate hardware, select the physical unit and test.
4. Save and verify a protocol-level read in Maintenance.

Worked example

A USB-RS485 adapter serving Modbus slaves is configured as RS485 with Modbus RTU, not generic USB simply because the PC connector is USB.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Endpoint opens but commands fail	Confirm the actual instrument protocol. RS485 wiring does not guarantee Modbus support.

Related instructions: [1.4.3 RS485 / Modbus configuration](#); [1.4.8 Advantech and NI-DAQmx hardware](#).

1.3.2 COM port, baud rate, timeout and retry count

Set serial speed, timeout and retry policy separately from test-step settling.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
COM Port (select or type)	Prefer a detected current port; a typed port still needs correct identity/manual-lock handling.
Baud Rate	Match the device exactly. Listed bus/serial rates are not supported by every instrument.
Timeout ms	Form default 3000; allow the documented response time and verify.
Retry Count	Form default 1. It does not guarantee repeated state-changing or programming operations.
Serial Open Delay ms	Default 0; wait after port open for hardware initialization, distinct from step delay.

Procedure

1. Obtain serial format and response time from the instrument specification.
2. Set baud, timeout and reviewed retry policy.
3. Send one safe read and inspect timing/framing.
4. Configure an explicit sequence settling delay when required after a hardware change.

Worked example

Illustrative: a read normally takes 150 ms, so a reviewed 1000 ms timeout permits its reply. A DUT needing 500 ms to stabilize after power-on still needs an explicit wait before that read.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Intermittent timeout	Inspect framing, response timing and port contention before increasing retries.
Repeated state changes	Stop cyclic/repeated sends and review the operation before another action.

Related instructions: [3.1.6 Cyclic transmission, response validation and troubleshooting](#).

1.4 Device-Specific Connection

Follow the setup guide for the actual adapter family.

Access and preparation

Device Configuration View permission; Add for new records, Edit for changes, Run for connection tests and Delete for disable/delete.

Success evidence differs by family. Serial detection proves Windows exposes an adapter. A TCP connection proves an endpoint accepts a socket. A VISA identity reply proves more about the addressed instrument. NI checks identity/capabilities without driving outputs. Follow detection with an appropriate controlled read.

Related instructions: [1.4.1 COM / Serial: detected device, data bits, stop bits and parity](#); [1.4.3 RS485 / Modbus configuration](#); [1.4.5 USB, GPIB and VISA resources](#); [1.4.6 CAN / CAN FD: channel, hardware ID and bitrates](#); [1.4.7 LIN: channel, mode and checksum](#); [1.4.8 Advantech and NI-DAQmx hardware](#); [1.4.9 Camera SDK, camera source and thermal connection](#); [1.6.1 TEST CONNECTION and response interpretation](#).

1.4.1 COM / Serial: detected device, data bits, stop bits and parity

Configure a physical serial instrument with explicit format and USB identity.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Detected COM Device / REFRESH COM PORTS	Enumerate Windows adapters; selecting one captures identity fields.
Data Bits / Stop Bits / Parity	Initial values 8, 1 and None; replace them when the instrument specifies another format.
DTR Enable / RTS Enable	Serial control-line states; enable only as required by equipment.
Serial Open Delay ms	Allows hardware that initializes on port-open to become ready.
TX Termination / RX Frame Mode	Command ending and response boundary.

Procedure

1. Connect/power equipment and press REFRESH COM PORTS.
2. Select the correct Detected COM Device and verify identity. For manual COM entry, confirm the current Windows assignment.
3. Set baud, data bits, parity, stop bits, control lines and open delay.
4. Test connection and save. Open Maintenance and send a documented read query.
5. Verify raw TX/RX and returned value before sequence use.

Worked example

Illustrative SCPI-capable meter: use the documented format and LF only if specified, then send *IDN?. The vendor/model reply is stronger evidence than a COM-detected message.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Port detected but no reply	Check serial format, DTR/RTS requirements, terminator, cable and port ownership.

Related instructions: [1.5.2 Automatic COM detection and matching behaviour](#); [1.4.2 TX termination, RX framing, HEX, checksum and CRC](#).

Screen reference

Figure 1.4.1 - Serial connection detail form. Reference capture: 07 October 2026.

1.4.2 TX termination, RX framing, HEX, checksum and CRC

Preserve binary bytes and define exact response-frame boundaries.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
TX Termination	None, LF, CR, CRLF or Custom HEX; use TX Custom HEX only in custom mode. Binary frames usually require no extra terminator unless specified.
Terminator framing	Use RX Terminator or RX Custom HEX. None falls back to idle timing.
Fixed Length framing	RX Fixed Length is the complete response size, including returned header/check bytes.
Idle Time framing	RX Idle Timeout ms ends a frame after inactivity; too short can split slow replies.
STX/ETX framing	RX Start HEX and RX End HEX delimit the frame; initial markers 02 and 03.
Checksum / CRC	None, XOR8, Sum8 or CRC16 Modbus; select the specified algorithm only.

Procedure

1. Select serial/RS485 and Custom Binary (HEX) protocol.
2. Set framing and checksum from the device specification.
3. For manual binary commands use HEX: followed by byte pairs, such as HEX: AA 01 02. Sequence Serial Send HEX / Serial Query HEX actions provide their own command template.
4. For adjacent bytes choose a suitable sequence decoder, for example RAW UInt16BE@0 or RAW UInt16LE@0.
5. For separate responses, capture HEXRAW@offset:1 into B1 and B2, then use a Formula step HEXBE(B1,B2) or HEXLE(B1,B2).
6. Verify raw bytes before applying Factor, Offset and Min/Max limits.

Worked example

Illustrative payload 01 02 means unsigned 258 in big-endian or 513 in little-endian. Factor 0.1 and offset 0 produce 25.8 from the first interpretation. Preserve leading zero bytes such as 05.

Expected result

TX/RX remain byte-exact and the result uses the intended offset, signedness and byte order.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Response truncated	Check complete length, terminator and idle timeout.
Wrong value from valid bytes	Check zero-based offset, byte count, endian, type and scaling.

Related instructions: [3.1.5 BYTE LAB](#); [3.1.5.1 Capture B1/B2, combine bytes, decode and compare](#).

1.4.3 RS485 / Modbus configuration

Address Modbus slaves, inputs, outputs and registers correctly.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Use RS485 with Modbus RTU for a serial bus, or supported Modbus TCP for a network endpoint. Every slave on one bus requires a unique address. S1 selects slave/unit 1; it does not change a module address.

Relay shorthand uses R1-R32, mapping R1 to coil 0. DI/DO shorthand uses one-based channels; without a valid mapping override DI1/DO1 target address 0. A timeout or exception is a failed command, not a valid zero.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RTU / TCP connection	Match serial format/USB identity or the network endpoint and unit ID. Confirm wiring and device power.
S1 DI1?	Read input 1, function 02. DI cannot be written.
S1 DO1 1 / S1 DO1 0 / S1 DO1?	Write ON/OFF via function 05 or read reported coil state via function 01 where supported.
S1 R1 ON / S2 R4 OFF	Relay shorthand explicitly selects slave and relay. Ranges/lists are supported for compatible relay modules.
Generic register actions	READ_DISCRETE 10001, READ_INPUT 30001 and READ_HOLDING 40001 normalize to wire address 0 in their respective spaces.

Procedure

1. Save the physical device with correct transport, protocol and slave/address map.
2. Start with a supported input read such as S1 DI1?. Use only channels present on the actual module.
3. For generic sequence actions select the device/action, then set ChannelNo to the documented address. A single register write accepts 0-65535; multiple values are comma-separated.
4. For a wait action review WAIT_DISCRETE with VALUE=1/0 and step Timeout.
5. Perform output checks only with the fixture prepared; confirm real feedback independently.

6. SAVE SEQ and include approved cleanup for completion, failure and stop.

Worked example

Illustrative shared bus: slaves 1, 2 and 3 share one PC adapter. S2 R4 OFF addresses relay 4 on slave 2. S3 R1,R2,R3 ON sets a list; S2 R1-R16 OFF sets a range; S1 ALL OFF requests all 32 relays OFF on compatible hardware. Confirm connected loads before using any output command.

Expected result

Reads return a value; writes require device acknowledgement. A reported coil state does not independently prove load movement.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Several boards act together	Check duplicate slave IDs.
Illegal address or exception	Verify function support and mapping. Engineering DI/DO overrides need correct type/address and scale 1, offset 0; invalid overrides fail instead of silently falling back.
Virtual device rejected	Physical Modbus DI/DO shorthand is not simulated by virtual devices.

Related instructions: [3.1.2 SMART ACTIONS](#); [3.3.1 Selecting a sequence step and running a trial](#).

1.4.4 LAN / TCP: IP address and port

Configure a TCP instrument and distinguish socket reachability from valid replies.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IP Address / TCP Port	Use the actual instrument service endpoint, not a web address.
Protocol / framing	Match the supported command protocol and TX/RX boundary rules.
Timeout ms	Allow the documented response; this does not fix unreachable hardware.

Procedure

1. Choose LAN / TCP and supported protocol.
2. Enter address/port and framing.
3. Press TEST CONNECTION. Supported TCP checks open the endpoint without sending an identification command.
4. Save and send one documented read in Maintenance.
5. Confirm the reply comes from the intended instrument.

Worked example

Illustrative SCPI socket: after reaching the instrument's configured port, use *IDN? only if it supports SCPI. TCP-connected alone does not certify command syntax.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Refused/timed out	Check power, cable, address/subnet, service port and firewall policy.
Connected but invalid reply	Check protocol, command and response framing.

Related instructions: [1.6.1 TEST CONNECTION](#) and [response interpretation](#).

1.4.5 USB, GPIB and VISA resources

Select a VISA resource or GPIB address and verify identity.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

USB instruments may expose VISA resources rather than COM ports. Install the appropriate runtime and confirm the instrument in its diagnostic utility. A resource string identifies a connection, not an arbitrary display name.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SCAN GPIB DEVICES	Refresh available resources and scan status.
Detected GPIB Device	Select the discovered instrument/resource.
GPIB Address	Instrument bus address; use the actual configured value.
VISA Resource Name	Exact resource reported by the runtime.

Procedure

1. Select correct USB/GPIB transport and supported VISA/SCPI protocol.
2. Scan where applicable and choose the intended resource.
3. Compare address/resource with the vendor utility.
4. TEST CONNECTION sends *IDN? for VISA; inspect the identity response.
5. Save and verify a useful safe measurement read.

Worked example

Illustrative resource syntax GPIB0::5::INSTR applies only to an instrument at address 5 on interface 0. Prefer the discovered string.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No resources	Check runtime, power and bus connection.
Identity query fails	Confirm resource, timeout and support for *IDN?.

Related instructions: [1.6.1 TEST CONNECTION](#) and [response interpretation](#).

1.4.6 CAN / CAN FD: channel, hardware ID and bitrates (License Required)

LICENSE REQUIRED

CAN license for CAN device communication and test sequences. CAN Calibration and Full packages also provide CAN access. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Bind the CAN channel and match bus timing.

Access and preparation

Device Configuration permissions; CAN entitlement for connection/execution.

CAN connection checks require the CAN entitlement. Discovery does not prove the DUT transmits at the configured bitrate. Verify known traffic afterwards in CAN Analyzer / UDS.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH CAN DEVICES / CAN Device / Channel	Discover/select the physical channel.
CAN Hardware ID	Read-only selected hardware identity.
Baud Rate	Nominal/arbitration rate.
CAN FD Data Bitrate	FD data-phase rate; hardware and DUT must support it.
CAN FD Bitrate Switch	Use only for the specified FD bus setup.

Procedure

1. Select CAN or CAN FD to match the DUT and adapter.
2. Refresh/select the channel and verify hardware identity.
3. Set nominal rate and, for FD, data rate and bitrate switching.
4. Test, save and confirm known receive traffic.

Worked example

Illustrative classical CAN nominal 500000 bit/s, or FD nominal 500000/data 2000000. These values are examples, not universal defaults.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
License warning	Arrange CAN entitlement; discovery does not unlock execution.
Adapter detected, no frames	Check DUT power, channel, rate, wiring and termination.
FD rejected	Check FD-capable adapter and supported timing.

Related instructions: [9 CAN Analyzer / UDS](#).

1.4.7 LIN: channel, mode and checksum (License Required)

LICENSE REQUIRED

LIN license for LIN communication, sequences and cyclic groups. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Configure LIN channel, network role and checksum.

Access and preparation

Device Configuration permissions; LIN entitlement for connection/execution.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH LIN DEVICES / channel	Discover and choose the connected adapter.
LIN Hardware ID	Verify selected identity.
Baud Rate	Match network specification.
LIN Mode	Master or Slave according to station role.
LIN Checksum	Enhanced, Classic or Auto as required by the frame/network.

Procedure

1. Choose LIN and the supported adapter/protocol.
2. Refresh and select channel; verify identity.
3. Set rate, mode and checksum from the network definition.
4. Test and save. Execute one reviewed LIN action to validate communication.

Worked example

Illustrative master setup uses the network-defined baud/checksum and a documented frame action. A slave need not transmit simply because its adapter is discovered.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Channel missing	Check adapter runtime/driver and refresh status.
No reply	Check master scheduling, frame ID, checksum, bus supply and wiring.

Related instructions: [3.1.2 SMART ACTIONS](#).

1.4.8 Advantech and NI-DAQmx hardware

Discover DAQ hardware through its own supported runtime.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Advantech uses DAQNav; NI uses NI-DAQmx. These are distinct drivers and lists. Confirm hardware in the vendor utility before application setup. Connection checks inspect availability and do not energize outputs or verify wiring.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH ADVANTECH HARDWARE	Scan DAQNav and select board identity.
REFRESH NI HARDWARE	Inspect NI API/runtime, identity, simulation state and capabilities.
BIND SELECTED NI HARDWARE	Capture a deliberate NI binding, then save.
COPY CHANNEL	Copy a discovered physical NI channel for a reviewed command.

Procedure

1. Select the correct DAQ family/protocol.
2. Refresh its list and verify model/identity.
3. For NI complete deliberate binding below; for Advantech select the discovered board.
4. Test and save, then validate a read-only input against a known signal.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Runtime unavailable	Install/repair the matching vendor runtime/API. USB presence alone is insufficient.
Replacement board selected	Recheck identity and channel map before execution.

Related instructions: [1.4.8.2 NI-DAQmx discovery, deliberate binding and replacement recovery](#); [1.4.8.1 NI single-sample I/O and supported channel/command limits](#).

1.4.8.1 NI single-sample I/O and supported channel/command limits

Execute supported NI single-sample I/O with actual discovered channels.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Streaming, synchronization, port-wide writes and DO readback are unsupported. Use a separate wired DI feedback input to prove an output state. An optional NI_ prefix is accepted. Each command uses explicit argument names and supported physical channels.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
AI_READ	CH=channel, MIN/MAX range. TERMINAL accepts RSE, NRSE, DIFFERENTIAL, PSEUDODIFFERENTIAL or DEFAULT; analog input only.
AO_WRITE	VALUE is required and must fall within MIN/MAX; confirm hardware range/load.
DI_READ / DO_WRITE	Read one input line; write one output with VALUE 0/1, OFF/ON or FALSE/TRUE.
DO_ON / DO_OFF / DO_PULSE	Single-line operations. Pulse DURATION defaults 500 ms, range 10-60000 ms.
COUNTER_READ / CHECK_CONNECTION	Available counter input or hardware check.
TIMEOUT	1-600000 ms; uses configured positive timeout or 3000 ms otherwise.

Procedure

1. Bind physical hardware and copy a compatible channel.
2. Start with a read using correct range and terminal wiring.
3. Compare its value against a known signal.
4. For outputs establish OFF/safe cleanup and feedback first, then perform one controlled action and verify cleanup.

Worked example

Illustrative syntax: AI_READ CH=Dev1/ai0 MIN=-10 MAX=10 TERMINAL=RSE; DI_READ CH=Dev1/port0/line0. Replace paths and ranges with the discovered hardware values.

Expected result

One value or acknowledgement is returned. Unsupported commands/arguments and DO_READ fail explicitly.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unsupported operation	Use listed single-sample commands.
Unexpected analog value	Check reference wiring, terminal mode, range and scaling.
Acknowledged output	Verify real feedback; an acknowledgement is not output readback.

Related instructions: [3.1 COMMUNICATION STUDIO](#); [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#).

1.4.8.2 NI-DAQmx discovery, deliberate binding and replacement recovery

Bind NI physical hardware and recover deliberately from replacement or alias changes.

Access and preparation

Device Configuration View, Add/Edit and Run permissions as applicable.

Discovery reports alias, model, serial, bus and simulation status. A saved alias remains visible when its expected serial/model is missing; another board sharing that alias is not silently accepted. Simulated hardware or unknown simulation status blocks hardware commands. Without a unique serial, only alias/model binding is available and must be checked in NI MAX.

Procedure

1. Confirm NI-DAQmx runtime/.NET API and the physical board in NI MAX.
2. Select NI-DAQmx and REFRESH NI HARDWARE.
3. Inspect detected model, serial, bus, physical status and channel counts.
4. Press BIND SELECTED NI HARDWARE, then SAVE DEVICE. Selection alone does not complete saved rebinding.
5. TEST CONNECTION; select a channel and COPY CHANNEL for a later input read.
6. For replacement, verify new hardware and wiring, bind deliberately, save and revalidate channels.

Worked example

Illustrative: the same board moves from Dev1 to Dev2; its serial/model can identify it. A different board renamed Dev1 still requires deliberate replacement review.

Expected result

Saved identity agrees with physical discovery; available channels are visible. The check does not drive outputs.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Saved binding not detected	Check runtime, power/cable and actual serial/model, then refresh.
SIMULATED/unknown simulation state	Hardware commands remain blocked until verified physical hardware is used.
COPY CHANNEL disabled	Resolve capability discovery before writing commands.

Related instructions: [1.4.8.1 NI single-sample I/O and supported channel/command limits](#).

1.4.9 Camera SDK, camera source and thermal connection

Configure visible-light and thermal acquisition separately.

Access and preparation

Device Configuration View/Run and Add/Edit as applicable. Thermal connection capture explicitly requires both Vision and IR Camera entitlements; a standard camera connection check does not itself prove access to licensed Vision inspection.

A standard camera uses Camera SDK and Camera Source. Thermal acquisition uses LAN / TCP with its supported thermal protocol and endpoint. Successful acquisition does not establish optical or temperature acceptance limits.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Camera Source	Source/index accepted by the camera path; initial 0 is the default indexed source, not a unique camera identity.
IP Address / TCP Port	Actual thermal acquisition endpoint.
Timeout ms	Maximum acquisition/transfer wait.

Procedure

1. For a standard camera select category/SDK and correct source; resolve ambiguity if several are connected.
2. Test and confirm the view belongs to the intended fixture camera.
3. For thermal hardware select its protocol/LAN endpoint and test.
4. Inspect returned frame identity/dimensions, save, then configure Vision checks separately.

Worked example

Illustrative: during a controlled setup check, briefly obscure the intended camera and confirm its image changes; restore the scene before capturing references. A thermal frame transfer is not calibration evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong view	Recheck source/index after reconnecting several cameras.
Thermal capture failure	Check endpoint, service, timeout and both required entitlements.

Related instructions: [4.1 Test Sequence](#).

1.4.9.1 Thermal TEST CONNECTION and frame verification (License Required)

LICENSE REQUIRED

IR Camera access is required for thermal inspection in addition to Vision access. The IR Camera package also supplies Vision access; a Vision-only package does not unlock thermal inspection. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Verify a thermal acquisition endpoint and returned frame before configuring thermal inspection.

Access and preparation

Device Configuration Run permission and both Vision and IR Camera access. The IR Camera package supplies Vision access.

This entitlement requirement applies to thermal TEST CONNECTION. Ordinary Camera SDK connection checking is a separate operation and is not locked by this thermal guard.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
LAN / TCP and thermal protocol	Choose the supported thermal transport for the actual instrument.
IP Address / TCP Port / Timeout ms	Use the thermal acquisition endpoint and an appropriate acquisition wait.

Procedure

1. Select the thermal device and verify its saved endpoint and protocol.
2. Use TEST CONNECTION under controlled setup conditions and inspect the returned frame identity and dimensions.
3. Save the configuration and configure the licensed Vision thermal inspection separately. A transferred frame does not establish temperature calibration or product acceptance.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Capture fails	Check both required entitlements, endpoint, acquisition service and timeout; preserve the displayed error.

Related instructions: [1.4.9 Camera SDK, camera source and thermal connection](#); [4.1.8.2.7 Thermal inspection and calibration](#).

1.4.10 Printer and custom communication

Relate a selected printer device to Printer Master, or configure a supported custom transport.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Printer Master owns label language, media, template and printing settings. A maintenance printer device can resolve to that profile; a usable TCP/COM endpoint can also supply a maintenance connection. Port success does not verify label content.

For proprietary serial/TCP equipment, select its supported custom protocol and specify framing. Custom does not automatically install an unknown SDK driver.

Procedure

1. For labels, configure/test the profile in Printer.
2. Verify maintenance device/profile and actual endpoint.
3. For another custom device, send a safe documented read in Communication Studio and inspect raw RX.
4. Save the reviewed configuration before sequence use.

Worked example

A device named LABEL_PRINTER alone does not define TSPL/ZPL language or physical label dimensions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Printer not configured	Check enabled Printer Master profile and endpoint resolution.
Custom decode fails	Review raw bytes and framing before limits.

Related instructions: [8.2 Printers](#); [1.4.2 TX termination, RX framing, HEX, checksum and CRC](#).

1.5 USB Identity

Capture USB identity for reliable serial matching after COM-number changes.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

USB identity comes from the detected serial device. Keep it associated with the actual fixture adapter. VID/PID identifies a family and is not unique when identical converters are connected. Ambiguity is reported; duplicate identities can disable automatic matching.

Related instructions: [1.5.1 VID, PID, serial number and Windows hardware identifiers](#); [1.5.2 Automatic COM detection and matching behaviour](#).

1.5.1 VID, PID, serial number and Windows hardware identifiers

Interpret identity fields before moving or replacing an adapter.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
VID / PID	Vendor/product IDs commonly shared by all units of one converter family.
USB Serial Number	Prefer a genuine unique per-unit serial.
USB Instance ID / Hardware ID	Windows identities used by later matching stages.
USB Location Path	Attachment path; moving USB socket/hub may change it.
USB Container ID	Windows grouping identity associated with the device.
Friendly Name / Manufacturer	Readable discovery details; names can be shared.
Auto Detect By USB ID	Enables staged identity matching; disabled mode uses saved COM behavior.

Procedure

1. Refresh and select the exact adapter.
2. Compare identity/current port with the fixture record.
3. After moving/replacing hardware, refresh and reselect deliberately; do not copy another row's identity.
4. Save and inspect TEST CONNECTION's matching explanation.

Worked example

Two converters can share VID/PID. Distinct genuine serials distinguish them; identical/absent serials require careful instance/location verification.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
COM number changed	Check identity matching before editing only the port.

Related instructions: [1.5.2 Automatic COM detection and matching behaviour](#).

1.5.2 Automatic COM detection and matching behaviour

Resolve serial matching failures using the reported match method.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Automatic matching attempts VID/PID plus serial, instance, location, container and hardware identity, then friendly name and unique VID/PID. A unique match is used. Remaining ambiguity blocks opening rather than choosing an arbitrary port. Saved COM fallback is reached only when identity matching has not produced ambiguity.

At save time duplicate USB identities can disable Auto Detect for affected records. The warning identifies them; they then use saved COM/Last Known COM. Review the warning rather than assuming auto detection stayed enabled.

Procedure

1. Connect the intended adapter; REFRESH COM PORTS.
2. Select it, verify identity and enable Auto Detect when a reliable match is available.
3. SAVE DEVICE and read duplicate warnings.

4. TEST CONNECTION; inspect current port and match method.
5. If ambiguous, identify/reselect the exact hardware to capture instance/location, or use uniquely serialized converters. In fixed COM mode verify every affected port.

Worked example

A unique-serial adapter moving from COM3 to COM7 can be found by serial. Two indistinguishable converters are not safe merely because COM3 still exists.

Expected result

The result identifies a current port and match method, or gives an explicit missing/ambiguous error.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Auto Detect disabled after save	Review duplicates and manually verify affected fixed ports.
Ambiguous match	Strengthen identity or reselect known hardware; ambiguity is not an ordinary timeout.

Related instructions: [1.5.1 VID, PID, serial number and Windows hardware identifiers](#).

1.6 Test Area

Use the connection check as the first verification stage.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Last connection result describes the most recent check. Read it before changing settings: it can distinguish missing hardware, missing runtime, license restriction, endpoint failure and invalid response. The meaning of success is transport-specific.

Procedure

1. Confirm intended device/form.
2. TEST CONNECTION and read the full message.
3. Resolve its cause, then repeat the check.
4. Save and verify a known protocol read in Maintenance.

Related instructions: [1.6.1 TEST CONNECTION and response interpretation](#); [1.9 Worked device configurations and connection troubleshooting](#).

1.6.1 TEST CONNECTION and response interpretation

Interpret connection success at the level actually tested.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Serial	Matches a Windows COM adapter; does not prove an instrument response.
TCP	Opens the endpoint without a command; proves reachability.
VISA	Sends *IDN? and shows identity.
NI / Advantech / CAN / LIN	Corresponding runtime/adaptor checks. NI does not drive outputs or verify wiring.
Camera / thermal	Attempts acquisition; thermal success includes frame identity/dimensions and transfer verification.
Virtual	Requires RUNNING simulation and reports a virtual response.
Basic configuration check	Not a measurement or load test.

Procedure

1. Read the method indicated in the result.
2. Follow detection/socket checks with a supported safe read.
3. Compare identity/value with the physical instrument and retain first-error evidence if it fails.

Worked example

COM device detected followed by *IDN? timeout means the adapter exists but the query was not verified; inspect instrument format/framing.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Green check, failed step	Compare what was tested with the step's command/parser/timing.
Feature warning	Resolve entitlement; changing hardware settings does not remove a license requirement.

Related instructions: [3.1.3 TX CONSOLE](#); [1.4 Device-Specific Connection](#).

1.7 NEW DEVICE, SAVE DEVICE, DISABLE, DELETE PERMANENTLY and CLEAR

Create, change, disable or permanently remove a selected saved device.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW DEVICE	Starts an add-new form.
SAVE DEVICE	Persists after validation and required reason handling.
Enabled	Runtime availability; retained records can be re-enabled through an authorized saved edit.
DISABLE	Retains configuration for later reactivation.
DELETE PERMANENTLY	Irreversible selected-record workflow; dependency validation may block it.
CLEAR	Resets the editor, not the saved database record.

Procedure

1. Select the existing row or use NEW DEVICE.
2. Make a reviewed change and test when relevant.
3. SAVE DEVICE, complete any change-reason prompt, and reselect to verify.
4. Use DISABLE when equipment may return; confirm retained disabled status.
5. Use permanent deletion only after reviewing dependencies and confirmations.

Worked example

Useful reason: "Replaced failed adapter; verified new serial and channel read." A vague "test" does not explain the physical change.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Change not retained	Check correct selected row and completed validation/reason prompts.
Delete refused	Review linked settings; disable if references/history must remain.

Related instructions: [1.8 HISTORY, activity records and change reasons](#).

1.8 HISTORY, activity records and change reasons

Review device changes and correlate them with operational evidence.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

HISTORY shows setting-change evidence for the selected device. Refreshing ports or checking a connection is activity; saving an endpoint or disabling a device is a configuration change. A meaningful reason explains why the change was needed and what verification followed.

Procedure

1. Select the saved device and open HISTORY.
2. Locate time/action and compare old/new values.
3. Correlate the change with the subsequent connection/read result in logs.
4. Correct an erroneous value through the normal editor so a new record remains.

Worked example

A baud change 9600 to 19200 should follow the real instrument setting and a verified read; a successful refresh does not validate it.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Connection test absent from change history	Inspect activity/debug/test logs; testing alone is not a setting edit.

Related instructions: 13 Application Log; 1.7 NEW DEVICE, SAVE DEVICE, DISABLE, DELETE PERMANENTLY and CLEAR.

1.9 Worked device configurations and connection troubleshooting

Commission an instrument from identity through a useful verified read.

Access and preparation

Device Configuration View and the relevant Add/Edit/Run/Delete action permission.

Procedure

1. NEW DEVICE; enter stable name, category, actual brand/model and purpose.
2. Set transport/protocol; capture serial identity, bind NI hardware or enter a documented network endpoint.
3. TEST CONNECTION and interpret its specific method.
4. SAVE DEVICE and reopen it to verify persisted values.
5. In Maintenance select that saved device and send a supported read; compare raw/decoded response to the known reference.
6. Link the device into a reviewed sequence and trial its relevant step.

Worked example

Illustrative commissioning record: DMM_MAIN matches its adapter identity, the supported identity reply matches the meter label, and a known voltage read agrees with the approved reference/tolerance. Record actual results.

Expected result

Saved configuration, physical identity, command response and sequence selection agree.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Missing device	Check power, runtime/driver and identity.
Readable reply but failed judgement	Check units, parser, scale and limits.
Manual read works, sequence fails	Compare selected device, generated command, timeout, delay and validation.

Related instructions: 1.4.2 TX termination, RX framing, HEX, checksum and CRC; 1.4.3 RS485 / Modbus configuration; 1.4.8.2 NI-DAQmx discovery, deliberate binding and replacement recovery; 3.3.1 Selecting a sequence step and running a trial.

2 Testing

Testing runs the selected saved Test Plan against the current unit. A plan connects models, DUT positions and flows. Start only after the station has accepted the required barcodes and all readiness conditions.

Access and preparation

Assigned Testing page permission; the saved plan, connected devices and fixture must be released for production.

Procedure

1. Select Test Plan and the DUT position you intend to load. Check that its displayed model matches the physical unit.
2. Load the fixture according to the machine work instruction. Scan the current unit through SCAN PANEL or its configured barcode slots.
3. Resolve every barcode, device, Golden Sample, report, print, NG-bin and external-reset hold before starting.
4. Use START TEST when the station is configured for a manual start, or wait for the configured external start condition.
5. Watch the current step and final status. After completion, verify result delivery and fixture readiness before removing/loading the next unit.

Expected result

The selected DUT has its own result, barcode association and timing evidence. A completed OK result does not by itself prove that every external report copy was delivered.

Related instructions: [2.1 Screen overview, plan selection and DUT selection](#); [2.2 Barcode Scanning](#); [2.8 START TEST, STOP, RESET and final OK/NG](#); [2.9 Failed steps, stopped runs, cleanup and next-unit readiness](#).

Screen reference

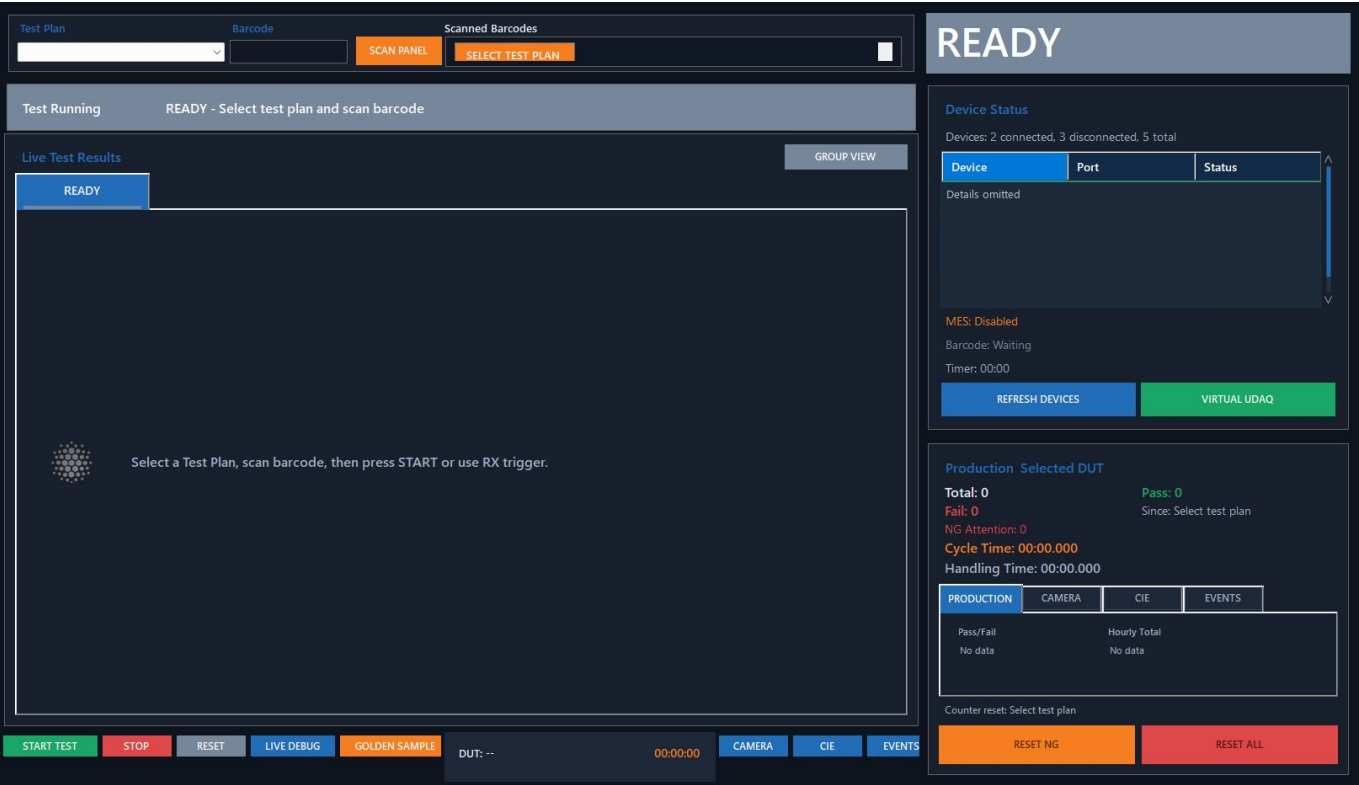


Figure 2 - Testing: ready state and production panels. Reference capture: 07 October 2026.

2.1 Screen overview, plan selection and DUT selection

A Test Plan connects models, DUT positions and saved flows. Select the plan before scanning. On a multi-DUT plan, select the intended DUT tab to inspect its results. A READY screen with no plan is not ready to run a particular product; the plan and barcode requirements must first be satisfied.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test Plan	Select the saved plan, not an unrelated model name. Its configured model/DUT/flow assignments govern the run.
DUT selection	Changes the displayed result workspace. It does not retarget ordinary barcode capture; follow the requested SCAN slot. The rolling-lane scan window identifies its own idle-lane target.
Readiness/status area	Read the complete blocking message. A previous green result can remain visible while the next start is held.

Worked example

Illustrative two-position plan: selecting the DUT 2 result tab displays DUT 2 evidence. Ordinary manual capture still requests the first uncaptured manual barcode slot in the plan. Load and scan according to that prompt, not the selected result tab.

Related instructions: [7 Test Plan](#); [2.3.3 Parallel DUT execution and selected DUT results](#).

2.2 Barcode Scanning

Use the barcode workflow selected by the plan. Panel scanning and separate slot scanning are different entry paths; a scan is accepted only after the configured slot validation succeeds. Clearing a pending scan does not delete a completed historical test.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.2.1 Panel scan, required barcodes and validation](#); [2.2.2 Next DUT Barcode Pre-Scan](#); [5.3 BARCODE RULES](#); [5.5 INTERLOCKING](#).

2.2.1 Panel scan, required barcodes and validation

Open SCAN PANEL and follow the displayed barcode slot order. ACCEPT SCAN validates the current value against the model rule. Complete every required slot before START TEST. CLEAR SCAN removes the pending scan values, so check which DUT they belong to before clearing. A rejected scan must be corrected rather than bypassed.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SCAN PANEL	Opens the panel/combination capture path where the configured plan supports it.
Barcode slot / ACCEPT SCAN	Identifies the barcode currently requested. The shown length and slot rules apply to that slot.
CLEAR SCAN / CLOSE	Clear an incorrect pending set and capture again, or leave the scan window. Neither action makes a rejected scan valid.

Procedure

1. Confirm model, DUT and the requested barcode slot. Scan the barcode with the configured scanner terminator.
2. Check the displayed value and acceptance result. Continue through every required manual slot; automatic capture slots follow their configured device rule.
3. For rejection, read whether the cause is length/format, a duplicate, an interlock file or MES. Correct the cause and rescan the complete required set when instructed.
4. Proceed to the normal start condition only when the station accepts the set.

Worked example

If a slot requires 10 characters, DEMO000001 is a ten-character illustrative value. It can still fail duplicate or interlock checks; correct length alone is insufficient.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Scan lands in the wrong place	Select the active scan field/slot. Confirm scanner terminator and manual versus serial-trigger capture configuration.
Valid-length scan rejected	Read the rejection text and check the matching model barcode rule. Do not disable the rule to force acceptance.

2.2.2 Next DUT Barcode Pre-Scan

When enabled in Test Plan, Next DUT Barcode Pre-Scan lets the next unit's barcodes be prepared while the current unit is running. Pending scans remain separate from the active unit. Follow the configured NG handling policy: a current failure may clear the pending barcodes. Confirm the next unit before starting it.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

While unit A is running, capture unit B in the separate pre-scan window. READY FOR VALIDATION means only that B has a complete pending set. B still waits for A to finish recovery and for final validation and a fresh start condition.

PROCEDURE / Use Next DUT Barcode Pre-Scan

Scan the next DUT's required manual barcodes while the current DUT test continues, then validate and transfer the complete set after the current run and recovery finish.

Access and preparation

OPERATOR or higher. An authorized setup user must enable Enable Next DUT Barcode Pre-Scan in Test Plan, set Pre-scan delay (seconds) from 0 to 600, choose Clear pending barcodes on current DUT NG, and click SAVE PLAN. The plan must require barcodes and contain manual barcode slots. Pre-scan is inactive for golden-sample runs, Rolling Lane Scan, and serial-trigger-only plans.

Steps

1. Select the configured plan, scan the current DUT and start its normal test.
2. After the configured delay, use the Next DUT Barcode Pre-Scan window. It shows how many required slots are scanned. Scan the next DUT's manual barcodes in the configured slot order; use the scanner's Enter terminator or wait for supported stable-input submission.
3. Read each validation message. Local format/length and enabled interlock checks occur while scanning. Use CLEAR / RESCAN to discard the pending set and scan it again.
4. READY FOR VALIDATION means the set is complete, not accepted by MES or ready to start immediately. Keep the next DUT separate until the current test, reports, result actions and recovery have finished.
5. If the current DUT is NG, complete required recovery, then use ACKNOWLEDGE NG / USE NEXT DUT. With clear-on-NG enabled, scan the complete next set again; otherwise review the retained set.
6. The app transfers the set through normal barcode capture and final duplicate/interlock/MES checks. If transfer fails or is interrupted, scan the complete combination again.
7. After acceptance, follow the configured normal START condition. Pre-scan does not bypass that condition; an earlier external start trigger must not be reused.

Expected result

Current-run barcodes stay separate from pending next-run barcodes. Only a complete accepted set is promoted, and the next run waits for its configured start condition.

Avoid these errors

Do not read READY FOR VALIDATION as a final MES acceptance or automatic test start. Do not use next-DUT scans to replace the current DUT identity. STOP clears the pending pre-scan set; changing plan also discards it.

If it does not work

If the popup is absent, check Test Plan enable/delay, barcode requirement and slot type, golden-run status and Rolling Lane mode. If input or acknowledgement is disabled, finish the active test, NG-bin/print/RX reset or Handling Idle recovery. If acceptance fails, retain the error and scan every required slot again.

Related instructions: [7 Test Plan](#); [2.8.1 Manual start and external RX start states](#); [2.9.1 NG Bin hold and next-unit readiness](#); [2.9.2 REPORT PENDING and REPORT STORAGE ERROR recovery](#).

2.3 Live Test Results

STEP VIEW shows individual results; GROUP VIEW summarizes grouped execution and loop progress. Use the view that answers the question: which measurement failed, or whether the group reached its configured target.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.3.1 Step view, limits, actual values and result status](#); [2.3.2 GROUP VIEW](#).

2.3.1 Step view, limits, actual values and result status

No. is the sequence position; Step identifies the operation; Min/Max and Unit define its allowed range; Actual is the result; Status records judgement; Time shows execution duration. Action-only steps may show execution status without a measurement. A blank Actual in a limit-checked measurement needs investigation.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
MIN / MAX / UNIT	Saved acceptance limits and measurement unit. A missing numeric limit can be valid for a command or message step.
ACTUAL	The formatted evaluated value; it may differ from the complete raw device response.
STATUS / DETAIL	Distinguish waiting, running and terminal results. Read the detail for timeout, mismatch or validation failure.

Procedure

1. Select the affected DUT and STEP VIEW. Locate the named failed step.
2. Read limits, unit, actual value and detail together. Note the run time and barcode.
3. Use saved history to inspect the retained raw response. Escalate configuration or device causes with that evidence.

Worked example

Illustrative numeric step: MIN 4.900000 V, MAX 5.100000 V, ACTUAL 5.020000 V. Compare like units, then read the recorded verdict. A rounded display near a limit is not a reason to override the verdict.

Related instructions: [13.1.2 Six-decimal numeric values and raw communication](#); [10.3 Barcode Search](#).

2.3.2 GROUP VIEW

Operator GROUP VIEW displays execution of the released recipe. Engineering Run Group and Copy Group are configuration-workspace actions with separate permissions; changing the display does not run or copy a group.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.3.2.1 Loop progress, group attempts and temporary target editing](#); [4.1.2.6.1 Copy Group: complete children, linked settings and save](#); [4.1.2.6.4 Run Group: selection, prerequisites, trials and results](#).

2.3.2.1 Loop progress, group attempts and temporary target editing

GROUP VIEW displays loop progress and retry attempts. Group attempt 2/3 means the second of at most three attempts in the current cycle. Temporary loop-target editing is available only when Admin enables it and the test is idle after cleanup. It changes the permitted session target, not the saved engineering sequence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

For a target of three completed cycles, progress 2/3 followed by a stop part-way through cycle three remains two completed cycles. A temporary permitted target edit affects this operator session and does not rewrite the saved recipe.

PROCEDURE / View and edit cyclic group targets

View group duration or cycle progress and inspect the inner steps in single or parallel production testing.

Access and preparation

OPERATOR or higher. Select a plan with an enabled TEST phase GROUP configured for Duration or Cycle Count. Plans without cyclic groups retain the normal Operator result layout. Loop headers must have unique group names.

Steps

1. Click GROUP VIEW. Each cyclic group shows its configured target and progress.
2. Expand the group with the arrow to see child Step, Min, Actual, Max, Unit and Status. The current child is highlighted; child rows refresh for each cycle.
3. If Admin enabled target editing, click EDIT before START. Enter minutes and seconds for Duration, or a positive cycle count, within the displayed range. The loop mode remains set by Admin.
4. Click APPLY. The target applies to matching DUTs using that flow in this Operator session; the saved recipe stays unchanged and the edit is audited.
5. Start normally. Each DUT has independent elapsed time and cycle progress. Targets are locked through start preparation, execution and cleanup.
6. Duration loops finish their current child cycle when time expires. Cycle Count loops show fully completed cycles. A prior failed cycle remains a final group failure even if later cycles pass.

Expected result

The group remains RUNNING between cycles and becomes PASS, FAIL or STOPPED only when its loop finishes. Completed-cycle counters exclude a partially executed cycle. Previous-run progress is labelled while idle.

Avoid these errors

100% time progress can still mean finishing the current cycle; it is not a PASS result. An EDIT button is absent when Admin disables editing. Duplicate group headers need Admin correction before target editing.

If it does not work

Check TEST phase, enabled child steps, GROUP membership and loop mode if progress is absent. Use STEP VIEW for the existing full step list. For missing EDIT, ask Admin to review General > Test Execution permission and ranges.

Related instructions: [14.2.3 Operator group target dialog shortcuts](#); [4.1.2.6.2 Group header highlighting, summary and execution states](#).

2.3.3 Parallel DUT execution and selected DUT results

Parallel plans maintain separate DUT results. Select each DUT before interpreting a failure or counter. Shared hardware must be assigned and coordinated by the approved plan. One passing DUT does not imply that every DUT passed. Use the final plan status and individual DUT evidence together.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Select each DUT in turn and verify its barcode and current state before running a parallel plan.
2. Scan an idle lane only through the scan path allowed by that plan. Rolling-lane mode has its own admission rules.
3. During execution, select a lane to inspect its live steps; do not assume another lane has the same status.
4. After a lane completes, finish its required NG-bin, report, print and reset actions. A shared reset condition can delay another start even when a lane appears idle.

Worked example

DUT 1 may finish OK while DUT 2 remains RUNNING. Selecting DUT 1 shows its completed values; it does not stop DUT 2. Keep the two barcode sets with their physical positions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Idle lane will not start	Read the lane and shared readiness messages. Check reset, report, print and NG-bin holds before rescanning.

PROCEDURE / Configure parallel DUT testing

Run multiple DUTs with separate hardware lanes while supporting scan-all-first or rolling scan/start behavior.

Access and preparation

ADMIN. Confirm each DUT has a dedicated fixture/hardware allocation and clear barcode ownership. Do not share a serial/CAN/device resource across active lanes unless the sequence intentionally serializes access.

Steps

1. Define DUT count and fixture positions.
2. Map each DUT to its hardware lane.

3. Choose scan mode: scan all DUT barcodes first, or rolling scan/start lane by lane.
4. Confirm result/report grouping per DUT.
5. Validate DUT1 and DUT2 completion independently.
6. Confirm the next barcode prompt appears for the free lane only.

Expected result

The operator can keep lanes busy without mixing barcodes, reports, fixture positions, or device resources.

Avoid these errors

Do not let DUT2 scan overwrite DUT1 context. Do not start a lane if its hardware is still owned by another active lane.

If it does not work

If barcode prompt appears for the wrong DUT, check fixture position, lane state, barcode context, and per-lane report/session key.

Related instructions: [7.7 Parallel batch scanning and rolling lane scanning](#); [2.9.1 NG Bin hold and next-unit readiness](#); [2.9.2 REPORT PENDING and REPORT STORAGE ERROR recovery](#).

2.4 Device Status

Device Status is a communication snapshot. Connected means the software has a usable connection; it does not certify wiring, calibration or the physical state of a load.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.4.1 Connection indicators, REFRESH DEVICES and VIRTUAL UDAQ](#); [1 Device Configuration](#); [3.1 COMMUNICATION STUDIO](#).

2.4.1 Connection indicators, REFRESH DEVICES and VIRTUAL UDAQ

Connected and disconnected badges describe runtime connections. REFRESH DEVICES rechecks their state. VIRTUAL UDAQ opens the simulation tool where available; simulation is useful for training and flow preparation but does not certify physical wiring or electrical output. Resolve required-device failures before production.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH DEVICES	Refreshes connection information. Repeated refresh is not a substitute for correcting the saved port or hardware identity.
Connected / Disconnected	Compare the required device with its current state and port. Disabled or unconfigured hardware may be intentionally absent.
VIRTUAL UDAQ	Opens the simulated I/O view when available. Simulated values are training/engineering evidence, not physical production measurements.

Procedure

1. Identify the exact required device in the list.
2. Refresh once after an authorized connection correction and read its resulting state.
3. If it remains absent, ask an authorized user to inspect Device Configuration and Communication Studio without starting another test.

Related instructions: [1.5 USB Identity](#); [3.6 VIRTUAL UDAQ](#).

2.5 Production Selected DUT

The evidence panels follow the selected DUT, while production counters aggregate the distinct report models in the current plan. Switching PRODUCTION, CAMERA, CIE and EVENTS changes the evidence view, not the saved test recipe.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.5.1 PRODUCTION](#); [2.5.2 CAMERA](#); [2.5.3 CIE](#); [2.5.4 EVENTS](#).

2.5.1 PRODUCTION

PRODUCTION summarizes counters for the distinct report models in the current plan alongside production timing. Selecting a DUT result tab does not reduce the counter-reset scope to that lane.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Reconcile the current plan and reset period before comparing these counters with historical reports.

Related instructions: [2.5.1.1 Totals, PASS/FAIL counters, cycle time and handling time](#).

2.5.1.1 Totals, PASS/FAIL counters, cycle time and handling time

Total, Pass, Fail and NG Attention summarize the current plan report-model scope. Counter resets change that summary without deleting historical results or converting a failed attempt to PASS.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Total / Pass / Fail	Aggregated counters for all distinct report models in the current plan, not only the selected DUT tab.
NG Attention	Failure attention count in the same counter scope.
Cycle Time / Handling Time	Displayed production timing; check the unit and context before comparing with a history report.
RESET NG	ADMIN-only. Sets NG/FAIL to zero, preserves PASS and sets TOTAL to PASS for the plan report models.
RESET ALL	ADMIN-only. Restarts Total/Pass/Fail/NG Attention for the plan report models; requires an additional acknowledgement.
Reason	A meaningful 5-250 character reason is required for either reset.

Procedure

1. With production idle and readiness conditions satisfied, verify the selected plan and all report models affected.
2. Choose the intended reset using the authorized account. Enter its reason; for RESET ALL also complete the acknowledgement.
3. Review the updated counters and retained activity record. Historical test attempts remain available.

Worked example

With TOTAL 10, PASS 9 and FAIL 1, RESET NG results in TOTAL 9, PASS 9 and FAIL 0. The failed historical attempt remains in saved reports. Selecting DUT 2 first does not restrict the reset to DUT 2.

Related instructions: [13.2.1 User activity, filters and history](#); [10.1 Date, model and production filters](#).

2.5.2 CAMERA

The camera panel presents image evidence for the selected vision step/DUT. Confirm the selected step and image timestamp before interpreting an overlay.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [2.5.2.1 Split view, full image, steps, overlays and zoom](#); [4.1.8 VISION](#).

2.5.2.1 Split view, full image, steps, overlays and zoom

CAMERA shows the image evidence associated with vision steps. Select the relevant step and use available split/full-image, overlay and zoom controls to inspect the region that failed. A zoom changes the view, not the stored camera calibration or result. Compare the image with the measurement and selected limits.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Split / image / steps views	Choose between context and image detail. Switching layout does not change the inspection region.
Fit / zoom	Fit shows the whole image; a zoomed image helps inspect a region. View zoom does not enlarge the saved ROI.
Overlays	Compare region number, measured result and boundary with the selected step. A stale or different-step image must not be used to approve a unit.

Procedure

1. Select the desired DUT and its vision result.
2. Start with the complete image, then zoom into the failing region.
3. Compare the region result with the corresponding step limits and saved evidence.

Related instructions: [10.3.1 Compare attempts and inspect saved attachments](#).

2.5.3 CIE

CIE presents colour/chromaticity evidence from supported inspection steps. Check the selected DUT and step, measured point and allowed region. Numeric display rounding does not replace the geometric containment decision. Review the full graph and boundary close-up in the configured report when detailed evidence is needed.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Measured point	Chromaticity result for the selected applicable step.
Allowed boundary	Configured acceptance region. A point near a drawn edge requires the recorded numerical result and verdict.

Worked example

For a point apparently on the edge, open the saved step values before concluding that the plot and result conflict; screen pixels and rounded labels cannot resolve the exact boundary.

Related instructions: [4.1.8 VISION](#); [13.1.2 Six-decimal numeric values and raw communication](#).

2.5.4 EVENTS

EVENTS lists production events associated with the run. Use it to follow transitions, messages and timing around an NG or stopped test. Match the event to the selected DUT and time. Keep the first relevant failure when reviewing later cleanup or report messages.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Select the affected DUT immediately after an event.
2. Read event order around START, step completion, stop or readiness failure.
3. Match its time, DUT and barcode to saved test history; ask ADMIN to use Application Log for raw technical detail.

Worked example

A sequence can finish before a report-delivery error appears. The timeline helps distinguish test execution from the subsequent delivery failure.

Related instructions: [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR recovery](#); [13 Application Log](#).

2.6 LIVE DEBUG

LIVE DEBUG displays execution and communication evidence while testing. Numeric measurements use six decimal places; raw device responses retain their original text or bytes. It is a diagnosis view. A readable response still needs to satisfy the configured response rule and limits.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Open LIVE DEBUG from Testing when the control is available.
2. Observe the command and response belonging to the selected run/device. Close the view when it obscures normal operator controls.
3. For a timeout, retain the device name, command time and absence or lateness of RX, then compare with the saved result.

Worked example

TX followed by a timeout without RX suggests that no acceptable reply arrived within the configured wait. It does not prove whether the cause is wiring, addressing, format or a slow device.

Related instructions: [13.1.1 Commands, responses, timeouts and exceptions](#).

2.7 GOLDEN SAMPLE

GOLDEN SAMPLE follows the machine's configured sample-validation rule. Use the designated reference unit and approved process. Review the recorded sample result before resuming normal production. A golden sample check does not justify overriding a failing production unit or modifying limits without approval.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Golden Sample checks verify the station against configured reference units. Use the designated reference sample and fixture; do not substitute a production unit or treat an intentionally failing Golden NG sample as an ordinary reject.

Related instructions: [2.7.1 Golden OK/NG sample scan and fixture selection](#); [4.13.5.1 Golden Sample validation status, history and reset/bypass](#).

2.7.1 Golden OK/NG sample scan and fixture selection

Run a configured reference sample when the station requests or permits Golden Sample validation.

Access and preparation

Golden Sample configuration and an authorized operator workflow; the requested reference sample must be available.

Procedure

1. Open GOLDEN SAMPLE and select the requested fixture/DUT when the dialog offers multiple positions.
2. Read whether Golden OK or Golden NG is required, then scan that sample identifier.
3. Run the validation through the displayed workflow and compare the result with the configured reference expectation.
4. Return to production only when the validation status permits it. If it fails, retain the validation reason and have the responsible engineer review the station.

Worked example

Golden OK checks the configured passing reference. Golden NG can be expected to fail a specific check; an unrelated failure or a wrong sample identity is not valid station verification.

Expected result

Validation updates the reference-check state. It does not grant permission to bypass a due/locked condition.

Related instructions: [4.13.5.1 Golden Sample validation status, history and reset/bypass](#); [4.13.5 GOLDEN SAMPLE RULE](#).

2.8 START TEST, STOP, RESET and final OK/NG

Use START TEST, STOP and RESET according to the configured Test Plan and current readiness state.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
START TEST	Requests a manual start when manual start is allowed. External-start plans wait for their configured trigger.
STOP	Requests controlled interruption and cleanup. Wait for the station to finish its stop path.
RESET	Returns the eligible state to readiness after required result/recovery actions; it does not prove reports were saved or hardware is off.

Procedure

1. Select the correct Test Plan and DUT, accept all required barcodes and confirm readiness.
2. Start using the configured manual or external path.
3. If interruption is needed, press STOP once and wait for cleanup/status changes. Follow the machine procedure to verify the fixture state.
4. After completion, read the final result and any remaining hold before RESET or loading another unit.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
START is unavailable	Read the readiness message; check barcode, Golden Sample, required device, report recovery and reset conditions.
STOP is taking time	Allow the current operation and cleanup path to settle. Escalate a persistent busy/cleanup failure; do not launch another hardware operation.

Related instructions: [2.8.1 Manual start and external RX start states](#); [2.8.2 Operator step messages: CONTINUE, acknowledgement and STOP TEST](#); [2.9 Failed steps, stopped runs, cleanup and next-unit readiness](#).

2.8.1 Manual start and external RX start states

Manual and external RX starts share admission checks, but use different start signals.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Manual start	The operator requests START TEST after accepted barcodes and readiness.
External RX start	The saved RX rule detects the configured start condition; an earlier trigger is not automatically a valid trigger for the next unit.
Reset wait	A configured shared or lane reset can block the next cycle after execution completes.

Procedure

1. Confirm the plan and its intended start method with the station work instruction.
2. Finish scanning and all readiness actions.
3. For manual mode, use START TEST. For external mode, wait for the configured physical start/reset sequence.
4. If the trigger is ignored, check its RX rule/device status and ready/reset message with maintenance. Do not defeat the trigger by changing modes during a run.

Worked example

After pre-scan transfer, a trigger that occurred while the previous DUT was active does not authorize the next run.

Related instructions: [4.13.1 RX Rules](#); [2.2.2 Next DUT Barcode Pre-Scan](#).

2.8.2 Operator step messages: CONTINUE, acknowledgement and STOP TEST

A sequence can intentionally show an operator instruction at a step. Repeated display at that step normally means the message is part of the saved sequence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CONTINUE	Acknowledges the displayed instruction when acknowledgement is required. Confirm the stated physical condition before continuing.
STOP TEST	Stops the run through the normal stop/cleanup path.
Attempt indicator	Shows the current step attempt; it is not the count of times the operator has opened the message.

Procedure

1. Read the message and identify the current sequence step.
2. Perform the requested check under the machine work instruction; choose CONTINUE only when satisfied, or STOP TEST when you cannot proceed.
3. If the message is unnecessary, ask the authorized sequence editor to review that row's Show Popup/Ack Required settings and save the sequence after review.

Worked example

A pre-run PSU instruction can appear on every run because Show Popup is saved on that step. Disabling its popup must preserve the step's actual power-control operation.

Related instructions: [4.1.2.5.8 Operator Popup: Show Popup, Ack Required and Message](#).

2.9 Failed steps, stopped runs, cleanup and next-unit readiness

An NG can occur late in a loop even if the latest visible child rows passed. Use the summary, group/cycle/attempt and failed-step evidence to locate the original failure. An abort or stop is distinct from an ordinary completed PASS. Wait for safe cleanup and the next-unit-ready indication before scanning or running again.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NG / failed step	Keep the unit identified and use the failed step evidence. A rerun is a new controlled decision, not report recovery.
STOPPED / cleanup failure	Wait for cleanup and physical fixture verification before the next start.
Report pending / storage error	Use the recovery procedure; closing the dialog does not clear the saved hold.
NG-bin / print / RX reset hold	Complete the specific configured action; unrelated RESET/scan actions may leave the hold active.

Procedure

1. Read the current hold after the terminal test result.
2. Identify whether the issue concerns the unit, fixture cleanup, result delivery or a required confirmation.
3. Follow that recovery path and verify its cleared state before the next unit.

PROCEDURE / Investigate NG result

Find the real reason for an NG result without guessing or bypassing safety.

Access and preparation

OPERATOR, MAINTENANCE, ADMIN. Keep barcode, model, time, failed step name, and device status visible.

Steps

1. Note model, barcode, timestamp, and NG step.
2. Check the operator result details and permitted Reports evidence.
3. Ask an ADMIN or authorized support user to review Application Log for raw command/response when required.
4. If hardware-related, ask a MAINTENANCE-authorized user to test the device manually.
5. If setup-related, ask ADMIN to review sequence limits and expected response.
6. Save evidence before retest.

Expected result

The fault is classified as product issue, device issue, MES issue, barcode issue, or setup issue.

Avoid these errors

Do not repeatedly retest without recording the first NG evidence. Do not change limits to make a failed product pass.

If it does not work

If the cause is still unclear, export logs and share model, barcode, sequence name, failed step, and timestamp.

Related instructions: [2.9.1 NG Bin hold and next-unit readiness](#); [2.9.2 REPORT PENDING and REPORT STORAGE ERROR recovery](#); [8.6.1 Print and scan records, failed print recovery and duplicate prevention](#).

2.9.1 NG Bin hold and next-unit readiness

An NG-bin hold keeps the next unit from starting until the configured reject-handling acknowledgement is satisfied.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Keep the failed unit and its barcode identified.
2. Follow the station's reject-bin process and the displayed acknowledgement/reset requirement.
3. Check that the hold clears before admitting the next unit or accepting a pending pre-scan set.

Worked example

A completed NG test may leave a red readiness message until the reject is placed and the configured input confirms the action. A new barcode alone does not clear that hold.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
NG hold stays active	Check the specified input and its expected state with maintenance. Confirm the correct lane/shared rule; do not bypass the sensor in production.

Related instructions: [2.2.2 Next DUT Barcode Pre-Scan](#); [4.13.7 NG Bin Rules](#).

2.9.2 REPORT PENDING and REPORT STORAGE ERROR recovery

Recover the already saved test result when a required report destination or report-recovery storage cannot be accessed.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Red REPORT PENDING banner	Next test is blocked under the required-destination policy. Click to open the pending items.
Orange optional-copy/fallback banner	Some copies remain pending even if the policy permits another start.
REFRESH	Reloads the pending list/status.
RETRY SAVE	Retries failed destinations only; copies already saved are not rewritten.
ADMIN RESET	Restricted recovery/fallback action. Use only when available to the authorized user and the displayed confirmation is understood.
REPORT STORAGE ERROR	Recovery storage itself could not be read. Acknowledge the alert, retain its exact message and resolve storage access before another start.
ADMIN RESET / RESET REPORT BLOCK	The label depends on whether the configured policy requires administrator authentication. It does not erase the unit result.
Admin login, password and reason	Use the authorized account when required and enter the recovery reason. Do not put credentials into the reason field or support evidence.

Procedure

1. Keep the completed DUT result/barcode. Open the banner and select the pending report.
2. Read which destination failed and its error. Restore the configured folder/network access or disk capacity with authorized support.
3. Choose RETRY SAVE and inspect the result for each required destination.
4. If permitted fallback/reset is needed, have the authorized administrator review the retained local evidence and perform the shown action.
5. Verify the red hold clears. Closing the dialog or restarting the app does not discard persistent pending copies.

Worked example

A network report copy can fail after the DUT tests OK. Retry the report delivery after restoring access; do not rerun the hardware test merely to regenerate the result.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
database is locked appears once	The message indicates a database access conflict, not a proven permanent fault. Preserve the time/error and check whether recovery storage becomes available. Repeated errors require log and storage investigation.
Retry still fails	Read the new destination error. Check permission, path availability, free space and locked files. Keep pending records intact.

Related instructions: [4.7 Report](#); [13.1.1 Commands, responses, timeouts and exceptions](#).

3 Maintenance

Diagnose devices, inspect inputs and carry out controlled manual fixture checks.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Maintenance tools can send real hardware commands. Before connecting, stop production and confirm the fixture is ready for manual work. A maintenance login does not automatically grant editing of device mappings or administrative settings.

Use COMMUNICATION STUDIO for commands and raw evidence; OUTPUT CONTROL for mapped output buttons; TEST TRIAL / RESPONSE for a selected sequence step; LIVE INPUT MONITOR for polling; TOOL / FIXTURE MAINTENANCE for life counters. VIRTUAL UDAQ provides simulation only.

Procedure

1. Choose the tool appropriate to the symptom.
2. Verify device identity and connection before any command.
3. Perform one controlled check and inspect response/quality.
4. Apply the approved safe state and verify the fixture before leaving.

Related instructions: [3.1 COMMUNICATION STUDIO](#); [3.2 OUTPUT CONTROL](#); [3.3 TEST TRIAL / RESPONSE](#); [3.4 LIVE INPUT MONITOR](#); [3.5 TOOL / FIXTURE MAINTENANCE](#); [3.6 VIRTUAL UDAQ](#).

3.1 COMMUNICATION STUDIO

Use Communication Studio to inspect a command and its actual response.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

The four modes are SMART ACTIONS, TX CONSOLE, RX MONITOR and BYTE LAB. They share the selected device and response context. Changing a display mode does not change the instrument protocol. Use a supported read before testing output commands.

Procedure

1. Select the saved enabled device and review its connection details.
2. Connect through the available device controls.
3. Choose SMART ACTIONS for an existing action or TX CONSOLE for an exact command.
4. Inspect TX/RX and response validation; use BYTE LAB for binary extraction.
5. Stop cyclic transmission/listening, return outputs to the approved state and disconnect after work.

Worked example

Illustrative: investigate a meter timeout with one known read in TX CONSOLE, inspect its raw RX, then compare with the corresponding sequence step.

Expected result

The selected device, transmitted request, received bytes/text and judgement can be correlated.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Manual command fails	Compare device, endpoint, syntax, framing, timeout and power.
Related instructions: 3.1.1 Device selection, connection controls and command history; 3.1.3 TX CONSOLE; 3.1.5 BYTE LAB.	

Screen reference

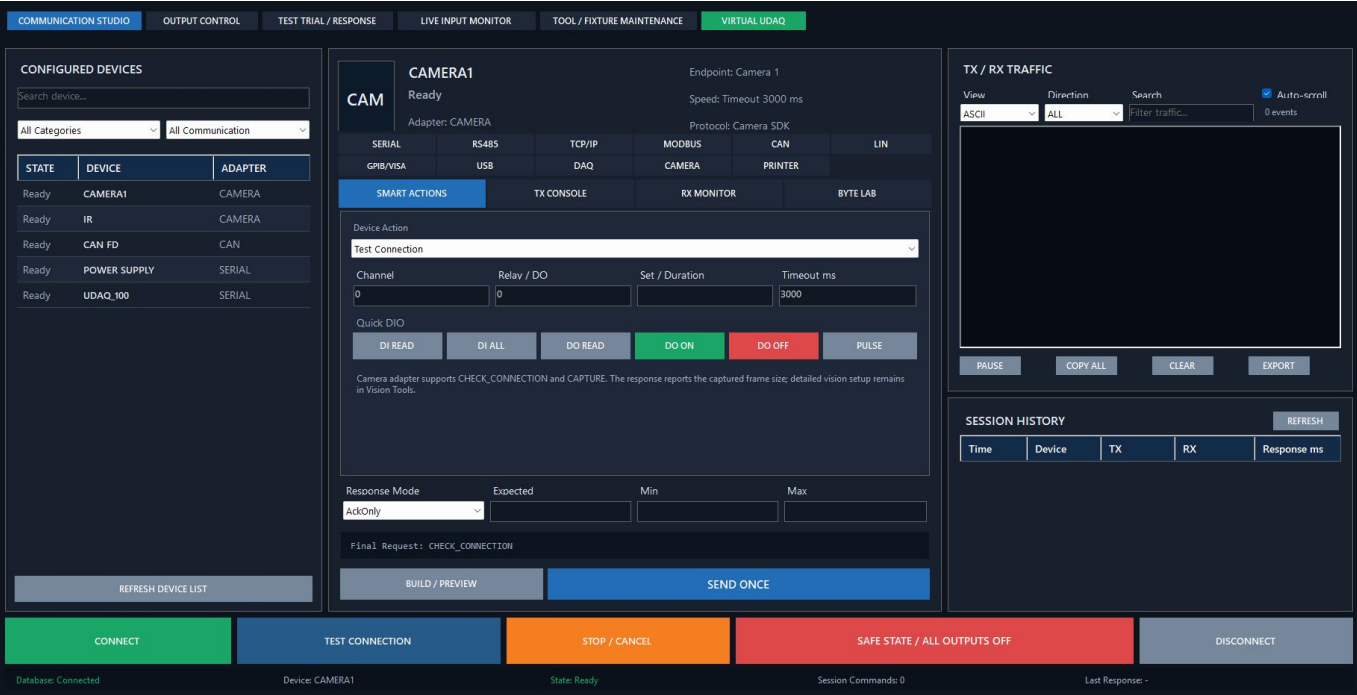


Figure 3.1 - Communication Studio: connection, transmit and receive areas. Reference capture: 07 October 2026.

3.1.1 Device selection, connection controls and command history

Establish a device session and preserve the correct request/response context.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Select the saved device before loading an action or reusing a command. Previous command text or history is not proof it belongs to the newly selected device. A listener or other tool can hold a port; close conflicting sessions deliberately.

Procedure

1. Refresh the device list after approved configuration changes.
2. Select the intended device and inspect endpoint/protocol/identity.
3. Use connection controls and read the returned connection status.
4. Recall or enter a command, then review the final request before sending.

- Keep the first failed transaction available while checking settings; stop cyclic/listening work before switching devices or leaving.

Worked example

A read previously sent to DMM_MAIN must be reviewed before selecting PSU_MAIN; identical transport settings do not make command syntax interchangeable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Port busy	Stop the other listener/session and identify its owner; do not repeatedly reconnect blindly.
Old response mistaken for current	Check time/direction and send one clearly identified new read.

Related instructions: [1.6.1 TEST CONNECTION](#) and [response interpretation](#); [3.1.4 RX MONITOR](#).

3.1.2 SMART ACTIONS

Use a supported device action while understanding the parameters it generates.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

SMART ACTIONS provides commands associated with the selected device family. Review the generated request and action fields before execution. An action being listed does not prove the connected model implements every function.

Procedure

- Select the saved device, then the appropriate action.
- Fill the action-specific channel/value/duration fields.
- Inspect generated command, expected response and limits.
- Execute one controlled read first. For writes, confirm the load and cleanup command before execution.
- Compare the response with manufacturer behavior and record the first failure.

Worked example

For a compatible Waveshare relay action, Module Relay ON/OFF uses Set / ms as slave ID and Relay / D as relay number. Set / ms 2 and Relay / D 4 select slave 2, relay 4. Module All Relays OFF uses Set / ms as slave ID.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong relay changes	Check slave versus relay field meanings and actual mapping.
Action unsupported	Use only a verified function for that model; custom syntax still needs protocol validation.

Related instructions: [1.4.3 RS485 / Modbus configuration](#); [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#).

3.1.3 TX CONSOLE

Send an exact request using the correct byte/text format.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
TX format	ASCII, HEX, DEC or BINARY; choose according to the command representation.
Encoding	ASCII or UTF-8 for text.
Ending	Device Default, None, CR, LF or CRLF; inspect the final request. Non-text selection changes Device Default to None to avoid unintended endings.
Final request preview	Verify actual outgoing content before sending.

Procedure

1. Select the device and choose TX format.
2. Enter the documented command; for binary formats use valid complete byte values.
3. Set encoding/ending and inspect the final request.
4. Send once and inspect both TX and RX.
5. If no reply, distinguish a send-only command from a query before changing validation.

Worked example

Illustrative text query *IDN? with the instrument-required line ending. Illustrative binary request AA 01 02 in HEX must remain those bytes; do not append CRLF unless specified.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unreadable reply	Use HEX view to inspect actual bytes and check encoding.
Extra bytes transmitted	Review Ending and any terminator already embedded in command text.

Related instructions: [1.4.2 TX termination, RX framing, HEX, checksum and CRC](#); [3.1.6 Cyclic transmission, response validation and troubleshooting](#).

3.1.4 RX MONITOR

Observe traffic without confusing display formatting with response acquisition.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
START MONITOR / STOP MONITOR	Start/stop the supported device listener. Availability depends on selected transport.
RX view	MIXED, ASCII, HEX or DEC changes presentation.
Direction filter	ALL, TX, RX, PASS, FAIL or INFO narrows visible evidence.

Procedure

1. Select and connect the intended device.
2. Open RX MONITOR and start monitoring when supported.
3. Use ALL/MIXED initially to retain transaction context, then narrow direction or byte view.
4. Check timestamps and source before attributing an unsolicited reply to a query.
5. Stop monitoring when finished or before another tool needs the endpoint.

Worked example

A binary payload can look meaningless in ASCII yet be valid in HEX; changing the view does not fix incorrect serial framing.

Expected result

Traffic is visible with enough context to distinguish commands, replies and validation outcomes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Empty view	Clear filters, confirm listener status and verify the device actually transmits.
Monitoring unavailable	Use the supported query path for that device; not all transports provide a passive listener.

Related instructions: [3.1.1 Device selection, connection controls and command history](#); [3.1.5 BYTE LAB](#).

3.1.5 BYTE LAB

Capture response bytes and validate their interpreted value.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

BYTE LAB works from received bytes, not from a hand-typed displayed decimal result. Captures use zero-based offsets and explicit lengths. B1+B2 concatenates byte captures for decoding; it is not a numeric addition of their decimal values.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Capture name / offset / length	Name a byte slice and specify its start/count. Names must be distinct and ranges must fit the response.
Combine expression	Arrange saved slices, for example B1+B2.
Decode type	RawHex, ASCIIString, UInt8/Int8, UInt16/Int16, UInt32/Int32 or Float32.
Endian / Scale / Offset	Interpret byte order and transform numeric value.
CAPTURE LAST RX / DECODE + COMPARE	Capture then interpret using the shared expected/limit fields.
CLEAR CAPTURES	Discard old capture variables before a different investigation.

Procedure

1. Receive a known full response and inspect HEX bytes.
2. Define B1/B2 slices; CAPTURE LAST RX.
3. Set combine expression, decode type, endian, scale and offset.
4. Enter reviewed expected value and/or limits; DECODE + COMPARE.
5. Clear or recapture when the response source changes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Capture outside response	Verify zero-based offset, length and complete framing.
Expected value not numeric	Use a numeric expected value with numeric decoding, or a text decoder/appropriate response mode.

Related instructions: [3.1.5.1 Capture B1/B2, combine bytes, decode and compare](#).

3.1.5.1 Capture B1/B2, combine bytes, decode and compare

Reproduce a complete byte capture, numeric decode and limit comparison.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
B1	Offset 0, length 1 in this illustrative payload.
B2	Offset 1, length 1.
Combine / decode	B1+B2, UInt16, BigEndian.
Scale / Offset	0.1 and 0.
Min / Max	25.0 and 26.0 for this example.

Procedure

1. Obtain a known response whose relevant two-byte payload is 01 02. If headers precede it, adjust both offsets to the real positions.
2. Set B1/B2 and CAPTURE LAST RX; confirm the slices are 01 and 02.
3. Choose B1+B2, UInt16 and BigEndian, then Scale 0.1/Offset 0.
4. Leave Expected blank when using only the example numeric range; enter Min 25.0 and Max 26.0.
5. DECODE + COMPARE; inspect combined bytes, value and comparison.
6. Change to LittleEndian only as a deliberate learning comparison, then restore the device-specified setting.

Worked example

Illustrative arithmetic: $0x0102 = 258$, scaled to 25.8, within 25.0-26.0. Little-endian yields 513, scaled to 51.3, outside this range. This is a decoding example, not a prescribed device acceptance limit.

Expected result

The result shows 25.8 and an in-range comparison under the illustrated settings.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Value unchanged after new RX	Recapture the latest reply; old captures can remain.
Pass without meaningful acceptance	A result stating No limit configured is a decode outcome, not proof of product conformity.

Related instructions: [1.4.2 TX termination, RX framing, HEX, checksum and CRC](#); [3.3.2 Expected response, limits, timeout and delay](#).

3.1.6 Cyclic transmission, response validation and troubleshooting

Repeat approved reads deliberately and separate response validation from transmission.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

START CYCLIC repeatedly sends the configured request until STOP CYCLIC. This is an intentional repetition mechanism, not ordinary retry handling. Use it only for commands safe to repeat. Programming and irreversible/state-changing actions require their own controlled workflow.

Procedure

1. Prove one successful single read first.
2. Set the cyclic interval with enough time for the response and shared-port workload.
3. Start cyclic work and watch timeouts, errors and response validity.
4. STOP CYCLIC before editing requests, switching devices or leaving.
5. Compare expected text or numeric limits only after framing and decoding are correct.

Worked example

An approved voltage read can be sampled repeatedly for diagnosis. A relay pulse or programming action must not be substituted into the same cyclic session.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Intermittent replies	Lengthen interval if transactions overlap or the device cannot respond at the requested rate; verify framing and bus ownership.
RX present but FAIL	Check expected mode, decoded value and limits instead of assuming a communication failure.

Related instructions: [3.1.3 TX CONSOLE](#); [3.3.2 Expected response, limits, timeout and delay](#).

3.2 OUTPUT CONTROL

Operate named output buttons with explicit hardware mapping and arming.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

OUTPUT CONTROL lists saved buttons together, potentially across several devices. Each button has its own target device/channel and ON/OFF commands. Device connections and commanded state are separate from physical feedback. Configuration changes require mapping permission and should be made while disarmed. Hardware mapping changes require an ADMIN account with Device Configuration Edit permission.

Procedure

1. Inspect mapped device/channel and connection status.
2. Confirm the fixture is ready, then hold ARM for two seconds.
3. Operate only the required button and verify actual feedback.
4. Use DISARM to apply configured safe states, or SAFE ALL OFF for literal OFF requests as described below.
5. Confirm hardware state before leaving.

Related instructions: [3.2.1 Workspace overview and hardware connection lifecycle](#); [3.2.2 ADD OUTPUT BUTTON](#); [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#); [3.2.7 Commanded state, connection state and disabled controls](#).

Screen reference

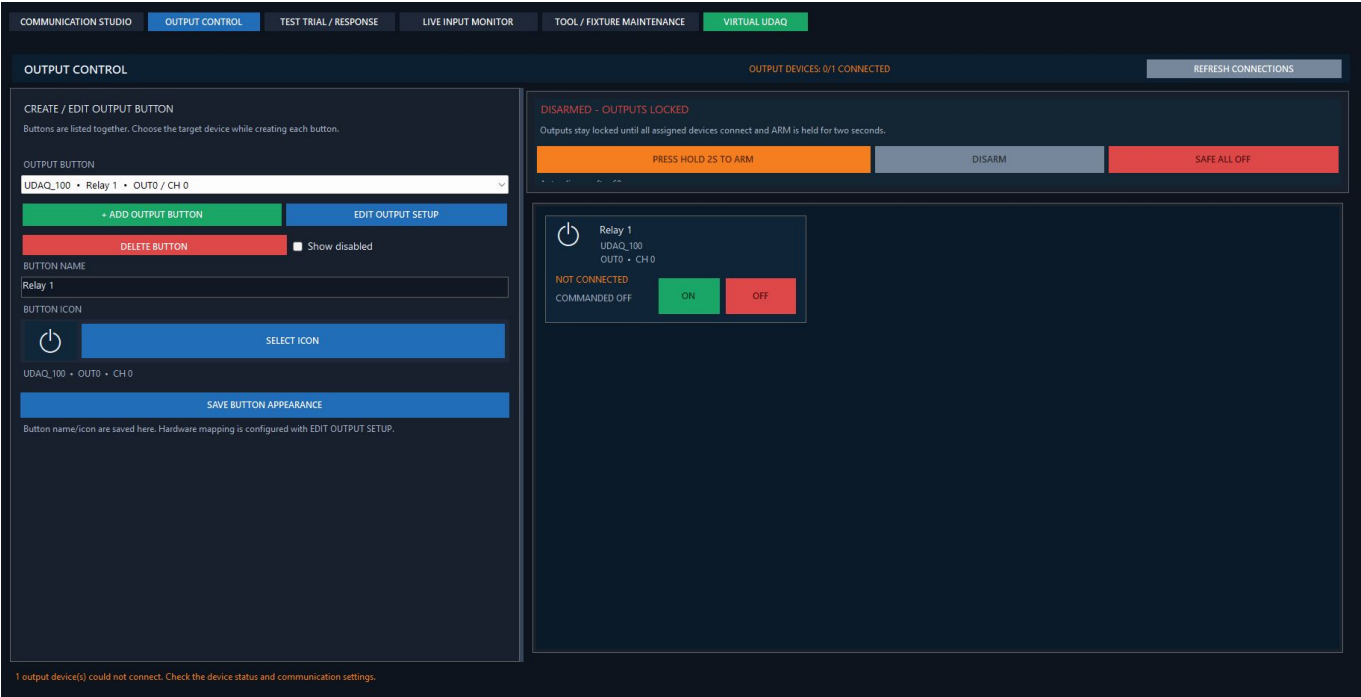


Figure 3.2 - Output Control: disarmed and disconnected overview; this capture does not prove a physical output state. Reference capture: 07 October 2026.

3.2.1 Workspace overview and hardware connection lifecycle

Understand when output devices connect and why the workspace can remain locked.

Access and preparation

Maintenance page access and applicable action permission. Configuration changes additionally require the relevant configuration permission.

Required enabled output mappings determine which devices must connect. The workspace opens the corresponding sessions when activated; leaving or changing active setup triggers cleanup/session handling. Arming requires the required connections to be ready. A missing connection is not solved by changing the button’s color or label.

Procedure

- 1. Open OUTPUT CONTROL and review every relevant mapped device status.
- 2. If one fails, read the first connection error and correct Device Configuration before proceeding.
- 3. Check output mapping with the fixture disarmed.
- 4. Arm only after required devices connect and the machine is ready.
- 5. Disarm and verify safe states before leaving or reconfiguring.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
ARM unavailable	Check required-device connections, active workspace and current safety state.
Setup save reconnects hardware	Saving an active mapping first applies safe states, reloads configuration and reconnects required sessions; perform this as a controlled maintenance action.

Related instructions: [3.2.3 EDIT OUTPUT SETUP](#); [1.6.1 TEST CONNECTION](#) and [response interpretation](#).

3.2.2 ADD OUTPUT BUTTON

Add an output button that points to one reviewed device/channel.

Access and preparation

Maintenance page access. Hardware mapping add/edit/delete/restore requires ADMIN and Device Configuration Edit permission; configuration is performed while disarmed.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Device	Select the intended saved output-capable hardware.
BUTTON NAME	Visible operator/technician label.
CHANNEL KEY / CHANNEL NUMBER	Stable mapping identity and hardware channel.
ON COMMAND / OFF COMMAND	Exact supported commands for the selected device.
Output mode / pulse duration	LATCHED or PULSE; duration applies to pulse behavior.
Set output ON as its safe state	Configured safe state for DISARM/automatic safety cleanup; choose from fixture design, not appearance.

Procedure

1. Disarm and select ADD OUTPUT BUTTON.
2. Choose the device and enter name, channel identity and ON/OFF commands.
3. Set output mode and safe state; verify the OFF/cleanup command before any ON action.
4. SAVE OUTPUT BUTTON and confirm the saved mapping/status.
5. Perform a controlled armed check with real feedback, then disarm.

Worked example

Illustrative compatible Modbus mapping: name Indicator, ON S1 DO1 1, OFF S1 DO1 0. Verify slave, channel map and connected load before using it.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Button saves but wrong load responds	Stop and check target device, channel and explicit command text.

Related instructions: 3.2.2.1 Device selection, hardware channel and ON/OFF commands; 3.2.6 Arm, Disarm, Safe All Off and automatic disarm.

Screen reference

Add Output Button

ADD OUTPUT BUTTON

CAMERA1 • Camera SDK / Camera SDK

BUTTON NAME

Output 1

Power Button

SELECT ICON

CHANNEL KEY

OUT1

CHANNEL NUMBER

1

ON COMMAND

OFF COMMAND

OUTPUT MODE

LATCHED

PULSE DURATION (MS)

250

☐ Set output ON as its safe state

Enter the exact hardware ON and OFF commands for this device. Output mapping is saved with an audit entry. Commands

CANCEL

SAVE OUTPUT BUTTON

Figure 3.2.2 - New output button: device, channel, commands and safe state. Reference capture: 07 October 2026.

3.2.2.1 Device selection, hardware channel and ON/OFF commands

Separate the button identity from the actual hardware command address.

Access and preparation

Maintenance page access. Hardware mapping add/edit/delete/restore requires ADMIN and Device Configuration Edit permission; configuration is performed while disarmed.

CHANNEL KEY identifies the saved mapping. CHANNEL NUMBER is its configured hardware channel, but an explicit ON/OFF command can itself contain a slave/channel address. Both must be reviewed together. Do not assume renaming a button changes its command.

Procedure

1. Choose the physical device first.
2. Enter a stable channel key and actual channel number.

3. Review ON and OFF command addresses against the manufacturer map.
4. For pulse mode, set a suitable duration and confirm return behavior.
5. Save and verify the command/response plus independent load feedback.

Worked example

A button labelled Clamp on a shared RS485 bus may use S2 R4 ON/OFF. The S2 and R4 command fields determine the target; the visible button label does not.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Displayed number differs from command	Correct the mapping deliberately; do not rely on the caption to override raw command addresses.

Related instructions: [1.4.3 RS485 / Modbus configuration](#); [3.2.7 Commanded state, connection state and disabled controls](#).

3.2.3 EDIT OUTPUT SETUP

Change output setup with the workspace disarmed and the fixture prepared.

Access and preparation

Maintenance page access. Hardware mapping add/edit/delete/restore requires ADMIN and Device Configuration Edit permission; configuration is performed while disarmed.

EDIT OUTPUT SETUP changes the selected mapping, including hardware commands and safe-state behavior. Saving an active setup first requests existing safe states, reloads mappings and reconnects device sessions. It can therefore cause hardware communication even though the edit itself is not an ON-button click.

Procedure

1. Disarm and verify current fixture state.
2. Select the exact OUTPUT BUTTON and open EDIT OUTPUT SETUP.
3. Compare existing device/channel and both commands before changing them.
4. Save and inspect the status/error; recheck any re-established connections.
5. Revalidate the affected output with an approved controlled check and disarm again.

Worked example

Replacing a relay module with a different address map requires reviewing ON, OFF and safe-state behavior together, not editing only the visible channel number.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Save fails	Preserve the reported validation/connection error; reselect to determine whether the mapping was saved before retrying.

Related instructions: [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#).

3.2.4 Button names, icon selection and saved appearance

Make output buttons recognizable without changing their electrical mapping.

Access and preparation

Maintenance page access. Button name/icon appearance editing is available to MAINTENANCE and ADMIN roles; hardware mapping still requires ADMIN plus Device Configuration Edit.

Names and icons are presentation settings. A new icon does not alter the device, ON/OFF commands or feedback path. Use labels that describe the actual function and state meaning; avoid a generic "ON" label when several devices are shown.

Procedure

1. Select the intended OUTPUT BUTTON while disarmed.
2. Edit its display name and use SELECT ICON to choose a suitable symbol.
3. Save the appearance with SAVE BUTTON APPEARANCE.
4. Reselect the button and confirm both caption/icon and underlying mapping remain understandable.

Worked example

"Fixture lamp" with a lamp icon is more specific than "Output 1"; the command still determines which hardware line changes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Appearance unchanged	Confirm the selected button and completed save.
Ambiguous physical function	Review setup and wiring before operating the button.

Related instructions: [3.2.3 EDIT OUTPUT SETUP](#).

Screen reference

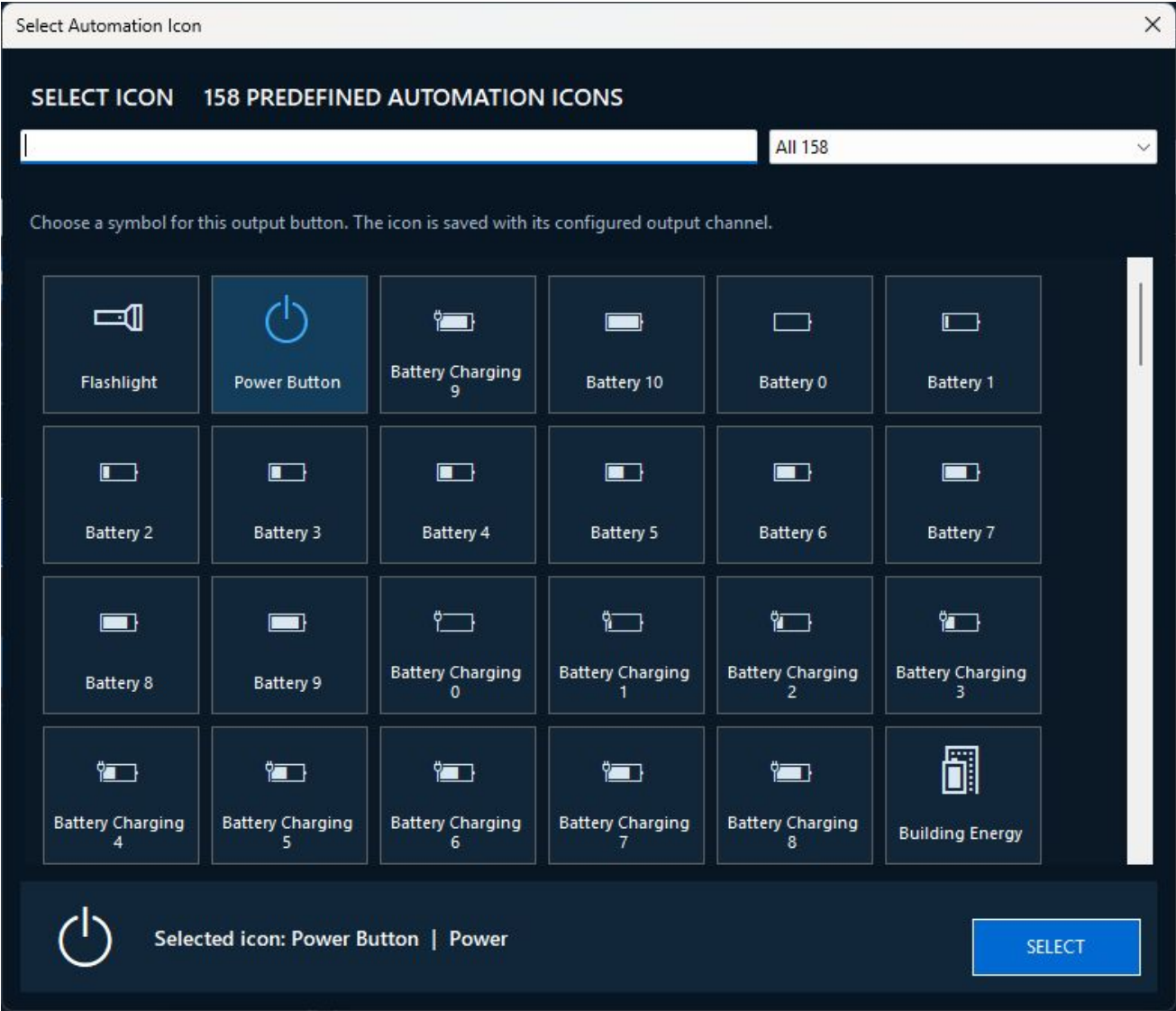


Figure 3.2.4 - Output icon library. Reference capture: 07 October 2026.

3.2.5 Button deletion and audit history

Remove a button from normal use while retaining recovery/audit evidence.

Access and preparation

Maintenance page access. Hardware mapping add/edit/delete/restore requires ADMIN and Device Configuration Edit permission; configuration is performed while disarmed.

The output-button delete action disables the mapping. The confirmation states that deleted buttons are removed from the normal list and retained for audit and recovery. Show disabled allows an authorized user to restore one. This is distinct from permanently deleting a device record.

Procedure

1. Disarm and select the mapping.
2. Use its delete/disable action and read the device/button confirmation.
3. Confirm it disappears from the normal enabled list.

4. To recover, enable Show disabled, select the retained mapping and use Restore.
5. Review its hardware commands and safe state before resuming use.

Expected result

The button's availability changes and the application records the mapping change.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cannot delete while armed	Disarm and verify safety first.
Deleted mapping seems missing	Use Show disabled; do not create a duplicate before checking retained records.

Related instructions: [1.7 NEW DEVICE](#), [SAVE DEVICE](#), [DISABLE](#), [DELETE PERMANENTLY](#) and [CLEAR](#).

3.2.6 Arm, Disarm, Safe All Off and automatic disarm

Use ARM, DISARM and SAFE ALL OFF according to their different effects.

Access and preparation

Maintenance page access; editing mappings/channels also requires Device Configuration editing permission.

Hold ARM for two seconds to unlock output operation. Arming lasts 60 seconds; automatic disarm applies each enabled connected mapping's configured Safe State once. State-changing commands are not automatically retried.

DISARM requests each configured Safe State, which can be ON if the fixture definition says so. SAFE ALL OFF instead sends the OFF command once to every enabled connected output and disarms. It does not apply a configured safe-ON state. Neither action can command a disconnected device or prove physical feedback.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ARM	Requires ready connections and deliberate hold.
DISARM	Disarms and applies configured Safe State.
SAFE ALL OFF	Literal OFF requests to enabled connected mappings, then disarmed.
Automatic disarm	After the armed interval expires, configured safe states are requested.

Procedure

1. Review every mapping's Safe State and confirm the fixture's approved shutdown procedure.
2. Hold ARM two seconds and operate only the required output.
3. Choose DISARM when returning to configured safe states; choose SAFE ALL OFF when the intended action is literal OFF.
4. Inspect individual command errors and independently verify the physical outputs.
5. If communication is unavailable, follow the station's physical isolation procedure; do not rely on the UI state.

Worked example

Illustrative: an indicator mapping with Safe State ON is requested ON by DISARM, but OFF by SAFE ALL OFF. This difference must be understood before using either action.

Expected result

Controls become disarmed; the requested states and actual feedback are checked separately.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
OFF requested but load remains active	Check command failure, device connection, wiring and independent feedback. A banner/button color alone is not proof.

Related instructions: [3.2.7 Commanded state, connection state and disabled controls](#); [3.4 LIVE INPUT MONITOR](#).

3.2.7 Commanded state, connection state and disabled controls

Distinguish commanded state, communication availability and physical feedback.

Access and preparation

Maintenance page access; editing mappings/channels also requires Device Configuration editing permission.

A displayed commanded ON/OFF state describes the command path. It is not an independent measurement of relay contacts, supply voltage or load motion. Connection state tells whether the application can communicate; it does not prove the connected output worked. Disabled controls can result from disarming, missing connections or configuration permissions.

Procedure

1. Check device connection before interpreting the button state.
2. Inspect the outcome of the last command and any error.
3. Read a configured independent feedback input or approved external indication when proof is required.
4. If status and hardware disagree, stop further output actions and diagnose mapping/wiring before reuse.

Worked example

A Modbus coil write acknowledgement says the module accepted a command; a separate fixture limit switch is needed to prove a clamp reached position.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Button locked	Check arming, required connections, enabled mapping and permissions.
State shown after a failed cleanup	Inspect individual transaction results and real hardware; do not assume the aggregate status guarantees success.

Related instructions: [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#); [3.4.1.2 Digital debounce, analog scaling and output feedback examples](#).

3.3 TEST TRIAL / RESPONSE

Trial a reviewed sequence step and inspect its response judgement.

Access and preparation

Maintenance page access; editing mappings/channels also requires Device Configuration editing permission.

TEST TRIAL / RESPONSE provides a focused check of a selected sequence action. A successful isolated step does not prove the complete production flow, required preconditions or cleanup. Configure the necessary safe initial state before running the step.

Procedure

- 1. Select the intended model/flow/sequence step.
- 2. Read its device, generated action, limits, timeout and delay.
- 3. Confirm all prerequisites and run one trial.
- 4. Inspect raw response and judgement, then return hardware to the approved state.

Related instructions: [3.3.1 Selecting a sequence step and running a trial](#); [3.3.2 Expected response, limits, timeout and delay](#).

Screen reference

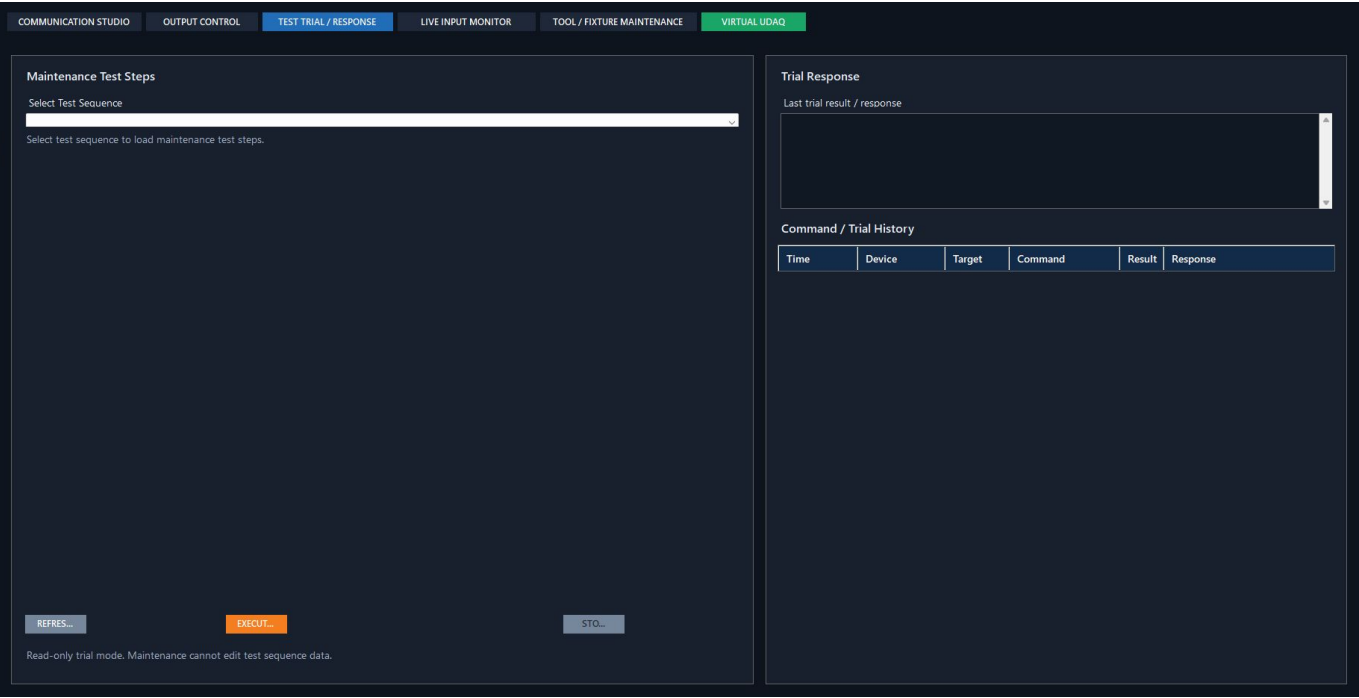


Figure 3.3 - Test Trial / Response: select a saved flow and step. Reference capture: 07 October 2026.

3.3.1 Selecting a sequence step and running a trial

Run the intended saved step without losing its hardware context.

Access and preparation

Maintenance page access; editing mappings/channels also requires Device Configuration editing permission.

A step can assume an earlier flow action has powered, routed or initialized the DUT. Running it alone does not automatically establish those preconditions. Confirm that the selected step is a measurement or controlled action appropriate for manual trial.

Procedure

1. Choose the desired sequence context and select the exact step.
2. Compare step name, device and command with the saved sequence.
3. Prepare the required fixture condition using an approved procedure.
4. Execute the trial once and inspect response, result and log.
5. For a failure, preserve the first error and diagnose before repetition; apply cleanup when finished.

Worked example

A current-reading step may require the DUT powered and the correct relay route. A timeout in isolation may reflect missing preconditions rather than an invalid meter command.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong device/action shown	Reselect the correct sequence context and step.
Standalone failure, full flow works	Compare prerequisites and timing.
Programming step	Use the programming procedure and explicit review; do not assume repeated trials are harmless.

Related instructions: [3.3.2 Expected response, limits, timeout and delay](#); [4.1 Test Sequence](#).

3.3.2 Expected response, limits, timeout and delay

Separate communication, parsing and acceptance settings during a trial.

Access and preparation

Maintenance page access; editing mappings/channels also requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Expected response / response mode	Defines text/ack/numeric validation; choose the mode matching the actual response.
Min / Max	Acceptance bounds on the interpreted measurement, with approved units/scaling.
Timeout	Maximum reply wait; timeout failure is not a measured zero.
Delay	Settling/wait behavior associated with the action; not a substitute for correct communication timeout.

Procedure

1. Obtain and inspect one complete response.
2. Check parser/byte order and scaling before acceptance limits.
3. Set a text expectation or numeric bounds suitable for the action.
4. Run the trial and distinguish no-response, parse failure and out-of-limit judgement.
5. Save sequence changes through its normal SAVE SEQ workflow when configuration is intentionally updated.

Worked example

A raw value 258 scaled by 0.1 is 25.8; compare it to limits in the scaled unit, not raw-byte units. A reply timeout cannot be treated as 0.0 within a range.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Correct-looking number fails	Check configured precision, scale, offset and units.
Reply exists but validation fails	Check mode and expected text/limits independently of connection settings.

Related instructions: [3.1.5.1 Capture B1/B2, combine bytes, decode and compare](#).

3.4 LIVE INPUT MONITOR

Monitor configured I/O with visible freshness and communication health.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

LIVE INPUT MONITOR uses the application device communication path. The LIVE MONITOR and INPUT SETTINGS pages separate viewing from channel definition. A displayed old value can remain visible when communication fails; inspect quality and last-update time before trusting it. Output checks require deliberate arming.

Procedure

1. Select the enabled device and CONNECT.
2. Confirm endpoint, protocol, identity and connection badge.
3. Review configured channels and choose a practical global poll rate.
4. Watch quality, last update, dropped reads and errors; PAUSE to inspect and resume when ready.
5. For approved output work hold ARM two seconds, verify feedback and disarm after the check.
6. Keep Return outputs to Safe State on close enabled for normal maintenance and verify cleanup before leaving.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Values frozen	Check connection, pause state, read command/parser and poll health.
Output remains unsafe	Inspect command errors and actual feedback; use the approved physical recovery procedure if communication is lost.

Related instructions: [3.4.1 Input Settings](#); [3.4.2 Polling, pause, health, dropped reads and errors](#); [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#).

Screen reference

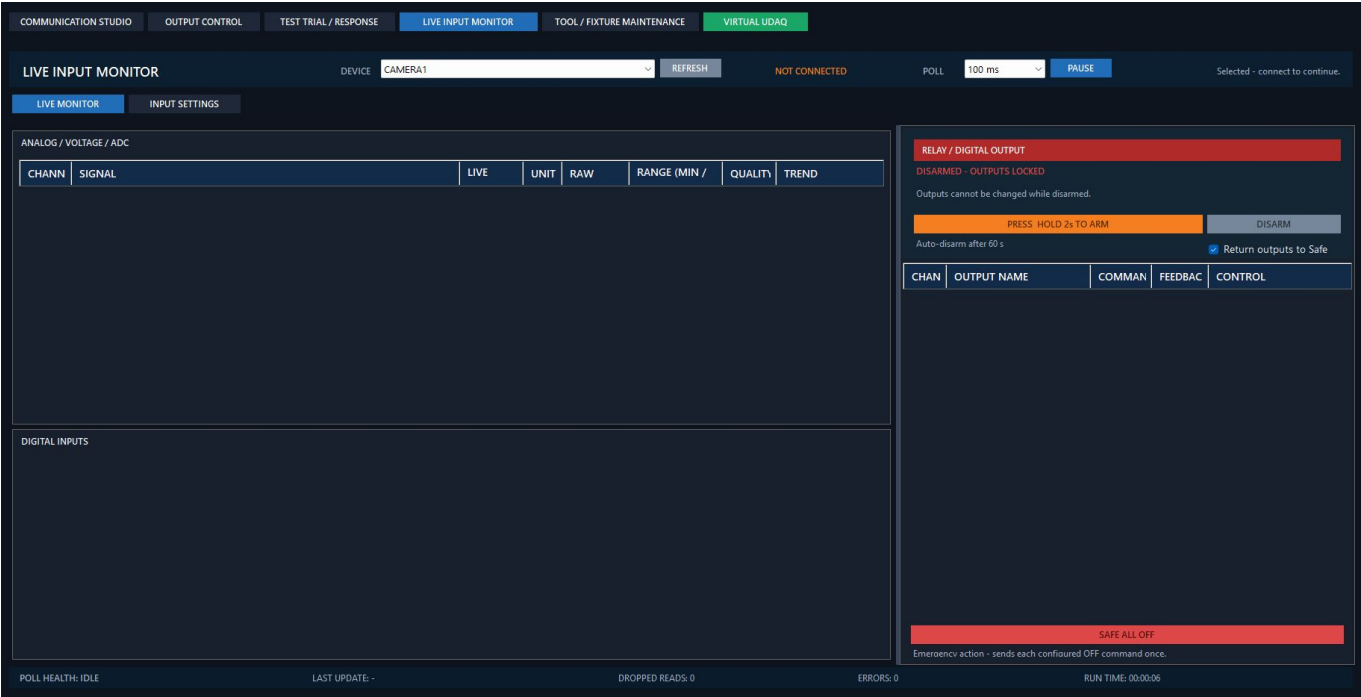


Figure 3.4 - Live Input Monitor: polling and channel area. Reference capture: 07 October 2026.

3.4.1 Input Settings

Define channels that convert device replies into named live signals.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

INPUT SETTINGS contains a channel list and four editor tabs: GENERAL, ACQUISITION, TYPE SETTINGS and QUALITY / SAFETY. ADD starts a new definition; CLONE copies a selected definition for review. A clone still needs a distinct key and correct address/command. Show disabled exposes retained inactive records. Channel editing requires both a connected selected device and Device Configuration Edit permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD / CLONE	Prepare a new definition, with copied settings reviewed carefully.
TEST READ	Trial the selected editor definition against the device; inspect raw/interpreted value.
SAVE CHANNEL	Persist the reviewed definition.
DISABLE / DELETE	Control channel availability/removal through authorized actions.
CLEAR	Reset editor values; does not prove a saved record was removed.

Procedure

1. Connect/select the device and open INPUT SETTINGS.
2. ADD or CLONE and complete GENERAL identity/type.
3. Configure ACQUISITION, then type-specific values.

- 4. TEST READ and compare with a known state/value.
- 5. SAVE CHANNEL and return to LIVE MONITOR to confirm the saved channel updates.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Read-only editor	Check Device Configuration edit permission.
Clone reads original signal	Update command/address, channel number and key rather than only its display name.

Related instructions: 3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY; 3.4.1.2 Digital debounce, analog scaling and output feedback examples.

Screen reference

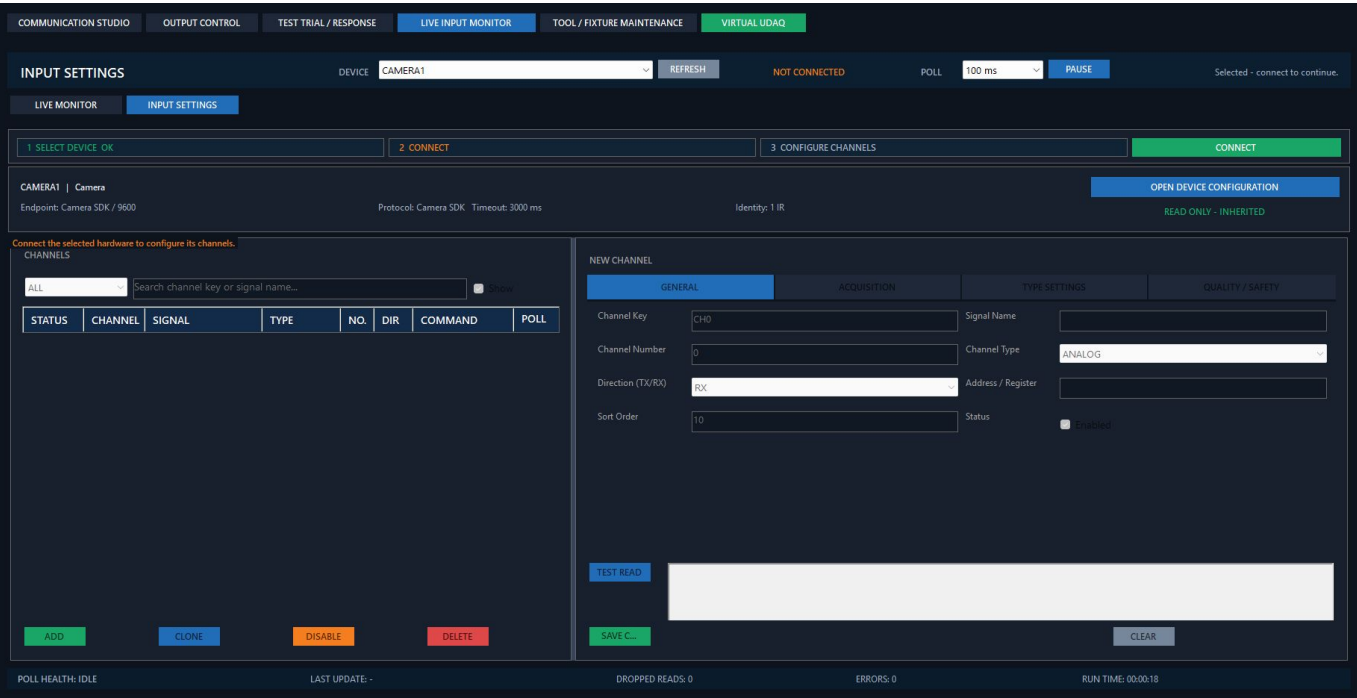


Figure 3.4.1 - Live Input Settings: disconnected camera overview showing GENERAL, ACQUISITION, TYPE SETTINGS and QUALITY / SAFETY tabs; no successful channel acquisition is shown. Reference capture: 07 October 2026.

3.4.1.1 Channels, scaling, units and per-channel decimals

Convert raw analog values into clear engineering units.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Scale and Offset transform the parsed numeric value; Unit and Decimal Places control how that channel is presented. A display precision setting is not sensor calibration. Minimum/Maximum are channel limits and must use the transformed unit. Keep the raw reply available while diagnosing scaling.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Channel Key / Signal Name	Stable identity and readable label.
Scale / Offset	Engineering value = parsed value × Scale + Offset.
Unit / Decimal Places	Display unit and per-channel numeric formatting.
Minimum / Maximum	Reviewed bounds in the engineering unit.

Procedure

1. Verify the acquisition parser returns the intended raw number.
2. Enter conversion Scale/Offset and the unit.
3. Set suitable Decimal Places and reviewed bounds.
4. TEST READ at a known reference, save, then check a second known point where practical.

Worked example

Illustrative: raw 2500 with Scale 0.001 and Offset 0 gives 2.500 V when displayed to three decimals. Do not use these values unless they match the actual device transfer function.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Correct shape but wrong magnitude	Check whether the device already returns engineering units before applying another scale.
Missing decimals	Review channel Decimal Places and normal numeric formatting; do not alter calibration just to change appearance.

Related instructions: [3.4.1.2 Digital debounce, analog scaling and output feedback examples](#).

3.4.1.2 Digital debounce, analog scaling and output feedback examples

Work through analog conversion, digital debounce and independent output feedback.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

These examples use illustrative values. Select real supported commands and addresses from the connected device before saving a channel. A quality badge describes communication/parsing freshness, while a digital label describes interpreted signal state; they answer different questions.

Procedure

1. Analog example: configure a valid numeric read that returns 2500; Scale 0.001, Offset 0, Unit V and three decimals display 2.500 V.
2. Digital example: use the correct input read/bit, Active Level HIGH, ON label Present, OFF label Absent and reviewed debounce such as 50 ms. Change the real input deliberately and verify stable transitions.
3. Output example: configure reviewed ON/OFF commands and reference the separately defined feedback input. Confirm commanded ON, actual feedback and quality independently.

4. TEST READ/save each input definition before using it as output feedback; perform any output test while armed and finish with verified cleanup.

Worked example

A clamp command can be ON while its position input remains Absent. That disagreement is diagnostic evidence; it must not be hidden by renaming the commanded state to "clamped."

Expected result

Raw value, converted value, state label, quality and feedback are consistent with the known physical condition.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Digital chatter	Check physical signal, correct bit/active level and reviewed debounce; do not mask a wiring fault with excessive delay.
Output has no feedback	Define and wire a real feedback input; a mapping alone cannot measure movement.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#); [3.2.7 Commanded state, connection state and disabled controls](#).

3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY

Configure each Live Input editor tab and save a verified channel.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

The four tabs belong to one channel definition. Switching tabs does not replace SAVE CHANNEL. Complete identity and acquisition before type settings, then validate the entire definition with TEST READ.

Procedure

1. Choose ADD/CLONE or select a saved channel.
2. Complete each tab below.
3. TEST READ against a known input and inspect interpreted value/quality.
4. SAVE CHANNEL, then verify the live row updates using the saved definition.

Expected result

The channel retains its identity, acquisition parser, type-specific behavior and quality rules.

Related instructions: [3.4.1.2 Digital debounce, analog scaling and output feedback examples](#); [3.4.2 Polling, pause, health, dropped reads and errors](#).

3.4.1.3.1 GENERAL

Use these controls in GENERAL.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Channel Key / Signal Name	Unique mapping identity and clear signal label.
Channel Number / Channel Type	Hardware channel and ANALOG, DIGITAL INPUT or DIGITAL OUTPUT.
Direction (TX/RX)	RX, TX or BIDIRECTIONAL to describe the channel's communication direction.
Address / Register	Protocol-specific address; use the actual device map.
Sort Order / Status	Display ordering and Enabled state.

Procedure

1. Enter identity and the actual channel type first.
2. Review direction/address rather than copying a neighboring channel blindly.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#).

3.4.1.3.2 ACQUISITION

Use these controls in ACQUISITION.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Read Command / Parser	Supported read plus Auto, Regex or Hex Bytes parsing.
Regex Pattern	Extraction expression for Regex mode; verify it against actual replies.
Data Type	UINT8, INT8, UINT16, INT16, UINT32, INT32, FLOAT32 or FLOAT64 for binary interpretation.
Byte Offset / Byte Length	Zero-based starting byte and required byte count.
Byte Order	BigEndian or LittleEndian from the protocol.
Poll Interval (ms) / Quality Timeout (ms)	Sampling schedule and stale-age threshold.

Procedure

1. Inspect one raw reply before choosing parser settings.
2. Choose the smallest appropriate byte slice/type or a verified text pattern.
3. Use TEST READ and confirm the extracted value before scaling.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#).

3.4.1.3.3 TYPE SETTINGS

Use these controls in TYPE SETTINGS.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ANALOG: Scale / Offset / Unit / Decimal Places	Convert parsed values and format engineering-unit display.
ANALOG: Minimum / Maximum	Reviewed engineering-value bounds.
DIGITAL INPUT: Bit Number / Active Level	Extract the intended bit and interpret HIGH or LOW as active.
DIGITAL INPUT: Debounce (ms) / Labels ON / OFF	Require stable input behavior and assign readable state labels.
DIGITAL OUTPUT: ON Command / OFF Command	Actual hardware command pair.
DIGITAL OUTPUT: Output Mode / Pulse Duration (ms)	LATCHED or PULSE behavior.
Feedback Channel / Default ON / Safe state ON	Independent feedback mapping and configured default/safe state; these do not create physical feedback automatically.

Procedure

1. Enter only the settings relevant to the selected channel type.
2. For outputs review OFF and safe-state behavior before an ON test.
3. Compare a known physical state against the interpreted display.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#).

3.4.1.3.4 QUALITY / SAFETY

Use these controls in QUALITY / SAFETY.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
GOOD / STALE / BAD	Valid recent reply; aged last value; communication/parse failure respectively.
Output arming	Outputs start disarmed. Hold ARM two seconds.
Automatic disarm	After 60 seconds, configured safe states are requested once.
State-changing commands	No automatic retry; investigate failure before another intentional action.

Procedure

1. Review quality interpretation and safe-state policy.
2. Confirm Quality Timeout is meaningful for actual polling time.
3. After TEST READ/SAVE CHANNEL, return to LIVE MONITOR and check freshness.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#).

3.4.2 Polling, pause, health, dropped reads and errors

Select a sustainable polling rate and interpret GOOD, STALE and BAD.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Global poll rate	100, 250, 500 or 1000 ms choices; actual completion depends on communication workload.
Poll Interval (ms)	Per-channel acquisition schedule.
Quality Timeout (ms)	Age threshold after which the last value is stale.
GOOD	A valid reply was parsed within configured timing.
STALE	Last valid value is older than Quality Timeout.
BAD	Communication or parsing failed.
Dropped / Errors / Last update	Health evidence; inspect trends and first error rather than trusting an unchanged value.

Procedure

1. Start with a poll interval the device/port can sustain.
2. Observe update times and counters with the intended number of channels.
3. If dropped/error counts rise, inspect command time and reduce load by increasing intervals.
4. PAUSE for inspection, then resume and verify fresh timestamps before using values.

Worked example

If five sequential reads each take about 100 ms, requesting every channel at 100 ms cannot guarantee five independent fresh values every 100 ms on one serial port.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
STALE after pause	Resume and wait for a successful new read.
BAD with received bytes	Review parser, byte range/type and regex rather than only cables.

Related instructions: [3.4.1.3 GENERAL / ACQUISITION / TYPE SETTINGS / QUALITY / SAFETY](#).

3.5 TOOL / FIXTURE MAINTENANCE

Track tool and fixture life using production-cycle counters.

Access and preparation

Maintenance access; item configuration/reset additionally require the permissions and administrator verification enforced by the screen.

TOOL / FIXTURE MAINTENANCE separates Dashboard health, Item Settings and History. Define each consumable with a meaningful scope and maintenance limit. Counts reflect qualifying production usage, not arbitrary visits to the page. A reset represents real inspection/replacement and requires traceability.

Procedure

- 1. Review Dashboard and identify warning/due items.
- 2. In Item Settings define name, category, scope, model/fixture, limits and due action.
- 3. Perform the real service when required.
- 4. Reset only the serviced item with reason and replacement serial/lot as applicable.
- 5. Review History and confirm the counter/state after reset.

Related instructions: [3.5.1 Counters, maintenance limits, reset and history](#); [3.5.2 Dashboard / Item Settings / History and due-action recovery](#).

Screen reference

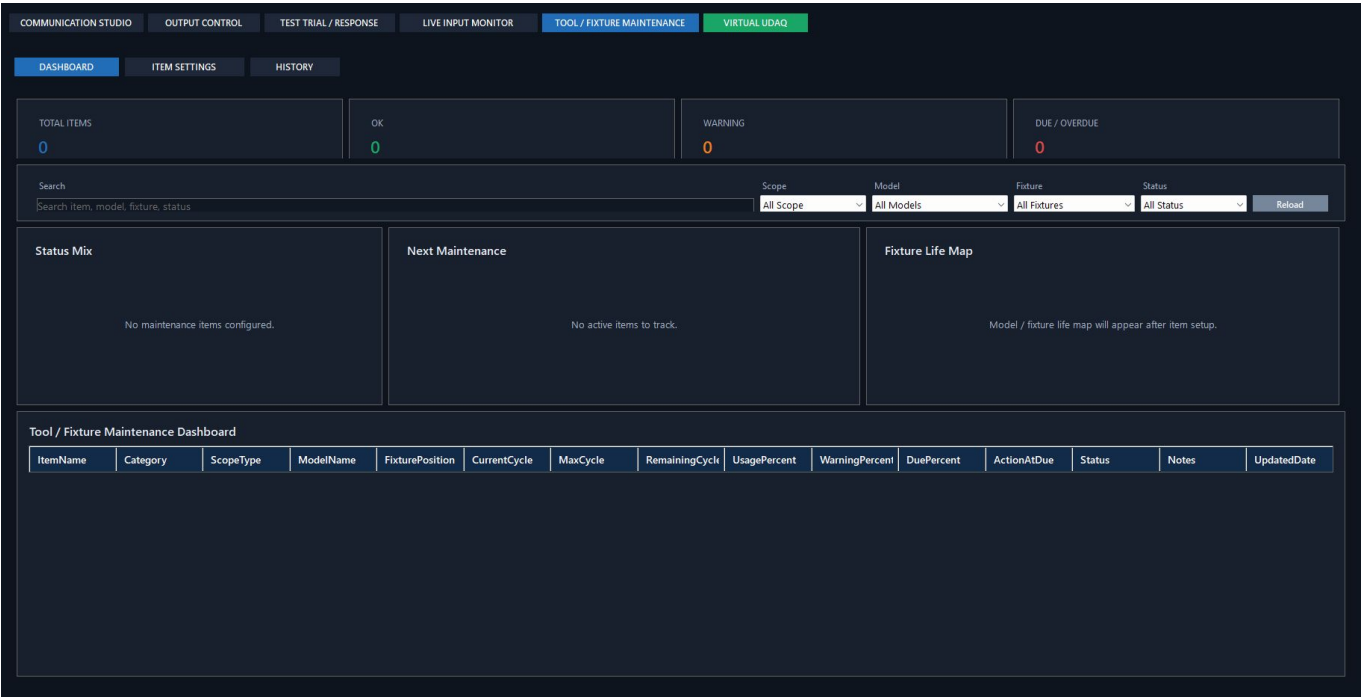


Figure 3.5 - Tool / Fixture Maintenance dashboard. Reference capture: 07 October 2026.

3.5.1 Counters, maintenance limits, reset and history

Set thresholds and reset only after a real maintenance action.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
GLOBAL / MODEL	Global applies across relevant production usage; Model limits the item to its configured model/fixture context.
Max cycle / Warning percent / Due percent	Life denominator and warning/due thresholds.
Active	Whether the item participates in tracking.
Due Action	Remind Only, Block Test or Admin Override.
Reset reason / replacement serial or lot	Traceability of why service restored the counter.

Procedure

1. Confirm scope and model/fixture association.
2. Set approved life and thresholds; save item settings.
3. Monitor Dashboard as qualifying production cycles accrue.
4. After replacement/inspection, select the item and RESET.
5. Complete administrator verification as requested, enter the service reason/details and confirm History.

Worked example

Illustrative Max cycle 10000, Warning 80% and Due 100% mean warning around 8000 counted cycles and due at 10000. These are training values, not a recommendation for a particular tool.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Counter unexpected	Check active/scope/model mapping, whether production reports count in production, and prior reset history.
Reset denied	Use the authorized logged-in administrator verification; do not reset by editing stored values.

Related instructions: [3.5.2 Dashboard / Item Settings / History and due-action recovery](#).

Screen reference

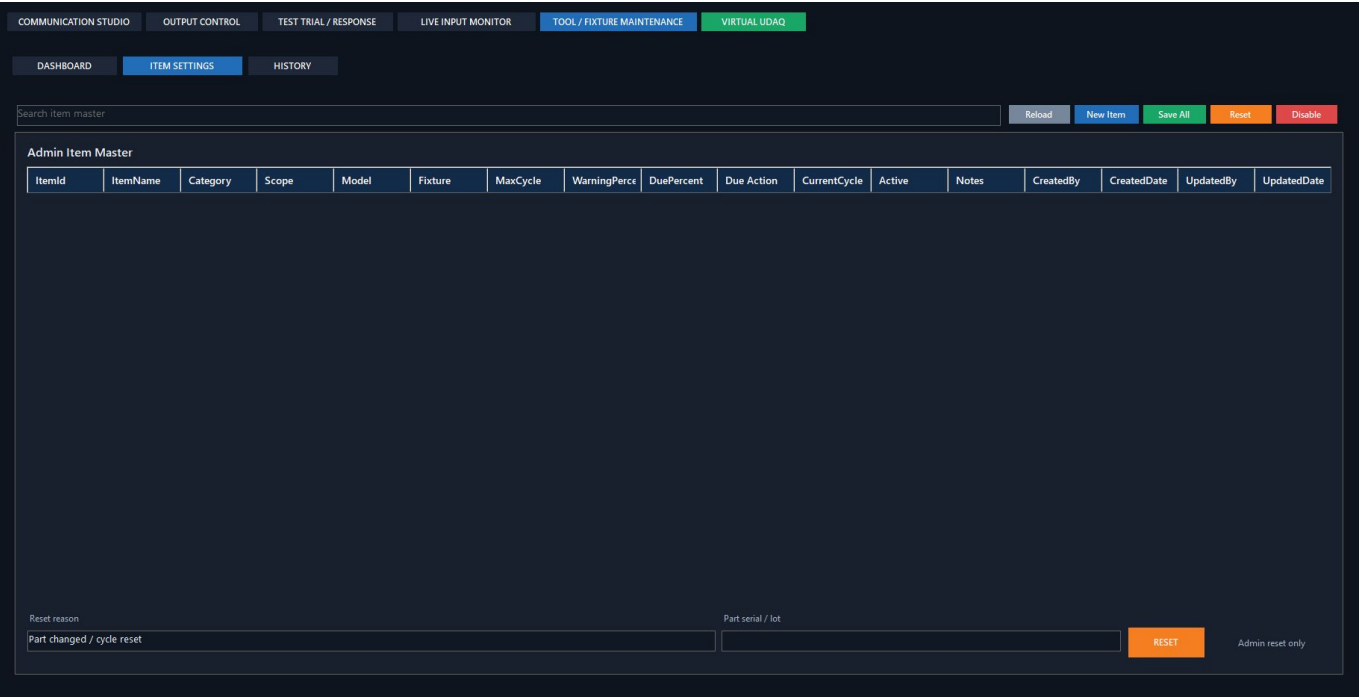


Figure 3.5.1 - Fixture item settings and reset reason. Reference capture: 07 October 2026.

3.5.2 Dashboard / Item Settings / History and due-action recovery

Use Dashboard, Item Settings and History to resolve maintenance due conditions.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Dashboard	Current health, scope/status filters and due item review.
Item Settings	Master identity, scope, thresholds, due action and active state.
History	Evidence of service/reset and previous counts.
Remind Only	Reports the due condition without the configured blocking policy.
Block Test	Requires service/recovery before normal production can continue.
Admin Override	Uses the controlled administrator override policy rather than pretending the item was replaced.

Procedure

1. Locate the due item in Dashboard and check its scope/usage.
2. Review Item Settings to understand the configured due action.
3. Carry out required inspection/replacement; retain relevant part serial/lot.
4. Select RESET only after service. The reset confirmation verifies the current administrator password and sets the selected item cycle to zero with audit/history evidence.

5. Check History and Dashboard after the reset; verify the production hold is resolved by the correct procedure.

Worked example

A due fixture contact should be replaced/inspected before reset. Administrative override, when permitted, is a separate controlled decision and does not document a physical replacement.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Due persists	Check whether another active scoped item is still due.
Verification fails	Confirm authorized account and credentials through the normal login/support process; no password belongs in a service note.

Related instructions: [3.5.1 Counters, maintenance limits, reset and history](#).

3.6 VIRTUAL UDAQ

Exercise a virtual UDAQ without controlling physical outputs.

Access and preparation

Authorized Maintenance/virtual-device access and the applicable licensed feature where enforced.

The VIRTUAL UDAQ CONTROL PANEL explicitly identifies simulation only. It can expose simulated relays, digital inputs, analog values and command events for training or sequence development. A passing virtual test does not verify device drivers, real wiring, load behavior or calibration.

Procedure

1. Open the intended virtual runtime and confirm its device name and running state.
2. Use its controls to establish a known simulated input/analog state.
3. Send a supported virtual command and inspect the response/event log.
4. Reset/stop the virtual session when finished and identify any resulting evidence as simulation.

Related instructions: [3.6.1 Virtual UDAQ command monitor, relay/DI/analog controls and reset](#).

3.6.1 Virtual UDAQ command monitor, relay/DI/analog controls and reset

Use virtual controls to test request/response behavior and simulated state changes.

Access and preparation

Maintenance page access; channel editing requires Device Configuration editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
COMMAND / RESPONSE	Enter a supported command and SEND.
LATEST RESPONSE	Result of the latest virtual request.
LIVE EVENT LOG	Time, Source, Command and Response for correlation.
Relay / DI / analog controls	Change the simulated state/value, not physical hardware.
PAUSE VIEW / RESUME VIEW / RESET ALL / STOP DEVICE / HIDE	Pause/resume display refresh; reset simulated relay, digital and analog values; stop runtime; or hide the panel. Pausing/hiding the view does not stop the virtual device.

Procedure

1. Start the intended virtual UDAQ runtime; confirm the simulation banner.
2. Change a simulated digital input and issue DI1? for the corresponding supported channel.
3. Edit a simulated analog channel value from 0 to 1023, then query the corresponding channel such as A0.
4. Send R1 ON, inspect relay state/event, then R1 OFF.
5. PAUSE VIEW is for inspecting the display, not stopping command execution. When the dependent test is stopped, use RESET ALL if needed; use STOP DEVICE to end the runtime. HIDE only hides its window.

Worked example

Illustrative: set DI1 ON in the virtual panel, send DI1?, and confirm a matching simulated state and timestamped event. This exercises the virtual command path only.

Expected result

The simulated response agrees with panel state and the event log identifies the request.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No virtual response	Check running/stopped runtime, selected virtual device and supported command. If only the view seems frozen, use RESUME VIEW/REFRESH.
Physical behavior unchanged	Expected: this panel does not drive physical outputs.

Related instructions: [3.6 VIRTUAL UDAQ](#).

4 Admin / Testing

Admin / Testing connects the station configuration workspaces. Configuration is applied through the owning workspace's save action; saving General settings does not save every other tab.

Access and preparation

ADMIN with the required page/action permissions and feature entitlements.

Procedure

1. Configure devices and models first, then the sequence and plan that use them.
2. Review the intended tab and selected record before editing. Use a meaningful audit reason where requested.
3. Validate and save in that workspace. Check success and reload the selected record when practical.
4. Release the changed station configuration through your controlled acceptance process before production.

Related instructions: [1 Device Configuration](#); [4.1 Test Sequence](#); [4.4 General](#); [5 Model Setting](#); [7 Test Plan](#).

4.1 Test Sequence

Build a reusable test flow and its linked specialist operations.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test Flow	Selects the edited flow; a model or plan references the saved definition.
Module tabs	TEST SEQUENCE contains parent rows; specialist tabs own reusable child definitions.

Procedure

1. Configure and test physical devices first.
2. Create/select Test Flow and build parent order and linked definitions.
3. Save child definitions, select them on parent rows and SAVE SEQ.
4. Trial one operation, then groups, then the complete approved flow.

Worked example

Illustrative flow: enable supply, read voltage, calculate power, switch supply off. Each operation remains an explicit reviewable row.

Expected result

The saved flow has traceable links, limits, evidence and cleanup.

Related instructions: [4.1.1 Test flow creation, copying, import, export and device mapping](#); [4.1.2 TEST SEQUENCE](#); [4.1.3 UDAQ / RS485 RELAY SEQ](#); [4.1.4 GENERAL PROGRAMMING](#); [4.1.5 CAN](#); [4.1.6 CUSTOM CRC](#); [4.1.7 CAN CALIBRATION](#); [4.1.8 VISION](#); [4.1.9 PRINTER](#); [4.1.10 LIN](#); [4.1.11 Data Link](#); [4.1.12 COMMUNICATION STUDIO SEQ](#); [4.1.13 RAJU BROS AI Assistance \(Beta\)](#); [1 Device Configuration](#); [5 Model Setting](#); [7 Test Plan](#).

4.1.1 Test flow creation, copying, import, export and device mapping

Create, copy or import a flow, then resolve its device names before a controlled trial.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Create a uniquely named draft and select it in Test Flow before copying or importing. IMPORT can retain a sequence when a referenced device is not configured locally. It preserves the saved device names and enabled states so that the draft can be reviewed and mapped deliberately. A successful import does not mean the sequence is ready to run.

Non-empty device names that do not match an enabled configured device are shown in red in the relevant device cells. Red is a configuration warning, not a measurement result. Import does not guess a replacement from a similar name or silently disable the affected test. Other invalid definitions, missing resources and import warnings still require correction.

MAP DEVICES applies an explicit replacement to the selected saved flow and its saved child definitions, including disabled rows. Its scope includes parent and retry-recovery references, Communication Studio commands, CAN UDS steps, Vision camera references, and flow-scoped CAN/LIN cyclic groups. Global cyclic groups and saved camera profiles must be edited in their own pages. Mapping a name does not translate commands, ranges, wiring or protocol settings.

Run admission checks the devices required by the requested run, including linked operations and relevant cleanup/recovery paths. Missing, disabled or ambiguous required references block execution before hardware commands. Saving an unresolved draft does not bypass this check. CAN, LIN, Vision and other licensed operations retain the access requirements documented in their feature chapters.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
New test seq name / ADD TEST SEQ	Create a unique flow. Select the intended destination before importing.
COPY FLOW	Copy to the offered destination and review resources that remain shared.
IMPORT / EXPORT	Transfer the offered format. A CSV must not be assumed to include all linked resources or customer files. Read the import summary and warnings.
Red device cell	The saved non-empty name has no matching enabled local device. Inspect the reference; do not treat the color as a failed product reading.
MAP DEVICES	Available to users with Test Sequence Edit permission while the editor is idle. Resolve a pending save/discard prompt before mapping saved references.
Saved device name / Status / References	Identify the original name, whether it is Configured or Missing / disabled, and how many references will be affected.
Map to configured device	Choose an enabled local device for each intended replacement. A blank choice leaves that original name unchanged.
APPLY TO ALL REFERENCES	Review every choice, apply and provide the requested audit reason. The mapping is saved and the flow is reloaded. CANCEL closes without applying.

Procedure

1. Import into the intended flow and read all warnings. Check enabled rows, phases, groups, device names, commands, limits and linked resources.
2. In Device Configuration, identify or configure the actual local equipment and enable only devices intended for use. Confirm protocol, port and command compatibility.
3. Return to the flow and use MAP DEVICES. Resolve the save/discard prompt for any unsaved edits.
4. For each old name, choose the verified local replacement. Check the References count because disabled rows and saved child definitions can also change.
5. Use APPLY TO ALL REFERENCES and provide the audit reason. Check the saved mapping count and inspect the reloaded parent and child commands.
6. Correct global cyclic groups or camera profiles separately when required. Reopen the relevant linked tabs and check remaining red cells and run-admission messages.
7. SAVE SEQ after any further edits. In Testing, refresh or reselect the intended plan so that it reloads the saved definitions.
8. Perform a controlled trial only after devices, limits, fixture state, cleanup and required feature access have been verified. Inspect raw responses and the result.

Worked example

An imported flow refers to PSU_SOURCE, while the equivalent bench supply is configured as PSU_BENCH. Select PSU_BENCH for PSU_SOURCE, review every affected reference and verify its SCPI commands and ranges. Similar naming alone is not evidence of compatibility.

Expected result

The imported definition is retained for review. Explicit mappings are saved with an audit trail; execution remains blocked while a required device reference is unresolved.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Import completes but a device cell is red	Configure/enable the intended device or explicitly map the saved name. Review warnings for other unresolved resources.
Required replacement is absent from the mapping list	Check Device Configuration and its enabled state, then reopen MAP DEVICES to refresh available choices.
Run remains blocked after mapping	Read the named flow, row and linked reference in the message. Check retry recovery, global groups, camera profiles and ambiguous device allocations. Refresh/reselect the plan before retrying.
Imported rows or commands are rejected	Missing device names are permitted in a draft; invalid command syntax, group structure and other validation failures still need correction.

Related instructions: [1 Device Configuration](#); [4.1.2.1 GRID VIEW: editing, expanding and collapsing groups](#); [4.1.5 CAN](#); [4.1.7 CAN CALIBRATION](#); [4.1.8 VISION](#); [4.1.10 LIN](#).

4.1.2 TEST SEQUENCE

Take a sequence draft through controlled trials to a saved definition.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Build and run test sequence: Select the correct model/test flow and confirm required devices/actions exist.

Do not run all steps on a live machine until outputs and safety conditions are verified.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD STEP	Adds a new test sequence row. Fill device/action/limits/response mode before running or saving the sequence.
DELETE STEP	Removes the selected unsaved or saved sequence row. Confirm the selected row and renumber/save the sequence after deleting.
ADD FORMULA	Adds a software formula step to calculate from values stored by earlier steps. Use Store Variable on measurement rows first, then put the expression in Command / Formula. Example: store POW, O_VOL, O_CUR, then calculate O_POWER = O_VOL * O_CUR and EFF = (O_POWER / POW) * 100.
CALCULATE	Calculates a numeric result from stored variables. Use after the source measurement rows have passed. Formula examples: O_VOL * O_CUR, (O_POWER / POW) * 100, ROUND(EFF, 2).
FORMULA	Runs a software-only formula step inside the sequence. Leave the device blank, enter the expression in Command / Formula, and set Store Variable if the calculated result must be reused.
RUN STEP	Executes only the selected sequence step. Use this for validation before RUN ALL. Check raw response and result message.
RUN ALL	Executes all enabled steps in the selected sequence. Use only after safety checks and step-level validation are complete.
SAVE SEQ	Saves the current test sequence. Saving should audit setup change and keep linked sequence IDs consistent.
Enable	Participation also depends on phase and group.
SAVE SEQ	Persists the parent; running does not save edits.

Procedure

1. Add or select test flow.
2. Add steps and choose node type, device, action, command, limits, response mode, and retry settings.
3. Link child sequences where required.
4. Use RUN STEP to validate one row.
5. Use RUN ALL only after the sequence is reviewed.
6. Save the sequence.
7. Create a read-only row using a validated Device and Action.

- 8. Set response mode, unit and limits; inspect command before RUN STEP.
- 9. Add required fixture setup and completion/failure operations.
- 10. Save linked definitions and parent; trial normal and failing paths.

Worked example

Illustrative voltage limits 11.5-12.5 V accept 12.1 and reject 13.0. Later passing rows do not erase the failure.

Expected result

The saved flow reproduces the reviewed order and judgement.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
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Build and run test sequence	If a step fails, check the response mode, expected response, min/max limits, retry recovery, and linked sequence selection.
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Related instructions: 4.1.2.1 GRID VIEW: editing, expanding and collapsing groups; 4.1.2.2 TREE VIEW; 4.1.2.3 VISUAL PREVIEW; 4.1.2.4 Toolbar, step creation, copying, enable/disable and deletion; 4.1.2.5 Selected step editor; 4.1.2.6 Groups, child steps, loops and group retries; 4.1.2.7 Stop-on-fail, continue-after-fail and final NG evidence; 4.1.2.8 Step/group dragging, movement and renumbering; 4.1.2.9 Undo, redo and keyboard shortcuts; 4.1.2.10 RUN STEP, RUN ALL, STOP RUN and LIVE DEBUG; 4.1.2.11 SAVE SEQ, review, audit reasons and saving progress; 4.1.2.12 Unsaved changes, failed saves and navigation.

Screen reference

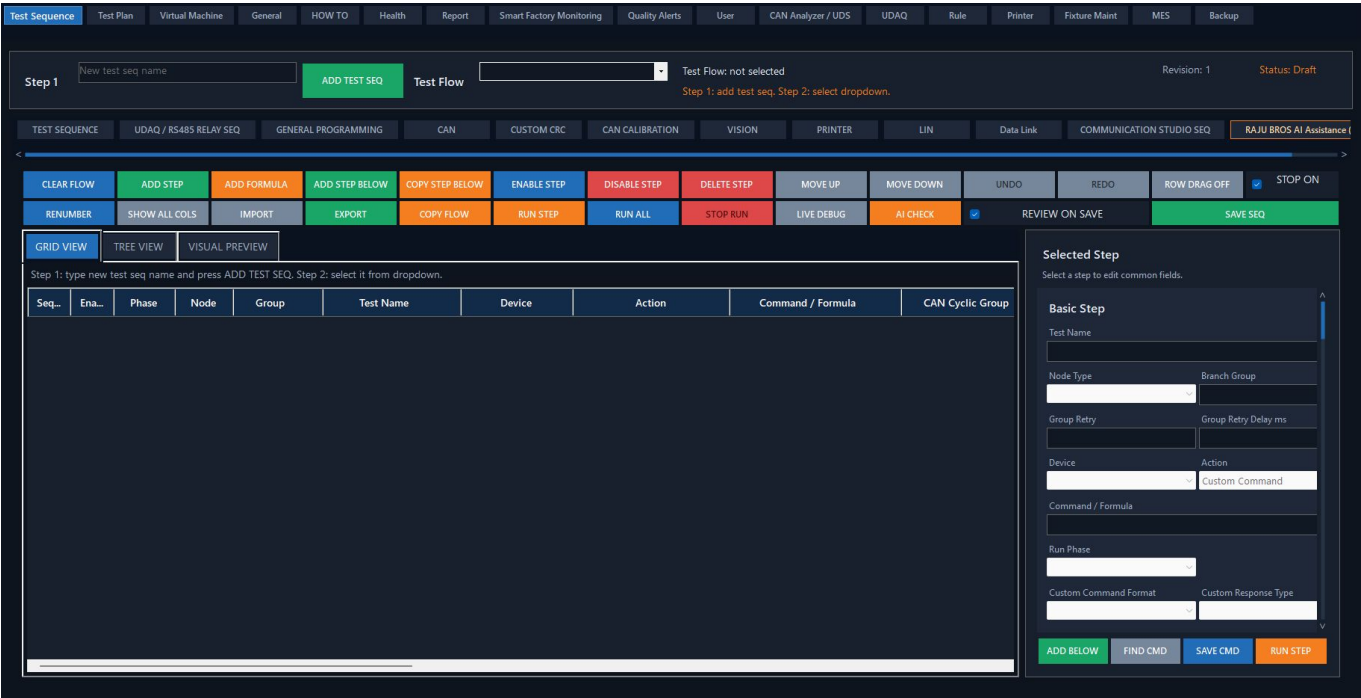


Figure 4.1.2 - Test Sequence reference layout; the newer grid group arrows, EXPAND ALL / COLLAPSE ALL and MAP DEVICES controls are described from source and are not shown in this retained capture. Reference capture: 07 October 2026.

4.1.2.1 GRID VIEW: editing, expanding and collapsing groups

Edit the selected row and collapse groups to navigate a long sequence.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

GRID VIEW is the main tabular editor. Select one row and confirm its Test Name in the detail editor. Horizontal scrolling reveals additional columns. Review the enabled state, phase, node type, group, device and action together.

Click the small arrow at the left of a GROUP row's Group Summary cell to collapse or expand that group. Only its child rows are hidden. The group header remains visible with its summary; unrelated rows remain visible. EXPAND ALL and COLLAPSE ALL act on the groups in the current flow.

Collapsing changes the view only. It does not disable children, remove them from save/export/copy, or limit which enabled steps execute. Disable the intended group or rows explicitly when they must not run. During a run the application reveals the current child when its group was collapsed.

Finish a cell edit before a row or group command. If a selected child becomes hidden by collapse, the header becomes the editing context; expand again and select the child to edit it. Group visibility controls are unavailable while a run or another protected editor operation is active.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
GRID VIEW	Select a row to load its detail editor. Confirm the displayed Test Name before editing.
SHOW ALL COLS	Reveal additional columns; scroll horizontally when necessary.
Seq / Enable / Run Phase / Node Type / Branch Group	Read together for execution order, participation and group membership.
Group Summary arrow	Click the small left-side arrow on a group header to show or hide that group's child rows.
EXPAND ALL / COLLAPSE ALL	Show or hide group children in the current grid without changing the saved sequence definition.
MAP DEVICES	Open the saved-reference mapping workflow described in the import and device-mapping section.

Procedure

1. Select the intended Test Flow and open GRID VIEW.
2. Use COLLAPSE ALL for an overview; read each header name and child-count summary.
3. Expand the group to inspect or edit, then select its intended child and verify the detail-editor Test Name.
4. Finish the edit and use SAVE SEQ for definition changes. Collapsing alone needs no sequence save.
5. Use EXPAND ALL when reviewing the full flow before a controlled run or export.

Worked example

Collapsing POWER_CHECK hides its SET, READ and OFF children. Those enabled children still run; disabling the group is a separate action.

Expected result

The grid remains navigable while every saved child and its configuration remain intact.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
A child is no longer visible	Expand its group or use EXPAND ALL. Check the selected editor context before changing a value.
A collapsed child still executes	Collapse is a viewing aid. Review the Enable state of the group and child to change participation.
The arrow has no effect	Click the small arrow at the left of Group Summary, finish editing and wait until the editor is idle.
The detail editor shows the header	The previously selected child may have been hidden. Expand its group and select the child again.

Related instructions: [4.1.1 Test flow creation, copying, import, export and device mapping](#); [4.1.2.2 TREE VIEW](#); [4.1.2.6 Groups, child steps, loops and group retries](#); [4.1.2.6.2 Group header highlighting, summary and execution states](#).

4.1.2.2 TREE VIEW

Inspect groups and select the correct header or child.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

TREE VIEW emphasizes group membership and child order. Expand the relevant group when checking a long flow. Collapsing a group changes the view, not the participation of its enabled children. Check all children when moving or disabling a group.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Expand / collapse	View only; does not disable children.
Run Group / Copy Group	Right-click an idle group header; permissions apply.

Procedure

1. Expand and inspect child order and enabled states.
2. Select a child for its operation or the header for loops/retries.
3. Check the name before a group action and use GRID VIEW for phase/order.

Worked example

Collapsing POWER_CHECK still allows its enabled SET, READ and OFF children to execute.

Expected result

The tree scopes actions to the intended group.

Related instructions: [4.1.2.6.1 Copy Group: complete children, linked settings and save](#); [4.1.2.6.4 Run Group: selection, prerequisites, trials and results](#).

4.1.2.3 VISUAL PREVIEW

Review graphical structure before execution.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

VISUAL PREVIEW presents the sequence structure for review. Use it to inspect flow arrangement after adding groups or links. It does not replace a controlled trial or prove that every hardware command is correct. Return to the editor to change the saved definition.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
VISUAL PREVIEW	Structural view; not a hardware validation.
REFRESH PREVIEW	Refreshes after draft changes.

Procedure

1. Open and refresh after adding groups/links.
2. Trace order and select unexpected operations.
3. Correct the actual row/link in the editor and refresh.

Worked example

If a measurement appears outside a group, inspect Branch Group and row order.

Expected result

Preview agrees with the table and tree.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Stale view	Refresh and verify selected Test Flow.

4.1.2.4 Toolbar, step creation, copying, enable/disable and deletion

Create and organize rows with deliberate inherited settings.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

ADD STEP creates a row; ADD FORMULA creates a calculation step; copy actions duplicate a selected definition. ENABLE/DISABLE control participation. DELETE removes the chosen draft item. CLEAR FLOW affects the current flow draft. MOVE UP/DOWN and RENUMBER organize it. Review the selection and unsaved status before saving.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD STEP / ADD FORMULA	Creates operation/calculation rows.
ADD STEP BELOW / COPY STEP BELOW	Inserts after the selection; copied fields need review.
ENABLE / DISABLE STEP	Participation without deleting definition.
DELETE STEP / CLEAR FLOW	Removes selected/current draft content; review confirmation.
MOVE UP / MOVE DOWN / RENUMBER	Order and numbering; recheck group boundaries.

Procedure

1. Select the preceding row and ADD STEP BELOW.
2. Configure operation and judgement; change all inappropriate inherited settings on copies.
3. Disable retained optional work or delete unwanted work.
4. Review and SAVE SEQ.

Worked example

Copying voltage to current requires changing action, unit, limits and Store Variable VOUT to IOUT.

Expected result

New work is in the intended order.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Copy overwrites a variable	Use a distinct Store Variable unless replacement is deliberate.

4.1.2.5 Selected step editor

Configure the selected row's operation, comparison, timing and optional behaviors.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Basic Step	Name, group, device/action, command and phase.
I/O and Limit	Addressing, setpoint, transforms, limits, response and timing.
Options	Enable, Report, Monitor, Clear RX, Pass Min, Operator Grid, Store Variable and decoder.
Popup / RX Safety / Sweep	Independent optional behaviors.

Procedure

1. Select a row and scroll through the complete editor.
2. Set execution, response/limits, variables/reporting in order.
3. Review optional controls and Command Preview before SAVE SEQ.

Worked example

A correctly named current row still needs the correct decoder and units.

Expected result

The row expresses a reviewable complete operation.

Related instructions: 4.1.2.5.1 Basic step, node type, phase, device and action; 4.1.2.5.2 Commands, response modes, limits and units; 4.1.2.5.3 Custom commands, serial HEX and byte decoding; 4.1.2.5.4 Formulas, stored variables and barcode assignment; 4.1.2.5.5 STATE CHANGE, monitor flags and barriers; 4.1.2.5.6 Step retries, recovery actions and Delay After; 4.1.2.5.7 Linked UDAQ, CAN, LIN, Vision, Programming and Data Link; 4.1.2.5.8 Operator Popup: Show Popup, Ack Required and Message; 4.1.2.5.9 RX Safety Phase: group, mode and operator message; 4.1.2.5.10 Scaling and output offset; 4.1.2.5.11 Sweep: range, step, dwell, stop mode and point evidence.

4.1.2.5.1 Basic step, node type, phase, device and action

Choose a step or header and its execution phase.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Test Name is the readable operation label. Node Type distinguishes a normal step from a group header. Phase determines when the operation participates in the run. Device and Action choose its execution target. A group header organizes children and should not be configured as an ordinary instrument measurement.

Implement generic hardware test step: Confirm the device exists in Device Configuration and the action is already validated in Maintenance or a single RUN STEP trial.

Do not build hidden machine logic into code when device/action/sequence can express it. Do not skip raw response logging for new hardware.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test Name	Readable result label.
Node Type / Branch Group	GROUP header and matching child identity; every header must be uniquely named.
Run Phase	TEST, COMPLETE, PASS and FAIL select main/end/result paths. A group and all children must share phase.
Device / Action	Configured enabled target and supported action; software formulas can leave Device blank.

Procedure

1. Select test flow and add a step.
2. Choose node type/device/action.
3. Enter command and expected response or parser/value type.

4. Set timeout and retry based on real hardware behavior.
5. Store variable if another step/formula needs the value.
6. Add min/max or expected text judgement.
7. Add fail action/recovery if outputs may remain ON.
8. Run one step and verify raw log before production.
9. For hardware select a normal row, Device and Action; inspect any filled command.
10. For grouping create a header immediately before its children and assign a common group/phase.
11. Keep completion/result operations explicit and test the intended paths.

Worked example

A COMPLETE output-off row is distinct from TEST measurement rows. Use actual offered phase choices rather than inventing a Setup phase.

Expected result

Target, order and phase are unambiguous.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Implement generic hardware test step	If the step is unreliable, separate setup, command, readback, compare, and recovery into separate rows.
Phase mismatch	Correct header and all children, including disabled rows.

4.1.2.5.2 Commands, response modes, limits and units

Match response validation to the required device evidence.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Command / Formula contains the selected action's command or calculation. Configure response requirements deliberately, then measurement limits and Unit where appropriate. An action that does not produce a numeric result should not inherit unrelated limits. Required missing responses or invalid numeric values must be investigated.

Implement LED analyzer test: Add the LED analyzer in Device Configuration first. Confirm communication type, protocol, command format, timeout, and expected raw response from the actual analyzer.

Do not use delay as a substitute for checking LED ON state. Do not retry if the LED/analyzer command changes state unpredictably.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Response Mode	None expects no reply; AnyResponse checks presence; Contains/ExactMatch/Regex checks text; NumericLimit checks numeric boundaries; HEX modes compare bytes.
Expected Response / State Pattern	Pattern for the selected mode, not the numeric limit.
Min / Max / Unit	Acceptance window in engineering units; blank boundary imposes no corresponding limit.
Timeout ms / Clear RX	Reply waiting and stale receive-data clearing.
Pass Min	Receive-count minimum stopping option where supported, not a general override of Max.

Procedure

1. Add or select the test flow.
2. Add a power/relay setup step if the LED must be turned ON.
3. Add LED analyzer command step with the configured analyzer device.
4. Set response mode and parser/value type to extract brightness/color/intensity.
5. Add min/max or expected response limits.
6. Set retry only if the analyzer can safely re-read without changing product state.
7. Add a shutdown/recovery step if fail must turn the LED/power OFF.
8. Run step first, then RUN ALL.
9. Capture a known device reply.
10. Choose the comparison and any binary decoder for the intended value.
11. Set final-unit limits and trial in-range and out-of-range inputs.
12. Inspect raw reply, Actual and result reason before saving.

Worked example

Temperature reply 25.0 with 20-30 limits passes. AnyResponse would only show that data arrived.

Expected result

PASS represents the configured acceptance test.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Implement LED analyzer test	If the reading is unstable, check fixture contact, LED drive current, exposure/integration time, command parser, timeout, and ambient light.
Wrong value passes	Check response mode, parser and inherited/blank limits.

4.1.2.5.3 Custom commands, serial HEX and byte decoding

Send a supported custom command and decode the intended bytes.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Use Custom Command for a documented device action absent from the list. Choose text versus HEX explicitly. For binary replies, define the correct byte slice, type, endianness and scale before storing a value. Confirm the decoder against a known reply. See the detailed custom-command and decoding procedures in this chapter.

Use Custom Command for any device: Select the correct saved, enabled device and obtain its supported command syntax. Custom Command is the first Action option for every device category. Sequence page and action permissions still control viewing, editing, saving and running.

Do not enter a workflow name such as VISION_SEQUENCE or PROGRAMMING_SEQUENCE as a device command; choose the corresponding specialized sequence action. Camera SDK devices and drivers without a generic command interface report a clear limitation. Use supported Vision, CAN, LIN, programming, printer or other specialized actions when the driver requires them. A deliberate loop can repeat a state-changing command, so configure that repetition only for the intended device behavior.

Decode response bytes into a variable: Use this when a device returns hex bytes and the value is not the first number in the response. Example: NTC ADC response 6F 00 1E 00 63 0E stores 0x0E63 = 3683.

Do not use plain Number/NumericLimit for hex payload bytes like 6F 00 1E 00 63 0E because it will read the first numeric text, not the ADC value.

Custom Command automatic retries are suppressed. An explicit loop is still a deliberate repeat operation and needs separate review.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Custom Command Format	Device Protocol uses its driver; Text / ASCII or HEX uses the explicitly supported raw transport.
Value Type / Decoder	Typed zero-based payload selection such as UInt16LE@4.
Store Variable	Name for the decoded current-run value.

Procedure

1. Use Custom Command for any device - Open Admin / Testing > Test Sequence, select the flow and select a normal step. Choose the configured device, then select Custom Command at the top of the Action dropdown.
2. In the Step Editor, enter the command in Command / Formula. Set Custom Command Format to Device Protocol, Text / ASCII or HEX. Device Protocol uses the configured driver syntax; for example READ_HOLDING {ChannelNo} COUNT=1 TYPE=UINT16 on Modbus. Text / ASCII and HEX are explicit raw formats for COM, RS485 or raw LAN/TCP transports. HEX needs complete byte pairs, for example 01 03 00 00.
3. Select Custom Response Type: No response uses Response Mode None; Text uses modes such as Contains, ExactMatch, Regex or AnyResponse; Numeric uses NumericLimit with MinValue/MaxValue; HEX uses HexExactMatch, HexContains or HexAnyResponse. STATE CHANGE polls a read command and counts observed 0/1 transitions; see Count input transitions with STATE CHANGE for its interval, measurement window, optional

extraction pattern and count limits. Supply Expected Response for text/HEX comparisons; HexAnyResponse only requires received bytes. Native Modbus responses are decoded values, so use Numeric or Text validation rather than a raw HEX comparison.

4. Set the step Timeout in milliseconds. Review the selected device's termination, framing and checksum settings. Explicit Text / ASCII or HEX on a Modbus device bypasses native Modbus framing and decoding and uses the configured raw transport settings, including any configured checksum. Enter the raw frame accordingly.
5. Use placeholders such as {SetValue}, {ChannelNo}, {RelayNo} and {TimeoutMs} where needed. Review Command Preview (after variable replacement) and resolve any displayed error. Runtime variable values resolve when the step executes.
6. Set Expected Response or Min/Max limits as required, then click SAVE SEQ to retain the command and validation settings with audit history.
7. Use RUN STEP for one reviewed invocation and inspect the response and result. Custom Command has no automatic retries; an explicitly configured loop can invoke the step again deliberately.
8. Decode response bytes into a variable - Enter the command and expected response normally.
9. Set Response Mode to Contains and Expected Response to the positive-response prefix, for example 6F 00 1E.
10. Enter Store Variable, for example NTC_ADC.
11. Set Value Type to UInt16LE@4.
12. Enter Min and Max limits if required, for example 3284 and 3920.
13. Run the step; the payload is decoded first, then limits and formulas use the decoded number.

Worked example

Payload 6F 00 1E 00 63 0E with UInt16LE@4 reads 63 0E = 3683. CAN frame 06 6F 00 1E 00 63 0E 00 first yields that six-byte payload.

Expected result

Correctly selected bytes become the judged/stored value; Custom Command gets one automatic attempt.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Use Custom Command for any device	If validation rejects the command, check the chosen format, complete HEX byte pairs, expected response, device driver and transport support. Check USB identity/COM port or IP/port and the device manual for a timeout or unsupported command. For a complete raw Modbus frame, confirm slave ID and CRC/checksum responsibility because native Modbus framing and decoding are bypassed. Resolve preview errors before running and use the specialized editor when the device has no generic command interface.
Decode response bytes into a variable	If decode fails, check the response contains hex bytes, the response prefix is correct, and the byte offset matches the payload.

4.1.2.5.4 Formulas, stored variables and barcode assignment

Reuse measured values and assign automatic barcode slots.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Stored variables make earlier measurements available to later formulas and commands. Use unique names and ensure the source step executes before the consumer. Barcode assignment must target the configured slot and pass

its rule. Formula calculations retain intermediate precision; final measurement comparison follows the run's numeric policy.

Capture barcode from serial CAN or MES: Set Barcode Count first. For every slot choose Capture Mode. Serial Trigger slots require either a Scan Barcode step or Assign Barcode From Variable step with an explicit SLOT=n mapping.

Do not map two automatic barcode steps to one serial slot. Do not omit SLOT=n. Assign Barcode From Variable requires an earlier step to store the named runtime variable. Existing models default to Manual, and the Admin General duplicate setting remains the policy for different DUTs.

Use formulas and stored variables: Measure the source values first and use stable variable names such as POW, O_VOL, O_CUR, O_POWER, and EFF. Confirm units before writing the formula.

Do not calculate before the source variables are stored. Do not mix mA and A without conversion. Do not use spaces in variable names.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Store Variable	Producer must run before its consumers; keep names and units consistent.
Command / Formula	Arithmetic, parentheses, ABS, ROUND, MIN, MAX, CLAMP and supported HEXLE/HEXBE byte composition.
SLOT=n	Explicit one-based barcode destination in Set / Duration for supported automatic capture/assignment actions.

Procedure

1. Capture barcode from serial CAN or MES - Open Model Setting and set Barcode Count.
2. Save each barcode rule with Capture Mode Manual or Serial Trigger.
3. Set Allow Duplicate Barcode Within Same DUT only when the product permits repeated slot values.
4. For a scanner, add Scan Barcode with its scanner device and set SLOT=n in Set/Duration.
5. For a value already read by CAN or another step, add Assign Barcode From Variable with the source name in Command / Formula (for example OFBC_BARCODE) and SLOT=n in Set/Duration.
6. In Operator, scan only the Manual slots shown as SCAN NOW.
7. Press START; each automatic step captures, validates, and stores its configured slot.
8. Continue only after every slot passes local validation, duplicate policy, MES, and interlocking.
9. Use formulas and stored variables - In a measurement step, enter a Store Variable name. Example: power meter input power -> POW.
10. Store output voltage as O_VOL and output current as O_CUR.
11. Add a Formula or Calculate step after those measurements.
12. Leave Device and Device Role blank for a normal software formula step.
13. Enter the formula in Command / Formula. Example output power: O_VOL * O_CUR.
14. Enter Store Variable as O_POWER to keep that result.

15. Add another Formula or Calculate step for efficiency: $(O_POWER / POW) * 100$ and store it as EFF.

16. Add min/max limits on the formula step or compare EFF in the next check step.

Worked example

POW=30 W, O_VOL=12 V, O_CUR=2 A gives O_POWER=24 W and EFF=80%. A zero POW is invalid for division.

Expected result

Derived results remain traceable and barcode assignment applies normal validation.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Capture barcode from serial CAN or MES	If START is blocked, check Capture Mode, automatic barcode action, explicit SLOT=n, duplicate slot mapping, source runtime variable or scanner readiness, timeout, raw response, local rule, and MES decision.
Use formulas and stored variables	If formula fails, check exact variable names, blank values, non-numeric device responses, input power equal to zero, and unit conversion. If O_CUR is in mA, use $O_VOL * (O_CUR / 1000)$. Supported operators are +, -, *, /, ^, parentheses, ABS, ROUND, MIN, MAX and CLAMP. For HEX fragments captured from Serial, RS485, TCP or other byte responses, use HEXLE({B1},{B2}) or HEXBE({B1},{B2}) to combine and decode up to 8 bytes.

Related instructions: [5 Model Setting](#).

4.1.2.5.5 STATE CHANGE, monitor flags and barriers

Count observed transitions, expose monitor values and coordinate parallel work.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

STATE CHANGE counts transitions of a configured input rather than sampling only its final value. Set the expected transition count and timing window. Monitor flags make chosen evidence easier to find. Barriers coordinate dependent work in parallel execution; they require all expected participants and a defined timeout.

Count input transitions with STATE CHANGE: Select a saved, enabled COM/Serial, RS485 or raw LAN/TCP device and confirm its read command and response format. Use a normal Test Sequence step; linked sequences, workflow actions and write commands are not supported for repeated state polling.

RX message count and STATE CHANGE are different measurements: repeated identical replies are not input transitions. Retry Count and Recovery Command are not the polling controls for this mode. Read commands must return one binary input state. Fast transitions occurring between polls can be missed; use a hardware pulse counter or RPM register when the signal is faster than reliable software polling.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
STATE CHANGE	Poll a read command and count observed LOW/HIGH changes within the measurement window.
Monitor	Marks chosen result evidence; does not add a hidden hardware read.
Barrier	Named synchronization point for participating parallel work.

Procedure

1. Open Admin / Testing > Test Sequence and select a normal step. Select the device and a digital-input read action, or choose Custom Command. For a native Modbus device use Device Protocol with S1 DI1? (slave 1, digital input 1) or READ_DISCRETE {ChannelNo} COUNT=1. For UDAQ or another ASCII device use its documented query, for example D1?, with Device Protocol or Text / ASCII as appropriate. Confirm the actual syntax in the device manual.
2. Select Response Mode STATE CHANGE. Leave Expected Response blank for automatic 0/1 or DI-channel state extraction. Replies 1 and DI1 1 mean HIGH; replies 0 and DI1 0 mean LOW. The first valid reply establishes the baseline and adds no count. Identical repeated states add nothing. Each observed 0-to-1 or 1-to-0 change adds 1; DI1 1, DI1 1, DI1 0, DI1 0, DI1 1 therefore counts 2.
3. For another response format, put a full-response extraction regex in Expected Response. Capture the state in a named state group or the first capture group; for example `^DI1\s+(?<state>[01])$` accepts only DI1 followed by 0 or 1. Include the required channel or device prefix in the pattern so another channel cannot be mistaken for this input. The default parser requires a binary 0/1 state. An explicit pattern defines the accepted state tokens; HIGH/ON normalize to 1 and LOW/OFF normalize to 0. Other captured tokens are compared as distinct states. Wrong-channel, malformed and error replies fail the step.
4. Set Timeout (ms) to the measurement window and Retry Delay (ms) to the interval between read polls; 0 uses the default 100 ms interval. Set Retry Count to 0 and leave Recovery Command blank. STATE CHANGE repeats the read within its measurement window and retains the previous state and count across those reads.
5. Enter nonnegative whole-number MinValue and/or MaxValue as limits on the raw state-change count; Min must not exceed Max. With Pass Min enabled, set a positive MinValue to finish as soon as that count is reached. With Pass Min disabled, polling continues until the measurement window ends and the final count is compared with the limits.
6. Use SAVE SEQ to retain the mode, command, optional extraction pattern, interval, timeout and limits with the existing audit history. Run the reviewed step and check its count/result and debug TX/RX records before using the flow in production.
7. Configure a validated input read, poll delay, measurement window and count limits using the detailed procedure.
8. Mark the actual measurement row for monitoring and inspect its evidence.
9. Place matching barriers at corresponding points in participating flows; test a delayed/missing participant and cancellation.

Worked example

Samples 0,0,1,1,0 contain two transitions. A pulse wholly between polls is not observed.

Expected result

Transition Actual reports observed changes; barrier and monitoring have separate purposes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Count input transitions with STATE CHANGE	Check the command, slave/channel address, selected protocol, serial settings and raw RX when the step rejects a reply. Use an explicit channel-specific extraction pattern for a custom response format. For unexpected counts, verify the initial baseline, both transition directions, polling interval, measurement window and whether Pass Min ended the step early. Enable debug logs to inspect sent commands, replies and the reported state/count.
Barrier timeout	Check exact names, phases, enabled paths and any stopped/failed participant.

4.1.2.5.6 Step retries, recovery actions and Delay After

Configure eligible retries and recovery without repeating uncertain writes.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Retry Count / Retry / Poll Delay ms	Additional eligible attempts and wait; STATE CHANGE uses its polling context.
Recovery Device / Command / Delay ms	Explicit supported recovery action and settling time.
Delay After ms	Spacing after an operation, separate from timeout/retry wait.

Procedure

1. Classify the operation before assigning attempts.
2. For an eligible read, set a limited count/delay and inspect all attempt evidence.
3. Review every child before allowing a group restart.
4. Programming, protected mutating/unknown UDS and Custom Command are restricted to one automatic attempt. Resolve the failure before a deliberate new run.

Worked example

Eligible Retry Count 2 means at most three attempts. A programming row does not receive those attempts even if an older saved count is 2.

Expected result

Read recovery remains traceable and unsafe automatic replay is blocked.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Implement retry and recovery	If retry hides a real fault, check retry count, retry delay, fail action, and whether the step should be split into read/setup/recovery phases.
Programming does not retry	This is enforced behavior; inspect the first result and recover the target before a reviewed new run.

Related instructions: [4.1.4.8 Programming trial, verification, replies and failure evidence](#); [4.1.2.6 Groups, child steps, loops and group retries](#).

4.1.2.5.7 Linked UDAQ, CAN, LIN, Vision, Programming and Data Link

Invoke a saved specialist definition and interpret its result.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Save the child sequence/profile before linking it into a main step. Choose the correct link type, saved definition and device mapping. The linked result must have a clear Actual/response and judgement rule. Review both child timings

and the parent Delay After; one should not be assumed to replace the other.

Configure linked-sequence limits and Actual values: Save and validate the linked sequence in its own editor first, then select one main Test Sequence row with only one linked-sequence type assigned.

Do not select two linked types on one row, duplicate child limits blindly on the outer row, type a missing profile name, judge a TRUE/FALSE fallback as a measurement, or use RUN ALL as the first trial.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Linked sequence selectors	Select UDAQ, CAN, calibration, programming, LIN, Communication Studio, Vision or Data Link resource. Conflicting links are cleared where required.
CAN Calibration Block	Limits execution to the selected block of a method.
CAN / LIN Cyclic Group	Saved repeated traffic for explicit start/stop operations.

Procedure

1. Open Admin / Testing > Test Sequence, select the main flow row, and choose the saved linked sequence in the matching Linked Sequences field.
2. Keep only one linked sequence type on that row and allow the editor to set the matching action/command instead of typing an unknown sequence name.
3. Put command-specific expected response, parser, and min/max limits on the measurement rows inside the linked sequence; use main-row limits only when that outer action intentionally judges a supported final numeric value.
4. Save the linked editor first, then save the main Test Sequence so its linked ID and name remain synchronized.
5. Press RUN STEP and review Result, Response, Actual, and Live Debug before RUN ALL.
6. For CAN, Actual prefers the decoded value and then the last available limit-evidence Actual; Communication Studio prefers its validated/decoded value; LIN uses its decoded value. A TRUE/FALSE status is used only when no numeric/text value is available.
7. Verify every child limit and the outer result with OK, NG, boundary, timeout, and malformed-response trials.
8. Confirm the Operator and production report retain the useful Actual value and identify the failed child evidence rather than showing a misleading blank or unrelated limit.
9. Save the child resource first.
10. Select its parent link and check resulting Action/Command.
11. Use parent numeric limits only when the child supplies a meaningful numeric Actual.
12. Place cyclic stop/cleanup around the required window; SAVE SEQ and trial the link.

Worked example

A relay-off acknowledgement is not a zero-volt measurement. Add a voltage readback if that physical confirmation is required.

Expected result

Parent status includes the linked execution evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Configure linked-sequence limits and Actual values	If Actual is blank or misleading, inspect the linked sequence's decoded/validated value and limit evidence, confirm the correct linked ID/name and action, save both editors, then rerun one row with Live Debug open.

Related instructions: [4.1.11.1 Flow assignment and enabled stages](#).

4.1.2.5.8 Operator Popup: Show Popup, Ack Required and Message

Change the per-row operator instruction without deleting its hardware action.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Show Popup	Enables that sequence row's message; clear it to remove the configured prompt.
Ack Required	Requires operator continuation where applicable.
Message	Specific instruction and completion condition.

Procedure

1. Open the Test Flow used by the model/plan and match popup sequence number/title to its row.
2. In Operator Popup, review Message and acknowledgement requirement.
3. For an obsolete reminder, clear Show Popup while retaining the Device/Action.
4. SAVE SEQ and run a controlled trial to verify behavior.
5. During testing, follow the instruction then CONTINUE, or STOP TEST to cancel.

Worked example

Clear Show Popup on an obsolete pre-run reminder attached to a power-off row. Deleting the whole row would also remove its power-off action.

Expected result

The prompt follows the saved row setting, so an enabled prompt can recur on every run.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Still appears	Check another row with the same text, assigned flow and successful SAVE SEQ.

Related instructions: [4.1.2.5 Selected step editor](#).

4.1.2.5.9 RX Safety Phase: group, mode and operator message

Change a configured RX safety group policy at the intended sequence phase.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Safety Group	Exact RX rule group to control.
Safety Mode	No Change, Hard Stop, Warning Only, Ignore or Follow Action.
Safety Message	Clear operator explanation; active modes require group/message configuration.

Procedure

1. Configure and validate RX event rules first.
2. Select the policy-change row and exact Safety Group.
3. Choose the approved mode and message.
4. Save, then test expected/missing/unsafe feedback using the fixture validation procedure.
5. Explicitly restore the required policy after any temporary change.

Worked example

A reviewed fixture process may switch from Warning Only during loading to Hard Stop before powered measurement. This configuration does not replace physical interlocks.

Expected result

The named policy is applied with useful operator evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Missing-field warning	Supply group and message for an active mode.
Unexpected stop	Inspect matched rule, default action, phase override and input freshness.

Related instructions: [4.1.2.5 Selected step editor](#).

4.1.2.5.10 Scaling and output offset

Separate outgoing adjustment and measurement scaling.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Numerical correction is not proof of traceable instrument calibration. Retain the approved basis and acceptance limits rather than tuning a defective sample into PASS.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Output Offset	Added to supported numeric outgoing setpoint, not incoming calibration.
Scale Factor / Scale Offset	For decoded numeric values: raw × factor + offset.

Procedure

1. Verify raw decoder/units against a reference.
2. Set justified scaling and compare raw/calculated evidence.
3. Review result precision and trial representative inputs; save.

Worked example

Raw $100 \times 0.1 + 0.2 = 10.2$.

Expected result

Raw and scaled values remain distinguishable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected Actual	Check decoder, units, factor, offset and result precision.

Related instructions: [4.1.2.5 Selected step editor](#).

4.1.2.5.11 Sweep: range, step, dwell, stop mode and point evidence

Sweep a reviewed range and retain point evidence.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enable Sweep / Sweep ID	Activates/identifies its operation block.
Start / Stop / Step	Nonzero step must move toward Stop; maximum 10,000 points.
Dwell ms / Log Point	Per-point settling and evidence.
Stop Mode	Continue All, Stop On Pass or Stop On Fail; global stop-on-fail also affects Continue All.
{SweepValue} / {SweepIndex}	Current point tokens supported in command templates.

Procedure

1. Choose the reviewed block and unique Sweep ID.
2. Enter range, signed step, dwell and stop mode.
3. Use supported tokens and inspect resolved commands.
4. Save and trial with point logging; inspect stop reason and overall status.

Worked example

1 to 3 step 1 visits 1,2,3. Stop On Pass may succeed at 2 after failure at 1; no passing point returns NG. Continue All retains NG if any evaluated point fails.

Expected result

The sweep explains completion or stopping and preserves point results.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Range rejected	Correct zero/wrong-direction step or excessive point count.
Missing later points	Check stop mode, global policy, cancellation and group/block boundaries.

Related instructions: [4.1.2.5 Selected step editor](#).

4.1.2.6 Groups, child steps, loops and group retries

Repeat contiguous groups with traceable failure handling.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Group Retry / Group Retry Delay ms	Additional attempts and restart wait for eligible child operations.
Loop Mode / Count / Duration / Interval	Deliberate single, count or duration repetition; distinct from retry.
Stop on fail / Log each cycle	Loop continuation and per-cycle evidence.

Procedure

1. Create a unique GROUP header and immediately following children with common Branch Group and phase.
2. Set loop mode and relevant count/duration/interval.
3. Permit retries only when every child is repeat-safe; programming or protected mutating UDS restricts the group to one automatic attempt.
4. Run Group on controlled hardware and save edits.

Worked example

For eligible reads, Group Retry 2 means up to three attempts in the current cycle. After child attempts exhaust, remaining children are skipped for that attempt and the next group attempt restarts at its first enabled child.

Expected result

Exhausted failures remain NG; disabled rows still participate in structural checks.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Implement aging or burn-in loop	If burn-in count is wrong, check group boundaries, disabled rows, loop stop condition, and whether duration uses machine time or step completion time.
Group rejected	Correct duplicate names, missing headers, separated children or phase mismatch.

Related instructions: [4.1.2.6.1 Copy Group: complete children, linked settings and save](#); [4.1.2.6.2 Group header highlighting, summary and execution states](#); [4.1.2.6.3 Group structure validation and renaming](#); [4.1.2.6.4 Run Group: selection, prerequisites, trials and results](#).

4.1.2.6.1 Copy Group: complete children, linked settings and save

Copy an entire group with coherent rows and deliberate shared resources.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Copy Group	Header context action requiring add/edit rights and idle editor.
New group name / COPY GROUP	Unique nonempty name; case-insensitive duplicate check.
SAVE SEQ	Allocates fresh row identities and copies saved row-owned commands/cyclic settings.

Procedure

1. Finish edits, select header and right-click Copy Group.
2. Review child count including disabled rows; enter unique New group name.
3. COPY GROUP inserts after the original. Inspect all children and revise channel, limits and variable names.
4. Device/action and linked profile references remain shared; duplicate those separately when independence is required.
5. SAVE SEQ before running, reopen and verify saved commands/links.

Worked example

Copy VOLTAGE_A to VOLTAGE_B, then change channel and variable. Both still share the saved calibration profile until explicitly relinked.

Expected result

Fresh rows retain full group structure without stale runtime results.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Run requests save	Copied saved commands and CAN/LIN settings must be materialized by SAVE SEQ.
Source settings changed	Reload current source, review changes and repeat the copy.
Name used	Choose another name even if the conflicting group is disabled.

Related instructions: [4.1.2.6 Groups, child steps, loops and group retries](#).

4.1.2.6.2 Group header highlighting, summary and execution states

Interpret highlighted headers and group summaries.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Summary	Title, child count, loop mode/count/duration and retry configuration; count includes disabled children.
Navy / gray	Normal / disabled group.
Amber / green / red	Running / passed / failed.
Selection highlight	Status colors remain visible; tree headers are also bold.
Grid summary arrow	Show/hide children from the small arrow on the left of Group Summary. Count includes the retained hidden children.

Procedure

1. Read header summary/tooltip and expand children.
2. Inspect enabled states and actual operations.
3. During Run Group, watch state then read child results.
4. Treat displayed retry as configuration subject to runtime replay restrictions.

Worked example

"5 children | 3 cycles | retry 2" does not mean all children are enabled or programming can automatically retry.

Expected result

Quick status remains available without replacing detailed evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No standard blue selection color	Group status color is intentionally preserved.
Gray header with enabled children	Inspect header participation as well as child checkboxes.

Related instructions: [4.1.2.1 GRID VIEW: editing, expanding and collapsing groups](#); [4.1.2.6 Groups, child steps, loops and group retries](#).

4.1.2.6.3 Group structure validation and renaming

Correct group boundaries and rename membership coherently.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Unique name	Every header including disabled ones needs a unique nonempty identity.
Contiguous children	Immediately after own header, without unrelated gaps.
Run Phase	Same phase for header and all members.
Branch Group rename	Updates child membership as one draft/undo operation; separate custom title may remain independent.

Procedure

1. Locate the Seq/group named by validation.
2. Fix missing header by assigning a valid group or clearing unintended membership.
3. Move scattered members together or clear inappropriate membership.
4. Rename the header identity, inspect every child and SAVE SEQ; UNDO reverses the operation.

Worked example

CHECK header, child A, ungrouped B, child C marked CHECK is invalid. Move C before B or clear its membership.

Expected result

Save/run/copy uses predictable group ownership.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Disabled row still causes error	Disabled rows are validated so later enabling cannot silently alter ownership.

Related instructions: [4.1.2.6 Groups, child steps, loops and group retries](#).

4.1.2.6.4 Run Group: selection, prerequisites, trials and results

Run only a selected group on a controlled trial setup.

Access and preparation

Open Admin / Testing > Test Sequence. Corresponding page and action permissions are required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Run Group	Right-click GROUP header with Run permission and idle editor.
Loop / retry	Apply subject to programming/mutating-UDS single-attempt restrictions.
STOP RUN	Cancellation request; verify physical state after stopping.

Procedure

1. Prepare required hardware and input variables; earlier unrelated setup rows are not included.
2. Select header, inspect children and loop/retry settings.
3. Save copied group and resolve structure errors.

4. Right-click Run Group and inspect child results/LIVE DEBUG.
5. After stop/failure, recover the fixture before a deliberate rerun.

Worked example

READ_CHECK may require a supply state established outside the selected group. Verify that prerequisite first.

Expected result

Only the chosen group scope is trialed and evidence identifies its children.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Action unavailable	Select header, wait for idle and check Run rights.
Missing variable	Run its producer or include prerequisites in the trial group.

Related instructions: [4.1.2.6 Groups, child steps, loops and group retries](#).

4.1.2.7 Stop-on-fail, continue-after-fail and final NG evidence

Collect later evidence while retaining unrecovered NG.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

STOP ON FAIL determines whether execution stops at a failure under the configured flow policy. Continuing can collect further evidence, but does not erase an earlier NG. Cleanup has its own purpose. Inspect the final failed-step/group/cycle summary even when the latest displayed operation passed.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
STOP ON FAIL	Stops normal flow after an unrecovered failure when enabled.
Group Stop on fail	Controls failed loop continuation.
Sweep Stop Mode	Point-search policy may stop or continue independently.

Procedure

1. Separate later useful measurements from operations dependent on the failed result.
2. Set flow/group policy and explicit completion/failure work.
3. Trial a known failure; inspect later rows and cleanup.
4. Review final status and first failure even if later rows pass.

Worked example

Voltage NG followed by identity PASS still yields final NG when continuation is allowed.

Expected result

Continuation gathers evidence without erasing failure.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Later formula misses input	Correct dependency or stop on failed producer.

Related instructions: [4.1.2.5.11 Sweep: range, step, dwell, stop mode and point evidence](#).

4.1.2.8 Step/group dragging, movement and renumbering

Move rows or complete groups while preserving membership.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Turn ROW DRAG ON to reorder. Drag a normal step to its permitted position; drag a group header to move the whole group, including collapsed and disabled children. Drop groups between complete groups. The editor renumbers the sequence. Review order and membership, then SAVE SEQ.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ROW DRAG OFF / ON	Enables intentional dragging.
MOVE UP / MOVE DOWN / RENUMBER	Order and sequence numbering controls.

Procedure

1. Finish cell editing and enable row drag.
2. Move a group header as a unit, including collapsed/disabled children.
3. Inspect drop position, membership and phase; UNDO unwanted moves.
4. SAVE SEQ; reload after manual sequence-number ordering before copying a group.

Worked example

Moving CHECK_B before CHECK_A moves its children together. A child moved outside its group needs deliberate membership correction.

Expected result

Saved order is coherent and contiguous.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Copy rejects changed order	Save, reload, verify order and retry Copy Group.

4.1.2.9 Undo, redo and keyboard shortcuts

Use history and shortcuts within their page/focus scope.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Ctrl+G assigns a normal selected step to the nearest preceding group. It rejects a group header or a step with no group above. Alt+Up/Down moves a step one position or a whole selected group. Ctrl+S saves, Ctrl+Shift+D toggles drag, Esc cancels drag, Ctrl+Z/Y undo/redo, and Ctrl+C copies the selected cell. See HOT Key for focus restrictions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
UNDO / REDO	Draft history; group copy/rename plus its child changes is one operation.
HOW TO > HOT Key	Current key map, page scope, focus restrictions and movement sizes.

Procedure

1. Finish active text/cell edits before row shortcuts.
2. Use the shortcut with grid/tree focus and verify selection afterward.
3. UNDO an unintended change and SAVE SEQ for the final draft.

Worked example

Undoing group copy removes its copied header and children together.

Expected result

Actions remain permission- and busy-state-controlled; undo/redo does not itself save.

Related instructions: [14.2.1 Test Sequence keyboard shortcuts](#).

4.1.2.10 RUN STEP, RUN ALL, STOP RUN and LIVE DEBUG

Trial the smallest required execution scope and inspect evidence.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

RUN STEP executes the selected operation; RUN ALL executes the selected flow. Review the target and fixture state before either. STOP RUN requests cancellation and cleanup. LIVE DEBUG records detailed progress and replies. A successful isolated step does not prove that the complete production flow is valid.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RUN STEP	Runs selected row; group selection invokes group behavior.
RUN ALL	Executes eligible flow with phases, links and policy.
STOP RUN	Requests cancellation; inspect actual end state.
LIVE DEBUG	Current traffic and execution evidence.

Procedure

1. Prepare the selected target, prerequisite values and fixture state.
2. Save copied groups and resolve structural errors.

3. Open LIVE DEBUG and trial a row or right-click header > Run Group.
4. After successful subset evidence, trial RUN ALL; check output state after any STOP RUN.

Worked example

A formula needing VOUT cannot succeed meaningfully without its current-run producer. Trial the producer or intended group first.

Expected result

Status and reply evidence correspond to the selected scope.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Run unavailable	Check busy state, Run permission and required license.

4.1.2.11 SAVE SEQ, review, audit reasons and saving progress

Persist a reviewed flow and respond correctly to rejected saves.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

SAVE SEQ validates the draft, requests the required review/reason and saves it. The saving overlay reports progress while background validation and database work complete. Editing, duplicate saves and navigation are restricted during the save. Wait for success before assuming production can use the new revision.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Review before save	Review differences when enabled.
SAVE SEQ	Validates/persists parent; child editors have their own saves.
Change reason	Required by applicable audit policy; explain the concrete change.

Procedure

1. Commit cell edits and save child resources.
2. Click SAVE SEQ, review changes and supply required reason.
3. Wait for successful completion.
4. For rejection, fix the named row/resource; keep the draft until resolved.
5. Reopen and inspect saved order, links and limits.

Worked example

"Correct current upper limit to approved specification" identifies the change. A duplicate-name error means the save did not complete.

Expected result

Saved revision and audit describe accepted changes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Copy source changed	Reload latest saved source, review it and repeat the copy.
Storage/link failure	Resolve availability and retry deliberately; do not declare success from the click alone.

4.1.2.12 Unsaved changes, failed saves and navigation

Resolve parent and child drafts deliberately before navigation.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

If a save fails, read the error and keep the draft available for correction. When leaving with unsaved changes, choose Save, Discard or Cancel deliberately. Discard abandons the draft changes. If the application becomes unresponsive, record the current page and action; an interrupted session notice does not confirm that an in-progress save completed.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Save	Attempts validation/persistence; errors leave work unsaved.
Discard	Abandons draft changes in that editor.
Cancel	Remains in the editor for inspection.

Procedure

1. Identify which editor owns the prompt.
2. Save a ready draft and correct errors in place.
3. Cancel to inspect/preserve unfinished work.
4. Discard only intended edits, then reopen the saved definition to verify.

Worked example

APPLY TO STEP in Vision still requires SAVE VISION, and the parent flow needs SAVE SEQ when its draft changed.

Expected result

Navigation does not silently approve unfinished child or parent edits.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Change disappeared	Check editor ownership and whether its own save succeeded.

4.1.3 UDAQ / RS485 RELAY SEQ

Create reusable ordered UDAQ or RS485 relay commands.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Sequence selector / name / Description / Enabled	Identity, purpose and participation of the reusable list.
NEW / ADD CMD / DELETE CMD / DEL RELAY SEQ	Manage list and command rows.
SAVE RELAY SEQ	Saves list for parent linkage.

Procedure

1. Select Test Flow and open UDAQ / RS485 RELAY SEQ.
2. Create a named list, add ordered commands and reply rules.
3. Save and link to a parent row with the intended device, then trial through RUN STEP.

Worked example

OUTPUT_RESET contains the approved output-off commands for that fixture; the name itself does not establish electrical safety.

Expected result

Saved ordered commands are available to parent rows.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Command is read-only	Raw command editing requires the applicable ADMIN authority and page permission.

Related instructions: [4.1.3.1 Sequence setup, relay commands, timing and trials](#); [4.1.3.2 Linking, responses and result handling](#).

Screen reference

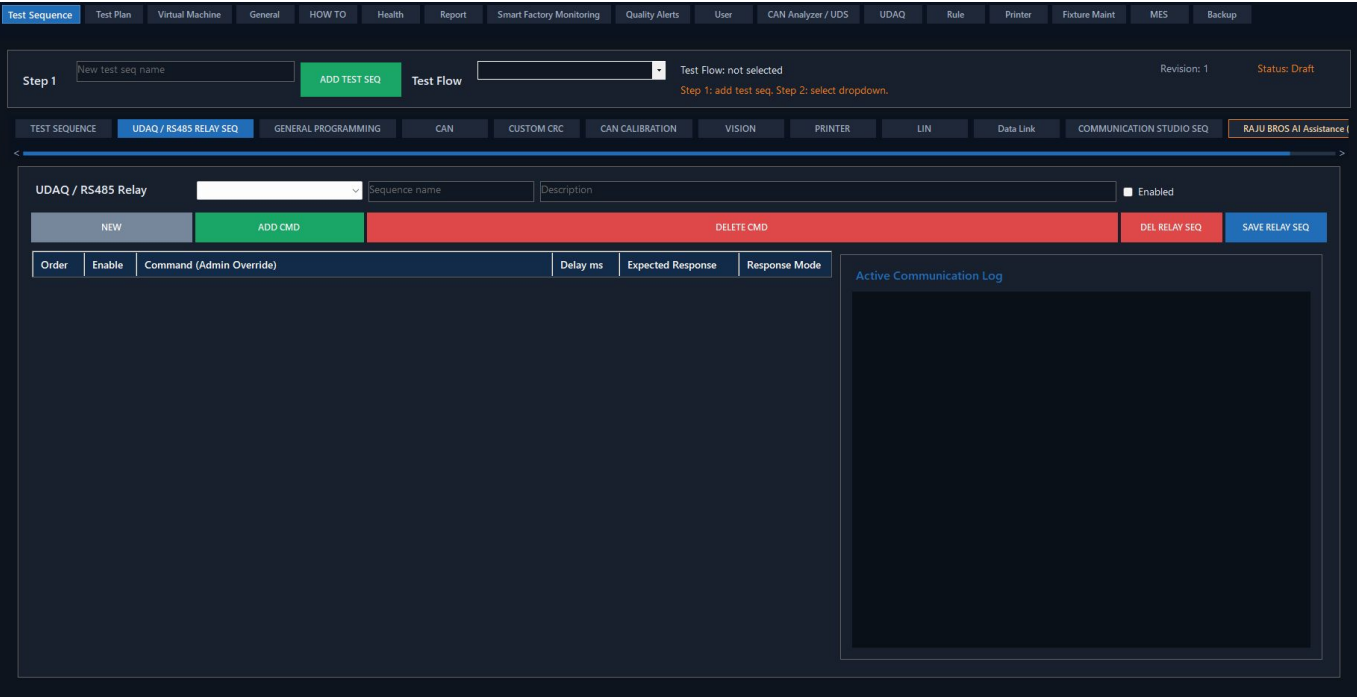


Figure 4.1.3 - UDAQ / RS485 relay sequence editor. Reference capture: 07 October 2026.

4.1.3.1 Sequence setup, relay commands, timing and trials

Configure command order, settling delay and acknowledgements.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Create a named UDAQ/RS485 relay sequence, add its command rows and select the intended device or addressed module. Set channel, state and timing for each row. Save before linking. Run an approved trial only when the physical fixture is ready for the complete command order.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Order / Enable	Command order and participation.
Command (Admin Override)	Documented syntax for the parent target.
Delay ms	Wait after this command.
Expected Response / Response Mode	Reply requirement; None only when no reply is expected.

Procedure

1. NEW and name the list.
2. ADD CMD per operation; enter documented syntax, reply and delay.
3. Review final fixture state and SAVE RELAY SEQ.
4. Link the saved list to the correct parent Device and inspect RUN STEP communication evidence.

Worked example

Turn output 1 off, wait 100 ms, then output 2 off. Actual bytes/addressing must match the approved relay driver.

Expected result

Enabled commands execute in order and failed acknowledgements identify the fault.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong relay responds	Check parent Device and command slave/channel addressing.

4.1.3.2 Linking, responses and result handling

Link relay commands and distinguish status from physical readback.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

In the main sequence, select the saved relay sequence link and appropriate result behaviour. Review whether the child produces a measurement or only execution status. The parent post-step delay remains relevant. Read child command evidence when the linked main step fails.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
UDAQ / RS485 Seq	Saved command-list selector on parent.
Parent Delay After ms	Extra wait after the linked list, separate from per-command delays.

Procedure

1. Save the list before selecting its parent link.
2. Review Device, link and unrelated copied limits.
3. Trial once, inspect each command/reply and observe final fixture state.
4. SAVE SEQ to retain linkage.

Worked example

A successful off acknowledgement is not a measured zero volts. Add a separate readback row when required.

Expected result

Parent status reflects linked command evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Child NG	Inspect the first failed reply rule, framing, address and timeout before repeating.

4.1.4 GENERAL PROGRAMMING (License Required)

LICENSE REQUIRED

General Programming license for the programmer workspace and linked programming steps. Device support, provider tools and Beta approval requirements still apply. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Configure provider-specific programming profiles with retained firmware and result evidence.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Workspace	Choose PICkit 5, Renesas Flash Programmer or the explicitly marked Beta provider.
SAVE PROFILE	Stores a draft; an incomplete saved profile can still be blocked at run validation.
Run Guard	Green indicates configured item; orange indicates missing/review/Beta item.
PROGRAM DEVICE	Performs complete validation before starting one approved operation.

Procedure

1. Choose provider and exact target/tool/firmware.
2. Save the profile and review every guard, including power and verification.
3. Trial one controlled target and retain complete replies.
4. Link the reviewed profile to a parent row and save that flow.

Worked example

A profile saved without its CLI path can be retained as a draft but cannot successfully run until the tool requirement is satisfied.

Expected result

Programming has one automatic attempt and traceable firmware, command, reply and verification evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Saved but blocked	Read Run Guard and execution validation; saving is not hardware readiness.

Related instructions: 4.1.4.1 PICkit 5; 4.1.4.2 Renesas Flash Programmer; 4.1.4.3 ST-LINK - BETA; 4.1.4.4 SEGGER Flasher - BETA; 4.1.4.5 XDM4011 - BETA; 4.1.4.6 Workspace selection and saved profiles; 4.1.4.7 Provider-specific workflow and configuration; 4.1.4.8 Programming trial, verification, replies and failure evidence; 4.1.4.9 Firmware packages, linking and Beta production approval.

Screen reference

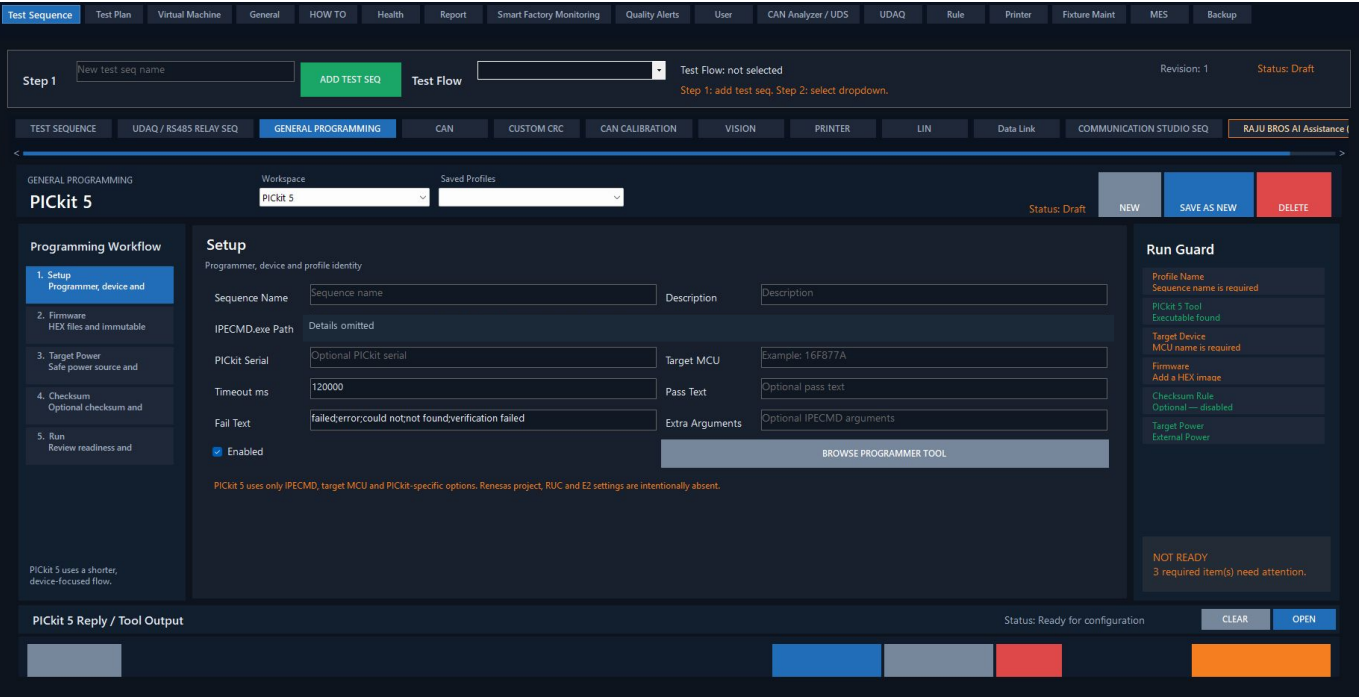


Figure 4.1.4 - General Programming: PICKit workflow. Reference capture: 07 October 2026.

4.1.4.1 PICKit 5

Program a PICKit target using its own firmware, power and checksum stages.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

PICKit 5 uses Setup, Firmware, Target Power, Checksum and Run stages. Select the exact MCU, programmer and approved firmware. External power and programmer-supplied power are different choices. Enable only the approved erase/program/verify/reset operations. Use the detailed provider procedure below before a controlled trial.

Program with PICKit 5: Connect PICKit 5 and the target safely, select the exact MCU, confirm the HEX file, choose External or Programmer target power, and keep the first trial unit available. Programming receives one automatic attempt; failure requires a deliberate new run after reviewing target state and recovery.

Do not select a Renesas RFP project or RUC file in a PICKit profile. Do not compare a customer checksum to the image SHA-256. Do not hide stderr or retry programming automatically after an uncertain write.

The runtime gives programming one automatic attempt, including when the parent row or group has a nonzero retry count.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IPECMD path / PICKit serial / MCU	Exact executable, intended probe identity and target part.
External / Programmer power	Choose according to actual fixture and safe voltage.
Read ID / Erase / Blank Check / Program / Verify / Reset	Select approved operations only.
Firmware	Saving retains immutable image content and SHA-256.

Procedure

1. Open Admin / Testing > General Programming.
2. Select workspace PICKit 5 and create or select a PICKit profile.
3. In Setup, enter a unique sequence/profile name, IPECMD executable path, optional PICKit serial, exact target MCU, timeout, and optional PASS/FAIL reply text.
4. In Firmware, select the production HEX image. Saving stores an immutable database revision and SHA-256. A later disk-file change does not silently replace the stored revision.
5. In Target Power, select External Power or PICKit power and enter the exact safe voltage. Choose Read ID, Erase, Blank Check, Program, Verify, and Reset only as required by the approved process.
6. Checksum is optional and independent. Expected Source currently supports Direct Value or File. For a file, configure path plus Full Text, exact Line Number, Key + Separator, or Regex extraction. Checksum validates; it never writes product data.
7. Save Profile is allowed with incomplete hardware settings. Green Run Guard tiles are ready; orange tiles need review. The software does not currently use a red Run Guard state.
8. PROGRAM DEVICE remains available unless another programming operation is running. Clicking it does not bypass safety: complete validation runs before any programmer process starts, and an invalid profile is blocked with a clear message.
9. Test one controlled unit. The output drawer and Live Debug retain the redacted command, exit code, each stdout line as REPLY, each stderr line as ERROR, image SHA-256, checksum comparison, and verification result.
10. To use production flow, add/select a Test Sequence row, choose the saved Programming Sequence name, confirm Action becomes PROGRAMMING_SEQUENCE, save the test flow, and run the programming step once before RUN ALL.
11. After PASS, continue the sequence. On failure or stop, preserve the first reply and return fixture relays/power to the defined safe state. Do not automatically retry an uncertain write.

Worked example

Changing a HEX file on disk after profile save does not silently replace the saved image. Explicitly save the intended image revision and verify its displayed hash.

Expected result

PICKit-specific configuration is used and full output plus verification evidence is retained.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Program with PICKit 5	If Run Guard is orange, read the tile details; PROGRAM DEVICE is intentionally still available but validation will block unsafe/incomplete settings. If programming fails, verify PICKit serial/tool detection, target MCU, stored HEX revision/hash, target power/voltage, wiring, IPE exit code, and the complete programmer reply.

4.1.4.2 Renesas Flash Programmer

Keep Renesas pre-flash data, programming, checksum and post-pass writes separate.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Renesas Flash Programmer uses its supported command-line tool and approved project/profile. Confirm device, interface, power and firmware mapping before execution. Review the tool's complete result and verification evidence. A project file alone does not prove the connected target matches the selected profile.

Program with Renesas Flash Programmer: Connect the Renesas programmer/emulator and target safely. Obtain the approved RFP project, firmware, target family/device, interface, power settings, and customer data rules. Decide each production field's write route before saving: RUC pre-flash, direct post-pass, or not written. Never configure the same address/field in both routes.

Do not use RUC for checksum validation. Do not expect Existing File mode to inject variables. Do not perform post-pass writes after programming/checksum NG. Do not write the same range through both routes. Do not claim unsupported DID, occurrence, padding, retry or failure-action settings.

A failed or interrupted operation is not automatically replayed. Review target readback and recovery before a deliberate new run.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Direct CLI / RFP Project	Direct fields configure connection; project mode delegates connection/power to its approved .rpj and requires External Power in this profile.
RUC Existing File / Generate Runtime	Existing file is used as supplied; runtime generation resolves one code at the fixed referenced output path.
Post-Pass Data	Write32/WriteBit execute only after programming and optional checksum pass.

Procedure

1. Open Admin / Testing > General Programming and select Renesas Flash Programmer.
2. Setup: create/select the profile and configure the RFP executable, timeout, log, PASS/FAIL reply text, and optional approved extra arguments.
3. Connection: in Direct CLI configure tool type or COM, optional tool serial, interface, speed, target power/voltage, ranges, authentication and advanced RFP switches. There is no separate retry-count field in the current programming profile. In RFP Project mode, the .rpj owns connection and power settings, so this profile must use External Power.

4. Project & Device: select Direct CLI or RFPV3 Project, operation, approved .rpj when applicable, target family, firmware/configuration and any operation-specific address/size/output fields.
5. Production Data sources currently support Direct Value, Runtime Variable and File. File modes are Full Text, Line Number, Key + Separator, or Regex. Key mode uses an optional exact line; line 0 searches all lines and returns the first exact key match. AUTO separator tests ':' then '='. After extraction the current fields can trim, select start character/count, convert uppercase, enforce exact length and apply a validation regex. There is no occurrence selector.
6. RUC Linking is data writing during flashing, never checksum. Existing File mode validates and uses the existing multi-code .ruc referenced by the RFP project; it does not inject variables into that file. Generate Runtime mode atomically creates one RUC code at the configured output path using address, byte size, index and data templates such as {BARCODE}, {SW_NO} or {HW_NO}. Confirm that the RFP project references this fixed output path.
7. Checksum is independent and runs after programming. Actual Source can be Programmer Checksum, Programmer CRC32, Device Checksum, File Tool Checksum, or Firmware SHA-256 when that provider reports/supports it. Expected Source in the current UI is Direct Value or File only. File extraction supports path, mode, optional line, key/separator, regex capture group, start character and character count.
8. Post-Pass Data runs only after flash PASS and checksum PASS. Current operations are Write32 and WriteBit. Each row supports order, name, address, value template, value format, optional read-back verification, read size and verify pattern. The current UI does not provide DID, padding, per-row retry, or configurable failure-action fields; any enabled write/read-back failure fails the programming sequence.
9. Never assign the same field/address to both RUC and Post-Pass. The hybrid overlap guard validates the RUC address range against enabled post-pass ranges before starting RFP.
10. Save incomplete profiles as drafts. Green Run Guard tiles are ready and orange tiles need review. PROGRAM DEVICE remains available, but full validation blocks incomplete or unsafe settings before hardware access.
11. Execution order is: resolve and validate sources; validate/generate RUC when enabled; run RFP and capture full reply; run independent checksum validation when enabled; execute post-pass writes/read-back only after PASS; record result and timing.
12. Link the saved profile to Test Sequence by selecting its Programming Sequence name in the required row. Confirm Action becomes PROGRAMMING_SEQUENCE, save, run the single step on a trial unit, then approve RUN ALL.

Worked example

Use one route for a serial field: either its approved RUC range before flashing or a post-pass write range. Overlapping both routes is rejected before starting the programmer.

Expected result

Validation, RUC, flash, checksum and post-pass evidence remain distinct.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Program with Renesas Flash Programmer	If RUC data is wrong, first identify whether the profile uses Existing File or Generate Runtime. Check fixed output path, RFP project reference, address, index, size, data format/template and RUC hash. If checksum fails, inspect only actual/expected sources and normalization. If post-pass fails, preserve flash PASS evidence and the exact write/read-back reply.

4.1.4.3 ST-LINK - BETA

Configure the ST-LINK Beta provider and verify its generated operation.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

ST-LINK is marked Beta. Configure the supported programming tool, exact target and firmware format; supply a correct address when the format requires one. Validate connect, program, verify, stop and failure paths on approved trial hardware before production approval.

Program with ST-LINK Beta: Install STM32CubeProgrammer, connect the exact ST-LINK probe and trial target, obtain the approved firmware and BIN address when applicable, and confirm whether the probe supports target-power control. Confirm the approved tool workflow and applicable vendor authorization before production use.

Do not use ST-LINK Beta as an assumed production programmer. Do not select Verify without Program. Do not omit the BIN start address. Do not enable programmer power on an unsupported probe.

Use only an approved tool/probe workflow and verify applicable vendor authorization with the responsible organization before production.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
STM32_Programmer_CLI.exe / probe serial	Exact tool and optional probe selector.
SWD / JTAG / frequency	Approved target interface and numeric frequency.
BIN start address	Required for a raw binary image.
Program + Verify	Verification follows the write; Verify-only is blocked for this provider.

Procedure

1. Open Admin / Testing > General Programming and select ST-LINK • BETA.
2. Setup: enter a unique profile name, select STM32_Programmer_CLI.exe, optional probe serial, timeout, log, and reply criteria.
3. Firmware: add the approved HEX, BIN, ELF, or SREC image. Saved firmware retains immutable database content and SHA-256 evidence.
4. Connection & Operations: select SWD or JTAG, optional frequency in kHz, External Power or supported ST-LINK power control, erase/blank-check/program/verify/reset, and a required start address for BIN.
5. Program + Verify generates download followed immediately by verify. Verify-only is blocked because STM32CubeProgrammer ignores verify unless it follows the write command.
6. Checksum stays independent from firmware writing. When required, compare a captured programmer/checksum value or firmware SHA-256 with a direct value or customer-file extraction rule.
7. Save the profile even when incomplete; orange Run Guard items remain visible. The BETA tile remains orange as a release reminder and does not hide other readiness faults.

8. Run only on a controlled trial target. Confirm the generated CLI command, full stdout/stderr, exit code, checksum/verification evidence, target power, and safe fixture recovery.
9. Do not approve production use until tool licensing, probe type, firmware, wiring, voltage, expected reply, and repeated trials are formally accepted.

Worked example

A BIN image needs its approved load address; the application cannot infer a safe address from the filename. A HEX image carries addressing differently.

Expected result

The Beta provider records its CLI/replies and image evidence; commissioning remains required.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Program with ST-LINK Beta	If the run is blocked, check the CLI executable, SWD/JTAG selection, numeric frequency, image, BIN address, Program + Verify selection, checksum rule, and complete programmer reply.

4.1.4.4 SEGGER Flasher - BETA

Run a SEGGER Flasher Beta profile through its approved J-Flash project.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

SEGGER Flasher is marked Beta. Use the supported runner/template and an exact target profile. Confirm programmer identity and operation selection. Review the external tool's result, not merely whether it launched. Production use requires the provider acceptance procedure below.

Program with SEGGER Flasher Beta: Install the licensed SEGGER software, connect the Flasher and trial target, obtain the approved .jflash project and firmware, and confirm which USB serial, nickname, hostname, or IP identifies the intended programmer.

Do not run without a real .jflash project. Do not omit the BIN address. Do not silently switch between USB and network Flashers. Do not treat the BETA workflow as production-approved without repeated hardware validation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
JFlash.exe / .jflash	Tool and project owning target/interface/voltage/production order.
USB serial / network identity	USB serial takes priority when both are entered.
Operation	Production, Program + Verify, Program, Verify, Erase Chip, Blank Check or Connect Only.
BIN load address	Explicit address when required by the selected image format.

Procedure

1. Open Admin / Testing > General Programming and select SEGGER Flasher • BETA.
2. Setup: select JFlash.exe, enter profile identity, optional Flasher USB serial, timeout, log path, and optional PASS/FAIL text.

3. Project & Firmware: select the approved jflash project and firmware. Enter an explicit load address when the data file is BIN.
4. Connection & Operation: choose Production, Program + Verify, Program, Verify, Erase Chip, Blank Check, or Connect Only. USB Serial takes priority over IP/host/nickname when both are entered.
5. Keep MCU, interface, voltage, erase policy, verification method, and production-step order inside the approved J-Flash project; the RB profile does not duplicate those settings.
6. The generated order is Flasher selection, open project, open image, optional log/approved arguments, selected action, optional start application, hidden mode, exit.
7. Checksum validation is independent. Use it only when the customer requires a comparison and select the correct actual and expected source.
8. Save incomplete profiles as drafts. Review every Run Guard tile and the permanent orange BETA reminder.
9. Run a controlled trial and verify the full command, J-Flash exit code, stdout/stderr, J-Flash log, verification result, image SHA-256, target behavior, and safe recovery before production approval.

Worked example

If both USB serial and hostname are filled, verify the intended USB Flasher is the chosen device; do not assume the network target wins.

Expected result

J-Flash action, return code, log and firmware evidence describe the run.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Program with SEGGER Flasher Beta	If programming fails, verify JFlash.exe, project path/version, data image/address, Flasher identity, project connection and voltage settings, operation, licence, and complete J-Flash reply/log.

4.1.4.5 XDM4011 - BETA

Run only an approved XDM4011 command template and strong reply checks.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

XDM4011 is marked Beta. Configure the supported external tool workflow and target details shown for this provider. Validate the complete operation and its returned evidence. Do not assume that a profile created for another programmer can be reused unchanged.

Program with XDM4011 Beta: Obtain the exact XDM4011 executable, command-line manual/example, firmware format, connection parameters, confirmed success and failure reply text, timeout, and a disposable trial target. The executable must be non-interactive and return control after one operation.

Do not invent command switches. Do not store an interactive GUI path as the CLI. Do not use a vague PASS token such as OK if it appears in normal startup text. Do not link the Beta profile to production before hardware proof.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Command Template	Exact tested non-interactive vendor arguments; no default syntax is invented.
Placeholders	{FILE}/{HEX}, {PROJECT}, {DEVICE}/{MCU}, {TOOL_SERIAL}, {INTERFACE}, {SPEED}, {ADDRESS}, {COM_PORT}, {OPERATION}, {LOG}.
PASS / FAIL Reply	Confirmed distinctive tokens; zero exit alone cannot pass without the required PASS token.

Procedure

1. Open Admin / Testing > General Programming and select XDM4011 • BETA.
2. Setup: select the exact vendor CLI executable, create the profile, set timeout/log, enter at least one confirmed PASS Reply token, and keep robust FAIL Reply tokens.
3. Firmware: add the approved image when the command writes or verifies firmware.
4. Command Template: paste the exact tested vendor arguments. Available placeholders are {FILE}/{HEX}, {PROJECT}, {DEVICE}/{MCU}, {TOOL_SERIAL}, {INTERFACE}, {SPEED}, {ADDRESS}, {COM_PORT}, {OPERATION}, and {LOG}.
5. Fill the provider-specific fields used by those placeholders. Unused fields remain blank; no default vendor command is generated.
6. Checksum remains a separate optional validation rule. Do not infer a checksum from arbitrary output; select the actual source and direct/file-based expected value explicitly.
7. Save the profile as a draft before hardware is available. The Run Guard requires a tool, exact template, PASS token, required image, and valid checksum rule.
8. On a controlled target, inspect the generated command before confirming, then retain full stdout/stderr and exit code. A zero exit code without the configured PASS token is treated as failure.
9. Mark production-approved only after the vendor command, reply parsing, firmware, target connection, timeout, failure recovery, and repeated trials are documented.

Worked example

A generic "OK" printed during startup is a poor PASS marker. Use the approved final operation-success text from a known tool reply.

Expected result

Only the saved provider template is executed and result criteria are explicit.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Program with XDM4011 Beta	If execution is blocked, verify executable path, complete argument template, unresolved placeholders, PASS/FAIL tokens, image path, COM/interface/speed/address fields, timeout, and full vendor reply.

4.1.4.6 Workspace selection and saved profiles

Save a profile, link it by name and retain provider/firmware identity.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Select a programming workspace before creating or loading its profile. Give profiles distinct names for different targets or firmware revisions. Saving a profile does not execute it. Link only the approved saved profile into a test sequence and retain traceability to its firmware revision.

Run a programming profile from Test Sequence: Select the correct Test Flow/model first. Prepare one controlled trial target, approved firmware, programmer/tool path, fixture power plan and safe relay recovery. Confirm the General Programming feature is licensed.

Do not type a profile name that does not exist. Do not leave two different linked sequence types on one row. Do not use RUN ALL as the first hardware test. Do not assume an orange profile is safe merely because the button remains clickable.

Programming and groups containing programming are restricted to one automatic attempt. Deliberate loops are separate repeated operations and require process review.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW / Sequence Name	Creates a uniquely named provider profile.
SAVE PROFILE	Persists profile and enabled image revision.
Programming Seq	Parent link selects saved profile and sets the programming action while clearing conflicting linked types.

Procedure

1. Open Admin / Testing > General Programming and select the correct provider workspace.
2. Press NEW, enter a unique Sequence Name, and configure only that provider's setup, firmware, connection/operation and optional checksum/data-writing fields.
3. Press SAVE PROFILE. Saving a draft is allowed when only Test Flow, Sequence Name and Provider are complete; orange Run Guard tiles show what still needs attention.
4. Add firmware before final approval. Saving stores the enabled firmware revision in the database with SHA-256 evidence.
5. Review Run Guard. Green means that item is configured; orange means review/missing/Beta. PROGRAM DEVICE remains clickable, but execution validates every required setting before starting a process.
6. Use TEST SETTINGS or PROGRAM DEVICE only with controlled hardware. Confirm the warning dialog, target, power source, operation and firmware-file count.
7. Open Test Sequence and add/select the required row. In Programming Sequence Name choose the saved profile. The software sets Action Name to Programming Sequence and Action Command to PROGRAMMING_SEQUENCE and clears conflicting linked sequence types.

8. Save the Test Flow. Run the programming row once using RUN STEP and watch Live Debug. Confirm command, REPLY/ERROR lines, exit code, image SHA-256, checksum status and device verification.
9. Add explicit fixture shutdown/recovery steps for FAIL, STOP and ABORT. Programming is state-changing and receives one automatic attempt, including within a retry-enabled group.
10. After the single-step trial passes repeatedly under the approved quality plan, run the full flow and confirm the programming result appears in production evidence/reporting.

Worked example

Use separate approved profile names for distinct target families or firmware images. A parent row selecting one profile should not silently switch to another edited draft.

Expected result

The parent links the reviewed saved profile and receives one automatic programming attempt.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Run a programming profile from Test Sequence	If the Programming Sequence dropdown is empty, confirm Test Flow/model, General Programming licence, saved profile provider and enabled state. If the row does not execute, verify ProgrammingSequenceId/name and ActionCommand=PROGRAMMING_SEQUENCE.

4.1.4.7 Provider-specific workflow and configuration

Follow the fields exposed by the selected provider rather than mixing workflows.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Available stages depend on the selected programmer. PICKit presents Setup, Firmware, Target Power, Checksum and Run. Other providers may expose file values, post-pass writes or package preparation. Follow the provider's controls; a field hidden for one provider is not a universal programming option.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PICKit stages	Setup, Firmware, Target Power, Checksum, Run.
Renesas stages	Additional production-data/RUC/post-pass settings where supported.
Other providers	Their own connection, project or template settings and Beta status.

Procedure

1. Select workspace before editing.
2. Use its firmware/connection fields and optional checksum/data routes.
3. Inspect enabled operations and resulting command evidence.
4. Save and reopen in the same provider before linking.

Worked example

A Renesas .rpf is not a PICKit HEX image and an XDM argument template is not a SEGGER project.

Expected result

Each provider uses its defined configuration scope.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Expected field missing	Check provider selection; hidden provider-specific features are not universal options.
Related instructions: 4.1.4.7.1 FIRMWARE ; 4.1.4.7.2 VARIABLES / FILE VALUES ; 4.1.4.7.3 CHECKSUM VALIDATION ; 4.1.4.7.4 POST-PASS WRITES ; 4.1.4.7.5 RUC PREPARATION .	

4.1.4.7.1 FIRMWARE

Store and verify the intended immutable firmware revision.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Select the approved firmware image and confirm the format, target and version. Save the intended revision explicitly. A file changed outside the application must not be assumed to replace an already saved firmware revision. Recheck the saved profile before production linking.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Firmware file	Approved format, target and address mapping.
Enabled image / SHA-256	Saved content identity used for traceability.

Procedure

1. Browse the approved image in the chosen provider.
2. Set any format-dependent address and enabled state.
3. Save the profile, review stored hash/revision and reopen it.
4. When replacing firmware, explicitly save the new intended image and repeat validation.

Worked example

A disk filename unchanged after editing does not prove stored content changed; compare the saved SHA-256.

Expected result

The trial/report identifies exactly which stored image was used.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Old image used	Review saved revision, enabled image and parent profile selection.

4.1.4.7.2 VARIABLES / FILE VALUES

Resolve runtime or file-sourced production data with explicit extraction rules.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Variables and file values supply supported dynamic inputs such as approved production identifiers. Check the token name, source, encoding, length and allowed range. Preview the resolved value before use. Keep customer identifiers and secret values out of shared screenshots and documents.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Source	Direct Value, Runtime Variable or File where offered.
File extraction	Full Text, one-based Line Number, Key + Separator or Regex. Key line 0 searches all lines for the first matching key.
Trim / start / count / uppercase / length / regex	Post-extraction normalization and validation. There is no occurrence selector.

Procedure

1. Choose source per field and a unique token name.
2. For files, test extraction against a sanitized sample using stable key/regex when line positions vary.
3. Set required length/validation and review resolved value before any writing operation.
4. Save and trial valid, missing and invalid data cases.

Worked example

Illustrative file "SW=ABC123" uses key SW and separator =. Text preserves leading zeros when the field is an identifier.

Expected result

Only validated source values reach the selected write route.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong duplicate-key value	Key mode returns first match. Change file rule or approved source rather than assuming occurrence selection.

4.1.4.7.3 CHECKSUM VALIDATION

Compare like-for-like checksums after programming.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Enable checksum validation only when the process defines its source and expected format. Select a direct expected value or the supported file source. Check decimal/HEX interpretation and any formatting requirements. A checksum mismatch is a failure to investigate, not a reason to disable verification.

Configure programming checksum from direct value or file: Know what the customer's value represents: programmer checksum, CRC32, device checksum, file-tool checksum or firmware SHA-256. Obtain at least one known-good programmer reply and customer file. Do not compare different checksum algorithms merely because the displayed hexadecimal values look similar.

Do not use RUC as a checksum source. Do not compare Firmware SHA-256 to a programmer CRC. Do not use Line Number when customer files move the field. Do not use Key mode when duplicate keys exist because current behavior returns the first match and has no occurrence selector.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Actual Source	Only supported/reported programmer checksum, CRC32, device checksum, file-tool checksum or firmware SHA-256.
Expected Source	Direct Value or File.
Normalize hexadecimal values	Removes supported separators/prefix/leading zeros and compares case-insensitively; disable if exact formatting is required.

Procedure

1. Open the provider profile > Checksum and enable Validate checksum after programming only when the customer requires it.
2. Select Actual Source: Programmer Checksum, Programmer CRC32, Device Checksum, File Tool Checksum, or Firmware SHA-256. Use only a source that the selected provider/run actually reports; an empty actual source fails validation.
3. For a fixed customer value choose Expected Source = Direct Value and enter the exact expected checksum.
4. For a customer file choose Expected Source = File and browse the file path.
5. Full Text returns the entire file. Line Number is 1-based and returns that exact line. Use it when line position is stable.
6. Key + Separator supports line 0 to search every line, or a positive line to restrict the search. It returns the first line whose text before the separator exactly matches the key, ignoring key case and surrounding spaces. AUTO tries ':' and then '='; TAB, SPACE and a custom separator are also supported.
7. Practical HMF example: if line 45 contains 'checksum : 1234567', use Line=45, Key=checksum, Separator=: . If the line may move, use Line=0 with the same key/separator. Start Character=1 and Character Count=0 keep the complete extracted value.
8. Regex mode searches the complete file using the first matching expression. Enter a capture group that exists; group 1 normally returns the value inside the first parentheses.
9. Start Character is 1-based. Character Count 0 means all remaining characters. Use these only after the selected extraction mode returns the intended raw value.
10. Normalize hexadecimal values removes an initial 0x, removes spaces/comma/semicolon/colon/underscore/hyphen, uppercases, and removes leading zeroes before case-insensitive comparison. Disable it when those transformations are not allowed by the customer rule.
11. Save and run one known-good target plus one controlled mismatch test. Confirm Live Debug shows CHECKSUM COMPARE PASS for the good value and a clear expected/actual mismatch for the negative test.

Worked example

File line "checksum : 1234567" can use Key checksum, separator ;, line 0 for first search; Start Character 1 and Count 0 retain the extracted value.

Expected result

Missing source, extraction failure or mismatch fails the sequence; checksum comparison never writes product data.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Configure programming checksum from direct value or file	If extraction fails, check file existence, 1-based line, exact key, separator, first-match behavior, regex/capture group, start/count and normalization. If extraction is correct but comparison fails, confirm the actual-source algorithm and raw programmer reply.

4.1.4.7.4 POST-PASS WRITES

Perform optional Renesas data writes only after successful programming and checksum.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Post-pass writes occur after the configured successful programming stage. They may commit additional target data. Review their order, target address and values and approve a recovery plan. Do not retry a state-changing write automatically when its outcome is uncertain.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Order / Name / Address	Ordered intended destination.
Write32 / WriteBit	Current supported operations.
Value template / format	Validated value source and encoding.
Read-back / read size / verify pattern	Optional verification of the committed data.

Procedure

1. Review addresses against firmware and RUC ranges.
2. Configure each enabled write and its value template.
3. Add readback when required; save and trial a controlled target.
4. After any failed write/readback, preserve earlier flash PASS and exact failure evidence; review target state before another run.

Worked example

Flash PASS followed by post-write NG is an overall programming failure even though firmware may already be present.

Expected result

No post-pass write runs after programming/checksum failure; enabled write failure fails the sequence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Overlap guard blocks run	Remove overlapping RUC/post-pass routes for the same field/address.
Readback mismatch	Check address, byte format, size and returned evidence; do not automatically repeat writes.

4.1.4.7.5 RUC PREPARATION

Prepare the correct RUC path and data route before Renesas flashing.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Where RUC preparation is provided, select the approved source/project inputs and review the resulting package before linking it. Keep source firmware and customer package files backed up. Package preparation and target programming are separate operations.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Existing File	Validates and uses the supplied multi-code .ruc referenced by the project; no variable injection.
Generate Runtime	Atomically generates one code at the configured output path using address, byte size, index and data template.
RFP project reference	Must point at that fixed runtime output path.

Procedure

1. Select RUC mode deliberately.
2. For Existing File, verify approved source and project reference.
3. For Generate Runtime, configure address/size/index and supported data templates, then verify resolved data.
4. Check nonoverlap with post-pass writes, save and trial while retaining RUC path/hash evidence.

Worked example

A template {BARCODE} belongs to Generate Runtime when supported. Placing it in an existing file does not make that mode inject the current barcode.

Expected result

The programmer consumes the validated intended RUC content.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
RUC value unchanged	Check whether Existing File was selected and verify the project's referenced output path.

4.1.4.8 Programming trial, verification, replies and failure evidence

Retain the first programming result and diagnose failure without automatic replay.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Review elapsed time, exit code, standard output/error, verification and configured reply rules after a trial. A PASS string must not conceal a failed tool exit or verification error. On timeout or STOP, establish the target's state before another programming attempt.

Review programming reply and failure evidence: Keep the failed target connected in a safe powered state when permitted. Do not immediately retry, change firmware or clear output before capturing the first failure.

Do not treat exit code zero as sufficient when a PASS token is configured. Do not interpret image SHA-256 as device checksum. Do not clear the first reply before preserving it. Do not expose authentication values.

One automatic attempt applies to programming rows and their enclosing retry group. Do not increase Retry Count to work around this policy.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Output drawer / LIVE DEBUG	Redacted command, stdout REPLY, stderr ERROR, exit code and verification/checksum evidence.
STOP / timeout	Can leave an uncertain target state even when the process ended.

Procedure

1. In General Programming press OPEN on the provider Reply / Tool Output drawer. CLEAR removes only the visible reply, so export/copy required evidence first.
2. COMMAND shows the executable and redacted arguments. Authentication/password/token values are masked in logs.
3. Each normal stdout line is prefixed REPLY. Each stderr line is prefixed ERROR. These lines are also forwarded to Test Sequence Live Debug during a linked programming step.
4. RESULT shows PASS/FAIL, process exit code and message. Non-zero exit code fails. Any configured Fail Text token fails even with exit code zero. If Pass Text is configured, at least one token must appear.
5. FILE CHECKSUM is the final image SHA-256. It is image identity, not automatically the customer's device checksum.
6. Device verification reports PASS only when verification was requested and the command passed or a recognized verification-success reply was found. Verify-failure/mismatch text is treated as failure evidence.
7. For checksum-enabled profiles inspect Actual Source, Expected Source, raw expected/actual values and CHECKSUM COMPARE status separately from the flash result.
8. For Renesas inspect RUC VALIDATED/PREPARED path and SHA-256, then every POST WRITE and POST WRITE VERIFY line. Post-pass never starts after flash/checksum failure.
9. Record profile name/provider, firmware revision/hash, target identity, power source, command, exit code, first error line, complete reply, checksum status and duration in the service/quality record.

10. Correct one cause at a time, save an audited profile change, return hardware to safe state and run a controlled trial. Never hide an uncertain partially programmed target by immediately rerunning.

Worked example

A programmer exits with failure after erasing a target. The safe interpretation is "operation incomplete/target state uncertain", not "nothing changed".

Expected result

Complete first-attempt evidence supports deliberate recovery and a new approved run.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Review programming reply and failure evidence	If no reply appears, check executable path, process startup, timeout and output drawer. If only ERROR appears, inspect stderr and tool installation. If result passes but expected evidence is empty, enable the correct verification/checksum source and use a provider reply that actually reports it.

4.1.4.9 Firmware packages, linking and Beta production approval

Approve reusable firmware/provider configurations only after controlled acceptance.

Access and preparation

Open Admin / Testing > Test Sequence > General Programming. General Programming (License Required). A qualifying General Programming entitlement or bundle access is sufficient. Corresponding page/action permissions are also required.

Share only approved profiles/packages and confirm that required external tools and firmware revisions are available on the destination station. Beta is a software feature status. Saving a profile does not remove Beta or complete hardware acceptance. Follow the detailed acceptance procedure and site quality process.

Understand programming firmware storage and packages: Obtain the approved firmware and identify the provider-supported format.

Do not assume changing an original file changes a saved profile. Do not confuse the file checksum with the device checksum.

Approve a Beta programmer for production: Obtain the programmer vendor manual, supported tool/version, production licence approval, target/device list, approved firmware, fixture drawing, power limits, recovery procedure, expected PASS/FAIL replies and the customer's traceability requirement.

Do not remove or ignore the Beta marker after a single PASS. Do not approve an unknown XDM4011 command. Do not use an unlicensed programming tool. Do not skip negative tests, STOP recovery or update compatibility.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Package / profile identity	Retain approved firmware hash, tool/project/template identity and fixture setup.
Beta status	A persistent review marker; successful save or one trial does not remove the need for acceptance.

Procedure

1. Understand programming firmware storage and packages - Add firmware in the provider Firmware stage and enable the intended files.

2. Save the profile to retain the selected firmware revision. Changing the original file later does not silently replace that revision.
3. Use REFRESH HASH and inspect the saved-versus-disk status before releasing a change.
4. A multi-file package requires compatible Intel HEX files without conflicting overlapping data. Other supported formats must follow the selected provider requirements.
5. A single BIN for providers requiring a load address must have the approved address.
6. To release new firmware, select the approved new file, save the profile, repeat the controlled programming trial and review verification/checksum evidence.
7. Confirm the firmware revision and reported image checksum in the result before approving production.
8. Approve a Beta programmer for production - Keep the provider marked BETA during development. The orange BETA Run Guard tile is a release reminder, not a missing hardware setting.
9. Freeze the exact programmer executable version and hash. For SEGGER freeze the .jflash project. For XDM4011 freeze the verified CLI template and PASS/FAIL tokens. For ST-LINK obtain written production-tool/licence approval or select an approved production programmer.
10. Verify tool serial/IP selection when two programmers are connected so the wrong target cannot be selected silently.
11. Test every enabled operation: connect, blank/erase where used, program, verify, reset/start, checksum and failure recovery. Use approved trial hardware.
12. Run negative tests: missing programmer, wrong target, target unpowered, wrong firmware, invalid BIN address, programmer timeout, verification mismatch, checksum mismatch and operator STOP. Each must fail clearly and leave the fixture in its defined safe state.
13. Confirm database firmware revision/hash, command redaction, complete stdout/stderr, exit code, timing and report traceability.
14. Confirm updater/backward compatibility by loading the saved profile after an approved software update and rerunning the acceptance sample. Do not alter signed released packages in place.
15. Complete the customer's required capability/sample study and sign an engineering/quality release record referencing provider, software build, tool version, project/template hash, fixture revision and approved firmware revision.
16. Beta status should be removed only in a later reviewed software build after these gates pass; saving a profile does not promote a provider out of Beta.

Worked example

A Beta profile can program a trial target successfully yet still require failure/stop/readback and repeated-run acceptance before routine production.

Expected result

Approved evidence ties the provider profile and firmware to the commissioned process.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Understand programming firmware storage and packages	Check enabled files, saved revision, provider-supported format, overlap errors, load address and the first programmer error.
Approve a Beta programmer for production	If any gate fails, keep the provider Beta, preserve evidence, correct the implementation/profile/fixture, and repeat the affected acceptance set before production release.

4.1.5 CAN (License Required)

LICENSE REQUIRED

CAN license for CAN device communication and test sequences. CAN Calibration and Full packages also provide CAN access. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Define CAN messages, repeated traffic and reusable decode checks.

Access and preparation

Open Admin / Testing > Test Sequence > CAN. CAN (License Required). CAN Calibration includes CAN; a duplicate CAN purchase is not required for that bundle. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAN SEQ	Ordered TX/RX messages.
CYCLIC GROUPS	Saved timed transmissions with explicit lifetime/busy policy.
CAN TOOLS	Tools for discovering/reviewing candidates before adding them to a sequence.

Procedure

1. Configure adapter/channel/bitrate in Device Configuration.
2. Create a one-shot message and verify raw reply/decode.
3. Add cyclic traffic only if the DUT requires it and provide an explicit stop path.
4. Save definitions and link the parent flow.

Worked example

A keep-alive frame may need cyclic traffic while a measurement request should run once; configure those as separate responsibilities.

Expected result

Reviewed CAN definitions are reusable with clear reply and timing evidence.

Related instructions: [4.1.5.1 CAN SEQ](#); [4.1.5.2 CYCLIC GROUPS](#); [4.1.5.3 CAN TOOLS](#); [9 CAN Analyzer / UDS](#).

Screen reference

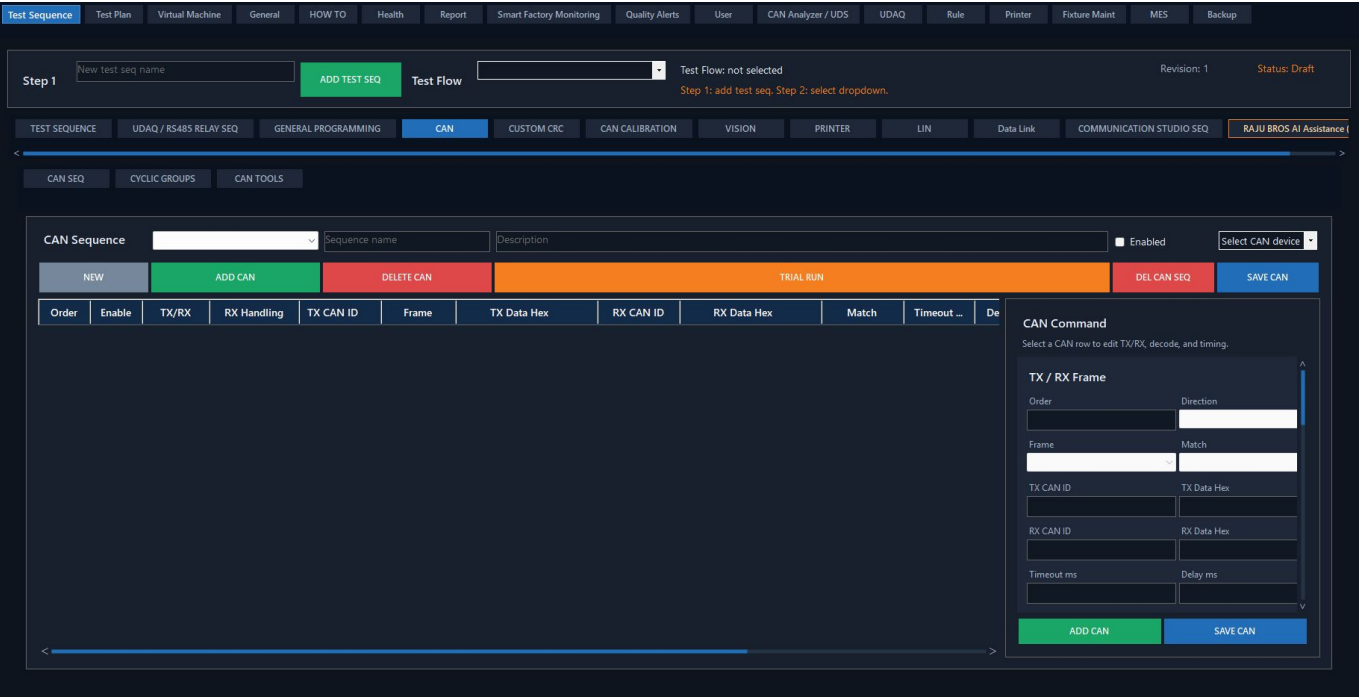


Figure 4.1.5 - CAN sequence and cyclic group navigation. Reference capture: 07 October 2026.

4.1.5.1 CAN SEQ

Create an ordered CAN TX, RX or TX/RX sequence and decoded judgement.

Access and preparation

Open Admin / Testing > Test Sequence > CAN. CAN (License Required). CAN Calibration includes CAN; a duplicate CAN purchase is not required for that bundle. Corresponding page/action permissions are also required.

CAN SEQ stores ordered CAN/UDS requests and their response rules. Set device, transmit and receive identifiers, frame type, payload, timeout and validation. Read/write UDS services have different effects. Confirm the service purpose before trying a request on a real controller.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW / ADD CAN / DELETE CAN / SAVE CAN	Definition lifecycle.
Trial device / TRIAL RUN	Selects the actual CAN device for a controlled trial.
TX/RX / RX Handling	Direction and Legacy versus Raw CAN receive handling.
TX CAN ID / Frame / TX Data Hex	Transmit identity, Standard/Extended frame and bytes.
RX CAN ID / RX Data Hex / Match	Required reply; Contains, ExactMatch, StartsWith, MaskMatch, BytePosition, AnyResponse or None.
Decode / Type / Start Byte / Len / Bit / Endian	Selects interpreted payload data.
Scale / Offset / Min / Max / Unit / Result Variable	Transforms, validates and stores the decoded result.
Cyclic TX / Cycle ms / Timeout / Delay	Repeated send, reply wait and post-command spacing.

Procedure

1. NEW and name the sequence, then ADD CAN.
2. Choose direction, frame/IDs and documented payload.
3. Set expected reply and matching mode; enable Decode only with known offset/type/endian.
4. For decoded checks, set scale, offset, unit and limits.
5. SAVE CAN, select trial device, TRIAL RUN and inspect raw plus decoded evidence.
6. Link the parent and save it.

Worked example

Illustrative bytes 10 27 decoded UInt16 little-endian give 10000; scale 0.001 yields 10.0 engineering units. Verify the offset is the actual receive representation selected.

Expected result

A reply must satisfy the intended match and decoded limits.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Plausible wrong value	Inspect raw-vs-payload handling, offset, length, signedness and endian before changing limits.
No reply	Check frame format/IDs, adapter channel, bitrate and timeout.

4.1.5.2 CYCLIC GROUPS

Create cyclic CAN traffic and define when it owns the adapter.

Access and preparation

Open Admin / Testing > Test Sequence > CAN. CAN (License Required). CAN Calibration includes CAN; a duplicate CAN purchase is not required for that bundle. Corresponding page/action permissions are also required.

CYCLIC GROUPS defines repeated CAN transmissions. Review the interval, enabled rows, start/stop behaviour and any limits. A cyclic command can continue to affect the bus until stopped. Confirm termination/cleanup and inspect bus loading before using it alongside a measurement sequence.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Saved Group / Group Name / Scope / Model / CAN Device	Identify reusable group, availability and target.
Busy Policy	Select intended behavior when another operation needs the bus; review the offered policy before use.
CommandOrder / CanId / FrameType / DataHex / IntervalMs / MaxSends / Priority / IsEnabled	Per-message transmission definition.
TRIAL START / TRIAL STOP	Starts/stops controlled cyclic trial.
OPTIONAL SAME-STEP LINK / LINK / UNLINK	Associates saved group with the selected test step.

Procedure

1. NEW GROUP and enter unique name, scope, target and busy policy.
2. ADD COMMAND, configure bytes/interval, then order using UP/DOWN; duplicate only after reviewing ID/data.
3. SAVE GROUP, TRIAL START on a controlled bus and observe actual traffic.
4. TRIAL STOP and verify traffic ended.
5. Link the group at the intended flow point, and retain required stop/cleanup behavior.

Worked example

A 100 ms status frame repeats while the measurement window is active; a separate diagnostic request must not compete unpredictably for its ID.

Expected result

Cyclic lifetime and contention behavior are deliberate.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected bus traffic	Stop all trial/transmit owners and inspect same-step links, interval and MaxSends.

4.1.5.3 CAN TOOLS

Turn observed CAN behavior into reviewed sequence candidates.

Access and preparation

Open Admin / Testing > Test Sequence > CAN. CAN (License Required). CAN Calibration includes CAN; a duplicate CAN purchase is not required for that bundle. Corresponding page/action permissions are also required.

CAN TOOLS opens supporting bus inspection and diagnostic functions. Use them to check traffic and decoding, then return to the saved sequence for production configuration. Monitoring a bus and transmitting a diagnostic request are different actions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAN TOOLS	Support tools operate within current flow context.
Candidate to sequence	Transfers a proposed message/check into the editable draft for review.

Procedure

1. Use a known adapter and capture approved test conditions.
2. Inspect the candidate raw bytes, identifier and timing before transferring it.
3. Review the resulting row, decode, limits and device link in the main sequence.
4. Save and trial the reviewed candidate as a single operation.

Worked example

A changing byte found in a trace can be a counter rather than a measurement; confirm meaning before building a limit check.

Expected result

Added candidates remain editable definitions, not automatically approved hardware behavior.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Candidate does not reproduce	Compare exact conditions, fresh traffic, ID/frame and decoder assumptions.

4.1.6 CUSTOM CRC (License Required)

LICENSE REQUIRED

Custom CRC license for custom methods, validation, preview and linked execution. Using it inside CAN does not remove the Custom CRC requirement. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Maintain reusable byte-transform methods for CAN CRC and counters.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
New method	Blank, general CRC or application CRC with alive-counter templates.
Library / Method name / Enabled / Revision	Shared definition and saved identity.
Validate code / Run sample / Save method	Static validation, offline sample and persistence are separate actions.

Procedure

1. Create a method from the closest template and give it an unambiguous name.
2. Configure parameters, tables/timers and known samples.
3. Validate and run all relevant offline vectors.
4. Save, select the method on the intended CAN message and inspect transmitted-byte evidence during commissioning.

Worked example

A method in the shared library can serve several CAN rows; each row's override parameters must also be reviewed.

Expected result

Only reviewed saved transforms are linked to message execution.

Related instructions: [4.1.6.1 C# method](#); [4.1.6.2 Parameters](#); [4.1.6.3 Byte tables](#); [4.1.6.4 Timers](#); [4.1.6.5 Samples / preview](#); [4.1.6.6 Validation, saving, package import/export and linking](#); [4.1.6.7 Custom CRC template library and known-vector tutorial](#); [4.1.6.4.1 START / STOP / RESET CRC TIMER sequence actions](#).

Screen reference

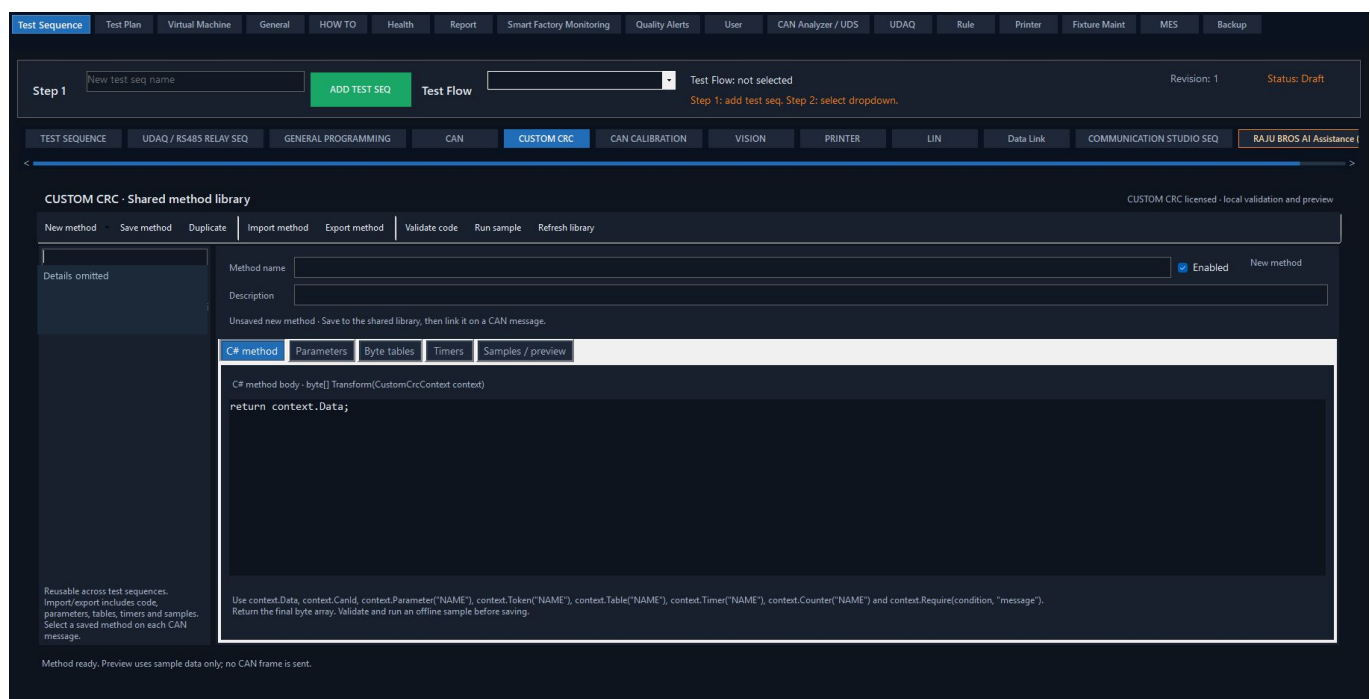


Figure 4.1.6 - Custom CRC: method and supporting data. Reference capture: 07 October 2026.

4.1.6.1 C# method

Write the supported C# transform body and return a validated byte array.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

C# method holds a user-authored checksum/CRC routine for the command workflow. Work from the approved protocol algorithm and validate known input/output vectors. Keep the method focused on its expected byte transformation. A successfully saved routine can still implement the wrong algorithm.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Transform body	byte[] Transform(CustomCrcContext context) body.
context.Data / CanId	Message bytes and arbitration ID.
Parameter / Token / Table / Timer / Counter	Named inputs provided by the supported restricted context.
context.Require	Stops processing when an assumption fails.

Procedure

1. Begin with a shipped template rather than unrelated host APIs.
2. Define expected length and ranges using context.Require.
3. Change only intended output bits/bytes and return final data.
4. Validate code and Run sample before saving or linking.

Worked example

A method should reject an unexpected payload length rather than writing CRC into an assumed final byte.

Expected result

Validation and sample evidence expose invalid code/data before transmission.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Compile/runtime validation fails	Use allowed context APIs and bounded logic; inspect exact diagnostic instead of suppressing it.

4.1.6.2 Parameters

Set defaults and row-specific method parameters accurately.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Parameters define configurable inputs to the custom method. Use documented names, types and defaults, and check how the calling sequence supplies them. Avoid silently using a default when a production-specific parameter is required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Parameter name / default	Exact named values consumed by code.
CAN-row JSON overrides	String-valued JSON object overriding defined defaults for that row.

Procedure

1. Read the selected template parameter descriptions.
2. Set width/polynomial/initial/XOR/reflection and payload region for the documented algorithm.
3. Review any message-row overrides; run a sample with those same values.
4. Save the method and parent message.

Worked example

For a general CRC template, an override such as {"INIT_HEX":"FF"} changes the named initial register. Use the exact names in that template, not a guessed synonym.

Expected result

Parameter values match both algorithm and message-specific layout.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Known vector fails	Inspect default/override precedence, HEX versus decimal format and exact parameter names.

4.1.6.3 Byte tables

Provide a named byte table without changing its index semantics.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Byte tables provide reference data used by the method. Check byte order, index range and the source protocol specification. Validate the exact table revision using known samples before approving it for command generation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Add table / Table name / Remove	Named lookup-table lifecycle.
Apply bytes to indexed table	Parses HEX with spaces, commas, 0x prefixes or braces.
Index	Zero-based byte position; each byte must fit 00-FF.

Procedure

1. Add/name a table and paste the approved bytes.
2. Apply bytes and inspect first, last and several middle indices.
3. Reference the exact table name in code and run a vector exercising its boundaries.

4. Save method after the table is verified.

Worked example

Bytes 00 07 0E occupy indices 0,1,2. A code lookup at 1 returns 07.

Expected result

The indexed table matches the approved order.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong CRC after table paste	Check byte count/order and incomplete byte pairs before changing code.

4.1.6.4 Timers

Configure per-run timers separately from CAN transmission interval.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Timers support the method's supported timing-related inputs. Distinguish these values from sequence response timeout and Delay After. Confirm units and the caller's meaning rather than assuming that every timing value is milliseconds.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Timer name / Interval (ms)	Independent counter and its advancing interval.
Start value / Increment / Max (inclusive) / Wrap to	Value progression and inclusive wrap boundary.
Start mode	At DUT start or Manual start.

Procedure

1. Add a timer with unique name and reviewed interval/range.
2. Select automatic or manual start and verify a sample using explicit timer state.
3. Save the method; add explicit timer actions if manual.
4. Check repeated message evidence and new-run reset behavior.

Worked example

Start 0, increment 1, maximum 14, wrap 0 cycles 0...14 then 0. It does not send reserved 15.

Expected result

Timer progression is predictable and distinct from Cycle ms on the CAN message.

Related instructions: [4.1.6.4.1 START / STOP / RESET CRC TIMER sequence actions](#).

4.1.6.4.1 START / STOP / RESET CRC TIMER sequence actions

Start, freeze or reset a named CRC timer at an explicit sequence point.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
START CRC TIMER	Starts the specified saved method timer.
STOP CRC TIMER	Freezes its value.
RESET CRC TIMER	Returns to configured Start value.
MethodName/TimerName	Exact target form displayed by the selected timer's helper text.

Procedure

1. Save the method and timer first.
2. Use Manual start when the clock should not begin at DUT start.
3. Add the required timer action with the displayed Method/Timer target at the intended point.
4. Bracket dependent traffic with the intended start/stop/reset operations and save the flow.
5. Trial and inspect values across start, stop, reset and a new run.

Worked example

Target TRAINING_CRC/ALIVE_CLOCK with maximum 14 wraps 0...14. STOP freezes the current value; RESET restores Start value.

Expected result

Timer state follows explicit actions rather than accidental transmission count.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Timer never advances	Check exact saved names, Manual start action, interval and whether STOP was already executed.

Related instructions: [4.1.6.4 Timers](#).

4.1.6.5 Samples / preview

Check a transform offline with known input and expected output.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Samples / preview is the place to compare known input bytes against expected output. Include empty, minimum/maximum and representative frames where supported. Review every changed byte and length. A single passing sample is insufficient for a new protocol implementation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Sample row / CAN ID / data	Selected test case; CAN ID is hexadecimal.
Parameters / tokens	JSON string objects.
Timers / counters	JSON integer objects for explicit sample state.
Expected hex	Optional known output for comparison.
Run sample	Local transform preview, not a CAN transmission.

Procedure

1. Select or add a sample and supply complete input bytes.
2. Set named overrides/state and known expected bytes.
3. Run sample and compare entire output, including unchanged bits.
4. Test edge cases such as counter maximum, wrong length and byte-region limits before saving.

Worked example

The shipped CRC-8 SMBUS check uses ASCII 123456789 and expected checksum F4, with extra output space in its sample payload.

Expected result

Offline evidence validates the configured transformation against a known answer.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Output differs	Check algorithm parameters, protected byte range, endian output and counter/timer sample values.

4.1.6.6 Validation, saving, package import/export and linking

Save and transfer complete CRC definitions before linking messages.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Validate the method and its sample vectors before saving. Import/export packages only from an approved source and review them before linking. In the calling sequence, verify the selected method and parameters and inspect the final transmitted frame during a controlled trial.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Validate code / Save method	Validation and shared-library persistence.
Duplicate	Creates a separately editable method.
Import method / Export method	Transfers code, parameters, byte tables, timers and samples.
CAN message method selection	Selects the saved method used at runtime.

Procedure

1. Validate and run relevant samples.
2. Save with a unique name and refresh library.
3. Export/import the complete method when moving configuration; inspect transferred state and run samples again.
4. Select the saved method on each intended CAN row, inspect overrides and save its sequence/group.

Worked example

Duplicating a method for another message family keeps a reviewed original; editing one shared method can otherwise affect multiple linked messages.

Expected result

References point at deliberate saved definitions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Method absent	Refresh library and check name/enabled state/license.
Imported method fails	Review complete dependencies and rerun samples before linking.

4.1.6.7 Custom CRC template library and known-vector tutorial

Use the template library and known vectors to establish a correct CRC.

Access and preparation

Open Admin / Testing > Test Sequence > Custom CRC. Custom CRC (License Required). Custom CRC is independently guarded; ordinary CAN access alone does not prove Custom CRC entitlement. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
General CRC template	Width 8/16/32; normal unreflected polynomial; independent input/output reflection and multi-byte output endian.
DATA_START / DATA_LENGTH / OUTPUT_BYTE	Zero-based protected range and CRC output, which must not overlap.
Application prefix / alive counter	Optional 16-bit application-ID prefix and counter inserted before CRC; application ID differs from arbitration ID.

Procedure

1. New method > General CRC-8 / CRC-16 / CRC-32 and enter a unique name.
2. Run the supplied ASCII check before altering defaults.
3. Set the real message length, protected range and output position; run an approved device-specific vector.
4. For alive-counter use, review counter byte/bit/width/start/inclusive maximum and one-transmitter ownership.
5. Save and link after samples pass.

Worked example

Shipped checks: CRC-8 SMBUS F4, CRC-16 ARC BB3D, CRC-32 ISO-HDLC CBF43926 for ASCII 123456789. These sample payloads include output space and are offline examples, not ready-to-send classic CAN frames.

Expected result

The implementation agrees with a known vector before hardware use.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Correct polynomial but wrong output	Check init, XOR, reflection, byte order, application prefix and protected region separately.

Related instructions: [4.1.6 CUSTOM CRC](#).

4.1.7 CAN CALIBRATION (License Required)**LICENSE REQUIRED**

CAN Calibration license. This package also includes CAN access. CAN-only or Analyzer-only access does not unlock calibration methods. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Build a calibration method that separates measurements, calculations, writes and verification.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

Configure UDS calibration: Confirm PEAK CAN hardware, CAN IDs, baud rate, method family, security method, and target limits.

Do not change target values during production. Do not use raw CAN steps for ISO-TP UDS steps.

Method-specific convergence attempts differ from replaying a whole failed calibration. Mutating or unclassifiable UDS prevents automatic parent/group replay.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
+ FORMULA	Adds a CAN UDS calculation step that stores the formula result in Store Variable. Select or create source variables first. Use the Formula field for expressions and Store Variable for the result name.
+ VARIABLE	Adds a CAN UDS step that stores a measured or parameter value for later formulas. Use stable variable names without spaces. Formula steps can reference the value later by name or as {NAME}.
TEST FORMULA	Evaluates the selected CAN UDS formula using current preview variables. Use this before saving the method. If it fails, check missing variables, non-numeric values, unit conversion, and divide-by-zero.
NEW / SAVE / DELETE	Saved method lifecycle.
ADVANCED	Exposes IDs, bitrate, target, attempts, formula and security configuration.
ALLOCATE	Maps method device roles to configured instruments.
FLOW STEPS / PARAMETERS / CALCULATION / UDS COMMANDS / MONITOR FLAGS / PREVIEW	Complementary views of one method.

Procedure

1. Open Admin / Testing.
2. Open CAN Calibration.
3. Select or create calibration method.
4. Configure request/response CAN IDs and baud rate.
5. Add UDS steps, variables, formulas, and limits.
6. Use RUN STEP for validation.
7. Save method and link it to the main test sequence.
8. Create a named method and select only a reviewed template suitable for the product.
9. Allocate actual CAN/reference devices and verify bus settings.
10. Configure read, calculate, write and readback operations explicitly.
11. Validate calculations with known inputs before any write; save and trial a controlled target.
12. Link the saved method or selected block to a main row and save the parent.

Worked example

A measured current produces a proposed trim value; its range must be checked before a persistent write and then confirmed by readback.

Expected result

Method and parent evidence retain measurement, calculation, programming and final verification.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Configure UDS calibration	If UDS fails, check session, security access, CAN IDs, expected positive response, timeout, and variable formula output.

Related instructions: [4.1.7.1 Calibration methods, groups and device allocation](#); [4.1.7.2 FLOW STEPS](#); [4.1.7.3 PARAMETERS](#); [4.1.7.4 CALCULATION](#); [4.1.7.5 UDS COMMANDS](#); [4.1.7.6 MONITOR FLAGS](#); [4.1.7.7 PREVIEW](#); [4.1.7.8 Read/write behaviour, retries and calibration results](#).

Screen reference

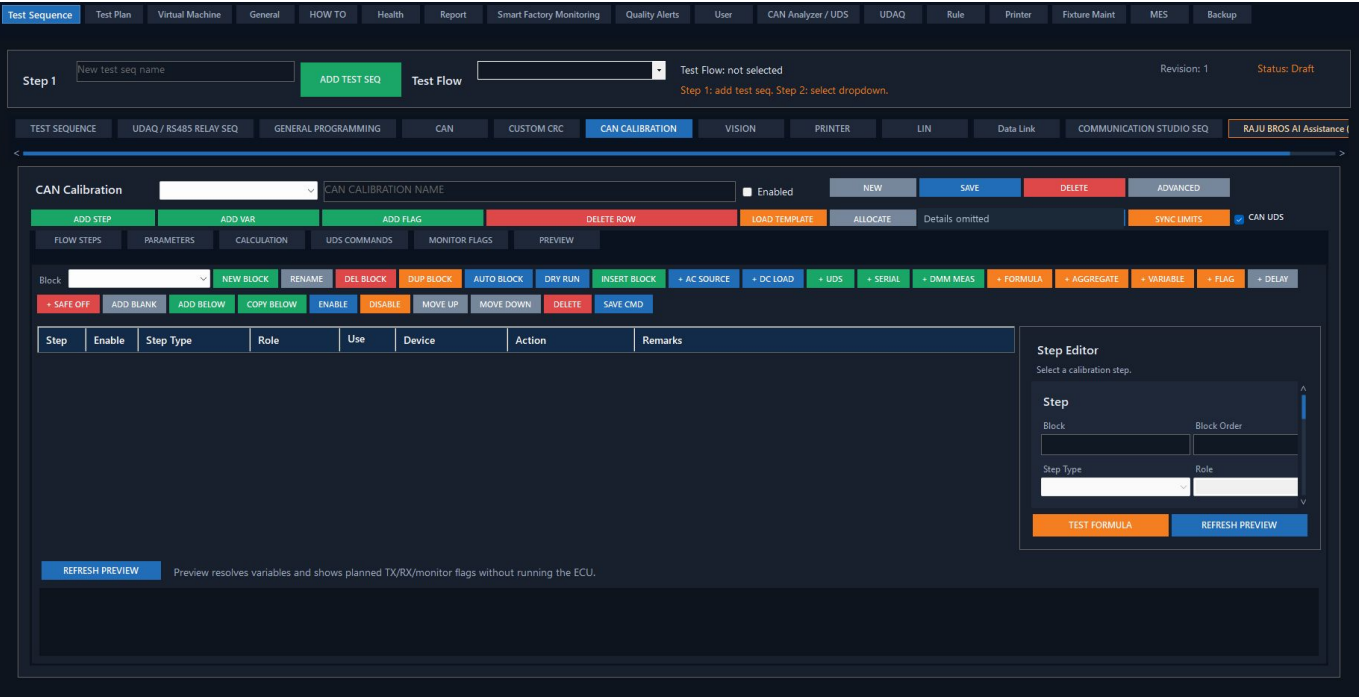


Figure 4.1.7 - CAN calibration method workspace. Reference capture: 07 October 2026.

4.1.7.1 Calibration methods, groups and device allocation

Select method scope and allocate the intended physical instruments.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

Select a saved calibration method and allocate the intended devices and group. Calibration combines measurement, calculation and potentially persistent writes. Confirm the reference equipment, allowed range and approved process before execution. Example templates must be reviewed for the actual product.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Method name / Description / Enabled	Saved method identity and participation.
Request/Response/Tester-present IDs / baud / frame	Approved controller communication settings.
ALLOCATE / Role / Use Map	Assigns logical roles to configured devices.
Calibration Block	Named subset selected by a parent row.

Procedure

1. Select or create a method and review its family/template assumptions.
2. Open ALLOCATE and map every role to the intended enabled instrument.

3. Confirm request/reply IDs, frame type and bitrate; review required session/security configuration through approved access.
4. Save, reopen and check the parent's method/block selection.

Worked example

Two fixtures can use the same logical current-measurement role but different saved DMM devices; allocation must match the selected fixture.

Expected result

No read/write silently targets an unintended instrument.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong device or missing role	Review ALLOCATE, Use Map and explicit row device settings before running.

4.1.7.2 FLOW STEPS

Arrange calibration actions in a traceable execution order.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

FLOW STEPS defines calibration order. Check each action's enable state, device, read/write role, timing and stop behaviour. Put verification after a persistent write when required by the approved process. Do not remove stabilizing operations merely to reduce cycle time.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD STEP / DELETE ROW	Creates/removes the selected operation.
Step / Enable / Calibration Block / Method Type	Order, participation, membership and execution kind.
Command / UDS Data / Measured Var / Store Var	Operation payload and current-run data dependencies.
Min / Max / Unit / Timeout / Delay	Acceptance and timing.

Procedure

1. Add prerequisite session/setup work followed by measurement.
2. Store measurements before calculation; validate output before write.
3. Place approved readback/verification after persistent writes.
4. Review block membership, disabled rows and delays; save and trial the smallest eligible operation.

Worked example

Read REF_CURRENT, calculate TRIM, check TRIM bounds, write once and read back. A missing measurement must not be replaced by an old default.

Expected result

Order exposes dependencies and retains first failure evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Formula uses empty input	Move/enable its producer and inspect the stored variable name/type.

4.1.7.3 PARAMETERS

Define typed calibration inputs and their intended scope.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

PARAMETERS contains method inputs and limits. Match units and ranges to the approved calibration specification. Review defaults before a trial; a default value is not evidence that it is correct for a particular product.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Variable / Data Type / Value	Exact name and supported Text/ASCII/numeric/HEX/date representation.
Scope	Model, Runtime, Measured, Calculated, Operator or Report.
Unit / Description	Engineering meaning and origin.
Min / Max display	Read-only displayed boundaries where linked to parameters/limits.

Procedure

1. ADD VAR for each required input and give it a stable name.
2. Choose encoding/type and scope, then set only justified defaults.
3. Verify the producing read or calculation fills measured/calculated variables before use.
4. Review units and SAVE.

Worked example

A UInt16LE response value and its physical scaled current are different representations; name and describe them distinctly.

Expected result

Inputs have explicit types, provenance and units.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected value conversion	Check signedness, endian, selected type and whether the value was treated as text.

4.1.7.4 CALCULATION

Preview calibration calculations against independent reference values.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

CALCULATION transforms measured values into calibration outputs. Check formula inputs, units, scaling and output range with known examples. Compare intermediate values with independent reference calculations before enabling any persistent write.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Predefined Formula / Formula	Selected calculation logic.
Source 1 / Source 2 / Source 3 / Voltage Source	Enabled input sources used by that calculation.
Store Variable / Output Unit	Destination and physical unit.
TEST FORMULA	Evaluates current preview inputs where offered.

Procedure

1. Select the calculation step and its formula/preset.
2. Enable only required sources and match them to produced variables.
3. Supply known preview values and compare the result independently.
4. Check zero denominator, output bounds and unit conversion; save only after valid and invalid examples behave correctly.

Worked example

Illustrative Target $10 \times \text{CurrentPWM } 100 / \text{MeasuredValue } 8$ gives 125. This is a mathematical example, not authorization to write a 125 trim value.

Expected result

A reviewed calculated value is available for the next explicit check/write.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Preview fails	Inspect exact names, missing/nonnumeric inputs and divide-by-zero.
Out-of-range trim	Correct source/calculation or stop; do not silently clamp unless that is the approved formula.

4.1.7.5 UDS COMMANDS

Define diagnostic payloads and acceptance conditions for the approved ECU protocol.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

UDS COMMANDS defines diagnostic requests, expected responses and data interpretation. Separate read services from write services. Confirm identifiers, byte order and payload length against the approved protocol. A negative response must remain a failed operation with evidence.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Method Type / Logical Command / Official Name	Operation identity; distinguishes raw CAN from UDS.
Payload / Command Template / Params JSON	Documented request and supported parameters.
Expected RX / Match / Timeout	Required positive reply and waiting.
Role / Use Map	Device-routing choice.

Procedure

1. Select the exact read/write service from the approved controller specification.
2. Enter payload and response rule; check byte order and field length.
3. Preview resolved variables and confirm session/security prerequisites.
4. Trial reads first; execute writes once only after approval and retain raw reply/readback.

Worked example

A matching RX identifier alone cannot prove a write succeeded; inspect its service-specific positive response and required readback.

Expected result

Transport and business/diagnostic acceptance remain distinct.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Negative response	Retain its code and inspect session, security, request length and target state.
No response	Check IDs, frame format, ISO-TP handling and timeout.

4.1.7.6 MONITOR FLAGS

Choose calibration checkpoints and limits for monitoring.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

MONITOR FLAGS select relevant measurements/events for diagnosis. Use consistent labels so a failed calibration can be traced to the original reading and calculation. Monitoring does not change the acceptance limit or authorize a write.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Monitor Flag / Checkpoint Name	Stable evidence identifier and readable label.
Value / Signal	Produced variable to evaluate.
Min / Max / Unit	Checkpoint acceptance boundaries.
SYNC LIMITS	Synchronizes supported parameter-driven limits; review affected values.

Procedure

1. ADD FLAG and name the checkpoint.
2. Select the source variable with correct units and set approved limits.
3. Use SYNC LIMITS only for the intended template mapping and inspect the result.
4. SAVE and trial a known in-range and out-of-range input.

Worked example

A final current checkpoint references the post-calibration measured current, not the requested setpoint.

Expected result

Monitoring identifies actual evidence without authorizing writes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Missing checkpoint value	Check producer execution, exact variable and enabled flag.

4.1.7.7 PREVIEW

Inspect assembled method configuration before hardware execution.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

PREVIEW lets you inspect the assembled method before running it. Review resolved commands, calculated values, device assignments and order. Treat preview as configuration evidence; it does not prove that the physical calibration will pass.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PREVIEW	Resolved method/order/variables for configuration review.
Refresh preview	Rebuilds preview from current edits where offered.

Procedure

1. Save/commit pending row edits and open PREVIEW.
2. Trace device allocation, commands, variable dependencies and limits in order.

3. Return to the relevant tab to correct unresolved or inappropriate values.
4. Refresh and retain the reviewed configuration with trial evidence.

Worked example

A preview containing the correct command template but an unresolved measured token is not ready for a write.

Expected result

Preview is internally coherent; actual response still requires a controlled trial.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Preview differs from expected	Check selected method/block and pending edits before running.

4.1.7.8 Read/write behaviour, retries and calibration results

Handle reads and persistent writes according to their replay risk.

Access and preparation

Open Admin / Testing > Test Sequence > CAN Calibration. CAN Calibration (License Required). CAN Calibration includes CAN access. Corresponding page/action permissions are also required.

Restrict automatic repetition to operations safe to repeat. After an uncertain write or interrupted calibration, read back the target state using the approved recovery procedure. Keep measurement, calculation, write and verification evidence together with the final calibration result.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Read-only diagnostics	May use eligible retry behavior when the operation is repeat-safe.
Mutating or unknown UDS	Parent step/group automatic replay is limited to one attempt.
Final calibration evidence	Keep measurement, calculation, write, readback and failure together.

Procedure

1. Before running, identify every state-changing operation in the selected block.
2. After timeout/stop/write failure, retain the first reply and safely inspect target state.
3. Use the approved readback/recovery process to decide whether a deliberate new run is appropriate.
4. Confirm final verification rather than inferring success from a preceding calculation.

Worked example

A timeout after a trim write can mean the write completed but its acknowledgement was lost. Blind repetition is not a safe resolution.

Expected result

A failed method is not silently replayed and target state is established before further writing.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected no retry	Check for any mutating/unclassifiable UDS in the selected method/block; this restricts the enclosing group too.

4.1.8 VISION (License Required)

LICENSE REQUIRED

Vision license. Covers vision sequences, image inspection and the Vision Camera Tool. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Build image inspections with saved camera settings and validated segment rules.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Set up vision sequence: Set lighting, focus, exposure, camera mounting, and product position before training or saving limits. Keep verified OK and NG samples available. Normal segment RGBI limits use the ROI average; MAX_RGBI adds peak-pixel maximum checks.

Do not train on NG samples as OK. Do not use one sample as the complete production tolerance. Do not use MAX_RGBI unless peak-pixel checking is required. Before All Segments, verify the source values, selected limit families, destination count, and linked-profile expansion. ROI, component name, and unrelated fields must not be copied by a limit-only operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
VISION sequence	Ordered inspection steps and their linked result.
Vision Camera Tool	Image/ROI/rule authoring for the selected step.
SAVE VISION	Persists applied step settings; parent flow saves separately.

Procedure

1. Open Admin / Testing and open the Vision tab.
2. Select or create the vision sequence and camera step.
3. Capture or browse a stable reference image.
4. Create and name every required ROI/segment, group related segments, and select the correct rule.
5. Run TEST so each segment has actual average RGBI and other required measurements.
6. Click SET on any segment to open Segment Core Setting. The clicked segment loads automatically with its ROI preview.
7. Use the segment selector or PREVIOUS/NEXT to review other segments without closing the window.
8. In Actual Values, review Actual, Limit Min, Limit Max, and PASS/FAIL.
9. In Validation Limits, enter RGB/Intensity Min-Max manually or click USE AVERAGE for a starting window.

10. To copy the source limits, click APPLY LIMITS, choose Current/Selected/Group/Same Profile/All Segments, select only the required limit families, review the destination count, and confirm.
11. Linked Limit Profiles update all members; clear the Limit Profile in the main segment grid first when one segment needs independent limits.
12. Click OK to commit popup drafts, then save/apply the vision sequence.
13. Reopen the sequence and validate multiple verified OK, NG, and boundary samples.
14. Link the saved vision sequence to the main test flow and verify the Operator result shows segment Actual and Limits.
15. Create/select a Vision sequence and add the intended inspection step.
16. Choose camera/source and open its camera tool.
17. Configure stable capture, ROIs and approved judgement; test good and known-bad samples.
18. SAVE CAM, APPLY TO STEP, SAVE VISION, then SAVE SEQ when parent linkage changes.

Worked example

One board inspection may use a presence segment, an OCR segment and a light-leakage segment; each needs its own acceptance rule.

Expected result

The saved inspection uses deliberate capture settings and per-segment evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Set up vision sequence	If vision gives false NG, inspect camera stability, focus, lighting, ROI, average Actual versus configured limits, MAX_RGBI state, rule, and Limit Profile. If limits revert, check whether the segment is linked to a shared profile. If ROI preview is blank, capture/browse an image and verify that the segment ROI is valid.

Related instructions: [4.1.8.1 Vision sequence setup, steps and linked results](#); [4.1.8.2 Vision Camera Tool](#).

Screen reference

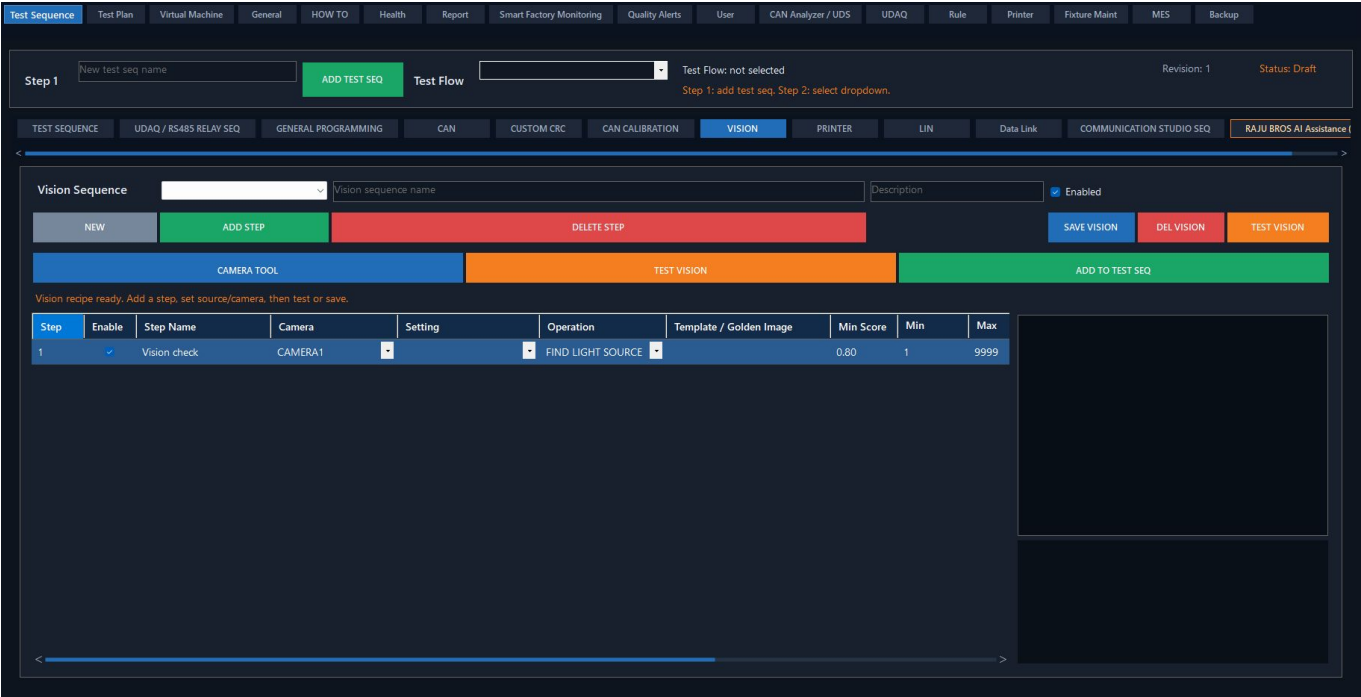


Figure 4.1.8 - Vision sequence with an unsaved example inspection row. Reference capture: 07 October 2026.

4.1.8.1 Vision sequence setup, steps and linked results

Create the Vision child sequence and link its judged result.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Create a vision sequence and add its inspection rows. Choose the camera, operation, limits and expected object/segment result. Open Camera Tool to configure image regions. Save the camera settings to the step, then save the vision sequence before linking it into the main flow.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW / ADD STEP / DELETE STEP	Create sequence and operations.
Vision sequence name / Description / Enabled	Definition identity and participation.
TEST VISION / SAVE VISION	Controlled evaluation and persistence.

Procedure

1. NEW and name the sequence.
2. ADD STEP and select intended source/operation; use the Camera Tool for detailed setup.
3. Apply settings from the tool, then TEST VISION on representative images/capture.
4. SAVE VISION and select its saved name on a parent row.
5. SAVE SEQ and verify aggregate result and segment detail in a controlled full flow.

Worked example

A parent Vision PASS must reflect all enabled required checks, not merely successful image capture.

Expected result

The parent consumes the saved reviewed child inspection.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Old regions used	Check APPLY TO STEP, SAVE VISION and the parent's selected sequence.

4.1.8.2 Vision Camera Tool

Use the Camera Tool as a complete image-to-inspection authoring workspace.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAPTURE	Captures an image from the selected camera/source. Use after lighting, focus, exposure, and camera mounting are stable.
DETECT PART	Runs part/presence detection for the active ROI. Use on a known OK sample first, then verify NG samples.
DETECT CAP	Runs capacitor polarity detection for the active segment. Set expected side and confidence before saving production limits.
LEARN LIMITS	Learns limits from OK samples. Use only verified OK samples. Revalidate with NG samples before production.
USE AVERAGE	Creates starting Min/Max values around the selected segment's measured average RGB, intensity, and supported color values. Run TEST on a verified sample first. Review the generated window against multiple OK, NG, and boundary samples before production use.
APPLY LIMITS	Copies only selected limit families from the current source segment to Current, Selected, Group, Same Profile, or All Segments. Verify the source, field selections, destination count, and linked-profile expansion. ROI, component identity, group, and unrelated settings remain protected.
OCR READ	Reads text from the selected ROI. Use after ROI, focus, lighting, threshold, and language data are verified.
TRAIN AI	Trains the local vision model from selected OK samples. Do not include bad samples in OK training. Record the trained model path and validate before production.
APPLY TO STEP	Applies camera/vision settings back to the selected vision step. Review ROI, limits, and model path before applying.
CAPTURE / BROWSE	Live source or approved setup image.
TEST / operation buttons	Evaluate the selected recipe or focused tool.
Segment grid / Core Setting	Component identity, ROI and rule configuration.
SAVE CAM / APPLY TO STEP	Save named camera setting and return draft inspection to its step.

Procedure

1. Capture/load a stable image and create/select segments.
2. Set each segment rule, limits and calibration using Core Setting.
3. Test known OK, NG and boundary samples.
4. Review optional profiles/alignment/training and save through the full camera-to-sequence chain.

Worked example

A browsed reference image is useful for setup but does not prove the currently mounted DUT was captured.

Expected result

Camera, geometry, rules and persistence are reviewed together.

Related instructions: [4.1.8.2.1 Camera selection, capture and image loading](#); [4.1.8.2.2 ROI drawing, segment shapes and Auto Segment](#); [4.1.8.2.3 Segment movement, scaling and keyboard shortcuts](#); [4.1.8.2.4 Limits, learned values and result judgement](#); [4.1.8.2.5 Colour, CIE and light leakage inspection](#); [4.1.8.2.6 Part/cap detection, OCR and AI tools](#); [4.1.8.2.7 Thermal inspection and calibration](#); [4.1.8.2.8 Save CAM / APPLY TO STEP and image evidence](#); [4.1.8.2.9 Auto Align saved LED segments](#); [4.1.8.2.10 Camera API controls and live](#)

preview; 4.1.8.2.11 Limit profiles, bulk limits and component CSV; 4.1.8.2.12 Post Process and measurement calibration; 4.1.8.2.13 QR reading and result mapping; 4.1.8.2.14 Segment Core Setting tabs and scoring; 4.1.8.2.15 Training sets: SAVE OK, SAVE NG, SAVE GOLDEN and VALIDATE.

Screen reference

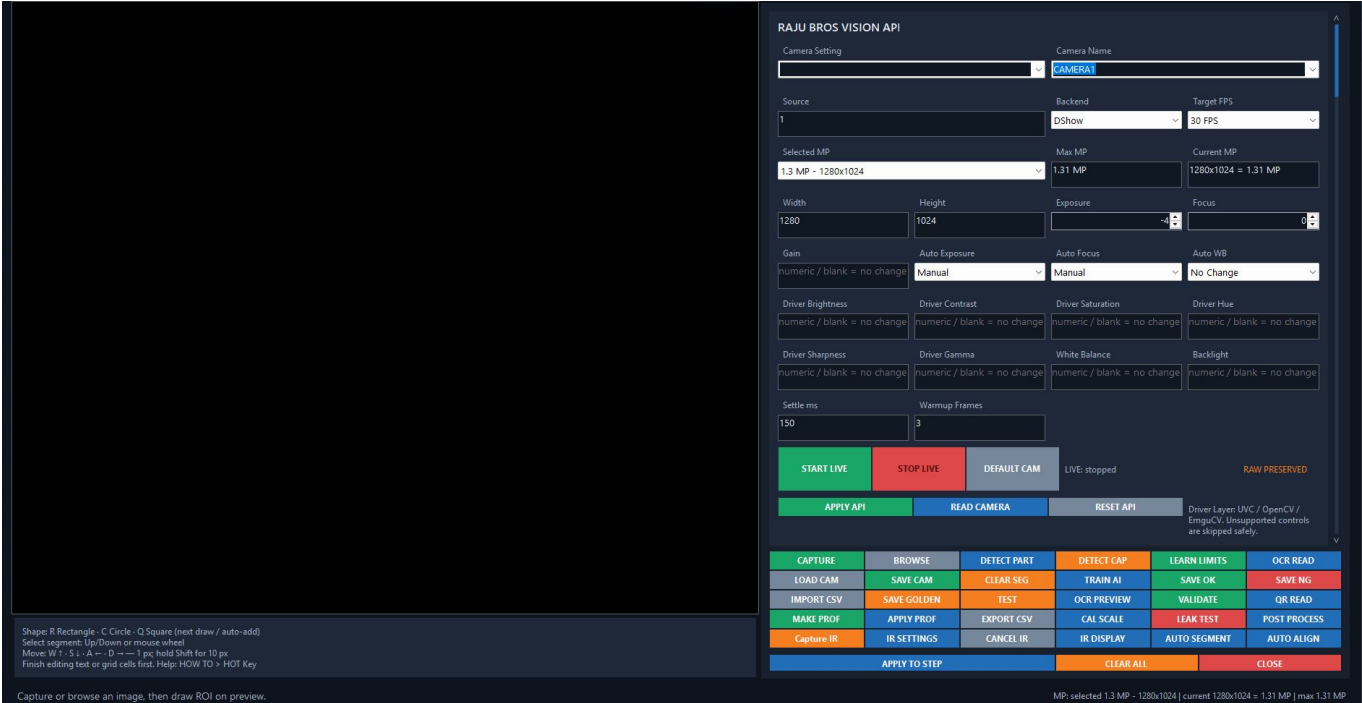


Figure 4.1.8.2 - Vision Camera Tool: image and inspection controls. Reference capture: 07 October 2026.

4.1.8.2.1 Camera selection, capture and image loading

Select the intended source and establish repeatable image capture.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Select the intended camera and capture an image, or load an approved reference image for setup. Confirm orientation, focus, illumination and exposure. A loaded image is a setup input; it is not a live capture of the current DUT. Recheck settings when the lens, camera or fixture changes.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Camera Setting / Camera Name / Source	Named profile, configured device and input source.
CAPTURE	Obtains the current source image.
BROWSE	Loads an existing image for setup/validation.
LOAD CAM	Loads saved named configuration.

Procedure

1. Select camera/profile and inspect source identity.

2. Fix mounting, lighting, focus and exposure before setting limits.
3. CAPTURE and confirm orientation, ROI coverage and image size.
4. Use BROWSE only for known setup/validation samples; return to live capture for fixture validation.

Worked example

A rotated or differently sized reference can move an otherwise correct ROI onto the wrong component.

Expected result

The image origin and geometry are known.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Black/blurred image	Check source/device readiness, lens/focus, exposure and illumination.
ROI shifts between captures	Check resolution, fixture placement and automatic camera controls.

4.1.8.2.2 ROI drawing, segment shapes and Auto Segment

Create and review visible-light ROI segments.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Draw an ROI around the intended inspection area. Choose rectangle, circle, square or the available shape before drawing. Auto Segment helps place regions, but every proposed region must be reviewed. Avoid including reflections, labels or adjacent components that would distort the measurement.

Use Vision Auto Segment: Open Vision Camera Tool from the Sequence page with the applicable view/edit permissions. Capture or browse a stable visible-light sample with fixed camera position, lighting, focus and exposure. Auto Segment does not operate on thermal frames.

After capture adds setup segments in the camera tool; it is not a command to regenerate segment numbering on every production test. Changing shape does not convert existing ROIs until APPLY SHAPE / SIZE. Auto Segment differs from Align LEDs in tests, which adjusts existing saved segments within its configured maximum correction.

Auto Segment is visible-light setup and supports up to 256 segments. It is distinct from runtime adjustment of already saved segments.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Draw / add shape	Rectangle, Square, Circle or Ellipse for new regions.
Width / diameter px / Height px	Requested shape dimensions; square/circle use width.
DETECT + ADD	Adds detected bright sources without deleting existing covered segments.
APPLY SHAPE / SIZE	Changes selected existing ROI while retaining its centre.

Procedure

1. In AUTO SEGMENT, choose Draw / add shape: Rectangle, Square, Circle or Ellipse. Set Width / diameter px and Height px; Square and Circle use width for side length or diameter.
2. Set Min light source > (0-255), Min contour area > and Max contour area for the LED sources. Detection uses a grayscale brightness threshold and contour area from the measurement-adjusted image.
3. Click DETECT + ADD. Check Detected LEDs, Added and Segments counts and the ROI overlay. Existing segments containing a detected centre are preserved; additions use available segment numbers up to 256.
4. Select each added segment and review position, shape, dimensions and measurement rules/limits. Use APPLY SHAPE / SIZE to change the selected existing segment while keeping its centre; selecting a draw shape alone changes only future drawing/additions.
5. Adjust false detections and missed LEDs using thresholds, contour area, exposure or manual ROIs. Enable After capture only if detection should also run when CAPTURE is used in this tool.
6. Click SAVE CAM to keep the named camera setting, APPLY TO STEP to return the reviewed profile to the vision step, then SAVE VISION. If the vision sequence is linked into a main test-flow draft, click SAVE SEQ there too.

Worked example

A new Circle choice affects the next drawing/auto-add. To convert an existing rectangular ROI, select it and APPLY SHAPE / SIZE.

Expected result

Reviewed distinct ROIs cover intended sources; detection does not itself approve limits.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Use Vision Auto Segment	If nothing is added, confirm a visible-light image is loaded, inspect threshold/area settings and existing ROIs, and check the 256-segment capacity. If reflections or merged light sources are detected, improve exposure/lighting or tune threshold/area and review each ROI before saving. See HOW TO > HOT Key > Vision Camera Tool hotkeys for precise position adjustment.

4.1.8.2.3 Segment movement, scaling and keyboard shortcuts

Precisely move/select visible-light regions and calibrate physical dimensions.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Select the segment before moving it. W/A/S/D moves a visible-light region by one image pixel; Shift moves ten. R/C/Q chooses rectangle/circle/square for drawing. Scaling/calibration changes how image geometry is interpreted. Keep geometry changes separate from result decimal display settings.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
R / C / Q	Next-draw rectangle/circle/square.
Up / Down / image mouse wheel	Next/previous segment selection.
W/A/S/D	Move selected region one image pixel; Shift moves ten; movement stops at image boundary.
Scale mm / CALIBRATE SCALE / mm / px	Known reference distance and derived physical scale.

Procedure

1. Finish text/grid editing and focus the image preview.
2. Select the required segment and verify its number.
3. Move with W/A/S/D or Shift combinations; inspect position at image scale.
4. For dimensions, use an approved known distance and calibration procedure; save/apply the revised profile.

Worked example

Shift+D moves the visible-light region ten image pixels right, regardless of screen zoom. It does not mean ten millimetres.

Expected result

Geometry and dimensional scale are deliberate and saved.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Key edits text instead	Finish editing and return focus to preview.
Wrong dimensions	Recheck lens/resolution/calibrated scale after camera changes.

Related instructions: [14.2.2 Vision segment keyboard shortcuts](#).

4.1.8.2.4 Limits, learned values and result judgement

Set meaningful segment limits and validate their decision boundaries.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Set limits using approved reference samples and the product specification. Learned values provide a reference, not automatic production approval. Check both good and known-bad samples. General result decimals apply to scalar measurements; full-precision geometry remains relevant to region and boundary decisions.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
LEARN LIMITS	Builds candidate limits from verified OK samples.
USE AVERAGE / USE RATIO	Starting windows/ratios from measured actuals in Core Setting.
Min Score / Present / measurement Min-Max	Rule-specific judgement.
TEST	Runs current recipe and shows actual evidence.

Procedure

1. Capture a verified sample and TEST before using actual-based limit helpers.
2. Inspect selected rule and relevant measurement family.
3. Compare candidate limits with the product specification; test multiple good, bad and boundary samples.
4. Save approved values and reopen to verify.

Worked example

A single bright OK LED may produce a narrow starting window; validate normal production variation and a known dim NG LED before approval.

Expected result

Learned values support engineering review rather than automatic acceptance.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
False NG varies with time	Check capture stability and calibration before widening limits.
Known NG passes	Review rule enabled state, selected measurement and learned window.

4.1.8.2.5 Colour, CIE and light leakage inspection

Judge color, chromaticity, uniformity and unwanted illumination.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Colour and CIE tools inspect measured colour against the configured limits or region. Light leakage evaluates unintended illumination using its defined image areas and conditions. Keep capture exposure consistent, review overlays, and retain representative failing images when diagnosing borderline results.

Configure light leakage detection: Use a stable camera, fixed lighting, correct exposure, and a verified OK/NG sample. Draw ROI/segment before tuning if only one board area should be checked.

Do not use full image if background reflections create false spots. Do not set max area so high that the source becomes a leak unless that is intended.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RGB/intensity / CIE / temperature / hue / wavelength	Different measured color families; enable the appropriate approved limits.
Chromaticity boundary	Saved region decision, not merely rounded displayed coordinates.
LEAK TEST	Shows detected leakage spots and source handling.
Uniformity settings	Sampling mode, brightness percentage and color delta depend on chosen geometry.

Procedure

1. Open Vision Camera Tool.
2. Capture or browse image.
3. Select LIGHT LEAKAGE rule/tool.
4. Set threshold and channel mode.
5. Set min/max leak area and max leak count.
6. Choose ROI mode and source action.
7. Press LEAK TEST and review numbered circles.
8. Save/apply to the vision sequence and validate on OK and NG samples.
9. Fix exposure/lighting and set the intended ROI.
10. Choose the color/region or leakage rule and relevant thresholds.
11. For leakage, set channel, area/count, ROI and source handling before LEAK TEST.
12. Inspect overlays plus numeric values on OK/NG samples; save approved profile and test in the parent flow.

Worked example

A large intended light source may be excluded by source handling while a small outside bright spot is counted as leakage.

Expected result

Judgement corresponds to selected regions and rules.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Configure light leakage detection	If false NG occurs, check focus, exposure, threshold, ROI mode, channel mode, min/max area, source action, and saved profile.
False leaks	Check background reflections, ROI, threshold, area and source action.
CIE near boundary changes	Inspect full-precision boundary behavior and capture/calibration; rounded display alone is insufficient.

4.1.8.2.6 Part/cap detection, OCR and AI tools

Configure presence, polarity, text and model-based detection for each selected ROI.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Part/cap detection, OCR and AI tools require the correct region and operation-specific settings. Confirm the expected object count, text or classification and its confidence/score rule. Review results on representative good and bad products. A detected object alone may not satisfy the configured acceptance condition.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
DETECT PART / DETECT CAP	Active segment presence/polarity trial.
Expected Neg Side / Min Confidence / Tilt Tolerance	Capacitor acceptance parameters.
OCR Type / Language / Page Mode / Whitelist	English, Number or 7 Segment path and recognition configuration.
OCR PREVIEW / OCR READ	Inspect preprocessing and recognized result.
ONNX Model Path / Labels / Class / Expected Count / confidence / position tolerance / NMS	Object-detection model and result requirements.

Procedure

1. Select the segment and intended rule in Core Setting.
2. For capacitor inspection, set expected side/confidence and test reversed/missing examples.
3. For OCR, constrain ROI and expected text/match, inspect preprocessing and recognized confidence.
4. For model detection, select the approved model/class and validate count/position against representative samples.
5. Apply and save only after error cases are rejected.

Worked example

Detecting one object is insufficient when Expected Count is two; reading text is insufficient when the required content differs.

Expected result

Detection and acceptance are separately visible.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
OCR unstable	Review focus, lighting, rotation, threshold, channel, whitelist and image scale.
Wrong class passes	Check model label mapping and selected class/count.

4.1.8.2.7 Thermal inspection and calibration (License Required)

LICENSE REQUIRED

IR Camera access is required for thermal inspection in addition to Vision access. The IR Camera package also supplies Vision access; a Vision-only package does not unlock thermal inspection. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Measure IR temperatures from the supported thermal frame within a reviewed region.

Access and preparation

Vision > Vision Camera Tool > IR CAMERA (License Required). Requires IR Camera entitlement, which includes Vision access, plus relevant view/edit/run permissions and supported raw thermal hardware.

Thermal inspection requires the supported source and appropriate measurement/calibration setup. Confirm the scale, units, reference and allowed temperature range. Do not apply visible-light ROI assumptions to a thermal result without checking that tool's controls and coordinate mapping.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Capture IR / IR SETTINGS / CANCEL IR	Source acquisition/configuration/cancellation.
Enable IR temperature check / Mode	Highest, Lowest or Both temperature evidence for the selected region.
Highest/Lowest Min-Max	Finite Celsius boundaries; unused fields may be blank.
IR DISPLAY / highlight / color scale	Visualization only; changes do not alter raw temperature limits/results.

Procedure

1. Configure the supported IR source and capture a raw thermal frame.
2. Draw/edit the region on the main Vision image; outside it is ignored.
3. Open Core Setting > IR CAMERA, enable check and select mode/limits.
4. Inspect raw hover values and result on a known reference.
5. Apply and save; verify physical source calibration through the approved equipment procedure.

Worked example

Highlighting the hottest one degree helps locate a hotspot but does not raise or lower its acceptance threshold.

Expected result

Judgement uses raw thermal values in the saved valid ROI.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Enable rejected	Capture IR first and draw a valid region with known frame dimensions.
No temperature evidence	A colorized photograph is not a raw thermal measurement source.

4.1.8.2.8 Save CAM / APPLY TO STEP and image evidence

Persist camera and inspection settings and verify image evidence separately.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Save CAM / APPLY TO STEP transfers the current camera setup into the selected inspection step. Save the vision sequence afterward to persist the complete definition. Configure report image inclusion separately. Reopen the saved step and verify its regions before production use.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SAVE CAM	Saves named camera settings.
APPLY TO STEP	Transfers reviewed tool configuration to the selected Vision step.
SAVE VISION	Persists the child sequence.
Image/report settings	Control retained evidence separately from whether the inspection passes.

Procedure

1. SAVE CAM for a reusable named setting.
2. APPLY TO STEP and verify returned row/source/ROI.
3. SAVE VISION, then SAVE SEQ if linking/editing parent.
4. Reopen the saved step and TEST it; inspect report image inclusion using the configured reporting workflow.

Worked example

Closing the tool after editing without applying/saving is different from a saved production recipe.

Expected result

Reopened settings and retained evidence match the reviewed inspection.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No image in report	Check report/evidence configuration and saved path; successful Vision capture alone does not choose report inclusion.

4.1.8.2.9 Auto Align saved LED segments

Align existing saved LED regions without regenerating segment identity.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Align Mode	Auto, Fiducial, Board Rectangle or None.
Align Score / Max Angle / Max X/Y px	Global alignment acceptance and allowed movement.
Align LEDs in tests / Max LED correction px	Optional bounded correction of existing saved LED segments.
ALIGN CURRENT IMAGE	Preview current-image correction.

Procedure

1. Create and review saved segments first.
2. Choose alignment mode and justified correction bounds.
3. Capture a representative shifted image and ALIGN CURRENT IMAGE.
4. Inspect each corrected ROI, identity and failed/missed source; reduce false matches before enabling runtime alignment.
5. Save/apply and validate maximum allowed fixture movement.

Worked example

A two-pixel fixture shift may be corrected within an approved small bound. A large misloaded board should not be accepted by allowing an unbounded correction.

Expected result

Segment identity persists while supported bounded alignment adjusts its position.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong LED followed	Review original ROI, nearby sources, exposure and correction bound.
Confused with Auto Segment	Auto Segment adds setup ROIs; alignment adjusts existing saved ones.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.10 Camera API controls and live preview

Read/apply supported camera driver settings and control live preview.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Backend / Source / Target FPS / Width / Height / MP	Capture device/backend and resolution request.
Exposure / Focus / Gain / auto controls / white balance	Driver-supported image acquisition controls.
READ CAMERA / APPLY API / RESET API	Read current values, apply reviewed settings or reset editor defaults.
Settle ms / Warmup Frames	Allow settings/frame stream to stabilize.
START LIVE / STOP LIVE	Preview lifecycle.

Procedure

1. Choose configured source/backend and READ CAMERA to inspect actual capabilities.
2. Set reviewed resolution and supported controls; blank/no-change settings retain the applicable driver behavior.
3. APPLY API, then START LIVE and inspect stability/focus/exposure.
4. STOP LIVE before a fixed setup trial, capture an image and SAVE CAM/APPLY TO STEP/SAVE VISION.

Worked example

A driver can ignore an unsupported focus control. Check status and actual image rather than assuming every requested numeric value took effect.

Expected result

Supported controls and preview state are observable and saved deliberately.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Control unavailable	Inspect driver support/status; unsupported controls are skipped.
Capture differs from preview	Check warmup/settle, auto exposure/focus and saved source settings.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.11 Limit profiles, bulk limits and component CSV

Reuse selected limit families and transfer component ROI definitions safely.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
MAKE PROF / APPLY PROF / Limit Profile	Named shared limit configuration and membership.
APPLY LIMITS	Copies selected limit families to Current, Selected, Group, Same Profile or All Segments; inspect expansion of linked profiles.
EXPORT CSV / IMPORT CSV	Export current schema, edit approved columns and import reviewed component data.

Procedure

1. Select and validate the source segment's limits.
2. MAKE PROF and assign members, or APPLY LIMITS with only intended families and destination scope.
3. Inspect destination count and any linked-profile expansion; preserve geometry/component identity unless separately edited.
4. For CSV, export a reviewed template first. Keep headers including Segment, Ref, Type, Group, Profile, Rule, Present, X/Y/W/H and Shape; use the full exported schema for advanced limits/Thermal.
5. Import, inspect every affected segment, apply/save and reopen to verify.

Worked example

Copying RGB limits to Selected segments should not move their ROIs. A shared profile change can affect additional linked members, so review the expanded list.

Expected result

Limits and geometry changes have explicit scope.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected multiple changes	Inspect shared profile membership; remove/change the profile association before intentionally independent limits.
CSV fields mismatched	Use current exported headers and review parsed rows rather than guessing column positions.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.12 Post Process and measurement calibration

Separate image display changes from measurement/reference calibration.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
POST PROCESS	Preview processing and its effect; distinguish display from measurement settings.
Ambient Image / Ambient Max / Ambient Subtract / CAPTURE AMBIENT	Ambient reference and subtraction controls.
Ref cd/m2 / Ref Intensity / Scale / Offset / CALIBRATE LUMINANCE	Known luminance reference and conversion.
WHITE REF / REF IMAGE / RESET CALIBRATION	Reference/white calibration tools.
Scale mm / CALIBRATE SCALE	Known physical length to mm-per-pixel.

Procedure

1. Stabilize camera and lighting before any reference capture.
2. Acquire an appropriate ambient reference and inspect its maximum before enabling subtraction.
3. Use a known luminance/length reference for the relevant calibration tool.
4. Compare independent references and representative images before and after processing; keep raw evidence.
5. Apply/save and revalidate after lens, resolution, exposure or fixture changes.

Worked example

Increasing display contrast must not be treated as a measured luminance calibration. A known cd/m2 reference is needed for the configured photometric conversion.

Expected result

The source and purpose of each adjustment are documented and verifiable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Measurements change unexpectedly	Inspect measurement processing, ambient image and conversion settings separately from display controls.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.13 QR reading and result mapping

Read a QR code inside the intended region and apply the required content rule.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
QR rule / QR READ	Enables/tries QR decoding for configured segments.
CAP / OCR / QR > Expected Text / Match Mode	Required decoded content and comparison.
Min Confidence / ROI	Acceptance score and code coverage.

Procedure

1. Select/draw a region covering the complete code and quiet border.
2. Select QR rule and set approved expected text/match behavior in Core Setting.
3. QR READ and inspect decoded text/score; trial wrong-code and no-code samples.
4. Apply/save and verify the parent result. Map the result to a runtime/barcode destination only through its explicit supported linkage.

Worked example

Correctly decoding DEMO-002 must fail an ExactMatch requirement DEMO-001; a decoded string is not automatically the product barcode.

Expected result

Decoded content and acceptance evidence remain distinct.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No code	Check ROI coverage, focus, glare, size and orientation.
Wrong destination value	Verify the configured result/variable mapping and barcode action; QR decoding alone does not assign a slot.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.14 Segment Core Setting tabs and scoring

Edit the selected segment's scoring, actuals, limits and specialized checks.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Scoring	Rule, Present, minimum score, method and dark/bright thresholds/ratios.
Actual Values	Current measured evidence for the selected segment.
Validation Limits / Calibration	Separate tabs: acceptance limits and raw-to-reference measurement mapping.
CAP / OCR / QR / Object Detection / IR CAMERA	Operation-specific settings; thermal frames restrict applicable tabs.
OK / CANCEL	Validate/commit dialog draft or discard it.
USE RATIO / USE AVERAGE / CLEAR LIMIT / APPLY LIMITS	Candidate helpers and scoped limit edits.

Procedure

1. Select the intended segment and open Segment Core Setting.
2. Verify its number/name, ROI preview, rule/group/profile before editing.
3. Use Actual Values from a known image to understand the signal, then set approved scoring/limits.
4. Inspect specialized tabs used by its rule; evaluate shared profile effects.
5. OK to validate/commit, then TEST and save the camera/step/sequence. CANCEL leaves those dialog edits unapplied.

Worked example

A capacitor segment needs polarity settings, while a QR segment needs content matching. Adjusting RGB limits does not replace either specialized rule.

Expected result

The selected segment receives validated settings with explicit commit/cancel behavior.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Changes affect other segments	Check linked limit profile and APPLY LIMITS scope.
No actuals	Capture/load and test a usable image first.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.8.2.14.1 Scoring

Choose how the selected segment is recognized and whether its presence meets the required score.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule / Present	Select the inspection rule and expected presence for this segment. Specialized rule settings remain on their corresponding tabs.
Min Score / Scoring Method	Acceptance score and selected scoring method. Review the actual result using the same method before setting the threshold.
Dark Threshold / Bright Threshold	Pixel classification settings used by the applicable scoring method.
Dark Ratio Min / Dark Ratio Max / Bright Ratio Min / Bright Ratio Max	Allowed ratios for dark and bright classified pixels. These are separate from RGB and dimensional limits.

Procedure

1. Select the intended segment and inspect its ROI preview. Set Rule and expected Present state.
2. Choose the scoring method and enter reviewed score/ratio requirements. Do not copy a threshold from an unrelated camera or lighting setup.
3. Test known present and missing/rejected examples. Inspect Actual Values, then use OK and save the camera/step/sequence when the configuration is accepted.

Worked example

Illustrative: a presence check must distinguish a correctly installed component from an empty location. A high score from the correct sample alone does not establish the rejection threshold.

Expected result

The chosen recognition rule, presence expectation and score settings belong to the selected segment.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring.](#)

4.1.8.2.14.2 Actual Values

Read the selected segment measurement and the limits used to interpret it. This tab is a read-only evidence table.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

The table does not permit adding, deleting or editing rows. Selecting this tab captures the current dialog draft and refreshes the selected segment presentation. It does not itself save the camera or sequence.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Parameter / Actual Value	Measured parameter and available current value for the selected image/segment.
Limit Min / Limit Max	Limits displayed alongside the actual value; edit acceptance requirements on Validation Limits.
Result / Verification Note	Per-measurement judgement and interpretation/availability note. Missing evidence should be investigated using the note and image source.

Procedure

1. Capture or load a suitable image and select the segment.
2. Open Actual Values after reviewing the selected segment and image. Read Parameter, Actual Value, limits, Result and Verification Note together.
3. Return to Validation Limits to make an authorized limit change; retest both accepted and rejected samples before saving.

Worked example

An intensity actual of 120 with displayed limits 100 to 140 can satisfy that numeric check while a separate OCR or presence check fails. Inspect every applicable measurement.

Expected result

Evidence is visible without editing measurements or changing acceptance limits in this table.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.14.3 Validation Limits

Set the acceptance boundaries for measured values, independently of their calibration mapping.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Chromaticity boundary panel	Edit the supported x/y boundary; inspect its geometry and applicable measurement context.
Limit R/G/B Min/Max / Limit Intensity Min/Max	Numeric color-channel and intensity acceptance boundaries.
Limit Temp K Min/Max / Limit Wavelength Min/Max / Limit Hue Min/Max	Color-related limits. Temp K is a color-temperature measurement, not the IR temperature in degrees Celsius.
Limit cd/m2 Min/Max / Leak Threshold / Leak Max Pixels / Leak Max Ratio	Photometric and light-leak acceptance settings.
Mode / Glow Threshold / Min Uniformity % / Max Color Delta	Uniformity sampling and acceptance. Dot Radius px, Dot Count, Line Width px, Line Step px and Line End Trim % configure the relevant sampling geometry.
Length Min mm / Length Max mm	Dimensional acceptance using the configured image scale.

Procedure

1. Read Actual Values from representative images before entering reviewed limits.
2. Enter applicable min/max values and configure the chromaticity boundary, leakage or uniformity settings used by the rule. Both limits can remain blank to skip another optional measurement, as described by the tab.
3. Check segment/profile scope before APPLY LIMITS. Retest known boundary and rejected samples, then commit with OK and save the parent configuration.

Worked example

Illustrative intensity limits 100 to 140 reject a measured 145. Changing a calibration mapping to force 145 into range would change the measurement and is a separate engineering decision.

Expected result

The configured boundaries define judgement; the Actual Values tab reports their effect.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.14.4 Calibration

Map a selected raw measurement to a known reference while keeping acceptance limits independent.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Opening values use the captured image. TAKE TRIAL may use new camera frames and can differ from the opening sample. Disabled calibration uses the raw value. Calibration verification in this editor is not an independent certification of the physical reference.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enabled for this segment / PARAMETER / METHOD	Enable the selected parameter mapping and choose its method. Supported parameters include x, y, color temperature, wavelength, intensity and candela.
CALIBRATION INPUT / REFERENCE OUTPUT / ADD POINT	Measured input and trusted reference used to build mapping points.
CALIBRATION POINTS: INPUT / REF OUTPUT / OUTPUT / ERROR	Review source/reference points, mapped outputs and errors with the mapping plot.
TAKE TRIAL / CALCULATE / VERIFY	Acquire a measurement from the selected source, calculate the mapping preview and inspect mapping verification. TAKE TRIAL alone leaves calibration and limits unchanged.
SAVE FOR SEGMENT / RESET	Stage the reviewed mapping for this segment or reset the calibration draft; parent OK and camera/sequence saves are still required.

Procedure

1. Stabilize acquisition and choose the intended parameter. Select an appropriate method and enable it only when reference evidence is available.
2. Enter calibration inputs and reference outputs; explicitly ADD POINT for multi-point mappings. Linear and piecewise mappings require at least two valid points.
3. CALCULATE and VERIFY, inspect point errors and the INPUT -> OUTPUT -> LIMIT -> RESULT presentation, then check independent references.
4. SAVE FOR SEGMENT and OK. Resolve incomplete/invalid calibration messages before saving the camera and sequence.

Worked example

Illustrative known input 100 and reference 105 can support an offset correction when that relationship is justified by reference measurements. Test another known point before accepting the mapping.

Expected result

A validated mapping is staged for the selected segment; its acceptance limits remain separately configured.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.14.5 CAP / OCR / QR

Set capacitor polarity checks or recognized-text requirements and inspect the current read preview.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Expected Neg Side / Min Confidence / Tilt Tolerance	Capacitor polarity expectation, confidence requirement and permitted tilt.
Expected Text / Min Confidence / OCR Rotation / Match Mode	Text/code expectation, confidence, orientation and comparison behavior for the applicable OCR/QR rule.
Threshold / Invert / Morph / Channel	Preprocessing choices for the read.
Padding Px / Scale / Manual Th	Crop padding, preprocessing scale and manual threshold where applicable.
OCR / QR Live Preview / RUN READ	Preview image, decoded text/status and explicit read refresh.

Procedure

1. Choose the corresponding rule on Scoring and verify the ROI contains the complete intended marking/component.
2. For polarity, enter the expected negative side and reviewed tolerance. For text/code, enter the expectation and matching/preprocessing settings.
3. Use RUN READ and inspect both decoded text and status. Test a different/rejected code and realistic rotation/lighting before OK and parent saves.

Worked example

An illustrative required marking DEMO-A must be rejected when the sample reads DEMO-B under the selected exact-match policy. A successful QR read does not automatically assign an operator barcode slot.

Expected result

The specialized rule uses its configured polarity or text acceptance rather than relying only on image brightness.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.14.6 Object Detection

Configure the selected segment to judge detections from an approved ONNX model.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ONNX Model Path / BROWSE	Select the model file. Browsing selects OBJECT_DETECTION and may populate Labels / Classes from a companion labels file when blank.
Labels / Classes / Class Name / ID	Class-label source and intended class selector; verify these match the model output.
Min Confidence / Expected Count	Minimum accepted detection confidence and expected object count.
Position Tol Px / NMS Threshold	Position tolerance in pixels and suppression threshold for overlapping detections.

Procedure

1. Select the approved model and verify its labels/class mapping. Confirm the selected ROI and expected class/count.
2. Enter reviewed confidence, position and overlap-suppression settings.
3. Test correct, missing, extra and misplaced objects. Inspect result evidence before OK and saving camera/step/sequence settings.

Worked example

Illustrative: an expected count of one for the intended connector class should be tested with zero, one and two connectors. Confidence alone does not check the required count.

Expected result

The object check applies the intended model/class and detection acceptance settings.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.14.7 IR CAMERA (License Required)

LICENSE REQUIRED

IR Camera access is required for thermal inspection in addition to Vision access. The IR Camera package also supplies Vision access; a Vision-only package does not unlock thermal inspection. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Judge raw thermal temperatures inside the selected region. IR Camera entitlement is required in addition to Vision; the IR Camera package includes Vision access.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Outside the selected region is ignored. A raw thermal frame restricts the other core-setting tabs. A colorized photograph is not a raw temperature source.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enable IR temperature check	Enable thermal judgement for this segment after acquiring a supported raw thermal frame.
Check	Highest, Lowest or Both selects the temperature extremes to evaluate.
Highest temperature / Lowest temperature: Minimum °C / Maximum °C	Finite Celsius acceptance boundaries for the selected checks.
Highlight hottest 1°C	Display-only hotspot highlighting; it does not change the raw measurements, limits or results.
Raw temperature hover / result	Inspect the temperature under the pointer and the region result.

Procedure

1. Capture IR in the main camera tool and draw/edit this segment on the main Vision image.
2. Open IR CAMERA, enable the check, select Highest/Lowest/Both and enter reviewed limits.
3. Inspect raw values and a known reference. Commit with OK and save the camera/step/sequence after validation.

Worked example

Illustrative Highest maximum 60 °C rejects a measured regional maximum of 62 °C; changing the color scale or hottest-degree highlighting does not change that judgement.

Expected result

The saved check evaluates raw thermal values inside the valid region; source calibration still needs its physical verification.

Related instructions: [4.1.8.2.14 Segment Core Setting tabs and scoring](#).

4.1.8.2.15 Training sets: SAVE OK, SAVE NG, SAVE GOLDEN and VALIDATE

Collect labeled image evidence and validate a recipe against separate sample sets.

Access and preparation

Open Admin / Testing > Test Sequence > Vision. Vision (License Required). IR Camera access includes Vision. Ordinary Vision does not itself grant IR Camera. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SAVE OK / SAVE NG / SAVE GOLDEN	Saves current full image plus nonempty component crops in the recipe/class folders.
TRAIN AI	Uses the selected verified OK training input for the supported local model workflow.
VALIDATE	Selects OK folder and optional NG folder and saves a validation report.

Procedure

1. Use stable camera conditions and descriptive camera/recipe/component names.
2. Capture verified images and select the truthful class; do not label unreviewed samples as OK.

3. Train only from the intended training set; keep representative holdout images separate.
4. VALIDATE with OK and NG folders, inspect OK/NG totals and False NG/False OK counts.
5. Review every error, adjust justified settings, revalidate and save/apply the approved model/profile linkage.

Worked example

If 20 known NG images include one PASS, the report's False OK count is 1 and the recipe needs investigation despite many correct decisions.

Expected result

Training evidence and validation mistakes are explicit; saved examples do not automatically train or approve a model.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No validation records	Select folders containing supported image files and at least one valid ROI.
Crop missing	Check nonempty in-frame segment ROI and component naming.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

4.1.9 PRINTER (License Required)

LICENSE REQUIRED

Printer / Label Printing license for printing operations, label rules and linked print actions. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Link printing through its saved profile and controlled production timing.

Access and preparation

Open Admin / Testing > Test Sequence > Printer / Label Printing. Printer / Label Printing (License Required). Use a valid feature or qualifying bundle entitlement. Corresponding page/action permissions are also required.

The Printer workspace is shared with the sidebar Printer page. See chapter 8 for profiles, templates, variables, print rules and logs. Confirm the printer profile and timing when a print action is linked to a sequence.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PRINTER	Shared workspace with sidebar Printer page.
Saved printer/template/rule	Determines target, content and automatic print conditions.

Procedure

1. Configure/test the printer and template in the Printer chapter.
2. Select the approved saved resource for the intended flow operation or print rule.
3. Verify token values, serial policy and PASS/NG timing using a controlled sample.
4. Save and check duplicate/failed print recovery before production.

Worked example

A label with a unique serial must not be automatically duplicated merely because a later step retries.

Expected result

Printing uses the reviewed target/template and explicit recovery policy.

Related instructions: [8 Printer](#).

4.1.10 LIN (License Required)

LICENSE REQUIRED

LIN license for LIN communication, sequences and cyclic groups. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Define LIN transactions and cyclic schedules for the configured bus.

Access and preparation

Open Admin / Testing > Test Sequence > LIN. LIN (License Required). Use a valid feature or qualifying bundle entitlement. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SEQUENCES / LIN SEQ	Ordered message operations.
CYCLIC GROUPS	Repeated scheduled traffic and busy policy.

Procedure

1. Configure and validate the LIN adapter/channel and bus role.
2. Build a one-shot sequence and confirm a known response.
3. Add any required cyclic schedule and explicit stop lifecycle.
4. Save child/parent definitions and trial under expected conditions.

Worked example

A subscriber response depends on the appropriate header/master behavior; sending data as publisher is a different operation.

Expected result

Bus role and response rules are explicit.

Related instructions: [4.1.10.1 SEQUENCES](#); [4.1.10.2 CYCLIC GROUPS](#).

Screen reference

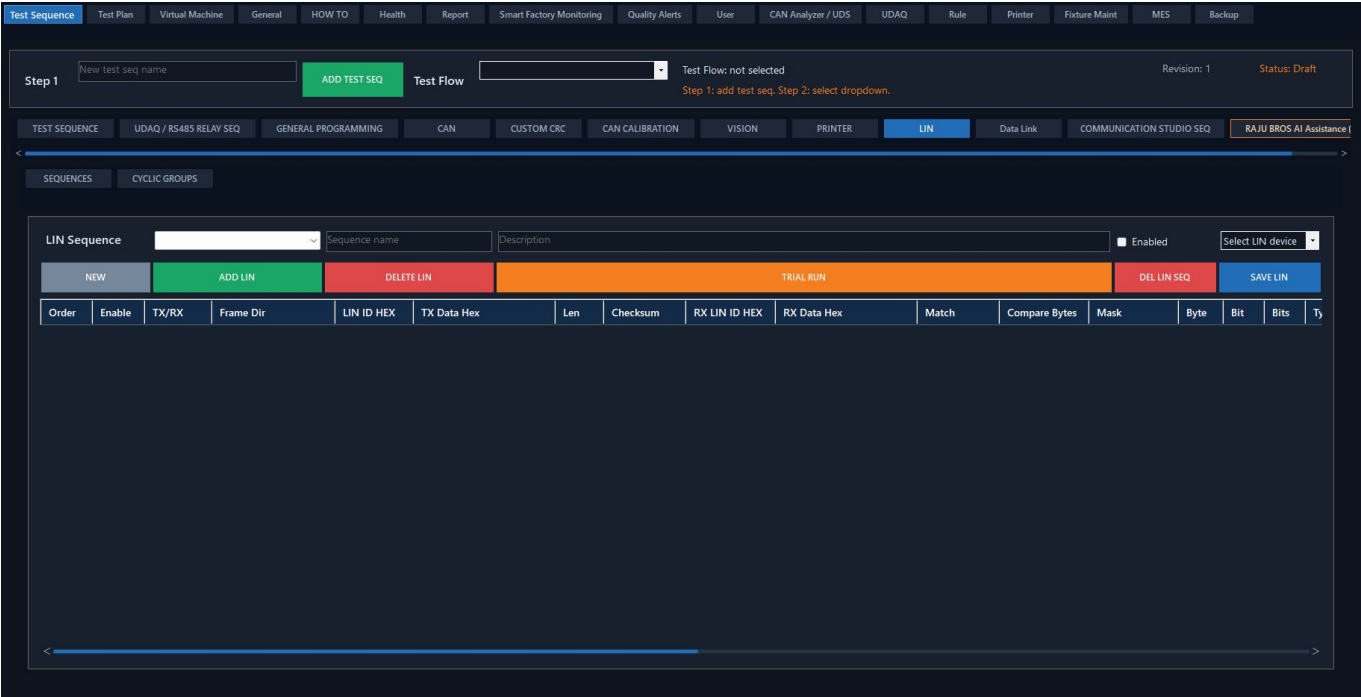


Figure 4.1.10 - LIN sequence workspace. Reference capture: 07 October 2026.

4.1.10.1 SEQUENCES

Create a LIN message with the correct direction, checksum and reply decoding.

Access and preparation

Open Admin / Testing > Test Sequence > LIN. LIN (License Required). Use a valid feature or qualifying bundle entitlement. Corresponding page/action permissions are also required.

SEQUENCES defines ordered LIN operations. Configure channel, frame/PID, data, expected reply, checksum mode and timing as required by the selected device. Save the child sequence before linking. Verify a known response on the correct bus mode before production.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW / ADD LIN / DELETE LIN / SAVE LIN / TRIAL RUN	Sequence lifecycle and selected-device trial.
TX/RX / Frame Dir	TX, RX or TX/RX; Auto, Publisher, Subscriber or Subscriber Automatic Length.
LIN ID HEX / TX Data Hex / Len / Checksum	Message identity/bytes and Enhanced, Classic or Auto checksum.
RX LIN ID / RX Data / Match	Required response with offered text/byte/bit/numeric matching.
Compare Bytes / Mask / Byte / Bit / Bits / Type / Endian / Scale	Select and interpret required bytes or bits.

Procedure

1. NEW and name the sequence, then ADD LIN.

2. Set documented bus role, ID, data length and checksum.
3. Configure required RX and relevant match/decode fields only.
4. SAVE LIN, select trial device and TRIAL RUN.
5. Inspect raw bytes, decoded value and parent link before SAVE SEQ.

Worked example

Illustrative one-bit status checks require the correct byte and bit position; full-frame ExactMatch may fail when unrelated counter bytes change.

Expected result

Only the intended response content determines judgement.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No response	Check master/header ownership, frame direction, baud/channel, checksum and timeout.
False NG	Check byte selection/mask and variable counter bytes.

4.1.10.2 CYCLIC GROUPS

Create and stop an intentional LIN cyclic schedule.

Access and preparation

Open Admin / Testing > Test Sequence > LIN. LIN (License Required). Use a valid feature or qualifying bundle entitlement. Corresponding page/action permissions are also required.

LIN CYCLIC GROUPS stores scheduled/repeated frames. Review order and cycle interval, and make the start/stop lifecycle explicit. Keep required network traffic active only for the intended test window. Check for scheduling conflicts when more than one tool uses the same adapter.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Group Name / Scope / Model / LIN Device	Saved identity, applicability and target.
Busy Policy	Pause Matching ID, Pause All, Continue Safe or Continue Always as offered; choose based on reviewed bus contention.
NEW GROUP / ADD COMMAND / DUPLICATE / REMOVE / UP / DOWN / SAVE GROUP	Ordered schedule editing.
TRIAL START / TRIAL STOP	Controlled runtime lifecycle.

Procedure

1. Create group, select device/scope/busy policy.
2. Add and order documented frames with intended intervals and lengths.
3. SAVE GROUP and trial the schedule, checking bus load and replies.
4. TRIAL STOP and verify traffic ended before adapter handoff.

5. Link only the intended flow interval and verify stop/failure cleanup.

Worked example

Pause Matching ID may avoid a scheduled frame competing with a one-shot operation for that identifier; the appropriate policy depends on the real protocol.

Expected result

Schedule and one-shot use cooperate according to the saved policy.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Adapter busy or unexpected replies	Stop other schedule owners, review busy policy and verify one master/owner per required operation.

4.1.11 Data Link (License Required)

LICENSE REQUIRED

Data Link license for its profiles, sequences, assignments and execution. Confirm this feature separately when planning MES or customer-server integration through Data Link. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Exchange before/during/after-test data with an explicitly assigned reusable template set.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CURRENT TEST SEQUENCE	Saved flow receiving the assignment.
ASSIGNED TEMPLATE SET	Definition actually assigned; browsing another library card does not change it.
Connection / Requests / Tokens / Report	Transport, messages, outputs and report visibility.

Procedure

1. Select the saved flow, create or select a template set and configure its connection.
2. Build requests with their stages, output mappings and acceptance rules.
3. Use offline preview/sample checks, then a confirmed controlled server trial.
4. Save & assign with intended Before Test/After Test stage choices and verify assignment text.

Worked example

A before-test authorization and after-test result upload are separate requests. A passing DUT can still have an unaccepted upload.

Expected result

Stage execution, result acceptance and report data have explicit configuration.

Related instructions: [4.1.11.1 Flow assignment and enabled stages](#); [4.1.11.2 Data Link Tool](#); [4.1.11.2.4 Connection](#); [4.1.11.2.7 Requests: Response & rules](#); [4.1.11.2.8 Requests](#); [4.1.11.2.11 Upload hold: review, recovery and unblock](#).

Screen reference

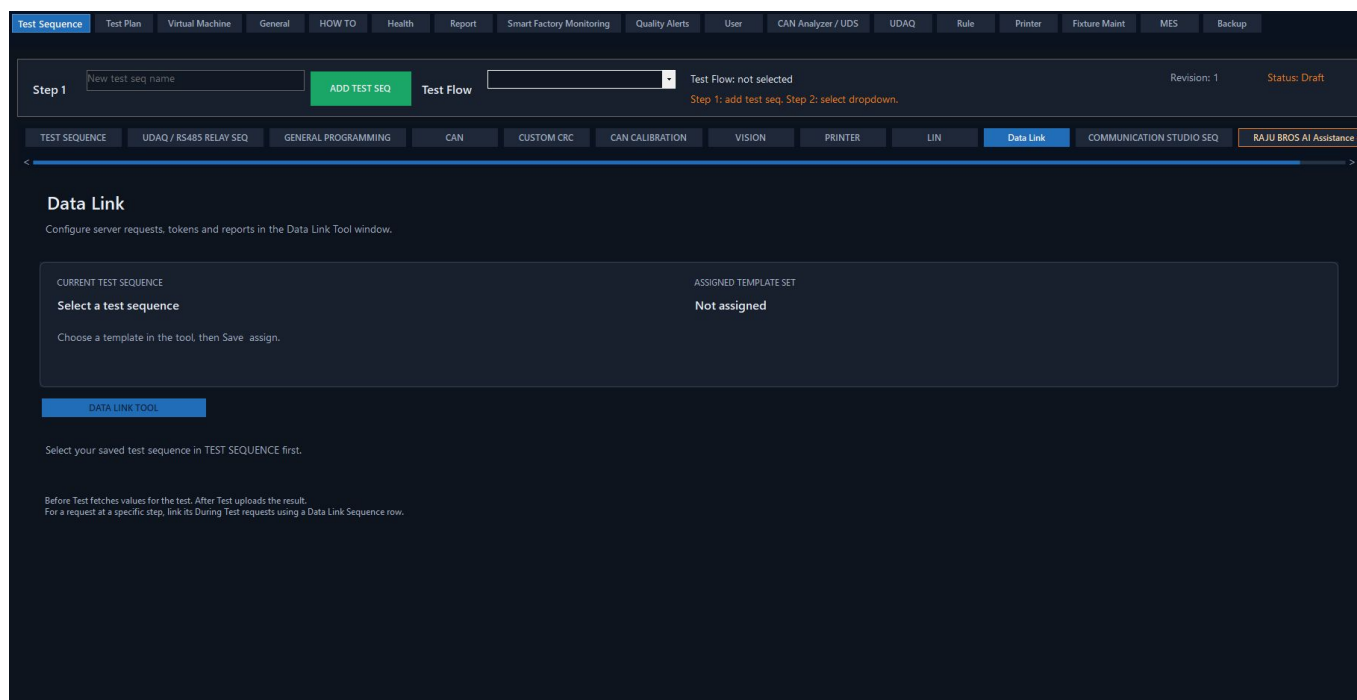


Figure 4.1.11 - Data Link flow assignment. Reference capture: 07 October 2026.

4.1.11.1 Flow assignment and enabled stages

Assign a saved template to the selected flow and control automatic stages.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Data Link is assigned to a saved flow. Select the flow first; the tool may be disabled until a valid saved flow exists. Enable only the required stages and review when each request runs. Separate before-test validation from after-test result submission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Before Test / After Test	Assignment-stage toggles, distinct from request Enabled.
Save & assign	Saves pending template edits if needed and assigns it to the current flow.
Remove	Removes assignment while retaining reusable template.
During Test	Requests must be linked at the intended explicit sequence point.

Procedure

1. Select a saved Test Flow before opening Data Link.
2. Choose the reviewed template and check Before Test/After Test.
3. Save & assign and verify both current flow and assigned set headings.
4. For during-test work, select the saved Data Link definition on the intended parent row and save the flow.

5. Trial expected approval/rejection and final upload behavior.

Worked example

Viewing TEMPLATE_B while ASSIGNED TEMPLATE SET still shows TEMPLATE_A does not switch production to B.

Expected result

The saved assignment-not library selection-determines automatic execution.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Stage did not run	Check flow assignment, stage toggle, template enabled state and individual request Enabled.

4.1.11.2 Data Link Tool

Configure the Data Link Tool from draft to sample evidence and assignment.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Set settings	Name, description, Enabled, copy/delete controls.
Validate / Save draft	Checks and persists configuration; neither changes flow assignment by itself.
Check sample	Offline parsing/rule evaluation.
Send trial	Confirmed real endpoint contact using trial values; writes sent once.

Procedure

1. Configure Connection first.
2. Add ordered Requests and their rules, then Tokens and Report display.
3. Validate and Check sample for both accepted and rejected replies.
4. Save draft, review live trial endpoint and values, and Send trial only on the approved test service.
5. Save & assign the accepted template to the intended flow.

Worked example

An offline sample PASS proves the parser/rules for supplied text; it does not prove server reachability or write acceptance.

Expected result

Configuration, local validation, live trial and assignment remain distinct steps.

Related instructions: [4.1.11.2.1 Connections, requests, parameters and authentication](#); [4.1.11.2.2 Response mapping, variables and trial execution](#); [4.1.11.2.3 Read/write policies, uploads and failure handling](#); [4.1.11.2.9 Template library, Set settings, Validate and Save draft](#); [4.1.11.2.4 Connection](#); [4.1.11.2.8 Requests](#); [4.1.11.2.7 Requests: Response & rules](#); [4.1.11.2.6 Requests: Advanced and Trial & evidence](#); [4.1.11.2.10 Tokens](#); [4.1.11.2.5 Report](#).

4.1.11.2.1 Connections, requests, parameters and authentication

Build transport and authentication settings using the approved service contract.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Define the approved connection and request type, then its parameters and any required authentication. Use site-approved values; this manual deliberately contains no live endpoints or credentials. Confirm template tokens and content type before sending a request to a real service.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Shared Connection	Default endpoint for requests with Use template connection on.
Request method/path/body	Set on each request independently.
Advanced override	Used only when template connection inheritance is off.

Procedure

1. Configure transport, endpoint, timeout and TCP framing as applicable.
2. Select approved authentication and enter secrets only in protected fields.
3. Set each request's method, relative path and format.
4. Preview resolved content and validate before a controlled trial.

Worked example

Illustrative HTTPS base `https://mes.example.invalid` with relative path `/authorize` is a documentation example only; replace with the authorized test endpoint.

Expected result

Each request uses a reviewed endpoint and correct body/authentication.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong server contacted	Check inheritance and Advanced override before another trial.

Related instructions: 4.1.11.2.4 Connection; 4.1.11.2.8 Requests.

4.1.11.2.2 Response mapping, variables and trial execution

Map response outputs and prove business rules with offline and live evidence.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Map response fields to named variables with the correct type and conversion. Use sample checking and preview before a live trial. Confirm required fields and success conditions. A transport success is different from business approval returned by the service.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Tokens	Typed named outputs extracted from selected request.
Response & rules	Filtering, sample response and required acceptance conditions.
Trial & evidence	Explicit synthetic inputs and masked real-trial results.

Procedure

1. Paste a representative sanitized response and set its sample HTTP status.
2. Configure mappings, types and required flags; use Text for identifiers with leading zeros.
3. Add acceptance rules separately from extraction.
4. Check sample with approval, rejection and missing required fields.
5. After local validation, Send trial against an approved test service and inspect transport and business evidence.

Worked example

{"approved":true,"serial":"00123"} can map serial as Text and require approved Equals true. HTTP 200 alone does not establish approval.

Expected result

Mapped values and all enabled conditions are checked before dependent work.

Related instructions: 4.1.11.2.7 Requests: Response & rules; 4.1.11.2.10 Tokens.

4.1.11.2.3 Read/write policies, uploads and failure handling

Keep write uncertainty, DUT result and upload acceptance separate.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Reads, writes and uploads can have different retry and failure policies. Do not repeat a state-changing request when completion is uncertain without an approved duplicate-handling rule. Inspect the request/reply evidence and pending result status before releasing another unit.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Operation	Write or Read only. Only eligible read operations use the configured read retry count.
On failure	BLOCK, WARN or HOLD according to intended process policy.
Request status token	Names request outcome for later use.
Upload hold	Requires review before allowing the next DUT when active.

Procedure

1. Classify each request honestly; a state-changing API must remain Write.
2. Choose required/failure policy and validate its effect with a rejected sample/trial.

3. After uncertain write outcome, retain request/run identifiers and inspect the receiving system through the approved reconciliation procedure.
4. Resolve a hold only after review; unblocking does not send a request or mark an upload accepted.

Worked example

A server may commit a result before the acknowledgement is lost. Automatically repeating the POST could create a duplicate.

Expected result

No blind write retry is used to disguise uncertain acceptance.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Test PASS with upload failure	Preserve DUT result and investigate upload evidence separately.

Related instructions: [4.1.11.2.11 Upload hold: review, recovery and unblock](#).

4.1.11.2.4 Connection

Configure the reusable connection, authentication and receive framing.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Transport / encoding	TCP_RAW, HTTP or HTTPS; UTF-8, ASCII, UTF-16LE or HEX as required.
Host / TCP port / HTTP base URL	Transport-specific destination.
Accept header / TLS policy	SYSTEM_DEFAULT, TLS12 or TLS13 where offered.
Authentication	NONE, API_KEY_HEADER, BEARER, BASIC or CLIENT_CERTIFICATE.
Header / username / secret / certificate path/password	Only fields required by selected mode; saved secrets are protected.
Connect / Response timeout	Separate connection and receive waits in milliseconds.
TCP framing	UNTIL_TERMINATOR with terminator HEX, FIXED_LENGTH with byte count, or UNTIL_CLOSE; set maximum response bytes.

Procedure

1. Obtain transport/auth/framing requirements from the approved integration specification.
2. Enter only relevant endpoint fields and authentication values.
3. For TCP, set exact framing and maximum response size.
4. Enable Use template connection on inheriting requests, validate and perform a controlled trial after offline checks.

Worked example

If a documented TCP service terminates replies with CR LF, terminator HEX 0D 0A is appropriate; guessing line endings can make a complete reply appear to time out.

Expected result

The client knows when a complete response has arrived and which server/authentication to use.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Connected but receive timeout	Check terminator, fixed byte count or close behavior rather than only increasing timeout.
TLS/auth failure	Check approved certificate/trust policy and credential type without exposing secret values in evidence.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.5 Report

Choose which mapped outputs appear in new saved reports.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Token	Existing selected-request output; add outputs in Tokens first.
Include	Includes that output in report data where eligible.
Report display	Visible shows value; Masked displays *****.
Sensitive in logs	Inherited from mapping; diagnostic redaction remains separate from report display.
Refresh report preview	Uses selected request's sample response, not a production report.

Procedure

1. Select the request and create its output mappings.
2. Open Report and select Include and Visible/Masked per approved field.
3. Refresh preview using a sanitized sample and inspect every field.
4. Save draft and verify a new controlled run's actual report.

Worked example

An intentionally Visible sample serial may display 00123; Masked displays *****. Before/During outputs may enter the saved report, while After reply values remain in upload history.

Expected result

Report visibility is deliberate and applies to new runs.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
After token missing from main report	Review stage: after-response values belong to upload history.
Preview empty	Check selected request's sample response, mapping and Include setting.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.6 Requests: Advanced and Trial & evidence

Use advanced overrides and distinguish local checks from real server trials.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Legacy acknowledgement	EXACT, CONTAINS, REGEX, JSON_FIELD, DELIMITED_FIELD or RAW_BYTES for retained legacy definitions.
Connection override	Used only when Use template connection is off.
Import saved V2	Conditional migration control when saved legacy endpoint settings exist; not a generic template file importer.
Trial values	Barcode, Fixture, Result token and one name=value per line.
Send trial / Stop trial	Confirmed endpoint execution and cancellation.

Procedure

1. Inspect inherited versus overridden connection before any live request.
2. For modern JSON/STRING use Response & rules; retain legacy acknowledgement only for its intended integration.
3. Enter synthetic trial inputs and refresh resolved preview.
4. Review the confirmation showing that real endpoints will be contacted; writes are sent once.
5. Inspect masked per-request result, attempts, request/reply and stop/failure evidence.

Worked example

Barcode DEMO001 and MODE=BENCH are explicit trial values. They are not automatically replaced with current production data.

Expected result

A trial uses a prepared configuration snapshot and explicit inputs.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Variable line rejected	Use name=value with a nonempty name.
Stopped write uncertain	Reconcile receiver state; cancellation is not proof the server did not commit.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.7 Requests: Response & rules

Filter a response and require every enabled acceptance rule to pass.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Response format	LEGACY, JSON or STRING.
Line starts with / Start-End marker / Allow empty	Select the intended response portion before extraction.
Sample HTTP status / Sample server response	Inputs to an offline check.
Rule Source	Text, JsonPath, Delimited, KeyValue, BetweenMarkers, FixedWidth, Regex or HttpStatus.
Condition	Equals, NotEquals, NotEmpty, Contains, GreaterThan or LessThan.
Field (1+) / start index (0+) / regex group	Index conventions differ: rule delimited field is one-based; fixed-width starts zero-based.

Procedure

1. Select the request and paste a realistic sanitized sample.
2. Set filtering only if needed to isolate its business message.
3. Add enabled conditions for status and business acceptance, with appropriate extraction options.
4. Check sample, then change the sample to a rejection and remove a required field to verify failures.

Worked example

For {"approved":true,"code":"OK"}, use JsonPath \$.approved Equals true and optionally HttpStatus Equals 200. Changing approved to false must fail despite HTTP 200.

Expected result

All enabled conditions must pass; Check sample never sends a network request.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected field value	Review filter first, then index, quotes/empty fields, key separator or regex capture.
Transport success mistaken for approval	Add an explicit business acceptance condition.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.8 Requests

Build ordered stage requests with resolved token previews.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Before Test / During Test / After Test	Request stage navigation.
+ Add request / Up / Down / Remove	Stage request editing/order.
Request name / When to run / Enabled / Required	Identity, stage and required participation.
HTTP method / URL or relative path	GET, POST, PUT, PATCH, DELETE, HEAD or OPTIONS with approved semantics.
Request format / Content type	LEGACY, JSON, STRING or NONE; NONE sends no body and retains the template for later use.
Insert token / Refresh sample preview	Insert supported tokens and render using trial values.
Operation / status token / On failure / read retries	State-change classification and result handling.

Procedure

1. Select the stage, add/name request and set enabled/required state.
2. Choose connection inheritance, method/path, format/content type and the documented template.
3. Insert supported tokens such as {BARCODE}, {MODEL}, {RUN_ID}, {VAR:name} or {STEP:name}.
4. Enter synthetic trial inputs and Refresh sample preview; fix unresolved values before acceptance rules and live trial.
5. Set operation/failure policy, validate and Save draft.

Worked example

Illustrative JSON body {"barcode":{"BARCODE"},"result":{"RESULT"}} with trial Barcode DEMO001 and Result PASS should resolve to the intended JSON values. The receiving API defines its real schema.

Expected result

Each stage sends reviewed ordered messages with explicit outcome policy.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Body unexpectedly empty	Check Request format NONE.
Wrong request edited	Confirm selected stage/card and the selected-request context on Tokens/Report.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.8.1 Request template

Define the selected request message, execution stage and outcome policy.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Request name / When to run / Enabled / Required	Name, BEFORE/DURING/AFTER stage, enabled state and whether the operation is required. Stage selection and card order determine which request is being edited.
HTTP method / URL / relative path / Use template connection	Method/path and inheritance of the shared Connection settings. A request-specific connection override is configured on Advanced when inheritance is off.
Request format / Content type	LEGACY, JSON, STRING or NONE and the receiving endpoint content type. NONE sends no request body while retaining the template text.
Insert token / Expand editor / Refresh sample preview	Insert a supported token at the cursor, edit a larger view or refresh the resolved message from trial inputs.
Operation / Request status token / On failure	Write or Read only classification, output status token and BLOCK/WARN/HOLD failure policy.
Read-only retry count / Retry delay (ms)	Retry policy for requests classified as read only. State-changing requests are sent once.

Procedure

1. Select Before Test, During Test or After Test and the intended request card. Add/name the request and confirm its order.
2. Set its endpoint inheritance, method/path, format and body using the receiving service specification.
3. Insert named tokens and enter explicit values on Trial & evidence. Refresh sample preview and check the resolved message before contacting the server.
4. Set operation/required/failure behavior, Validate and Save draft. Use Save & assign separately to apply the accepted template to a flow.

Worked example

Illustrative body {"barcode":"{BARCODE}","result":"{RESULT}"} with trial barcode DEMO001 and result PASS should resolve to those supplied values. The real receiver determines the required schema.

Expected result

The selected request has a reviewed message and outcome policy; preview and draft save do not themselves send it.

Related instructions: [4.1.11.2.8 Requests](#).

4.1.11.2.8.2 Response & rules

Filter the selected request response, extract acceptance values and check business approval using an offline sample.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Response format	LEGACY, JSON or STRING selects interpretation.
Line starts with / Start marker / End marker / Allow an empty response	Optional response filtering and explicit empty-response handling. Filter before interpreting extraction results.
Sample HTTP status / Sample server response / Check sample	Supplied offline evidence. Check sample evaluates the configuration without contacting the server.
Source / Condition	Choose Text, JsonPath, Delimited, KeyValue, BetweenMarkers, FixedWidth, Regex or HttpStatus and an Equals, NotEquals, NotEmpty, Contains, GreaterThan or LessThan condition.
Field (1+) / start index (0+) / regex group	Extraction conventions differ: rule delimited fields are one-based, while fixed-width starts are zero-based.

Procedure

1. Paste a sanitized accepted reply and its sample HTTP status. Set the appropriate format and only the filters needed to isolate the message.
2. Create enabled rules for actual business acceptance, not only transport success. Configure extraction and comparison for each.
3. Check sample with accepted, rejected, empty and missing-field replies. All enabled acceptance conditions must pass.
4. Save the validated draft and review live-trial evidence independently.

Worked example

For {"approved":true,"code":"OK"}, a JsonPath \$.approved Equals true rule distinguishes approval from {"approved":false,"code":"NG"}, even when both carry HTTP 200.

Expected result

Acceptance follows all enabled rules, with reproducible sample failures for rejected business replies.

Related instructions: [4.1.11.2.8 Requests](#).

4.1.11.2.8.3 Advanced

Configure retained legacy acknowledgement rules or a request-specific connection, and migrate a saved V2 endpoint when available.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Legacy acknowledgement / JSON path / field (1+) / Expected acknowledgement	Retained EXACT, CONTAINS, REGEX, JSON_FIELD, DELIMITED_FIELD or RAW_BYTES acknowledgement checks.
Legacy delimiter / Case-sensitive legacy reply	Delimiter and case behavior for the selected legacy comparison.
Connection override	Transport, host/port, text encoding, Accept header, TLS policy, timeouts and response framing used only when Use template connection is off. Method, path and body remain on Request template.
Authentication / Header name / User name / Secret / Certificate path / Certificate password	Request-specific protected authentication configuration where needed; inspect the destination before supplying credentials.
Before / After / Import saved V2	Conditional migration control for retained endpoint settings. This is not a general-purpose template-file importer.

Procedure

1. Confirm whether this request inherits Connection. Leave inheritance enabled when the shared destination/settings are intended.
2. If an override is required, configure its exact destination, framing/timeouts and authentication, then review it alongside the method/path on Request template.
3. Use legacy acknowledgement only for the intended retained integration. For modern JSON/STRING business checks, configure Response & rules.
4. If Import saved V2 is available, choose Before or After and inspect every imported setting and stage before validating, saving and assigning it.

Worked example

A request inheriting the shared HTTPS connection continues using that connection even if unused override fields contain an old TCP host. Turning inheritance off changes which connection settings take effect.

Expected result

The effective connection and acknowledgement path are explicit; import alone does not prove correct sequence placement or execute the request.

Related instructions: [4.1.11.2.8 Requests](#).

4.1.11.2.8.4 Trial & evidence

Supply deliberate sample values and run a confirmed live endpoint trial with visible per-request evidence.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Barcode / Fixture / Result token	Explicit trial inputs, also used by offline preview. Production values are not automatically loaded here.
Sample token values	One name=value pair per line, with a nonempty name; refresh request sample after changing these values.
Send trial / Stop trial	Send a prepared configuration after confirmation, or request cancellation of the current trial.
Trial evidence	Read-only masked request/reply evidence, per-request result and attempt count.

Procedure

1. Enter synthetic values suitable for the approved receiver and refresh the request sample preview. Resolve missing values and offline rule failures first.
2. Review the real destination, operation and resolved message. Send trial contacts configured servers after its confirmation; writes are sent once.
3. Inspect the overall result and each request result, attempts, message, masked request and masked response. Investigate receiver state after a timeout or stopped state-changing request before deliberately sending again.
4. Save the accepted draft and Save & assign when ready to use it in the intended flow.

Worked example

Trial barcode DEMO001 and variable MODE=BENCH are the values used for the trial. An offline Check sample PASS does not establish network reachability or server acceptance of a write.

Expected result

The live trial uses explicit inputs and a prepared snapshot; cancellation is not proof that the receiver did not commit a request.

Related instructions: [4.1.11.2.8 Requests](#).

4.1.11.2.9 Template library, Set settings, Validate and Save draft

Create or copy a template draft without silently changing production assignment.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Template library / search	Find/select reusable sets; selection is browsing.
+ New template set / Set settings	New draft, name, description and enabled state.
Copy as new set / Delete set	Copy creates a separately named draft; delete follows applicable permission/validation.
Validate / Save draft	Check and save configuration.
Save & assign / Remove	Explicit current-flow assignment lifecycle.

Procedure

1. Select current saved flow and browse/create the intended set.
2. Enter meaningful name/description in Set settings.
3. For an independent variant, Copy as new set, rename and review every request/connection.
4. Validate, Check sample and Save draft.
5. Save & assign only after review; verify assigned heading separately from selected library heading.

Worked example

Copying LINE_A to LINE_B creates a draft but does not redirect the flow until Save & assign succeeds.

Expected result

Saved library content and current-flow assignment remain separate.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unsaved prompt	Save validated work, discard intentionally or cancel navigation.
Import/export expected	Current visible library provides new/copy/delete, not generic template import/export buttons. Conditional Import saved V2 in Advanced is a specific migration action.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.10 Tokens

Extract typed current-run tokens and use approved global values.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Token / variable / Extract by / Response path	Named output and Text/JsonPath/Delimited/KeyValue/BetweenMarkers/FixedWidth/Regex extraction.
Type	Text, Integer, Decimal, Boolean or JSON; Text preserves leading zeros.
Field index (0+) / start index (0+)	Token mapping positions are zero-based, unlike one-based rule Field.
Required / Numeric limits / Min-Max / Unit	Presence, conversion and optional numeric acceptance.
Sensitive / Enabled	Redaction classification and mapping participation.

Procedure

1. Select the request before editing Tokens.
2. Add exact output name and extractor, then type/required status.
3. Set extraction details such as separator/quotes/empty fields, markers or regex groups.
4. Check response sample and verify downstream token availability.
5. Use already configured global token names directly; they need no separate response mapping. Save draft.

Worked example

Response {"serial":"00123","voltage":12.4} maps serial to Text to preserve zeros and voltage to Decimal with approved numeric limits. A required missing serial blocks its dependent work.

Expected result

Outputs belong to the current run and are typed/validated before consumption.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Off-by-one extraction	Token delimited Field index starts at 0; acceptance-rule Field starts at 1.
Token unresolved	Check exact name, producer stage/order, enabled/required mapping and global definition.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.11.2.11 Upload hold: review, recovery and unblock

Review an upload hold without pretending the receiver accepted the data.

Access and preparation

Data Link (License Required). Open Admin / Testing > Test Sequence > Data Link for a saved flow. Configuration, assignment and hold review require ADMIN authority plus Testing add/edit/delete permissions as applicable. Live trials require Testing view/run permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Review upload hold	Opens the active current-flow hold.
Review / resolution reason	Required explanation of reconciliation and decision.
RECORD REVIEW & UNBLOCK	Audits review and allows next DUT; sends no request and does not mark upload accepted.
CANCEL	Leaves hold unchanged.

Procedure

1. Identify the failed/uncertain request and retain run/report identifiers and reply evidence.
2. Use the approved receiving-system process to establish whether data was accepted, rejected or requires separate action.
3. Open Review upload hold and enter the concrete review/resolution reason.
4. RECORD REVIEW & UNBLOCK only after the authorized decision; verify readiness and retain upload history separately.

Worked example

"Receiver confirms record exists for this run; acknowledgement was lost" is a specific review reason. Unblocking alone cannot create or confirm that receiver record.

Expected result

The next DUT is released through audited review while actual upload acceptance is unchanged.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No hold displayed	Check current saved flow and whether this request's failure policy actually created a hold.
Permission denied	Use authorized ADMIN with Testing edit rights and Data Link entitlement.

Related instructions: [4.1.11.2 Data Link Tool](#).

4.1.12 COMMUNICATION STUDIO SEQ

Build reusable communication operations with explicit formats and decoding.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

Add Serial RX / TX sequence: Configure and test the COM / Serial device first. Confirm its baud, data bits, parity, stop bits, command termination or frame rule, timeout, retry, and whether the protocol uses text or HEX bytes.

Do not use a Send action when the sequence must judge a reply. Do not mix text and HEX formats, guess line endings, or place credentials and production identifiers in example commands.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW / ADD COMM / DELETE COMM / SAVE SEQUENCE	Definition lifecycle.
Protocol / Device communication profile	Selected device protocol is read-only context; inspect its framing/transport.
TX format / Allow format override	ASCII, HEX, Decimal, Binary or Mixed; deliberate override only.

Procedure

1. Open Test Sequence and add a step linked to the configured Serial Device.
2. For TX only, choose Serial Send Text or Serial Send HEX. Enter the command in Set Value; use byte pairs for HEX.
3. For TX followed by RX, choose Serial Query Text or Serial Query HEX. The query action sends the command and waits for the reply.
4. Set timeout and retry from the real device behavior.
5. Set expected text or select the response parser/value type; add min/max when the response is numeric.
6. Use Store Variable when another step, formula, or report needs the RX value.
7. Run one step in a safe machine state and verify sanitized TX/RX evidence before production.
8. Select Test Flow, NEW and name the child sequence.
9. Add target/direction/format and documented TX/RX definition.
10. Configure decode/capture and APPLY COMMAND.
11. VALIDATE, SAVE SEQUENCE and run a controlled trial; link/save parent.

Worked example

A TX action cannot judge an expected reply unless the configured operation includes receive behavior.

Expected result

Transport format and stored response interpretation are explicit.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Add Serial RX / TX sequence	If RX is empty or incorrect, check the current COM port/USB identity, baud/parity/stop bits, command termination, fixed-length or STX/ETX framing, HEX byte order, checksum, timeout, and the raw permission-controlled debug log.

Related instructions: [4.1.12.1 TX/RX steps, capture, decoding, validation and trials](#).

Screen reference

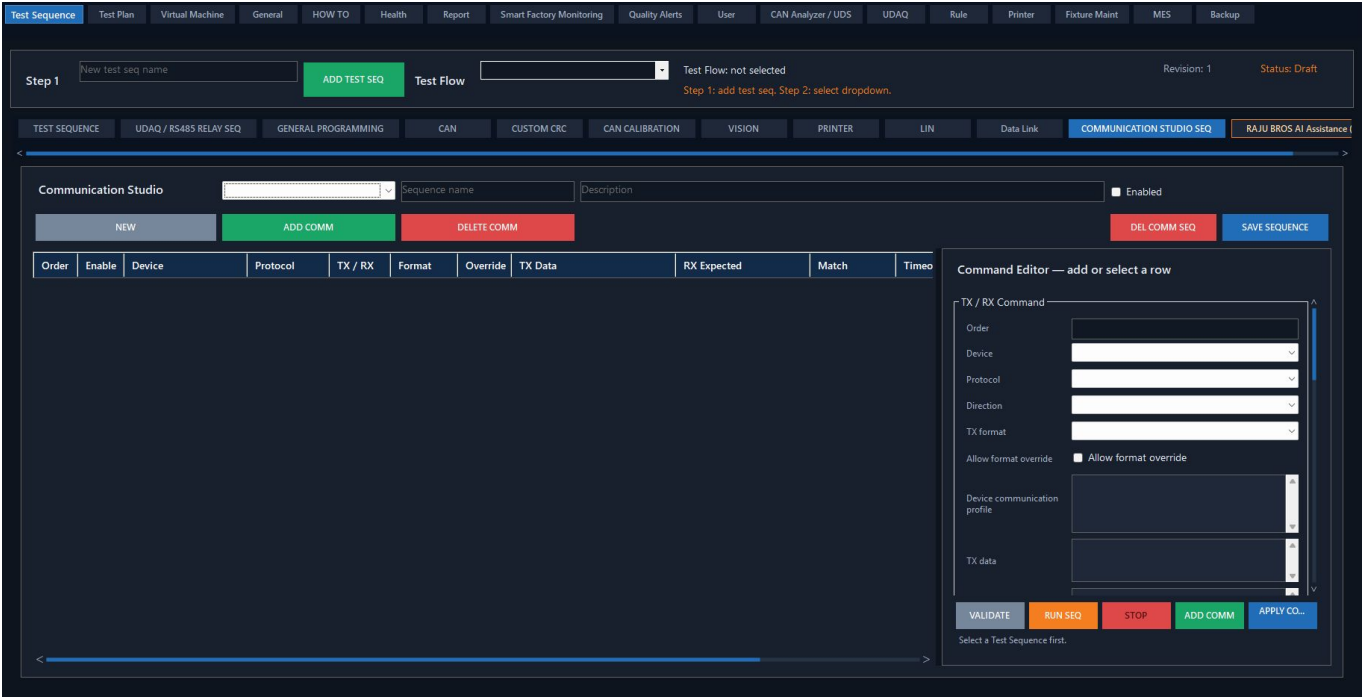


Figure 4.1.12 - Communication Studio sequence editor. Reference capture: 07 October 2026.

4.1.12.1 TX/RX steps, capture, decoding, validation and trials

Configure TX/RX, decoded limits and captured variables, then inspect live evidence.

Access and preparation

Open Admin / Testing > Test Sequence. Viewing, editing, saving and running depend on the corresponding page and action permissions.

COMMUNICATION STUDIO SEQ stores reusable TX/RX operations. Configure text/HEX, framing, capture and decoding, then expected response or limits. Save and trial the sequence before linking it. Review both raw bytes and decoded values when the parent step reports NG.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Direction / TX data / Expected RX / RX match	TX, RX or TX/RX with None/AnyResponse/ExactMatch/Contains/StartsWith/NumericLimit.
Decode enabled / type / byte slice / Endian / Scale / Offset	RawHex, ASCII String or supported numeric decode.
Store bytes / Combine / Result variable	Captured fragments and combined result.
Continuous TX / Cycle interval / Repeat count	Deliberate repeated sends, distinct from a reply timeout.
APPLY COMMAND / VALIDATE / SAVE SEQUENCE / trial controls	Commit row editor, preflight, persist and controlled execution.

Procedure

1. Select a command and configure target/direction/format.
2. Enter approved payload and reply match; set decoder/limits if needed.
3. Apply the command, validate all enabled rows and save before first trial.
4. Run trial, inspect Live TX/RX Traffic and stop before leaving the adapter to another owner.

Worked example

Bytes 34 12 as UInt16 little-endian give 4660; choosing BigEndian gives 13330. Validate with a known reply rather than choosing whichever value passes.

Expected result

Raw capture and decoded result support the same conclusion.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Trial asks to save	A saved child identity is required before running.
Format preflight fails	Review device protocol and deliberate format override.
No RX	Check framing/termination, direction, timeout and device profile.

4.1.13 RAJU BROS AI Assistance (Beta) (License Required)

LICENSE REQUIRED

RAJU BROS AI Assistance license for the sequence-assistance tab. This notice applies to that Beta feature; AI HELP / RBX is documented separately. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Use RAJU BROS AI Assistance (Beta) to draft reviewable sequence suggestions.

Access and preparation

Open Admin / Testing > Test Sequence > RAJU BROS AI Assistance (Beta). RAJU BROS AI Assistance (Beta) (License Required). Sequence assistance access is separate from merely seeing an AI HELP button. Corresponding page/action permissions are also required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IMPORT DOC	Supported PDF, text, CSV and workbook requirement inputs.
GENERATE DRAFT / ANSWER QUESTIONS	Creates suggestions and resolves required missing facts.
APPLY TO DRAFT	Transfers reviewed suggestions; does not approve/save/run production by itself.

Procedure

1. Provide sanitized requirements and correct flow context.
2. Generate, answer required questions and inspect proposed steps.
3. Review every device, command, limit, retry and cleanup operation.

4. Apply to draft, save through normal review and validate controlled operations.

Worked example

A requirement “measure current” still needs the actual device, range, unit, parser and acceptance limits; the Beta tool’s suggestion is not evidence of those facts.

Expected result

Assistance output remains an engineering-reviewed editable draft.

Related instructions: [4.1.13.1 Sequence assistance, suggestions and review](#).

Screen reference

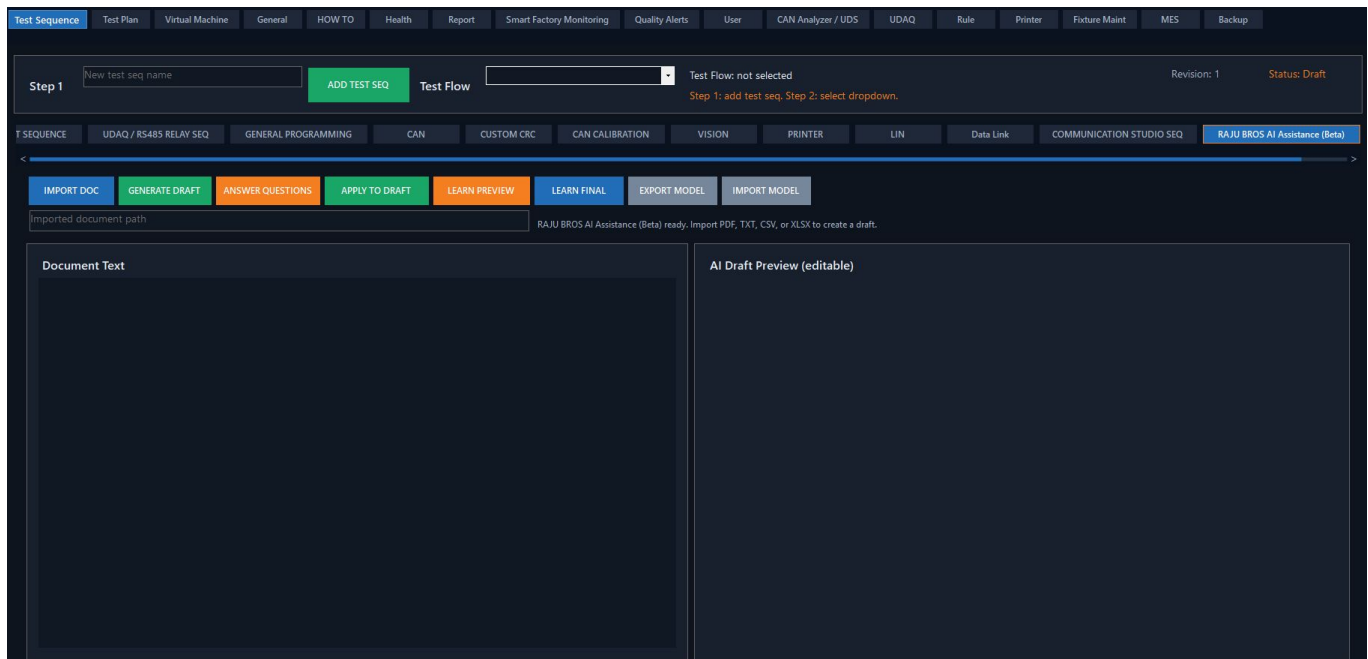


Figure 4.1.13 - RAJU BROS AI Assistance (Beta): document and editable draft. Reference capture: 07 October 2026.

4.1.13.1 Sequence assistance, suggestions and review

Review, apply and learn from a corrected assistance draft.

Access and preparation

Open Admin / Testing > Test Sequence > RAJU BROS AI Assistance (Beta). RAJU BROS AI Assistance (Beta) (License Required). Sequence assistance access is separate from merely seeing an AI HELP button. Corresponding page/action permissions are also required.

IMPORT DOC loads supported requirement documents. GENERATE DRAFT creates suggested steps; ANSWER QUESTIONS resolves missing information; APPLY TO DRAFT transfers reviewed suggestions to the sequence draft. LEARN PREVIEW/LEARN FINAL and model import/export support the assistance workflow. Review every command, device, limit, retry and cleanup path before saving or running. Beta suggestions require engineering review.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IMPORT DOC / source text	Loads/pastes requirements; importing clears previous questions/preview.
GENERATE DRAFT / ANSWER QUESTIONS	Required questions must be resolved before apply.
LEARN PREVIEW / LEARN FINAL / model import-export	Assistance learning/model workflow; review permitted source content.

Procedure

1. Import supported sanitized source or paste requirements.
2. Generate and answer questions with documented device/process facts.
3. Inspect each proposed row and fix omissions or unsupported commands.
4. APPLY TO DRAFT, review resulting main sequence and save normally.
5. Use learning actions only on deliberately reviewed examples; trial actual execution independently.

Worked example

A generated write action with an invented address must be replaced with the approved documented address before it can be considered for execution.

Expected result

The saved sequence is accepted by normal engineering checks, not by Beta suggestion status.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Apply blocked	Resolve required questions and empty draft conditions.
Suggestion inaccurate	Correct the source facts and review individual rows; do not compensate by increasing retries.

4.2 Test Plan

Open the shared Test Plan workspace.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Admin / Testing > Test Plan opens the same plan editor as the Test Plan sidebar page. A plan links product identities to reusable test flows and fixture positions. Saving the plan header and its model rows are separate actions.

Procedure

1. Open Test Plan.
2. Select the existing plan or use NEW. Follow the complete creation and validation procedure in chapter 7.

Expected result

The selected saved plan and DUT mappings are available for production selection.

Related instructions: [7 Test Plan](#).

4.3 Virtual Machine

Create and run explicitly identified simulation devices.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Virtual Machine is a simulation workspace. Its profiles appear in Device Configuration and can be selected by test steps, but their results do not verify physical hardware. Use unique names such as SIM_DMM so their purpose is visible.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD VIRTUAL DEVICE / CONFIGURE	Create a profile or edit the selected profile. Choose the communication protocol, virtual endpoint and deterministic behavior in its configuration dialog.
LAUNCH / STOP	Start or stop the selected runtime. Confirm the runtime status after either action.
DISABLE	Remove the profile from runtime availability without treating it as a physical device.
DEVICE MANAGER LINK	Open Device Configuration to inspect the managed device and its current runtime availability.

Procedure

1. Create a uniquely named profile for a controlled engineering flow.
2. Save the definition, select it and press LAUNCH. Inspect its runtime window and RUNNING status.
3. Bind the engineering flow to this virtual device and exercise its intended normal response, negative response and timeout cases.
4. STOP after the trial. Before production, check that every production step selects the intended physical device.

Worked example

An engineering parser trial uses SIM_DMM to return a fixed numeric reading. A passing result proves the parser and limits for that response; it is not a measurement of a connected product.

Expected result

A running virtual profile supplies predictable simulated responses through the normal device path.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Virtual device is unavailable	Check that the saved profile is enabled and launched, then refresh Device Configuration.
LAUNCH fails	Check the profile identity, endpoint conflict and the displayed runtime error before trying again.

Related instructions: [4.3.1 Machine definition, device assignment and test relationships](#); [1 Device Configuration](#).

Screen reference

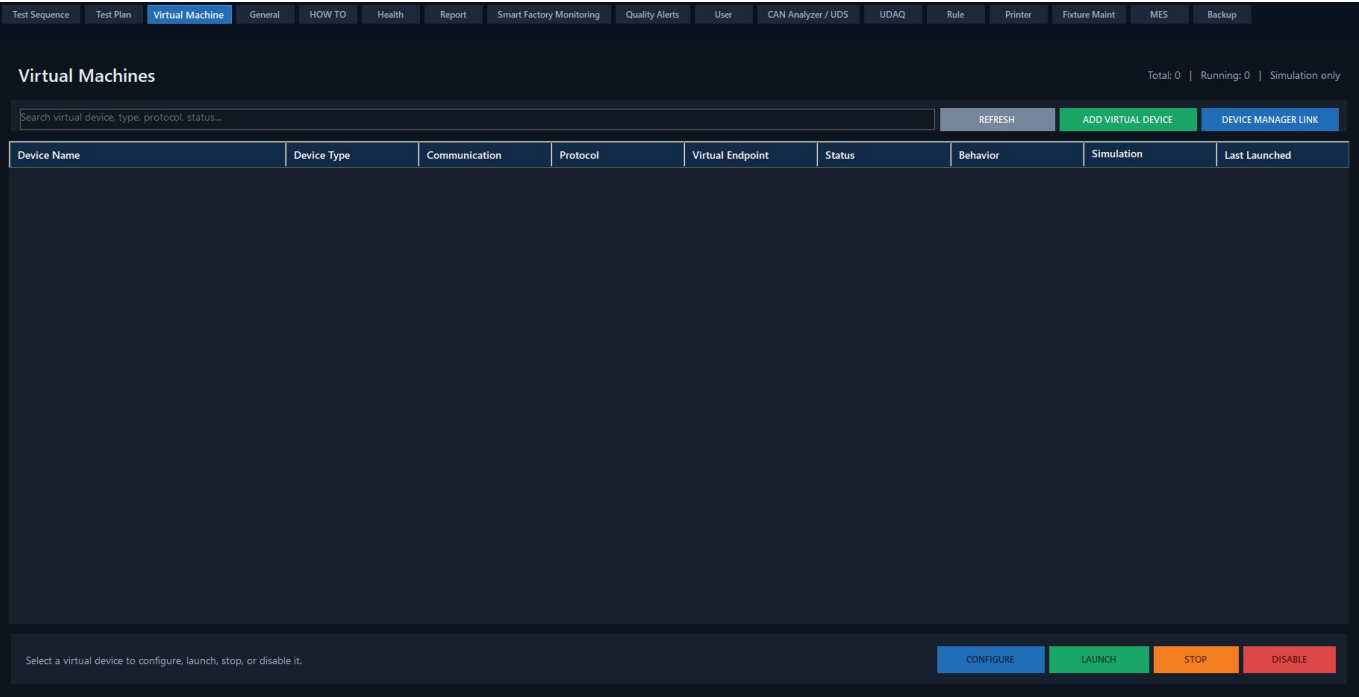


Figure 4.3 - Virtual Machines: simulated device definitions. Reference capture: 07 October 2026.

4.3.1 Machine definition, device assignment and test relationships

Connect a simulation profile to the flow that will consume it.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Keep the device profile, the launched runtime and the step device selection consistent. Editing a response does not by itself launch the runtime or change a flow that still points to a different device.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Select Device Type / Hardware Shape	Choose the simulated instrument and, where applicable, relay shape. Selecting a type supplies defaults; inspect them before saving.
Device Name / Communication Type / Protocol / Endpoint / Channel	Unique simulation identity and its virtual communication settings.
Timeout (ms) / Retry Count	Simulation communication timing, separate from a production hardware approval.
Measurement Mode	Fixed, Range or Script as offered; choose Fixed with zero noise for a deterministic numeric trial.
Simulated Value / Unit / Tolerance / Noise	Numeric value, displayed unit and variation.
Response Delay (ms)	Delay before the simulated response.
Disconnect After Commands (0 = never)	Controlled disconnect after a command count; 0 disables this fault.
Timeout response / Invalid response / Out-of-range response	Explicit fault simulation options; enable one at a time to isolate behavior.
Command / Response Test / SEND	Preview the configured response to a command.
SAVE CONFIGURATION / LAUNCH VIRTUAL DEVICE	Save without launching or save and launch; CANCEL abandons the dialog.

Procedure

1. Choose a device type and unique Device Name. Inspect the default Communication Type, Protocol and Endpoint / Channel.
2. For a repeatable DMM trial, select Fixed, enter Simulated Value 5.0 and Unit V, set Tolerance / Noise 0 and clear the three fault checkboxes.
3. Enter MEAS:VOLT? in Command / Response Test and SEND to inspect the preview. Set appropriate response delay/timeout and save or launch.
4. Use DEVICE MANAGER LINK to identify the managed virtual device, then bind a dedicated engineering flow to it.
5. Run the controlled request and compare its actual RX with the preview. Test Timeout response, Invalid response or Out-of-range response separately, restoring the normal settings between trials.
6. STOP after the trial and confirm no virtual device remains bound to a production flow.

Worked example

With Fixed=5.0 V and zero noise, a numeric parser trial with limits 4.8-5.2 should accept the simulated value. An explicitly enabled timeout fault should exercise timeout handling. These outcomes verify software paths only; no physical product was measured.

Expected result

Device selection, runtime status and returned data identify the same simulation profile.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected value	Compare the request actually sent with the configured response rule and verify the step device binding.

Related instructions: [4.3 Virtual Machine](#).

4.4 General

Configure station-wide operating policy.

Access and preparation

ADMIN with the page and action permissions required for this operation.

General contains Machine Identity, Test Execution, Production Counter, Limit & Result, Operator Flow, Diagnostics, Audit Log, AI Assistance, Storage & Archive and Shift Master. Review the purpose of each control before changing a production policy. Most pages use SAVE GENERAL SETTINGS; Storage & Archive and Shift Master have their own save controls.

Procedure

1. Open the relevant General subtab.
2. Change the necessary fields and use that subtab's save action. Enter the change reason when requested.
3. Reopen the subtab and check saved values. Validate the changed behavior on a controlled run before resuming production.

Expected result

Saved settings govern subsequent applicable operations; a running operation can retain its initial settings snapshot.

Related instructions: [4.4.11 SAVE and audit history for General settings](#).

4.4.1 Machine Identity

Identify the station in reports and communication.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Company / Customer / Plant	Inherited read-only identity. This page displays it for confirmation.
Line name / Station name / Machine name	Editable station identifiers used by reports and MES tokens. Use stable, unambiguous names agreed with the receiving system.
PC name / App version	Read-only computer and application information.

Procedure

1. Compare the inherited identity with the intended installation.
2. Enter Line name, Station name and Machine name.

3. SAVE GENERAL SETTINGS and inspect a report/MES preview that uses the corresponding tokens.

Worked example

Line name LINE_A, Station name FINAL_TEST and Machine name TESTER_01 produce distinct LINE, STATION and MACHINE values when those tokens are used.

Expected result

The saved station identity resolves consistently in future report and MES content.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Company or plant cannot be edited	These are read-only here; arrange identity correction through the authorized installation support process.

Screen reference

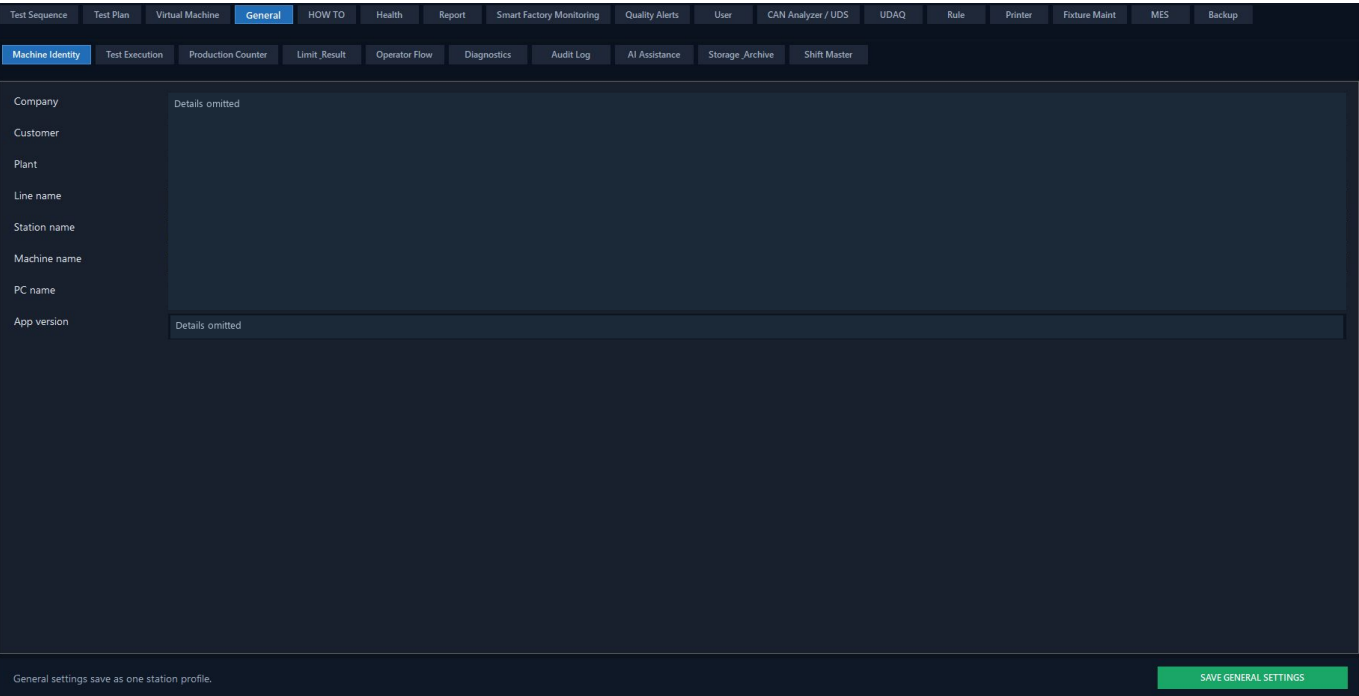


Figure 4.4.1 - General: identity fields. Reference capture: 07 October 2026.

4.4.2 Test Execution

Choose how tests start, stop after failure and present their results.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Test Execution affects start triggers, result reset timing, passed-barcode duplication, UI refresh and Operator group target overrides. A permission to edit a group target does not authorize editing its loop mode or child steps.

Procedure

1. Choose the start and failure policies for the line.
2. Set the required display options and any allowed group-target range.

3. SAVE GENERAL SETTINGS, then verify one accepted start and one blocked or duplicate trigger on a controlled setup.

Expected result

The Operator workflow follows the selected trigger and target-editing policy.

Related instructions: [4.4.2.1 Execution options and Operator group target permissions](#).

4.4.2.1 Execution options and Operator group target permissions

Set start triggers, failure handling and permitted Operator group targets.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Start trigger mode	AUTO starts after barcode validation. RX RULE ONLY disables manual START. RX RULE OR START BUTTON accepts the first valid trigger and ignores the second.
Reset delay ms	Delay used when automatic UI reset after completion is enabled. Allow enough time for the operator to read the result.
When step fails	Select the available failure action deliberately; verify its effect on the remainder of the flow.
Allow duplicate passed barcode	Controls whether a barcode with a previous pass can be accepted again. This is separate from local barcode-format validation.
Show step execution time / optimized run UI updates	Control displayed timing and screen refresh behavior. UI refresh does not redefine a device timeout.
Admin / Operator UI refresh ms	Available when optimized updates are enabled. Higher intervals reduce refresh frequency.
Waiting overlay transparency (%)	Use the adjacent meaning label to verify how the chosen percentage appears.
Allow Operator to edit group loop targets before START	Allows temporary target-only changes within configured duration/count ranges.
Group duration minimum/maximum (sec); Group cycle count minimum/maximum	Maximum must be at least minimum. These constrain Operator overrides and do not rewrite the recipe.

Procedure

1. Configure the group's loop mode and original target in the saved Test Sequence first.
2. Choose the station start trigger and failure behavior. If Operator overrides are needed, enable the target option and enter both allowed ranges.
3. SAVE GENERAL SETTINGS with the required reason.
4. While idle, check the GROUP VIEW target editor. Start a controlled run and confirm the target is locked from START through cleanup.
5. Check the same behavior in the intended single or parallel workflow. Disable overrides when subsequent runs must use saved recipe targets.

Worked example

A saved count loop has target 5. With Operator editing enabled and allowed range 1-10, an idle Operator may choose 3 for the run. The stored target remains 5 and the target cannot change after START.

Expected result

Start is accepted only through the configured mode; temporary group targets remain fixed for the run or rolling parallel session.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Target cannot be edited	Check that settings were saved, the enabled TEST loop header has a unique name, the value is in range and cleanup has finished.
Manual START unavailable	Check whether RX RULE ONLY is selected and whether all barcode/interlock conditions are satisfied.

4.4.3 Production Counter

Define the production counter period and which real runs contribute.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Automatic daily reset	Enabled starts a new counter period at local midnight. Disabled continues the period until a confirmed manual reset.
Count ADMIN Testing runs	Includes real Testing runs from an administrative session when enabled. Simulation and Golden Sample runs remain excluded.

Procedure

1. Decide whether shift reporting needs a continuous or midnight-based period.
2. Set the two switches and SAVE GENERAL SETTINGS.
3. Compare the counter period and one eligible real run with the resulting count; use a separate simulation to check its exclusion.

Worked example

If the period currently contains 20 products, enabling daily reset starts the next period at local midnight. It does not erase historical report records.

Expected result

Counter totals reflect the current period and the selected run eligibility.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Engineering run changed the production total	Check whether real ADMIN runs are included; using an administrative login alone does not make a run a simulation.

4.4.4 Limit & Result

Set the common scalar numeric judgement policy.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Use Limit & Result to control decimal handling consistently across measured values and their numeric limits. The following sections explain the boundary calculation and the scopes that retain independent precision.

Procedure

- 1. Open General > Limit & Result.
- 2. Review the PASS boundary preview before saving a changed policy.

Expected result

The policy is explicit and repeatable for subsequent numeric operations.

Related instructions: [4.4.4.1 General decimals, boundary judgement and display scope](#); [4.4.4.2 Live Input Monitor and Vision precision rules](#).

Screen reference

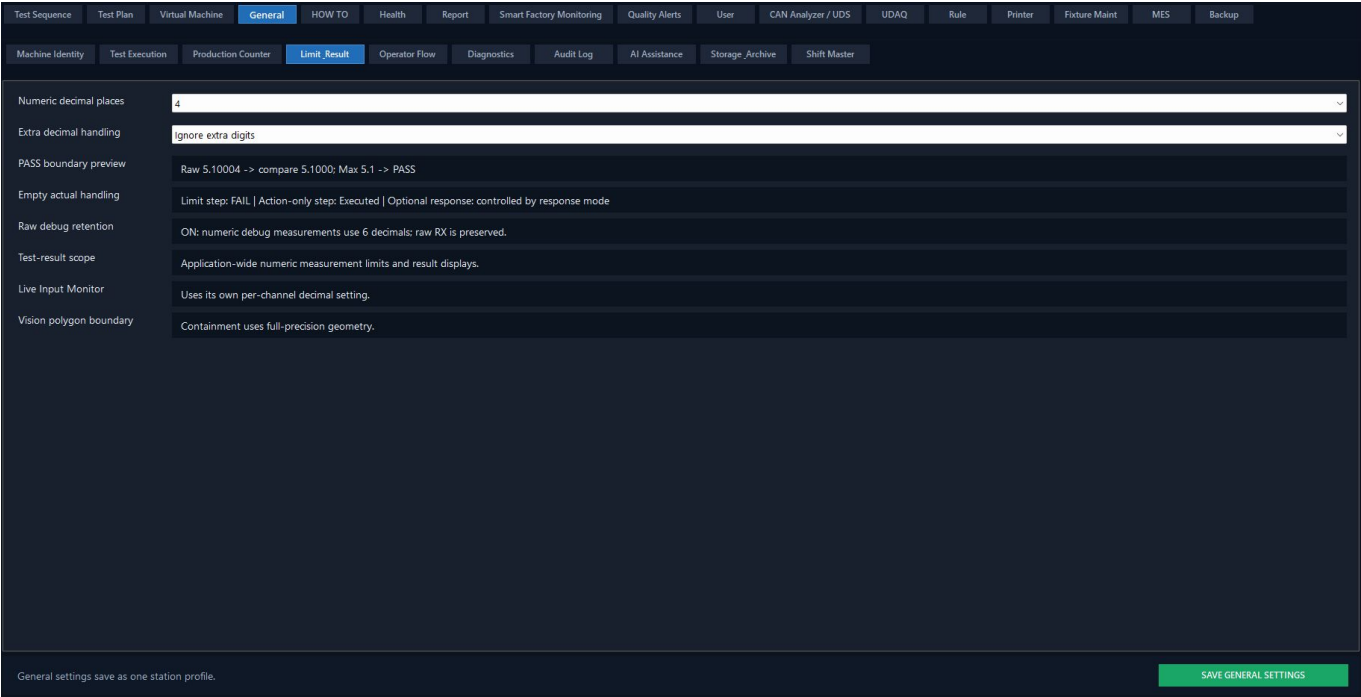


Figure 4.4.4 - General: decimal policy and its scope. Reference capture: 07 October 2026.

4.4.4.1 General decimals, boundary judgement and display scope

Understand a numeric result at a decimal boundary.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Numeric decimal places	Select 0-6 places for scalar result judgement/display.
Extra decimal handling	Ignore extra digits or Round off. The selected policy applies to both measured value and min/max limits.
PASS boundary preview	Shows the consequence of the selected policy before saving.
Empty actual handling / Raw debug retention	Read-only explanations of missing values and retained raw evidence.

Procedure

1. Open General > Limit & Result and select decimals and handling.
2. Review the boundary preview against the product's required judgement rule.
3. SAVE GENERAL SETTINGS. Start a new controlled operation for the changed policy.
4. When investigating a verdict, compare raw actual, processed actual and processed limits, not only the displayed text.

Worked example

At four decimals, actual 5.10004 against maximum 5.1 is compared as 5.1000 against 5.1000. A running operation keeps its initial policy even if General settings change.

Expected result

Scalar checks in Testing, Maintenance, Vision, RGBI, CAN/UDS, LIN, Communication Studio, Data Link numeric rules and FEASA use the captured policy. Existing stored verdicts are preserved.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
PASS appears above a displayed maximum	Compare the raw actual and both values after the configured decimal transformation.
A change did not affect the current run	The operation retains its starting policy; verify using a subsequent controlled run.

4.4.4.2 Live Input Monitor and Vision precision rules

Separate numeric result formatting from geometry, raw data and channel displays.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Intermediate numeric variables retain full precision for later formulas. Raw calculations, calibration data, image geometry and protocol bytes keep their original precision. Chromaticity polygon containment uses full-precision geometry. Live Input Monitor uses its own per-channel decimals. Numeric debug measurements use six decimal places, including trailing zeros; raw device response text remains unchanged.

Procedure

1. Identify whether the value is a scalar test result, a Live Input channel, raw protocol text or geometric data.

2. Use General decimals for scalar judgement and the channel editor for Live Input display precision.
3. Retain the raw response and geometric evidence when diagnosing a boundary result.

Worked example

Changing General decimals to two places does not move a chromaticity polygon boundary or reduce the precision of a variable used by a later formula.

Expected result

Display changes do not silently redefine geometry or raw communication.

Related instructions: [3.3 TEST TRIAL / RESPONSE](#); [4.1 Test Sequence](#).

4.4.5 Operator Flow

Control next-DUT scanning panel visibility.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Next DUT opacity after scanning (%)	Applies before, during and after scanning. 100% is fully opaque.
Operator visible pages / Barcode focus / Result popup / Vision preview	Read-only summaries. They describe current behavior rather than providing independent switches here.

Procedure

1. Enter the opacity percentage and SAVE GENERAL SETTINGS.
2. View the next-DUT panel while idle and during a controlled scan.
3. Confirm barcode text and prompts remain readable in the intended display environment.

Worked example

Choose 100% if the next-DUT panel must remain fully opaque throughout pre-scan.

Expected result

The pre-scan panel uses the saved opacity; test-start behavior remains governed by Test Execution.

Related instructions: [4.4.2.1 Execution options and Operator group target permissions](#).

4.4.6 Diagnostics

Control diagnostic logging and startup permissions.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Diagnostics provides the editable debug, group-attempt label and startup permission options together with read-only descriptions of raw communication, failed-step evidence and retention. It is not the evidence cleanup editor.

Procedure

1. Review the diagnostic choices and their scope.
2. Save a deliberate change and check one new log entry.

Expected result

New diagnostic evidence follows the saved options.

Related instructions: [4.4.6.1 Debug logging, group attempt labels and startup permissions](#); [4.6.1 Machine health, diagnostics, cleanup and failure evidence](#).

Screen reference

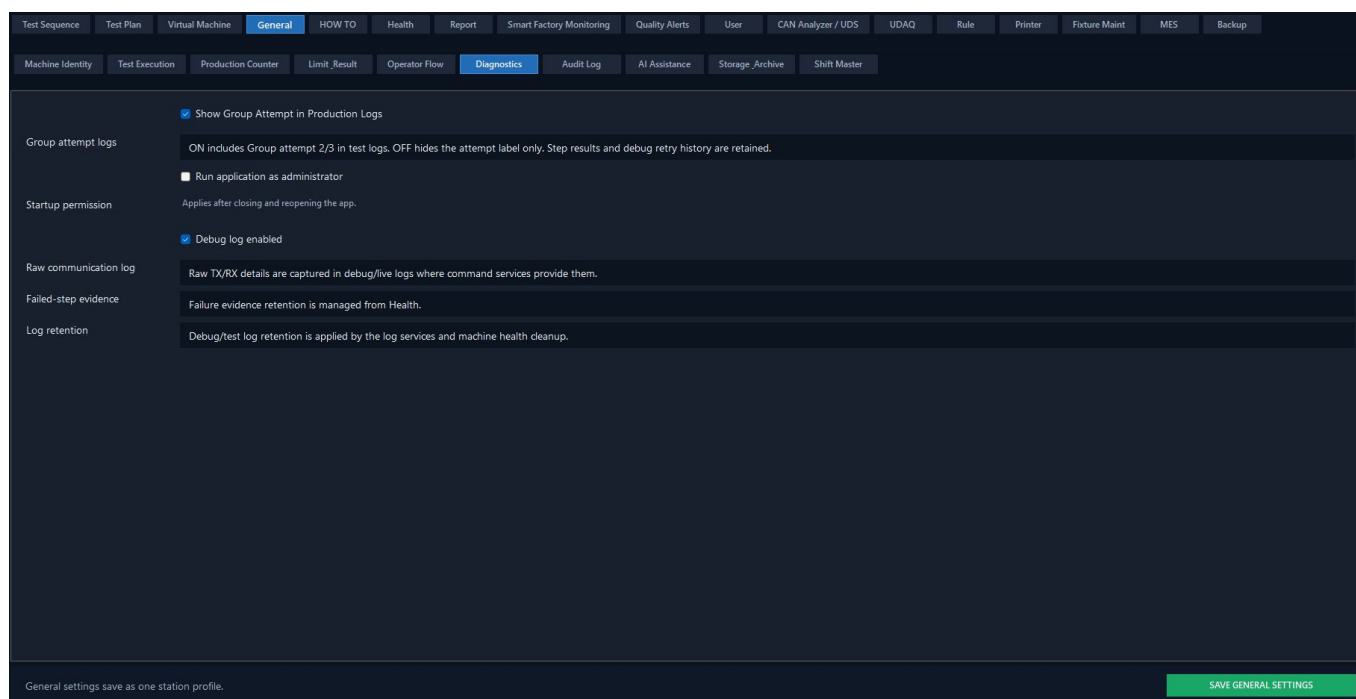


Figure 4.4.6 - General: group-attempt labels and debug logging. Reference capture: 07 October 2026.

4.4.6.1 Debug logging, group attempt labels and startup permissions

Save useful diagnostic evidence without confusing display labels with retained history.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Group attempt labels	ON includes labels such as Group attempt 2/3 in production logs. OFF hides that label only; step results and debug retry history remain.
Run as administrator	Changes Windows startup permission behavior after the application is closed and reopened. It does not grant application page permissions.
Debug logging	Enables or disables debug capture according to the displayed policy.
Raw communication log / Failed-step evidence / Log retention	Read-only policy information; use Health for its evidence controls.

Procedure

1. Set the logging choices needed for the issue being investigated.
2. SAVE GENERAL SETTINGS and generate a controlled operation. Check its timestamp and device/step identity in the log.
3. If startup permission changed, close the app after work is complete and reopen it. Use the intended Windows account for the verification.

Worked example

Switch off group-attempt labels to simplify production output; a retry investigation still uses the retained debug history.

Expected result

Diagnostic changes are saved and the restart-dependent option applies on the next startup.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cannot open a restricted page after elevated startup	Windows elevation and application role/page permission are separate. Check the application account.
Related instructions: 13 Application Log ; 4.6 Health .	

4.4.7 Audit Log

Require an explanation when saving settings.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Change reason	Off saves normally. On prompts for a reason before a settings change is saved; Cancel preserves the current settings.

Procedure

1. Open General > Audit Log and choose the change-reason policy.
2. SAVE GENERAL SETTINGS.
3. For a later configuration change, enter a specific reason describing the intended change, or Cancel to abandon the save.

Worked example

Use a reason such as "Adjust station identity for line relocation"; do not put credentials or customer barcode data in the reason.

Expected result

Saved changes retain audit context. This subtab does not configure audit retention.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Values reverted after Cancel	Cancel abandons the pending save; edit again and complete the reason prompt if the change is still required.

4.4.8 AI Assistance

Configure optional cloud support for RAJU BROS AI Assistance (Beta).

Access and preparation

ADMIN with the page and action permissions required for this operation.

Offline assistance remains available. Cloud improvement is optional; the page states that compact local rules are saved after LEARN PREVIEW / LEARN FINAL. Treat Beta suggestions as guidance to review before applying to a machine.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Cloud enablement	Turns the optional cloud improvement path on or off.
AI provider / Cloud endpoint / Cloud model	Choose the supported provider and enter the organization-approved endpoint and model.
API key	Protected entry; leave blank to keep the existing key. Do not include the key in screenshots, manuals, logs or support exports.

Procedure

1. Obtain the approved provider configuration through the organization's account process.
2. Enter endpoint/model and the protected key only in this field, then SAVE GENERAL SETTINGS.
3. Use an approved nonsensitive question to verify assistance behavior; review any learning preview before finalizing it.

Worked example

Use a generic question about the location of a configuration tab to verify the connection without transmitting product or customer records.

Expected result

Optional cloud assistance follows the saved connection; offline help continues to work.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cloud assistance is unavailable	Check enabled state, endpoint/model spelling, network access and the authorized account configuration. Keep secrets out of copied error text.

4.4.9 Storage & Archive

Manage older report storage while retaining searchable test headers.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Storage & Archive has a separate Save storage settings action. Archive is a reviewed operation: files and detail records are exported and verified before eligible live detail cleanup. Historical headers continue to support barcode interlocks and production counts.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Active database + report storage warning (GB)	Storage warning threshold.
Archive reports older than months (minimum 4)	Age cutoff; the UI does not accept fewer than four months.
Archive destination	Location for the verified archive and its report/evidence content. Keep it accessible for later detail retrieval.
Delete archived step data after verification	Checked removes verified eligible detail data from the live database; unchecked performs export only.
Reclaim database disk space after cleanup when production is idle	Attempts idle compaction after successful cleanup; compaction can be deferred.

Procedure

1. Choose age and a destination with room for database detail, PDFs and evidence.
2. Save storage settings. Select Review & Archive and examine the count, cutoff and estimated database share.
3. Confirm only after checking whether export-only or cleanup is selected. Review completion and retain the archive path.

Expected result

Verified archives preserve historical details; searchable headers stay in the live database.

Related instructions: [4.4.9.1 Verified archive cleanup and searchable historical results](#).

4.4.9.1 Verified archive cleanup and searchable historical results

Archive and verify historical reports, then reclaim space safely.

Access and preparation

ADMIN with the page and action permissions required for this operation.

The preview estimate covers the database share; PDFs and attachments require extra destination capacity. A different drive is necessary if the objective is to free the current drive. Unknown or shared source files are preserved; verified unshared application-owned report files may be removed during cleanup.

Procedure

1. Finish production and communication/programming trials before planning compaction.

2. Set the cutoff of at least four months and choose Archive destination. For a first retrieval trial, clear Delete archived step data after verification.
3. Press Review & Archive. Read the exact “strictly before” cutoff, report count, detail row count and cleanup choice.
4. Start the reviewed operation and wait for “Archive complete and verified”. If cancelled, completed cleanup is backed by its verified archive; unprocessed reports remain live.
5. Open a known historical result and confirm archived details are accessible from the retained archive location.
6. When cleanup is intended, use the reviewed cleanup workflow. Reclaim database space only while idle, with free space at least twice the database size.

Worked example

Archive records older than six months to a separate approved drive. Verify a known report can still display its details before using cleanup for the same operational policy.

Expected result

The archive is verified before cleanup. Compaction shrinks the database file; removing rows alone usually makes internal space reusable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Archive stopped	Read the error and destination capacity/permissions. Unverified data is not deleted.
Historical details unavailable	Reconnect or restore the archive location; a searchable header does not contain the removed detail rows.
Database file did not shrink	Use idle compaction after cleanup; inspect whether automatic compaction was deferred.

Related instructions: [4.17 Backup](#).

4.4.10 Shift Master

Define shift names and time boundaries.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Name	Recognizable shift label.
Start / End	Time boundaries, including an end time on the following day for an overnight shift.
Active	Whether the shift is available for use.
Remarks	Operational explanation without sensitive data.
SAVE SHIFT / NEW / DISABLE / DELETE	Separate shift actions; SAVE GENERAL SETTINGS does not save this editor.

Procedure

1. Use NEW or select an existing shift.

2. Enter name, start/end, active state and remarks. SAVE SHIFT.
3. Select the saved record again and verify the times. Check reports around both boundaries before using the new schedule operationally.
4. Use DISABLE when a shift should no longer be selected; review the confirmation before DELETE.

Worked example

A Night shift begins at 22:00 and ends at 06:00. Check one report just before midnight and one after midnight to validate the intended grouping.

Expected result

The saved shift definition supports time-based reporting.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Shift change was not retained	Use SAVE SHIFT within Shift Master, then reselect the row.

4.4.11 SAVE and audit history for General settings

Use the correct save action for each General subtab.

Access and preparation

ADMIN with the page and action permissions required for this operation.

SAVE GENERAL SETTINGS applies to the standard General fields. Shift Master uses SAVE SHIFT. Storage & Archive uses Save storage settings and a separate reviewed archive action. Saving one area does not imply that edits in another independently saved editor were persisted.

Procedure

1. Finish editing the active textbox/grid cell.
2. Use the save control belonging to the current subtab.
3. Complete the change-reason prompt if enabled and wait for confirmation.
4. Reopen the area to verify persisted values before performing a dependent production operation.

Worked example

Changing a shift and then pressing a different page's General save is insufficient; save the shift in Shift Master.

Expected result

Each setting is saved at its defined boundary and relevant changes remain auditable.

Related instructions: [4.4.7 Audit Log](#); [4.4.9 Storage & Archive](#); [4.4.10 Shift Master](#).

4.5 HOW TO

Open the shared HOW TO guide from Admin / Testing.

Access and preparation

ADMIN with the page and action permissions required for this operation.

HOW TO contains role-filtered page guides and the HOT Key section. Use it alongside the task procedures in this manual. A guide's presence does not grant access to the corresponding action.

Procedure

1. Open Admin / Testing > HOW TO or use OPEN HOW TO HELP.
2. Search for the page, exact control name or action.
3. Follow the guide for the current page and role.

Expected result

The relevant in-app guidance is displayed.

Related instructions: [14 HOW TO](#).

4.6 Health

Review machine health and preserve failure evidence.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Health combines a health score, preventive advice and recent failure forensics. Read individual findings before deciding what maintenance is needed.

Procedure

1. RUN HEALTH CHECK for a current report.
2. Read the Machine Health and advisor findings.
3. Preserve relevant evidence before reset or cleanup.

Expected result

Current health findings and available failure evidence are displayed.

Related instructions: [4.6.1 Machine health, diagnostics, cleanup and failure evidence](#).

Screen reference

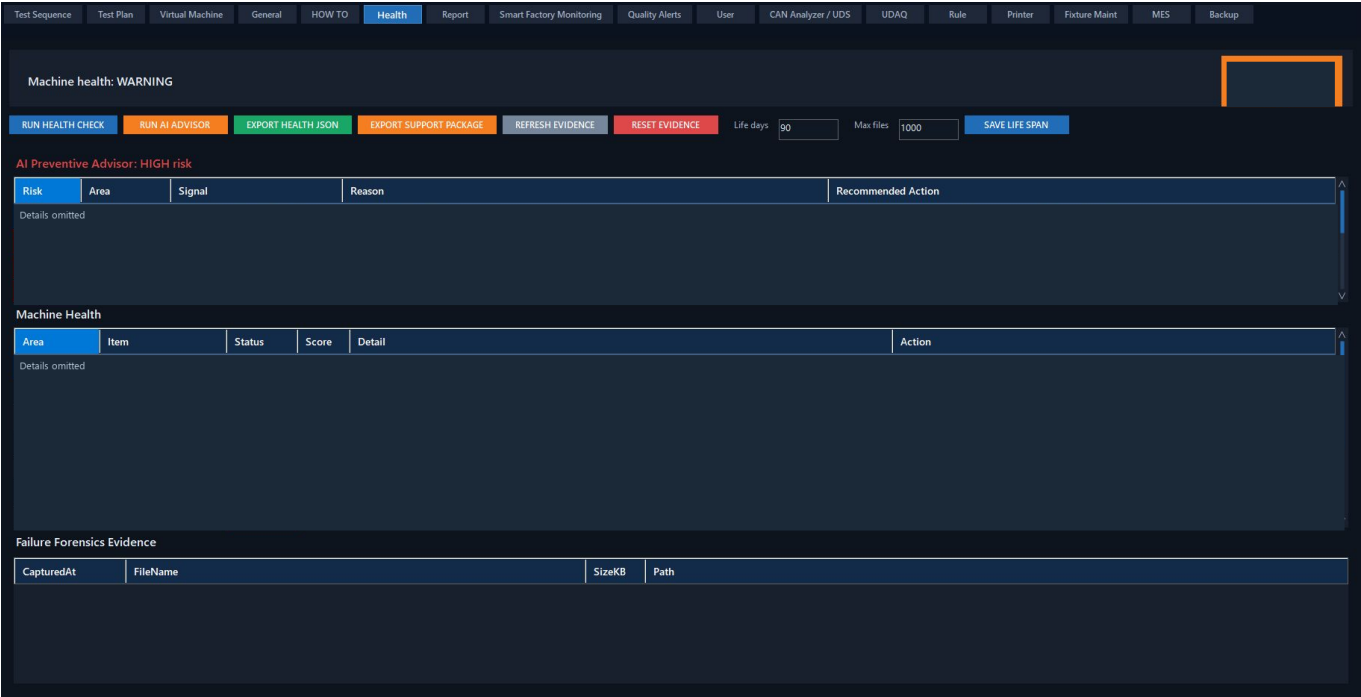


Figure 4.6 - Health: checks and retained evidence. Reference capture: 07 October 2026.

4.6.1 Machine health, diagnostics, cleanup and failure evidence

Collect, export and retain diagnostic evidence.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RUN HEALTH CHECK / RUN AI ADVISOR	Rebuild the report and advice. Review recommendations before changing the machine.
EXPORT HEALTH JSON	Save the current report; a report is generated first if necessary.
EXPORT SUPPORT PACKAGE	Choose a folder for a support package. Inspect its contents before sharing externally.
REFRESH EVIDENCE / RESET EVIDENCE	Reload the evidence list or perform the separately confirmed reset. Export needed evidence first.
Life days / Max files / SAVE LIFE SPAN	Set integer retention limits for failure-forensics files and save them.

Procedure

1. Record the issue time and RUN HEALTH CHECK.
2. Match its generated timestamp and finding to Failure Forensics Evidence.
3. Export health JSON and, where needed, a support package.
4. Save suitable Life days and Max files. Use RESET EVIDENCE only after preserving evidence for open investigations and reading the confirmation.

Worked example

After an intermittent device timeout, export the report and failure evidence, then compare the device finding with the same timestamp in Debug Log.

Expected result

Exported evidence is traceable to a captured health state.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Export fails	Check destination space and write access, then read the sanitized Debug Log error.
Old evidence absent	Check retention settings and previous reset/cleanup operations.

Related instructions: [13 Application Log](#).

4.7 Report

Configure report destinations and pending-result policy.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Report output and File Based MES are separate configurations. Pending report recovery retains the result so a failed write can be retried without repeating hardware testing.

Procedure

1. Configure and TEST WRITE each destination.
2. Choose formats, naming, evidence and failure policy.
3. SAVE REPORT LOG SETTING and verify a controlled result at each enabled destination.

Expected result

Future tests capture the saved destination requirements; already-pending copies keep their recorded requirements.

Related instructions: [4.7.1 Destinations, formats, paths and filename tokens](#); [4.7.2 Vision evidence, report retries and pending results](#); [2.9.2 REPORT PENDING and REPORT STORAGE ERROR recovery](#); [4.16.2 File Based MES](#).

Screen reference

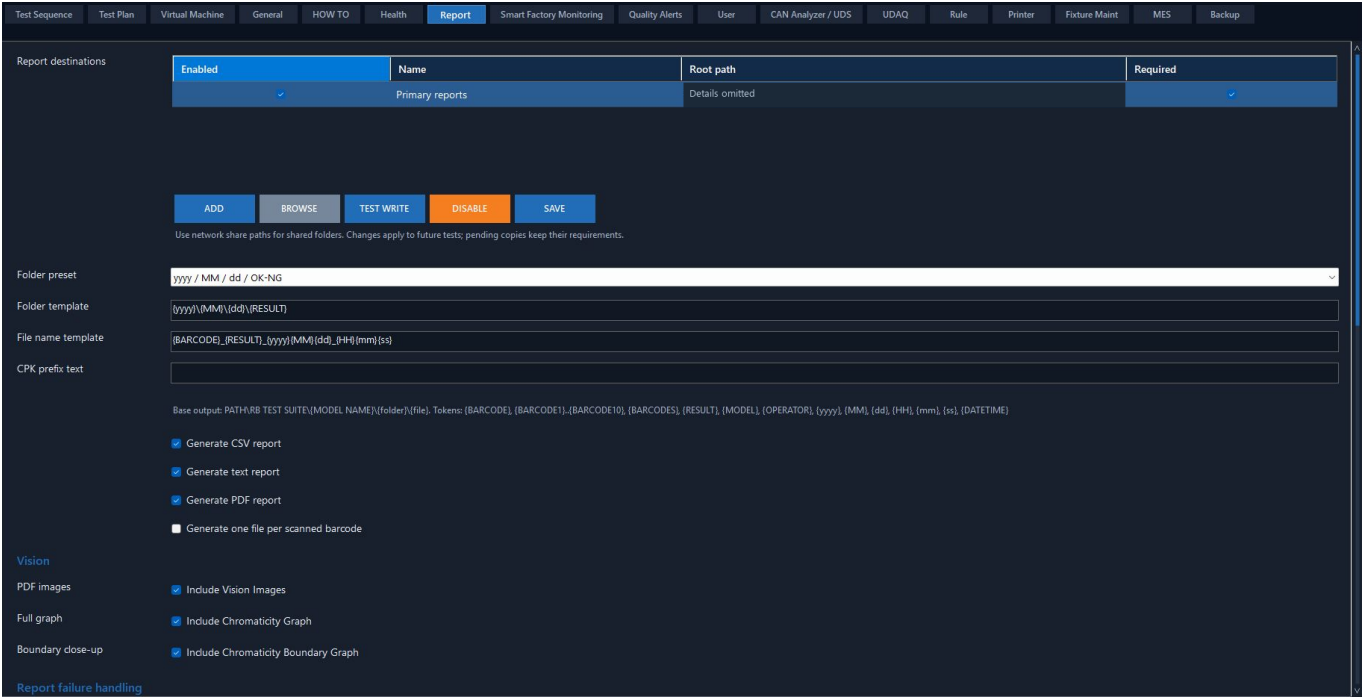


Figure 4.7 - Report destinations, templates and output formats. Reference capture: 07 October 2026.

4.7.1 Destinations, formats, paths and filename tokens

Configure report destinations and resolved paths.

Access and preparation

ADMIN with the page and action permissions required for this operation.

The fixed product-folder component in the example below is an established storage name retained for compatibility. Keep the actual resolved path when configuring report consumers; changing the software display name does not rename existing report directories.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enabled / Name / Root path / Required	Enable each destination, give it a clear name, enter its local or network root and decide whether it is mandatory.
ADD / BROWSE / DISABLE	Create a destination, choose its root or disable future output to it.
TEST WRITE	A real write test of the selected root using the current application environment.
Folder preset / Folder template	Subfolders below the product/model base; use date, RESULT, BARCODE or OPERATOR tokens as required.
File name template	Supported tokens include {BARCODE}, {BARCODE1}..{BARCODE10}, {BARCODES}, {RESULT}, {MODEL}, {OPERATOR}, date/time parts and {DATETIME}.
CSV / Text / PDF / per-barcode output	Choose formats and whether each barcode gets its own output.
CPK prefix text	Prefix used by report output; verify generated content before connecting a downstream parser.

Procedure

1. Set the primary root. ADD any secondary destinations and choose Enabled/Required individually.
2. TEST WRITE each destination using the intended operating account.
3. Choose templates and formats and review Preview.
4. SAVE REPORT LOG SETTING or destination SAVE, then verify a controlled result at every enabled destination.

Worked example

Root D:\ReportDemo, model DEMO_MODEL and folder {yyyy}\{MM}\{dd}\{RESULT} produce a directory below D:\ReportDemo\RB TEST SUITE\DEMO_MODEL\2026\10\09\OK for an OK result on 9 October. {BARCODE}_{HH}{mm}{ss} contributes DEMO001_140506 at 14:05:06.

Expected result

Every required destination is written or explicitly pending; optional failures remain distinguishable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Root test passes but report fails	Check the fully resolved subfolder/file path, format, permissions and file lock.
Pending copy uses old settings	Pending copies retain captured requirements; new settings apply to future tests.

Related instructions: [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR recovery](#).

4.7.2 Vision evidence, report retries and pending results

Set report-failure and Vision-evidence options.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PDF images / Full graph / Boundary close-up	Select Vision images and chromaticity graphs in PDF output.
Report failure interlock / Next test	Control the failure popup and whether unresolved report saving blocks the next test.
Reset authorization	Require the configured authorization for reset.
Local fallback / Fallback folder	Enable an approved local recovery destination and enter its writable root.

Procedure

1. Choose required evidence and report-failure behavior.
2. Configure fallback if permitted and check its destination.
3. SAVE REPORT LOG SETTING. When a result becomes pending, follow the operator recovery procedure.
4. Inspect each destination status after recovery.

Worked example

A required network share is unavailable after a test. Restore access and RETRY SAVE to write the stored result; hardware commands are not repeated.

Expected result

Pending reports survive restart. Retry saves reports only; reset does not discard an unsaved result.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
REPORT STORAGE ERROR	Recovery storage itself is inaccessible. Preserve the error and investigate database/path access before another production run.
OK result but next test blocked	Product judgement and report persistence are separate. Resolve the pending required destination.

Related instructions: [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR recovery](#).

4.7.3 File security, folder protection and preview

Apply security to future completed report files and recover legacy protection.

Access and preparation

ADMIN with the page and action permissions required for this operation.

File Security is applied after each TXT, CSV or PDF report is closed. Only completed reports saved after APPLY receive this policy; folders, subfolders and active logs are not protected by the current files-only mode. Folder permissions may still permit deletion and Windows administrators retain control. The Report page suggests the primary root; additional destinations retain their existing permissions.

The separate EXISTING REPORT PROTECTION / RECOVERY panel is for previously protected/encrypted reports. Its retired folder-protection controls are not the workflow for enabling security on new reports.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Protection mode	Without service or Windows service. Service mode enables SET UP / REPAIR SERVICE.
Report location / BROWSE	Root for the completed files covered by the policy. Check the exact resolved root in confirmation.
Read-only log files	Allow intended accounts to view/copy while applying read-only file restrictions.
Hide completed files	Set completed-file visibility according to the selected policy.
Access Denied	Blocks viewing/copying too; disables the read-only/account selection controls.
Windows accounts/groups	One approved reader per line for Read-only mode. Enter identities only in the authorized UI, not public documentation.
APPLY FILE SECURITY	Confirm and enable the chosen policy for future completed report files.
RESTORE ORIGINAL PERMISSIONS	Restore saved original permissions/visibility and disable this policy while retaining files.
REFRESH STATUS	Read applied, recovery-required or service-unavailable state.
EXISTING REPORT PROTECTION / RECOVERY	Use VIEW / EXPORT PROTECTED REPORTS for older protected files, then RESTORE / DISABLE LEGACY PROTECTION as appropriate. Recovery-key backup/restore and interrupted-change recovery belong to the authorized recovery process.

Procedure

1. Stop testing before changing file security. Verify the primary report root and the exact Report location.
2. Choose mode and the intended read-only, visibility or access-denied policy. For read-only access, enter the approved readers.
3. For Windows service mode, SET UP / REPAIR SERVICE if required, then APPLY FILE SECURITY and read the resolved-root confirmation.
4. Generate a controlled completed report and test permitted read/copy behavior using the intended account. Check secondary destinations independently.
5. If the page reports an interrupted change, use RESTORE ORIGINAL PERMISSIONS as directed; the backup is retained for recovery.
6. For existing legacy-protected files, open the recovery panel, export needed reports and restore/disable the retired policy through its provided actions. Keep all recovery secrets out of screenshots and support text.

Worked example

A newly completed CSV can receive read-only protection after APPLY while an older CSV and active log remain unchanged. A successful preview is not evidence that a reader account has the intended access.

Expected result

Future completed-file security, actual reader access and legacy recovery are distinguishable and verified separately.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Root/mode locked	An active or recovery-required policy locks those choices. Review status and restore original permissions through the supported action before reconfiguration.
Service unavailable	Existing saved permissions remain. Repair the service to change them; do not assume files were automatically unlocked.
Old reports unchanged	The new policy applies only to future completed reports. Use the separate legacy recovery tools for previously protected files.

Related instructions: [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR recovery](#).

4.8 Smart Factory Monitoring (License Required)

LICENSE REQUIRED

Smart Factory Monitoring license for the monitoring link and its services. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Share approved read-only reports with a Supervisor on the private LAN.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Smart Factory Monitoring (License Required) exposes selected report data rather than machine control. Configure the link, select shared categories and approve each requesting Supervisor after comparing its verification number.

Procedure

- 1. Review Overview and license state.
- 2. Configure Link Setup and Shared Report Data, then SAVE & APPLY.
- 3. Test readiness and start the link.
- 4. Approve the intended connection in Supervisor Access.

Expected result

Approved clients receive only selected read-only data.

Related instructions: 4.8.2 Link Setup; 4.8.3 Shared Report Data; 4.8.4.1 Supervisor IP request and verification-number approval.

Screen reference

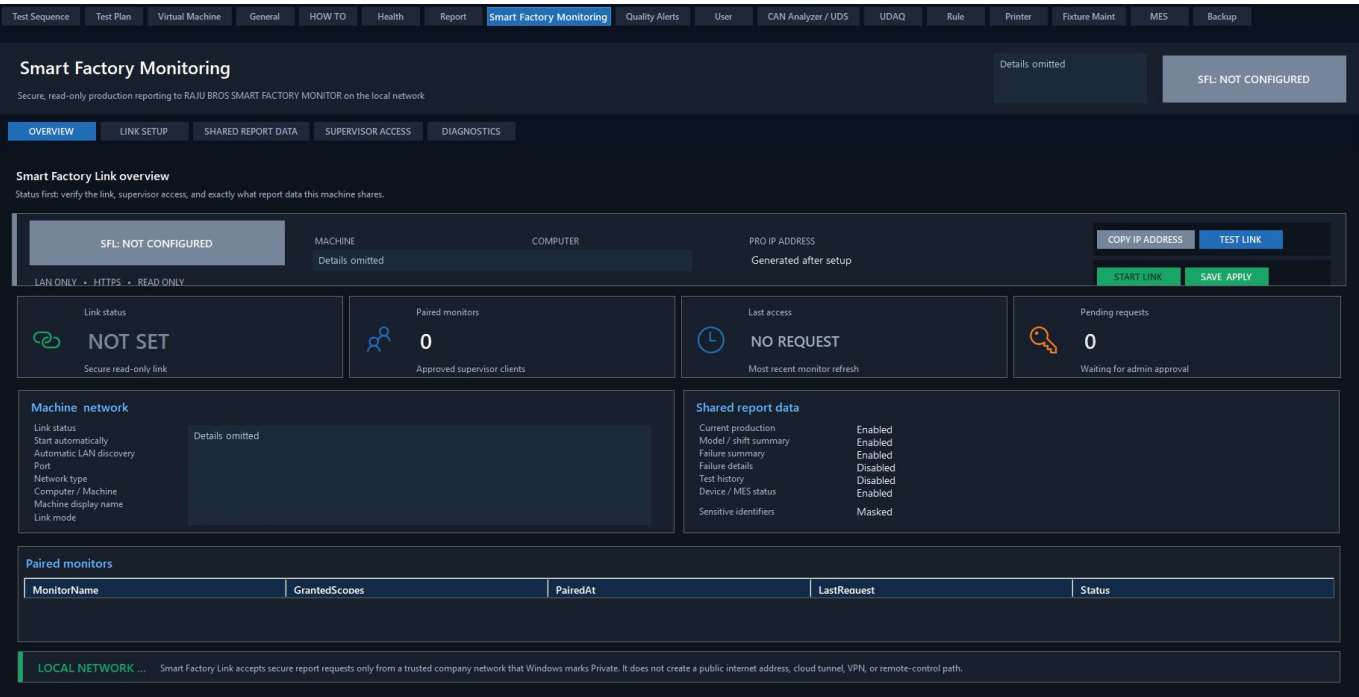


Figure 4.8 - Smart Factory Monitoring overview. Reference capture: 07 October 2026.

4.8.1 Overview

Interpret Smart Factory Link readiness.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Link state / License badge	Separate configured, running and licensed state. Saving Enabled does not prove the link is running.
Machine / Network summary	Verify machine identity, private-network scope and read-only HTTPS mode.

Procedure

1. Open Overview and inspect link/license status.
2. Verify the station identity.
3. Use Diagnostics for any unmet readiness prerequisite.

Worked example

A configured but stopped link cannot serve data until it starts successfully.

Expected result

Readiness is established before approving a client.

Related instructions: [4.8.5 Diagnostics](#).

4.8.2 Link Setup

Configure the private-LAN endpoint.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enable Smart Factory Link / Start automatically	Enable the link and optionally start it with the application.
Machine display name	Readable station identity for monitoring.
Stable machine ID / Computer host name / PRO IPv4 address	Displayed identities used to confirm the endpoint.
HTTPS report port	An unused local port suitable for the approved LAN.
Approval request life (minutes)	Expiry interval for new access requests.
LAN binding / Automatic discovery	Limit network scope and optionally advertise the station.

Procedure

1. Confirm private-LAN connectivity and enter the intended display name/port.
2. Set auto-start, discovery and request lifetime.
3. SAVE & APPLY. Complete an approved Windows administrator prompt if firewall setup requires it.
4. Test readiness and start the link.

Worked example

Name a station Final Test Station A and ensure the Supervisor selects that station before requesting access.

Expected result

The HTTPS endpoint is ready in the configured scope.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Port test fails	Inspect Diagnostics for another port owner or unavailable binding.
Network scope rejected	Correct the private-network setup rather than exposing the link publicly.

4.8.3 Shared Report Data

Choose the report data that Supervisors may read.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Current production / Model summary	Share aggregate counts.
Failure summary / Failure details	Separate aggregate failures from step names and measured values.
History / Download or export	Control historical visibility and downloads separately.
Machine health / MES status / Device summary	Share status only; device commands/settings are not exposed.
Sensitive identifier mode	Select available identifier treatment appropriate to the approved use.

Procedure

1. Agree the required categories.
2. Enable those categories and review identifier treatment.
3. SAVE & APPLY and check the approved client with nonsensitive sample data.

Worked example

A totals-only dashboard can use current production totals while failure details and history remain disabled.

Expected result

Only selected categories are available. The link excludes maintenance commands, relay control, programming, configuration, credentials, audit data, raw SQLite and customer files.

4.8.4 Supervisor Access

Manage pending and approved Supervisors.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

The current connection flow uses the machine IP and a verification-number approval; this page does not ask you to generate and distribute a pairing code.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH REQUESTS / APPROVE SELECTED / DENY SELECTED	Inspect and resolve a selected pending request.
REFRESH LIST / REVOKE SELECTED / REVOKE ALL	Inspect or remove approved access.

Procedure

1. Have the intended Supervisor request the machine by IP.
2. Compare its verification number with the selected pending request.
3. Approve the matching client or deny an unexpected request.
4. Revoke access when no longer required.

Expected result

Access remains tied to explicitly approved clients.

Related instructions: [4.8.4.1 Supervisor IP request and verification-number approval](#).

4.8.4.1 Supervisor IP request and verification-number approval

Approve an IP request using its verification number.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Procedure

1. Confirm the link is running and obtain the displayed machine IP.
2. In the Supervisor application, enter that IP and choose REQUEST CONNECTION.
3. In Supervisor Access, REFRESH REQUESTS and select the corresponding request. Compare verification numbers on both sides.
4. APPROVE SELECTED only after identity and number match. DENY SELECTED for an unexpected or mismatched request.
5. Create a fresh request if it expires. Verify the approved entry and subsequent reconnect.
6. Use REVOKE SELECTED when access ends, then verify the old approval no longer works.

Worked example

With two simultaneous requests, distinguish them by identity and verification number; the newest row alone is not proof.

Expected result

The intended client is approved until its access is revoked.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No request	Check address, port, link state, private-LAN connectivity and request expiry.
Number differs	Deny and repeat with the intended client.

4.8.5 Diagnostics

Diagnose local HTTPS readiness.

Access and preparation

ADMIN with Smart Factory Monitoring page/action permission and the Smart Factory Monitoring entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RUN LOCAL TEST	Check local readiness without production/device commands.
CHECK & REPAIR FIREWALL	Authorized repair of link firewall prerequisites.
REFRESH STATUS / COPY IP ADDRESS	Update evidence or copy the endpoint address.
RESET LINK SECURITY	Recovery action that changes link security identity; review confirmation and existing-access impact before using it.

Procedure

1. RUN LOCAL TEST and read diagnostic values and timestamps.
2. Correct the reported prerequisite and retest.
3. Verify a known approved Supervisor can read the selected categories.

Expected result

Local readiness is verified independently from remote reachability and approval.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Local test passes but remote connection fails	Check address/port reachability, private-network scope and client approval separately.

4.9 Quality Alerts (License Required)

LICENSE REQUIRED

Quality Alerts license for the notification workspace and scheduled or event-driven notifications. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Configure the complete quality-email path.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Quality Alerts (License Required) connects an account, recipient group and template to a model policy. Sign-in does not send a test message. SEND TEST EMAIL deliberately sends mail; enabled production policies can generate later mail automatically.

Procedure

- 1. Create and verify the sending account.
- 2. Save an enabled recipient group and recipients.
- 3. Create templates and choose them in a model policy.
- 4. Set thresholds, schedules and cooldown; enable the policy after an approved test delivery succeeds.
- 5. Check Outbox / History for actual delivery.

Expected result

Each policy has a usable sender, recipients and content.

Related instructions: [4.9.2 Mail Accounts](#); [4.9.3 Recipient Groups](#); [4.9.4 Model Policies](#).

Screen reference

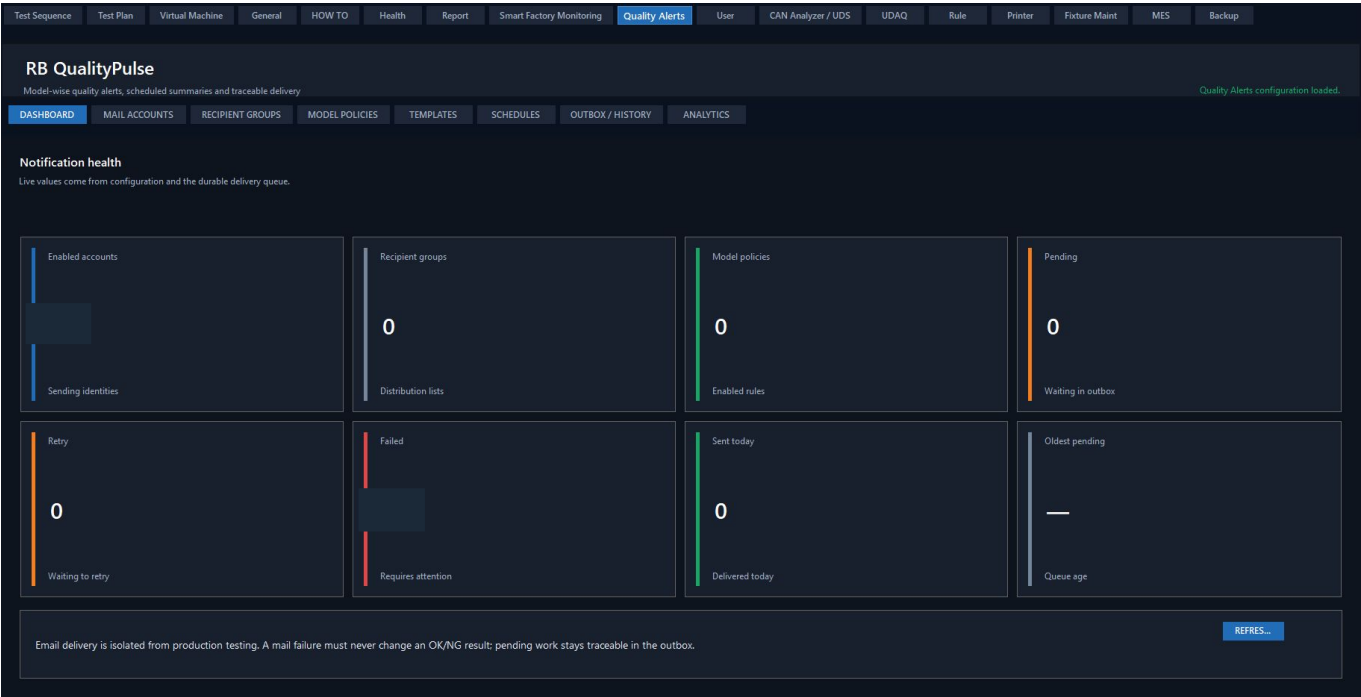


Figure 4.9 - Quality Alerts: dashboard and configuration tabs. Reference capture: 07 October 2026.

4.9.1 Dashboard

Read current alert-delivery status.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Dashboard queue counts describe notification delivery, not product pass/fail totals. Inspect individual messages in Outbox / History for the cause of a failed or delayed count.

Procedure

1. REFRESH STATUS.
2. Review pending, sent and failed indicators.
3. Open the affected message in Outbox / History.

Worked example

A failed email can coexist with a successfully saved product report; investigate mail delivery rather than retesting the product.

Expected result

Current delivery backlog and failures are visible.

Related instructions: [4.9.7 Outbox / History](#).

4.9.2 Mail Accounts

Save and verify a mail account.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Account name / Provider	Use a separate name per sender. Available providers include SMTP, personal Outlook/Hotmail, Google/Gmail, Microsoft 365 business and Outlook desktop (classic).
SMTP server / port / user / STARTTLS	SMTP uses authenticated STARTTLS, normally port 587. Implicit TLS port 465 is unsupported by this sender.
Tenant / Client registration fields	Use provider-approved registration values through the authorized setup process. Do not publish actual identifiers or credentials.
New password / app password	Protected provider-specific credential; existing secrets are not displayed again.
From / Reply-to / display name	Sender and reply routing; personal sign-in establishes the verified mailbox.
Timeout / Default sending account / Account enabled	Connection timeout, fallback sender selection and account availability. A policy may select its own sender.

Procedure

1. NEW, enter Account name and select Provider.
2. For personal Outlook or Google, enter the approved desktop registration values and complete the corresponding browser SIGN IN. Do not enter a mailbox password into registration fields.
3. For Microsoft 365 business, use approved application credentials and sender Mail.Send authorization. For SMTP, configure its server, STARTTLS, login and From address.
4. SAVE ACCOUNT. Use SEND TEST EMAIL to an approved Test recipient when ready to send.
5. Check history and the recipient inbox, then select this saved account in the model policy.

Worked example

Create separate saved accounts for line alerts and quality summaries, then select the appropriate account in each policy.

Expected result

A deliberate test verifies the configured sender path; sign-in alone does not prove delivery.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Personal sign-in expires	Reconnect and check consent/desktop registration; Google testing projects can require approved test users and renewed sign-in.
SMTP fails	Check STARTTLS, port, enabled state, sender permission and sanitized error.
Provider changed	Reconfigure or reconnect with the new provider; its credentials are not interchangeable.

Related instructions: [4.9.2.1 Outlook Desktop mail provider](#).

4.9.2.1 Outlook Desktop mail provider

Send through classic Outlook under the current Windows user.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Classic Outlook must be installed and signed in under the same Windows user. New Outlook is unsupported. From address must exactly match a configured Outlook account. This provider does not use a separately entered SMTP password; Outlook may ask permission to send.

Procedure

1. Verify classic Outlook can send from the intended Windows profile.
2. Create a saved Mail Account with Outlook desktop (classic) and the exact configured From address.
3. Send an approved test and check both application history and Outlook Outbox/Sent Items.
4. Select the saved account in the model policy after success.

Worked example

An Outlook account configured under a different Windows login is not automatically available to the station's current session.

Expected result

Mail uses the selected classic Outlook account.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Uncertain delivery	Check Outlook Outbox and Sent Items before manually retrying to avoid a duplicate accepted message.
Sender unavailable	Compare From address and the Outlook accounts under this Windows user.

4.9.3 Recipient Groups

Create a reusable recipient group.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Group name / Description / Enabled	Identify and enable the group.
Recipient name / Email address	Approved individual recipient.
Delivery type	TO, CC or BCC.
Recipient enabled	Disable a recipient without replacing the group.

Procedure

1. Create/save a group.
2. Select it and add/save each approved recipient with its delivery type.
3. Verify group and recipient enabled states.
4. Select the group in the policy and verify recipients during an approved test.

Worked example

A Quality team group can contain an approved TO and CC recipient; a disabled entry is not a reliable escalation destination.

Expected result

The policy resolves the group to eligible recipients.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No recipients	Check selected group and both levels of enabled state.

4.9.4 Model Policies

Bind a model to alert and summary behavior.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Model / Policy name	Scope and recognizable policy name.
Mail account / Recipient group	Saved enabled sending and receiving records.
Failure / Summary template	Match the message type.
Immediate NG alert	Independent of rate escalation and scheduled summary.
Summary schedule / Severity / Policy enabled	Frequency/time, urgency and whether the policy is active.

Procedure

1. Create/select the policy for the intended model.

2. Choose account, group and templates.
3. Set threshold, cooldown, summary, attachment and recovery choices.
4. Save and verify controlled event delivery through history.

Worked example

Daily summaries can be enabled while immediate NG alerts are disabled.

Expected result

Events use the intended saved delivery configuration.

Related instructions: [4.9.4.1 Alert escalation, cooldown, recovery and attachments](#).

4.9.4.1 Alert escalation, cooldown, recovery and attachments

Configure escalation and evidence attachments.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Consecutive NG	Escalation threshold for consecutive failures.
Failure-rate threshold (%) / window	Rate threshold over the configured number of attempts; 0% disables rate escalation.
Cooldown (minutes)	Limits repeated escalation within the interval.
PDF / CSV attachments	Require the corresponding report artifacts to exist.
Debug-log attachment	Requires an explicit debug-artifact path, not just the checkbox.
Parallel-DUT consolidation	Requires a production cycle ID.
Recovery notification	Enables the matching recovery message.

Procedure

1. Select the policy and choose immediate/escalation requirements.
2. Set consecutive, rate-window and cooldown values deliberately.
3. Enable only approved artifacts and verify report generation supplies them.
4. Save and inspect controlled failure, repetition and recovery in history.

Worked example

A 10-attempt window and 20% threshold target a high recent failure rate. Immediate NG can independently send individual failures; cooldown does not disable that option.

Expected result

Escalation and attachments follow configured conditions and available evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Attachment missing	Check artifact generation; debug attachments additionally need an explicit path.
Parallel messages separate	Check whether the production event includes the required cycle ID.

4.9.5 Templates

Create failure and summary templates.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Name / Type	Choose FAILURE or SUMMARY.
Subject / HTML body / Plain-text fallback	Provide readable content for both rich and plain mail.
HTML / Enabled	Choose presentation and availability.
Supported tokens	Use the shown token list; failure and summary contexts differ.

Procedure

1. Choose the template type and enter supported-token content.
2. Inspect its preview and save/enable.
3. Select the template in the matching model policy and inspect an approved sample delivery.

Worked example

Failure subject: [{SEVERITY}] {MODEL} - {BARCODE}. Body: {RESULT}; {FAILED_TESTS_TEXT}. Summary subject: {MODEL} {PERIOD}. Summary body: total {TOTAL}, pass {PASS}, fail {FAIL}, yield {ATTEMPT_YIELD}.

Expected result

Values resolve in the correct message context.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Blank/literal token	Check spelling and template type against the supported list.

4.9.6 Schedules

Review summaries scheduled by model policies.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Schedules come from Model Policies. Frequencies are SHIFT, DAILY, WEEKLY and MONTHLY. Use station local time and Shift Master consistently.

Procedure

1. Open Schedules and REFRESH.
2. OPEN MODEL POLICIES to edit the enabled summary, frequency and time.
3. Save the policy and verify its schedule.
4. Check the generated message in history at the reporting boundary.

Worked example

A daily summary at 18:00 should be checked against the station clock and intended reporting period.

Expected result

Schedule state follows the saved policy.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Summary absent	Check policy/summary enabled state and valid account/group/template references.

4.9.7 Outbox / History

Investigate delivery attempts and recover an eligible message.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Status	ALL, PENDING, RETRY, FAILED, SENT or CANCELLED.
Detail	Selected message and delivery attempt/error history.
REFRESH / RETRY / CANCEL	Reload status, retry an eligible message or cancel pending delivery.

Procedure

1. Filter and select the exact affected message.
2. Read its attempt error and correct the cause.
3. For Outlook uncertainty, check Sent Items and Outbox before retrying.
4. RETRY only the intended message and confirm its new state.

Worked example

Recover a transport failure using the saved message instead of rerunning the product test.

Expected result

The original attempt and recovery are visible in history.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Repeated failure	Check account/provider/recipient/network configuration; retry does not repair bad settings.

4.9.8 Analytics

Interpret notification analytics in the selected scope.

Access and preparation

ADMIN with Quality Alerts page/action permission and the Quality Alerts entitlement, including applicable bundle access.

Read the selected model and period together with the measures. Analytics should be compared with delivery entries and production records for the same scope.

Procedure

1. Choose the available model/period filters.
2. APPLY to refresh.
3. Trace an unexpected measure back to corresponding messages and product records.

Worked example

A one-model period view is not directly comparable to the all-model current production counter.

Expected result

Analytics is interpretable against matching evidence.

Related instructions: [4.9.7 Outbox / History](#); [10 KPI Dashboard](#).

4.10 User

Create named accounts and assign only required access.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Account details and page/action permissions have separate save controls. Use a named account for each person so production and audit records remain attributable. Disabling an account preserves its historical identity.

Procedure

1. Create or select the account in User.
2. Save account identity, role and active state.
3. Assign permitted page actions and SAVE PERMISSIONS.
4. Check the intended login and restricted actions in a controlled session.

Expected result

The user can access the intended pages and actions.

Related instructions: [4.10.1 Users, roles, passwords and active status](#); [4.10.2 Page/action permissions and access errors](#).

Screen reference

User Detail

New user: enter a unique Login ID and a password of at least 6 characters.

Name

Login ID

Password

New: 6+ characters; existing: blank keeps password

Code / Employee Code

Accessibility

OPERATOR

☒ Active

NEW USER

SAVE USER DETAILS

Page / Activity Permission

Save this new user first. Then grant page access using SAVE PERMISSIONS.

Page	View	Add	Edit	Delete	Run	Export	Import	Manage
Testing	☒	☐	☐	☐	☒	☐	☐	☐
Maintenance	☐	☐	☐	☐	☐	☐	☐	☐
Admin / Testing	☐	☐	☐	☐	☐	☐	☐	☐
General Setting	☐	☐	☐	☐	☐	☐	☐	☐
User Management	☐	☐	☐	☐	☐	☐	☐	☐
Device Configuration	☐	☐	☐	☐	☐	☐	☐	☐

Figure 4.10 - Blank user form and page/activity permissions. Reference capture: 07 October 2026.

4.10.1 Users, roles, passwords and active status

Save an account or reset its password.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
NEW USER	Start a new account rather than overwriting the selected record.
Name / Login ID / Code	Person, unique login and employee identifier.
Password	New accounts require at least six characters. For an existing account, blank keeps its current password.
Accessibility	Available customer roles include OPERATOR, MAINTENANCE, SERVICE and ADMIN.
Active / SAVE USER DETAILS	Control login availability and save account data. Permission edits require their own save.

Procedure

1. NEW USER, then enter unique Login ID and required identity.
2. Choose the role and active state. Enter a new password only through the protected field.
3. SAVE USER DETAILS and complete any reason prompt.
4. For an existing user, select their record; leave Password blank to retain it or enter the approved replacement.
5. Verify the intended login. Disable inactive employees rather than reusing their Login ID.

Worked example

A service engineer should receive a named SERVICE account when that role is intended; existing MAINTENANCE accounts are not automatically reassigned.

Expected result

The account is saved with protected password handling and attributable history.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Login ID already exists	Select the existing record to edit; do not create a duplicate.
Role change did not update permissions	Save account details first, then review and save its permission grid.

4.10.2 Page/action permissions and access errors

Save page and action permissions separately.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Page / Activity Permission	Controls available View, Add, Edit, Delete, Run, Export, Import and Manage grants for eligible pages.
SAVE PERMISSIONS	Persists permission changes; SAVE USER DETAILS alone does not apply them.

Procedure

1. Select a saved account with the intended role. If the role changed, SAVE USER DETAILS first.
2. Grant only required actions in the relevant page rows. Finish any active grid edit.
3. SAVE PERMISSIONS and reselect the user to verify the grants.
4. Check both an allowed and a prohibited action using the intended account.

Worked example

A person may view a page but still be unable to RUN its hardware trial. Granting View does not implicitly grant Run.

Expected result

Access checks reflect both role and explicit action permissions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Access Denied despite page visible	Check the specific action grant, account active state and role restriction. A page permission cannot override a hard role restriction.
Permission save says save user first	Finish the account or role save, then apply permission changes.

4.11 CAN Analyzer / UDS (License Required)

LICENSE REQUIRED

Either CAN Analyzer or CAN access is accepted for this workspace. A second Analyzer license is not needed when CAN access is already included. This does not by itself unlock CAN Calibration. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Open CAN Analyzer / UDS from the Admin workspace.

Access and preparation

Authorized CAN Analyzer / UDS page actions require CAN Analyzer or CAN entitlement, including applicable bundle access.

This navigation entry opens the shared CAN Analyzer / UDS workspace. Adapter/channel setup, frame transmission, cyclic traffic and UDS operation are documented in its sidebar chapter.

Procedure

1. Open CAN Analyzer / UDS.
2. Use the chapter procedure matching the intended adapter and operation.

Expected result

The shared CAN workspace uses the same saved setup and access checks.

Related instructions: [9 CAN Analyzer / UDS](#).

4.12 UDAQ (License Required)

LICENSE REQUIRED

UDAQ Programming license for firmware programming. This requirement applies to the UDAQ programming page; ordinary relay sequences and manual I/O are separate workflows. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Program a supported RAJU BROS UDAQ board.

Access and preparation

ADMIN with UDAQ Programming permission, the UDAQ Programming entitlement and the supported board/tool.

UDAQ Programming (License Required) is for RAJU BROS UDAQ boards based on Arduino Mega / ATmega2560. It is not a general programmer for unrelated hardware. Programming changes board firmware, so confirm the target and selected HEX before initiating it.

Procedure

- 1. Review supported board, connection and firmware prerequisites.
- 2. Follow the complete controlled flash procedure.

Expected result

A deliberate flash records programmer progress and final result.

Related instructions: [4.12.1 Programming connection, firmware, progress and results.](#)

Screen reference

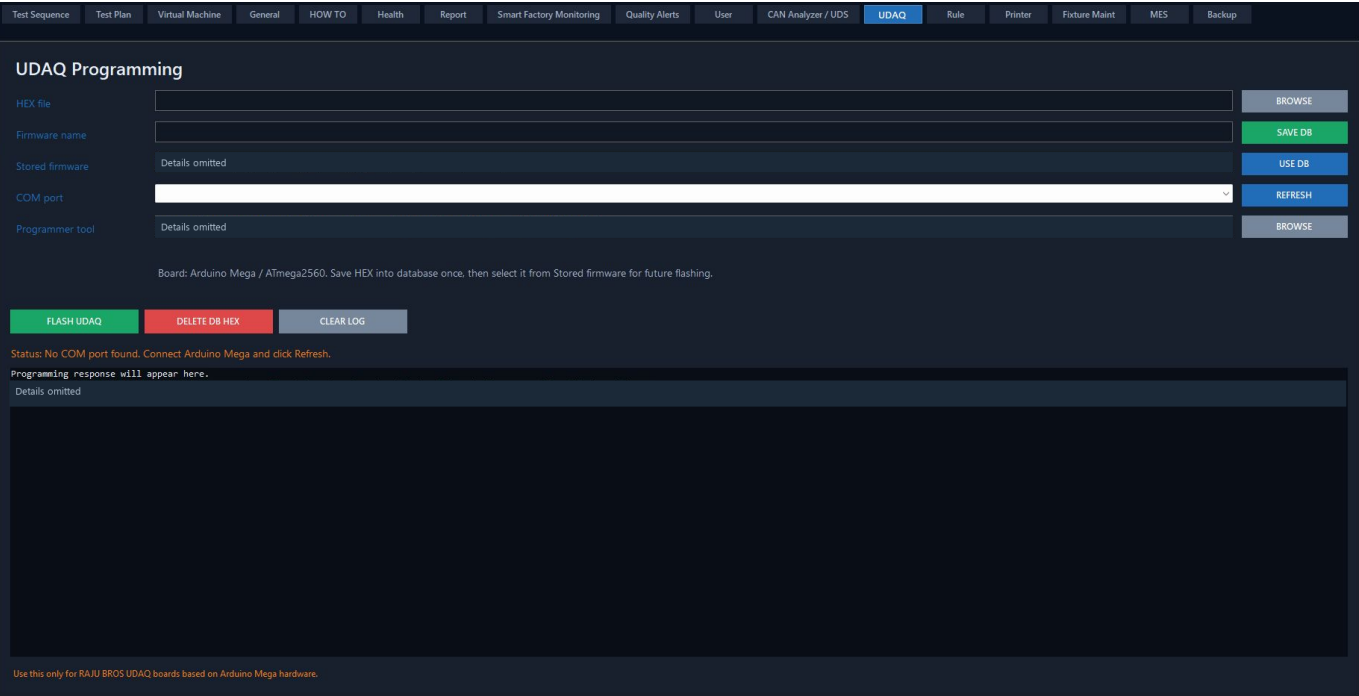


Figure 4.12 - UDAQ programming controls. Reference capture: 07 October 2026.

4.12.1 Programming connection, firmware, progress and results

Select firmware and perform one controlled UDAQ flash.

Access and preparation

ADMIN with UDAQ Programming permission, entitlement and the supported hardware/tool.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
HEX file / BROWSE	Select the approved target HEX.
Firmware name / SAVE DB	Store an identified firmware image for later use.
Stored firmware / USE DB	Select and use a saved firmware entry.
COM port / REFRESH	Refresh connected serial ports and select the verified target board.
Programmer tool / BROWSE	Select the required installed programming tool.
FLASH UDAQ	Starts the state-changing operation.
DELETE DB HEX / CLEAR LOG	Remove the selected stored firmware from use or clear the response display; neither verifies a board flash.

Procedure

1. Make the fixture safe and identify the supported board and correct COM port.
2. Choose the approved HEX or Stored firmware > USE DB. Check the intended firmware identity before proceeding.
3. Set the programmer tool path and review connection prerequisites.
4. Press FLASH UDAQ once. Keep power and the programming connection stable and wait for the final status and tool response.
5. Record the result and verify the board using the controlled post-programming procedure for that fixture.

Worked example

Store an approved engineering HEX under a clear firmware name, later select that same saved entry with USE DB, and verify its identity before flashing the intended board.

Expected result

The response pane records the actual tool execution and result; a selected filename alone does not prove successful programming.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
COM port missing or busy	Refresh ports, confirm board identity and release conflicting communication access before the approved trial.
Flash failed or interrupted	Preserve the response and inspect board/tool state. Do not automatically repeat a state-changing flash.

4.13 Rule

Configure event, reset, idle, completion and production-gate rules.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Rules connect a defined condition to a defined action. Their scope can be a plan, model/flow, DUT or station according to the rule type. Keep start gates, event-triggered stop/fail actions, output cleanup and reporting separate when commissioning so each cause can be identified.

Procedure

1. Select the rule family for the intended behavior.
2. Choose its scope and saved devices/actions.
3. Save and commission the positive, negative and recovery cases on a controlled setup.

Expected result

A matching rule performs the intended action within its configured scope.

Related instructions: [4.13.1 RX Rules](#); [4.13.2 Reset Rules](#); [4.13.3 Handling Idle](#); [4.13.4 Test Complete Rules](#); [4.13.5 GOLDEN SAMPLE RULE](#); [4.13.6 Start Rules](#); [4.13.7 NG Bin Rules](#).

Screen reference

The screenshot displays the 'Rule' configuration page in the Bharat Test Suite. The top navigation bar includes tabs for Test Sequence, Test Plan, Virtual Machine, General, HOW TO, Health, Report, Smart Factory Monitoring, Quality Alerts, User, CAN Analyzer / UDS, UDAQ, Rule (selected), Printer, Fixture Maint, MES, and Backup. Below this, a sub-navigation bar shows 'RX Rules' (selected), Reset Rules, Handling Idle, Test Complete Rules, GOLDEN SAMPLE RULE, Start Rules, and NG Bin Rules.

The main content area is divided into two sections. On the left is a table with columns: RuleId, Rule, Device, DUT Scope, DUT, Mode, Trigger Command, and RX Trigger. Below the table is a search bar with the placeholder 'Search rule, device, RX test, action...' and buttons for 'REFRESH' and 'NEW'. A footer note says 'Create rules like: UDAQ1 receives DI 1 -> Start Test.'

On the right is the 'ACTION HELP - LOG ONLY' section, which provides a detailed description of the rule type: 'Records the matched RX event in the log without changing the test or hardware state. Scope: All DUTs in the active plan. Passive RX: device sends data by itself. Example: UDAQ sends DI1 1 when input is ON. Match DI1 1 can Start Test. Use debounce 1 for short pulses.'

The configuration form on the right includes the following fields:

- Rule name: [Text input]
- DUT scope: [Dropdown menu, currently set to 'ALL DUTs (Common)']
- DUT: [Dropdown menu]
- Device: [Dropdown menu, currently set to 'POWER SUPPLY']
- Trigger mode: [Dropdown menu, currently set to 'Passive RX']
- Trigger command: [Text input]
- RX trigger text *: [Text input, with a hint: 'Required trigger text, e.g. DI1 1, OK, FAULT']
- Match type: [Dropdown menu, currently set to 'Contains']
- Action: [Dropdown menu, currently set to 'Log Only']
- Reset rule: [Dropdown menu]
- Action device: [Dropdown menu, currently set to 'CAMERA1']
- Saved device action: [Dropdown menu, currently set to 'Custom Command']
- Action channel no: [Text input]
- Action fiber no: [Text input]

At the bottom of the form are four buttons: 'SAVE RULE' (blue), 'TEST READ' (orange), 'DISABLE' (red), and 'CLEAR' (grey).

Figure 4.13 - Rules: RX trigger editor and rule tabs. Reference capture: 07 October 2026.

4.13.1 RX Rules

Convert a matched device receive event into an action.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
DUT scope / DUT	ALL DUTs (Common) or Specific DUT; select the intended fixture when specific.
Device / Trigger mode	Passive RX listens to incoming text; Poll Only reads; Send and Receive sends the configured trigger command then reads.
RX trigger text / Match type	Required text matched by Contains, ExactMatch or Regex.
Action	Start Test, Stop Test, Fail Test, Fail Step, Reject Barcode, Reset Rule, Fail and Reset, Run Device Action, Set Runtime Variable, Reset UI, Block Test, Clear Block, Show Warning, Acknowledge Warning or Log Only.
Reset rule / Action device / Saved device action	Select the saved dependency required by the chosen action.
Variable name / Variable value	For Set Runtime Variable; value may use {RX}, {MATCH}, {DUT} or fixed text.

Procedure

1. Create/select a rule and choose DUT scope, device and trigger mode.
2. Enter required match text and select match type; then choose the action.
3. Fill the action-specific dependencies and operator message. Set timing and safety options.
4. Save and use a controlled receive trial to inspect actual RX and match result.
5. Verify the final intended action in the correct idle/running scope before production use.

Worked example

Start Test with ExactMatch DI 1 should be checked against actual received line text. A substring match can accept additional surrounding text, so choose it only when that is intended.

Expected result

Only matching enabled rules execute the configured action.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cannot save	Check required RX text, specific-DUT selection and action dependencies. Safety Sensor rules also require Safety group.
Never matches	Inspect actual RX, whitespace, match mode, device selection and cooldown.

Related instructions: [4.13.1.1 RX rule safety and debounce/cooldown settings](#).

4.13.1.1 RX rule safety and debounce/cooldown settings

Configure RX safety state and repeated-event timing.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule type	Normal or Safety Sensor. A Safety Sensor needs a named Safety group.
Running safety mode / Idle / complete mode	Follow Action, Hard Stop, Warning Only or Ignore. Choose deliberately for each machine state.
Barcode condition	Requires a barcode before the action when enabled.
Debounce count	Number of qualifying observations required before firing.
Poll interval ms / Timeout ms	Timing for polling/read operations.
Cooldown ms	Minimum suppression interval after firing to avoid repeated action on persistent input.
Priority / Status	Execution priority and enabled state.

Procedure

1. Identify the intended event and its safe response while running and while idle.
2. Set the Safety Sensor group and both state modes when applicable.
3. Choose debounce, interval, timeout and cooldown based on the actual device response timing.
4. Save and verify a nonmatching value, a brief transient and a sustained matching event in a controlled environment.
5. Check that repeated receive messages do not produce unintended repeated state-changing actions.

Worked example

Debounce 2 requires repeated qualifying observations; cooldown 1000 ms limits repeated firing for a persistent event. These are application event controls, not proof of safety-rated hardware performance.

Expected result

The event is handled according to phase, barcode condition and timing.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Event appears ignored	Check Idle / complete mode, barcode requirement, debounce progress and cooldown.
Wrong DUT affected	Review Common versus Specific DUT scope and the selected fixture.

4.13.2 Reset Rules

Build an ordered reset action list.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Step 1 add rule / Step 2 select rule	Create a named reset rule and select it before adding steps.
Step name / Device / Device action	Describe and bind each reset operation.
Command / Channel / Fiber / Relay / Set value	Action-specific command parameters.
Delay before / after ms / Execution order	Control sequence order and settling time.
Device response / Failure behavior / Enabled	Choose required response and whether failure stops the rule.

Procedure

1. Create/select the named rule.
2. Add enabled steps in the intended order using the correct saved device action and fixed parameters.
3. Save each change and review the ordered list.
4. Commission a controlled reset with safe fixture conditions and inspect response/failure behavior.
5. Select this rule in the RX rule or other supported workflow that invokes it.

Worked example

A reset recipe can first disable a power output and then release an approved fixture actuator, using device-specific saved actions and verified delays.

Expected result

The reset follows the saved ordered steps and records failures.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Reset selected but no action	Check the selected rule, enabled steps, device binding and invocation condition.
Output remains active	Read the failed step response and execute only the approved recovery procedure.

4.13.3 Handling Idle

Create a unified Handling Idle setting with mandatory cleanup.

Access and preparation

ADMIN with the page and action permissions required for this operation.

The current editor uses START, REPEAT and END phases in one saved setting. It does not require separate ENTRY/CYCLIC/EXIT sequence and rule saves. Only saved, enabled, production-approved IDLE_SAFE Device Actions are available. Raw commands and UDAQ sequences are unavailable here. An END cleanup step is required.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Setting name / Apply to / Model	Named global or model-scoped idle configuration.
Activate after (sec) / Operator message / Enabled	Idle delay, visible prompt and setting state.
Step name / Run phase / Device / Saved Device Action	Ordered action and its START, REPEAT or END phase.
Delay after (ms) / Stop on failure / Enabled	Step timing and failure behavior.
Read-only command preview / safety approval	Verify the selected saved action rather than editing raw command text here.
Repeat interval (sec) / Maximum repeats	Repeat timing; 0 means unlimited repeats.
ADD / INSERT / UPDATE / DUPLICATE / REMOVE / UP / DOWN	Edit and order the action list.
VALIDATE / SAVE SETTING / DISABLE / NEW	Validate and persist the complete setting through its own save boundary.

Procedure

1. NEW and enter scope, delay and operator message.
2. Add appropriate START and, if needed, REPEAT steps using approved fixed Device Actions.
3. Add END steps that return every affected output to its approved state.
4. Set repeat timing and maximum repeats, then VALIDATE. Resolve approval, scope, phase or cleanup errors.
5. SAVE SETTING. Commission idle entry, repeats, acknowledgement, END cleanup, STOP and failure cases under controlled conditions.
6. Confirm the next START remains blocked until idle cleanup has completed.

Worked example

An approved idle status output is activated in START and cleared in END. A periodic indication belongs in REPEAT only if the saved action and repeat rate are approved for that fixture.

Expected result

Idle work completes its required END cleanup before normal testing resumes.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Action absent from picker	Check saved action enabled state, production approval, IDLE_SAFE classification and selected device.
Validation fails	Review missing END cleanup, conflicting scope, action approval and fixed parameter requirements. Keep the setting disabled until resolved.

4.13.4 Test Complete Rules

Apply an output action after the matching test result.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
When test is / Apply to	Result trigger and applicable run mode.
Test plan / Report model / Test sequence / Target DUT	Select the intended production identity and fixture scope.
Output device / Output action / ON command	Bind the result indication or approved actuator action.
Relay / channel / OFF command / ON duration ms	Pulse/output duration and its return action.
Advanced	Additional scope, fiber/relay/set value, delay, execution order and response settings.

Procedure

1. Create the named result rule and select its result and scope.
2. Choose the output device/action and required ON/OFF behavior.
3. Set duration and response/failure options and save.
4. Use controlled OK and NG results to verify only the intended rule fires and the output returns to its intended state.

Worked example

An NG indication pulse for one fixture should be scoped to that DUT; a station-wide rule could affect all lanes.

Expected result

The completion action matches the selected result and scope, with traceable output behavior.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Output fires for unexpected lane	Check Target DUT, run mode, plan and model scope.
Output remains on	Verify OFF command and duration, then inspect the device response using approved recovery.

4.13.5 GOLDEN SAMPLE RULE

Require known OK and NG master validation.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule name / Test plan / Model / flow	Select the production scope.
GOLDEN OK / OK barcode	Enable and identify the known acceptable master.
GOLDEN NG / NG barcode / Expected NG check	Identify the known failing master; optional expected failure is a Test Name or sequence number.
Retry allowed / Shift / Model / First run triggers	Set retry policy and when validation becomes due.
Fail action / Bypass role / Enabled / Remarks	Choose lock and authorized bypass behavior.

Procedure

1. Identify controlled master samples with unique barcodes and known expected behavior.
2. Configure required OK and/or NG validation and due triggers.
3. Set the expected NG check when a particular failure must be detected. Save the rule.
4. Use the Golden Sample operator workflow to perform the due validation and review its status/history.

Worked example

A known NG master intended to fail "Output Voltage" should specify that expected check; failure on an unrelated missing-device error is not equivalent evidence.

Expected result

Production validation state reflects the known-master results and configured due triggers.

Related instructions: [4.13.5.1 Golden Sample validation status, history and reset/bypass](#).

4.13.5.1 Golden Sample validation status, history and reset/bypass

Review Golden Sample state and use authorized reset or bypass.

Access and preparation

ADMIN with the page and action permissions required for this operation.

A due or failed Golden Sample gate is separate from production counters. Validation history provides the evidence for the latest master run. A bypass is an authorized exception, not a successful master test.

Procedure

1. Select the rule and review status/history and the triggering scope.
2. Compare recorded OK/NG identities and expected NG failure with the master actually used.
3. When a legitimate reset or bypass is required, use the available authorized action and enter a specific audit reason.
4. Verify the new gate state and its history entry. Complete the normal master validation when the condition is resolved.

Worked example

After replacing a fixture, review the master-validation history and revalidate according to the rule rather than treating a prior machine state as proof.

Expected result

Status changes and exceptions remain attributable and distinguishable from passed validation.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Production still blocked	Check due trigger, failed master result, plan/model scope and whether required OK and NG validations are both complete.
Bypass unavailable	The configured bypass role and action permission must be satisfied.

4.13.6 Start Rules

Configure Start hardware conditions.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Start Rules check the configured hardware readiness before testing. NG Bin Rules verify the configured reject-bin condition in their production workflow. These checks use real device communication; a TEST action is not only a text preview.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule name / Test plan / Model / flow	Select the intended scope.
DIO device / Check mode	Choose device and receive-only or TX/RX behavior as offered.
TX message / Expected RX / Match type	Device-specific request and qualifying response.
Operator message / Poll interval / Timeout / Priority / Enabled	Explain the hold and set communication timing and order.

Procedure

1. Create/select the rule and bind the correct plan/model and DIO device.
2. Enter the verified request/response condition and clear operator message.
3. Save and perform a controlled TEST with the machine safe.
4. Check both qualifying and nonqualifying hardware states and the operator hold/recovery behavior.

Worked example

A fixture-ready input must qualify before START; wrong or absent RX should leave the operator with the configured readiness message.

Expected result

The condition is evaluated in the selected scope and failures produce an actionable hold message.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Condition never qualifies	Check actual RX, match type, device connection, selected scope and timeout.
Wrong status clears the hold	Tighten the intended match against verified protocol text; do not use an overly broad substring.

4.13.7 NG Bin Rules

Configure NG Bin hardware conditions.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Start Rules check the configured hardware readiness before testing. NG Bin Rules verify the configured reject-bin condition in their production workflow. These checks use real device communication; a TEST action is not only a text preview.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule name / Test plan / Model / flow	Select the intended scope.
DIO device / Check mode	Choose device and receive-only or TX/RX behavior as offered.
TX message / Expected RX / Match type	Device-specific request and qualifying response.
Operator message / Poll interval / Timeout / Priority / Enabled	Explain the hold and set communication timing and order.
NG Bin wait time	Select the permitted wait interval, such as 10 sec, 20 sec, 1 min, 2 min or 5 min.

Procedure

1. Create/select the rule and bind the correct plan/model and DIO device.
2. Enter the verified request/response condition and clear operator message.
3. Save and perform a controlled TEST with the machine safe.
4. Check both qualifying and nonqualifying hardware states and the operator hold/recovery behavior.

Worked example

After an NG product, the intended bin sensor response must qualify within the configured workflow before the hold clears.

Expected result

The condition is evaluated in the selected scope and failures produce an actionable hold message.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Condition never qualifies	Check actual RX, match type, device connection, selected scope and timeout.
Wrong status clears the hold	Tighten the intended match against verified protocol text; do not use an overly broad substring.

4.14 Printer (License Required)

LICENSE REQUIRED

Printer / Label Printing license for printing operations, label rules and linked print actions. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Open the shared Printer workspace.

Access and preparation

Authorized Printer page/actions require Printer entitlement, including applicable bundle access.

Use the Printer sidebar chapter for printer connection, label design, stored commands and output verification. The Admin navigation entry shares that same workspace.

Procedure

1. Open Printer.
2. Follow the task-specific procedure in its chapter and verify the intended label/printer before sending a test print.

Expected result

Printer settings and actions follow the shared page permissions.

Related instructions: [8 Printer](#).

4.15 Fixture Maint

Track service usage of fixtures and replaceable items.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Fixture Maint separates item configuration, usage/dashboard status and service/reset evidence. A counter reset should correspond to an actual service or replacement event and include its reason.

Procedure

1. Select the item and scope in the dashboard.
2. Review current usage and warning/due state.
3. Record approved service and reset only after the physical work is complete.

Expected result

Usage status and reset history remain traceable.

Related instructions: [4.15.1 Fixture definitions, usage, service limits and records](#).

4.15.1 Fixture definitions, usage, service limits and records

Configure fixture items and record service resets.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Search / Scope / Model / Fixture / Status	Filter GLOBAL or MODEL items and OK, WARNING, DUE or DISABLED status.
Admin Item Master	Edit the selected item's identity, scope and available usage/service limits.
Reset reason / Part serial / lot	Evidence for the service or replacement that justifies reset.
RESET	Administrative reset requiring the configured authorization.

Procedure

1. Create/select the fixture item and set its model/fixture scope and approved warning/service limits.
2. Save and confirm the dashboard shows the correct item and current usage.
3. When due, perform the physical service, enter Reset reason and Part serial / lot where applicable, then use RESET with authorization.
4. Review the resulting status and service history.

Worked example

A replaceable contact set may be reset after physical replacement; record "Contact set replaced" and its generic lot reference rather than clearing the warning without service.

Expected result

Usage and service evidence support maintenance decisions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong item increments	Check GLOBAL/MODEL and fixture binding.
Reset denied	Check administrative authorization; do not change database values to bypass it.

4.16 MES (Confirm License Package)

CONFIRM LICENSE PACKAGE

Confirm the MES / Customer Server entitlement in your supplied package with Raju Bros Softech Pvt Ltd. Data Link integration requires Data Link access. This manual does not claim that every MES settings screen is locked by a separate MES license.

Configure station-level MES validation and output.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

MES contains IP Based MES and File Based MES. Before-test validation, a before-test stage file, after-test IP reporting and after-test file output are separate controls. Decide which are required by the receiving system before enabling them. File output does not itself read an acceptance response from another system. Model-specific barcode MES validation and previous-station interlocking are separate settings in Model Setting.

Procedure

1. Obtain the approved data contract: when data is required, transport/path, fields, accepted response and failure handling.
2. Configure the appropriate IP and/or file stages with generic test data first.
3. Check previews and save each independent profile/token/general MES change.
4. Use approved communication or file trials and verify the receiving evidence before production.

Expected result

Every enabled stage has a defined input, output and acceptance condition.

Related instructions: [4.16.1 IP Based MES](#); [4.16.2 File Based MES](#); [5.4 MES VALIDATION](#); [5.5 INTERLOCKING](#).

Screen reference

The screenshot displays the 'MES' configuration window with the 'IP Based MES' tab selected. The 'Legacy V1' stage is configured with the following settings:

- Mode:** ☐ Enable port based MES validation before test
- Protocol:** TCP Raw
- Validation mode:** All Barcodes In One Request
- HTTP URL:** (Empty field)
- HTTP method:** POST
- Content type:** application/json
- MES server IP:** (Empty field)
- MES server port:** (Empty field)
- Payload TX format:** [BARCODE]
- Accepted responses:** OK,PASS,TRUE,1
- Response timeout ms:** 3000
- Preview body:**

```
TCP <MES IP>-<PORT>
Raw TX payload:
[BARCODE]
```

Advanced server requests and response mapping are available in Test Sequence > Data Link (separate license).

Figure 4.16 - MES: request and response configuration. Reference capture: 07 October 2026.

4.16.1 IP Based MES

Configure automatic IP-based MES stages.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

The visible station-level engine is Legacy V1. Its Before Testing stage can validate readiness; After Testing sends the resulting data. Advanced requests and response mapping are performed through Test Sequence > Data Link, which requires its own entitlement.

Procedure

1. Choose the Before Testing and After Testing stages required by the process.
2. Configure each stage's protocol, destination, payload and accepted responses.
3. Review Preview body, SAVE MES SETTING and use an approved manual trial for the Before Testing endpoint.

Expected result

Each enabled IP stage uses its own saved endpoint/payload settings.

Related instructions: [4.16.1.3 Legacy V1 TCP Raw and HTTP REST JSON setup](#); [4.16.1.4 Reliable V2 migration to sequence Data Link](#).

4.16.1.1 Legacy V1 configuration and migration of saved V2 settings to Data Link

Understand Legacy V1 and previously saved advanced MES configuration.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

The current UI displays Legacy V1 rather than an engine selector. Previously saved Reliable V2 endpoint definitions are retained for migration/import; they are not a selectable automatic engine on this page. When the migration notice is shown, review the IP MES settings and SAVE MES SETTING before production. Data Link executes only when explicit sequence steps invoke it.

Procedure

1. Read the IP engine status message.
2. Review intended automatic Legacy V1 before/after settings.
3. If advanced saved endpoints are needed, migrate them through Data Link and validate the resulting sequence steps.
4. Save the station MES settings after review.

Expected result

There is one deliberate automatic IP policy and separately placed Data Link operations, avoiding accidental duplicate submission.

Related instructions: [4.16.1.4 Reliable V2 migration to sequence Data Link](#).

4.16.1.2 Before/after testing, responses and communication trials

Preview and trial the Before Testing IP transaction.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Trial machine ID / product ID / barcode	Nonsensitive example values substituted into the trial payload.
Manual trial payload / USE SAVED	Edit the trial body or copy the configured Before Testing template.
REFRESH PREVIEW / Manual trial TX preview	Inspect substituted text before sending.
SEND MES TRIAL / RX response	Perform a real network transaction and inspect the reply.
COPY TX	Copy the displayed TX text only after checking it contains no confidential values.

Procedure

1. Save/review the intended Before Testing endpoint and response rule.
2. Enter approved trial identities. USE SAVED or edit the manual payload.
3. REFRESH PREVIEW and verify the exact body.
4. SEND MES TRIAL only to the approved test endpoint, then inspect RX and status.
5. Test an accepted and rejected reply through the receiving system's agreed trial procedure. Validate After Testing separately with a controlled completed test.

Worked example

Trial product DEMO_MODEL and barcode DEMO001 can resolve {PRODUCT_ID} and {BARCODE}. A passing manual Before trial does not prove the separate After endpoint works.

Expected result

The trial records actual TX/RX and acceptance status without being mistaken for a hardware test.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
RX received but trial fails	Check Accepted responses and the actual reply format.
No RX	Check protocol, endpoint, timeout and receiving service availability.

4.16.1.3 Legacy V1 TCP Raw and HTTP REST JSON setup

Set up TCP Raw or HTTP REST JSON for Legacy V1.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Mode	Enable the intended Before or After stage independently.
Protocol	TCP Raw sends text to MES server IP/port; HTTP REST JSON uses HTTP URL and method.
HTTP method / Content type	POST, GET or PUT as supported by the receiving contract; use its required content type.
Payload TX format	Text with supported tokens such as {BARCODE}, {MODEL}, {MACHINE}, {STATION}, {LINE}, {PID}, {OPERATOR}, {DATETIME}, {DATETIME_MS} or formatted date/time.
Accepted responses	Match the receiving contract. A JSON field rule can be allowed_to_proceed=true. ANY accepts any nonempty RX and should be used only when that is the intended contract.
Response timeout ms	Maximum configured wait for the transaction response.
Validation mode	Before Testing validation timing; coordinate it with model barcode MES policy.

Procedure

1. Select the protocol for the stage and fill its applicable destination fields.
2. Write the payload using only verified supported tokens. A JSON body must remain valid JSON after substitutions; inspect Preview body.
3. Define the exact accepted response and timeout.
4. SAVE MES SETTING. Trial the Before stage using controlled identities, then verify the separate After stage during a controlled result.

Worked example

Illustrative HTTP body: {"barcode":"{BARCODE}","model":"{MODEL}"}. With DEMO001/DEMO_MODEL, preview should contain those literal values. Accepted responses allowed_to_proceed=true accepts the matching JSON field; a false value must reject. ANY would also accept a nonempty rejection message, so it is unsuitable for this decision.

Expected result

The endpoint and reply rule agree with the receiving contract.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong transport used	TCP IP/port and HTTP URL are separate; check Protocol.
Unexpected acceptance	Remove an overbroad ANY rule when the server has meaningful reject responses.
Malformed JSON	Check substituted data and escaping; a template preview is not a server-side schema check.

4.16.1.4 Reliable V2 migration to sequence Data Link (License Required)

LICENSE REQUIRED

Data Link license for its profiles, sequences, assignments and execution. Confirm this feature separately when planning MES or customer-server integration through Data Link. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Migrate retained Reliable V2 endpoints to explicit Data Link steps.

Access and preparation

ADMIN with MES and Test Sequence permissions plus Data Link entitlement, including applicable bundle access.

A migration notice means retained advanced endpoint settings need review. Data Link (License Required) has its own endpoint/request, response mapping and sequence placement. Importing a saved endpoint does not by itself insert or execute the correct sequence operation.

Procedure

1. Record the intended transaction stages and check whether automatic Legacy V1 stages should remain enabled.
2. Open Test Sequence > Data Link with its entitlement and use the supported retained-endpoint import workflow.
3. Review imported destination, payload, reply mapping and protected credential configuration in the authorized UI.
4. Insert the intended explicit request steps at the correct points in the test flow. Validate with the approved endpoint.
5. Review and SAVE MES SETTING, ensuring the same business transaction is not submitted twice by automatic and sequence paths.

Expected result

Advanced transactions occur only at the reviewed sequence locations.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Imported endpoint never runs	Check that an enabled sequence step references it and that flow execution reaches that step.
Two submissions	Review automatic Legacy V1 stages and explicit Data Link steps for overlap.

Related instructions: [4.1 Test Sequence](#).

4.16.2 File Based MES

Configure file-based MES from timing to verified output.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

File Based MES writes UTF-8 text to a resolved path. Before Testing and After Testing have separate enablement, roots, folders, filenames, output modes and columns. The writer appends records; a repeated filename does not overwrite the previous record. CSV Columns uses a header/column contract, while Custom Template uses token-expanded text.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Before Testing	Writes a pre-test stage record before measurements; this is output, not an incoming MES acceptance-file reader. To identify this stage as START, configure an explicit STAGE field or literal text as described in the Before Testing guide.
After Testing	Writes completed-result data and can create a separate output per barcode.
Model CSV Profile Editor	Structured After Testing CSV columns with model/default precedence.
Token Settings	Saved custom tokens for template/path contexts.
SAVE MES SETTING	Saves general stage configuration, distinct from profile SAVE and SAVE TOKENS.

Procedure

1. Decide which stage(s) the receiver needs and agree the exact directory/filename/content contract.
2. Configure one stage with generic sample values and inspect File preview and Content preview.
3. If After CSV needs mapped measurements, save the appropriate structured profile. If custom tokens are needed, save them separately.
4. SAVE MES SETTING. Verify an approved controlled run against the actual created files and MES debug evidence.
5. Repeat one write to verify intended append/header behavior and test an unavailable destination before production approval.

Expected result

The receiving system obtains files with the intended timing, path and content.

Related instructions: [4.16.2.9 Before Testing START file output](#); [4.16.2.10 After Testing output and one-file-per-barcode behavior](#); [4.16.2.2 Folder presets, filename tokens and Single/Daily/Monthly periods](#); [4.16.2.6 Model CSV Profile Editor and source mapping](#); [4.16.2.12 Complete File MES worked examples](#); [4.16.2.11 Required values, append behavior and failed writes](#).

4.16.2.1 Paths, templates, profiles, tokens and validation

Keep file naming, content mapping and save boundaries aligned.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

A file can be created at the expected location yet contain the wrong columns. Verify path and content independently. The After Testing structured profile can override the simple CSV columns and fallback mapping. Before Testing does not use that structured profile, so its own column/mapping fields must be configured.

Procedure

1. Check stage enablement and root/base folders.
2. Check filename extension and period behavior in File preview.
3. Check the active profile or fallback column contract in Content preview.
4. Save profile/token edits separately, then SAVE MES SETTING.
5. Inspect a real controlled output with the receiver's parser.

Worked example

Adding VOLTAGE to the simple After CSV columns does not change a saved structured model profile that still defines BARCODE,RESULT only. Edit/save the selected structured profile.

Expected result

The saved active mapping, not merely the visible fallback text, determines CSV output.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Column edit has no effect	Check for a structured model or default profile and the precedence rules.
Before file lacks measurements	Before-stage output runs before measurement rows exist. Configure STAGE=TEXT:START when a CSV stage marker is required; RESULT does not output START.

Related instructions: [4.16.2.8 Advanced fallback mapping and profile precedence](#); [4.16.2.6 Model CSV Profile Editor and source mapping](#); [4.16.2.7 Profile actions, COPY DEF and save boundaries](#).

4.16.2.2 Folder presets, filename tokens and Single/Daily/Monthly periods

Predict folder, period and filename resolution.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Base folders	Optionally append the application product folder and report-model folder below the root.
Folder preset / Folder template	Presets populate a tokenized subfolder expression such as {yyyy}\{MM}\{dd}\{RESULT}.
CSV file period	Used when File name template is blank: Single has no date suffix, Daily uses yyyy-MM-dd, Monthly uses yyyy-MM. Single still appends; it does not mean one file per test.
File name template	An explicit template overrides period-based naming. If it has no extension, .csv is appended; a supplied .txt extension is retained even for custom output.
Date tokens	{MM} is month, {mm} minutes; preserve case. {MMMM} or {MONTH_FULL} expands the full month name.

Procedure

1. Choose the root and base folders.
2. Set folder template and either leave the filename blank for period naming or provide an explicit name.
3. Inspect File preview for both an OK and NG result where applicable.
4. Save and verify the actual path created by a controlled result.

Worked example

With root D:\MesDemo, both base folders disabled and no extra folder, blank filename for DEMO_MODEL gives Single: DEMO_MODEL.csv; Daily on 9 October: DEMO_MODEL_2026-10-09.csv; Monthly: DEMO_MODEL_2026-10.csv. Template {BARCODE}_{yyyy}{MM}{dd}_{HH}{mm}{ss}_{RESULT}.txt at 14:05:06 gives DEMO001_20261009_140506_OK.txt.

Expected result

Directory and filename are predictable, with invalid filename characters sanitized by the application.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Changing period has no effect	An explicit File name template overrides period naming.
Month/minute values wrong	Check token case: MM and mm have different meanings.
Unexpected .csv extension	Supply the intended extension explicitly for custom text.

4.16.2.3 CSV columns, ordering, quoting and headers

Define ordered CSV columns and verify escaping.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

CSV Columns writes a header when enabled and the file is new or empty, then appends one result row per target. It does not insert a fresh header for every result. Column order comes from the active structured profile or the configured fallback columns. Changing a schema while appending to an existing file does not rewrite its old header.

CSV formula protection prefixes text starting with formula-like characters, including a minus sign, with an apostrophe. For example, a negative reading -1 is written as '-1. Confirm that the receiving MES accepts this text representation before using negative-value columns.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
System columns	BARCODE, numbered BARCODE1-BARCODE9 slots, MODEL, LOGICALMODEL, FIXTURE/DUT, RESULT, DATETIME, DATE, TIME, OPERATOR, MACHINE, STATION, LINE, STEPCOUNT and FAILCOUNT are supported contexts.
Measurement columns	Map a clear column name to STEP: followed by the actual result Test Name.
CSV quoting	Values containing comma, quote or newline are quoted; embedded quotes are doubled. Formula-like values are prefixed with an apostrophe for spreadsheet safety.
Write CSV header when file is created	Header is emitted only on new/empty files.

Procedure

1. Agree the receiving column order and names.
2. Set the active profile/fallback columns and mappings, then choose header policy.
3. Use a new test file and inspect its first two lines.
4. Write again and verify one header with two data rows.
5. When schema changes, coordinate a new filename or period file with the receiver instead of appending a new shape below an old header.

Worked example

Columns BARCODE,DATE,TIME,VOLTAGE,RESULT and mapping VOLTAGE=STEP:Output Voltage can produce header BARCODE,DATE,TIME,VOLTAGE,RESULT and row DEMO001,2026-10-09,14:05:06,5.02,OK. A text value Line A, Bench 2 is emitted as "Line A, Bench 2".

Expected result

The receiver sees the agreed order and correctly escaped values.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Header and rows disagree	Check whether the filename was reused after a schema change.
Measurement blank	Use the actual Test Name and ensure that result exists for this completed test.

4.16.2.4 Custom Template output and content preview

Create a token-expanded text file.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Output format	Choose Custom Template rather than CSV Columns.
Template preset / Custom template	Select a starting pattern and edit the actual content.
Template check / Content preview	Inspect unresolved or unexpected values before a real write.
File name template	Set an explicit extension such as .txt for custom text.

Procedure

1. Choose Custom Template and enter the agreed text layout.
2. Use supported built-ins or saved custom tokens. For measured data use {STEP:Output Voltage} with the actual step name.
3. Set the filename extension, inspect Template check and Content preview, then SAVE MES SETTING.
4. Verify the created text with the receiving parser. Repeated writes append; the writer adds a terminating newline when the content lacks one.

Worked example

Template: BARCODE={CURRENT_BARCODE}

MODEL={MODEL}

RESULT={RESULT}

VOLTAGE={STEP:Output Voltage}. A completed DEMO001 run can resolve to BARCODE=DEMO001, MODEL=DEMO_MODEL, RESULT=OK and VOLTAGE=5.02 on separate lines. Enter real line breaks in the editor.

Expected result

The output contains the intended resolved text and line structure.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Blank template value	Check stage context, token spelling, saved token scope and step result availability.
Repeated records in a supposed single-result file	The writer appends. Include suitable unique barcode/date-time tokens if the receiver requires separate result files.

4.16.2.5 Custom token creation and scope

Define reusable custom template tokens.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Enabled / Kind / Token / Sample	Enable a custom definition, identify its name and inspect its sample. Built-in rows are read-only. Use {TOKEN} in templates.
Source Type	Constant, System Token, Barcode Regex or Date/Time.
Source Value	Literal constant, a built-in token name such as CURRENT_BARCODE, or barcode source such as Barcode1.
Regex Pattern / Group	Pattern and capture group for Barcode Regex; group 1 is the first capture, group 0 the full match.
Date/Time Format	Formatting expression for a date/time token.
Scope / Model	Global or a particular model; an applicable model definition overrides the same global token.
Remarks / SAVE TOKENS	Describe and save definitions separately from stage settings.

Procedure

1. Add a custom token with a unique name that does not replace a built-in.
2. Choose source and fill its relevant fields. For model scope choose the intended model.
3. Inspect the Sample with generic barcode data and SAVE TOKENS.
4. Use the token in a folder, filename or Custom Template and verify the resolved preview and actual controlled output.

Worked example

Token LOT_CODE: Source Type=Barcode Regex, Source Value=Barcode1, Regex Pattern=^[A-Z]{3}-([0-9]{4})\$, Group=1. Barcode ABC-0123 gives {LOT_CODE}=ABC. Group=2 gives 0123. A separate Constant token LINE_TAG can contain DEMO_LINE.

Expected result

Applicable saved custom tokens resolve in template/path contexts. This token mechanism is separate from CSV profile Source Value mapping.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Regex token blank	Check source barcode, full pattern match and capture group.
Wrong model value	Check Global/Model scope and duplicate definitions.
Cannot edit a system token	Built-ins are read-only; add a differently named custom token.

4.16.2.6 Model CSV Profile Editor and source mapping

Map model CSV columns to their data sources.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Profile model	Choose the product/flow profile or (DEFAULT). Runtime selects logical-model profile first, report-model profile second and default profile last.
Profile source / SYNC FLOW	Show/link the currently open or saved Test Sequence flow so available measurement names correspond to that flow.
Order / UP / DOWN	Output column order.
CSV Column Name	Header name expected by the receiver.
Source Type	System, Model, Barcode, Result, Date/Time, Test Step, Variable, Fixed Text or Operator.
Source Value	Actual system item, barcode slot, exact Test Name/alias or literal text, according to Source Type.
Format	Date/Time uses this as its output format. Do not assume the numeric-looking format cell reformats a returned measurement string in this CSV writer.
Req	Rejects a CSV target write if this column resolves blank.
Sample Value / Profile preview	Preview values; they do not prove a completed hardware measurement exists.

Procedure

1. Open/save the intended Test Sequence flow. In MES, select Profile model and SYNC FLOW if appropriate.
2. ADD COL or a quick ADD VOLT/ADD CURR/ADD POWER/ADD RESULT and choose each source.
3. For a voltage column, choose Test Step and the actual saved Test Name. Set Req only when every eligible completed run can supply that value.
4. Reorder columns with UP/DOWN and review the header/sample preview.
5. Use profile SAVE, then verify an actual controlled result with this model.

Worked example

CSV Column Name=VOLTAGE, Source Type=Test Step, Source Value=Output Voltage, Req=checked maps that test's VALUE RECEIVED to VOLTAGE. If the step never ran, the target CSV write fails rather than silently supplying an empty required value.

Expected result

A saved structured profile produces the receiver's ordered schema from explicit data sources.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Flow selector has no context	Open or save the flow first, then SYNC FLOW.
Unexpected profile used	Check logical model versus report model and the saved default profile.
Measurement format differs from preview	This writer returns the result string; validate it directly and do not assume a numeric Format cell performs conversion.

4.16.2.7 Profile actions, COPY DEF and save boundaries

Save and reuse CSV profiles without losing edits.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
DEFAULT	Select the default profile for editing.
COPY DEF	Replace the current selected model grid with columns from the saved default; it is not an automatic live inheritance link.
ADD VOLT / ADD CURR / ADD POWER / ADD RESULT / ADD COL	Add convenient starting columns; inspect their Source Value before saving.
DELETE / UP / DOWN	Remove or reorder selected columns.
SAVE	Persist the currently selected profile independently from SAVE MES SETTING.

Procedure

1. Choose the intended model or DEFAULT before editing.
2. For a new model schema, COPY DEF only when replacement of the current grid is intended. The default must already contain saved columns.
3. Change sources/order/required flags and inspect preview.
4. Press profile SAVE. Separately SAVE MES SETTING for stage/path/format edits and SAVE TOKENS for token edits.
5. After changing a flow's step names, revisit its profile and verify every measurement mapping.

Worked example

Copy the saved default BARCODE,RESULT profile into DEMO_MODEL, add VOLTAGE and save DEMO_MODEL. A later edit to the default does not automatically rewrite that model's saved copy.

Expected result

Each profile has a deliberate saved schema.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
COPY DEF has no columns	Save a nonempty default first.
Edits vanished after changing model	Save the selected profile before changing selection.
General save did not change CSV schema	Use the profile SAVE action.

4.16.2.8 Advanced fallback mapping and profile precedence

Understand structured-profile and fallback precedence.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

After Testing first looks for a nonempty structured profile: logical model, then report model, then default. Only when no structured columns are found does it use CSV columns and Advanced fallback mapping. Before Testing always uses its own columns/mapping and bypasses structured After profiles.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Global mapping lines	Apply before any model-specific override.
[DEFAULT] / [GLOBAL]	Default fallback blocks; later applicable values merge over global mappings.
[MODEL:name]	Model-specific fallback block. Matching logical-model block is considered before report-model block.
[REPORTMODEL:name]	Report-model fallback considered after the MODEL candidates.
COLUMNS=...	Column list for the selected block.
STEP: / SYSTEM: / TEXT: / DATEFORMAT: / VARIABLE:	Supported mapping prefixes. VARIABLE resolves a result step/alias in this writer; it is not an arbitrary live variable lookup.

Procedure

1. Check and document whether a structured profile is active.
2. If using fallback, enter global mappings and explicit model blocks without conflicting duplicate definitions.
3. Use actual Test Names for STEP mappings and inspect a controlled file for each relevant logical/report model.
4. Save the Before or After settings through SAVE MES SETTING.

Worked example

Fallback text:

COLUMNS=BARCODE,RESULT

[MODEL:DEMO_MODEL]

COLUMNS=BARCODE,VOLTAGE,RESULT

VOLTAGE=STEP:Output Voltage

This produces the three-column schema only when that fallback block is selected and no structured profile supersedes it.

Expected result

The selected contract is predictable and avoids hidden schema overrides.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Fallback edits ignored	A nonempty structured profile may be selected, including (DEFAULT).
Wrong measured value	Use an unambiguous exact Test Name; alias/fuzzy matching can otherwise select an unintended similar result.

4.16.2.9 Before Testing START file output

Write a Before Testing record with an explicit stage marker.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Before Testing runs before measurement rows exist and does not use the After Testing structured model profile. Configure its own CSV columns and Advanced mapping, or its own Custom template.

The current writer passes an internal START value through the same result formatter used for completed tests. Consequently, an unmapped RESULT column or a {RESULT} token in Before content, folders or filenames resolves to NG with OK / NG result text, or FAIL with PASS / FAIL result text. This is a formatting behavior at the pre-test stage; it is not a completed test verdict. Use a dedicated STAGE column mapped to TEXT:START, or write START literally in a custom template or filename when the receiving contract requires that stage marker.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Mode	Enable the Before Testing file writer independently of IP validation and After output.
MES log root path / Base folders	Output root and optional product/model directories.
Folder template / CSV file period / File name template	Resolve the Before-stage file location. Blank filename uses period naming. Use literal START for a stage suffix, for example {BARCODE}_START.csv; {RESULT} follows the formatter behavior described above.
Output format / Custom template	Choose CSV Columns or Custom Template.
CSV columns / Advanced mapping / Header	Before-stage fields; After structured model profiles are not used here. For a START marker, add STAGE to CSV columns and STAGE=TEXT:START to Advanced mapping.
File preview / Content preview	Check resolved examples before saving.

Procedure

1. Enable Before Testing Mode and choose a writable test root.
2. Choose base folders, folder template and file naming.
3. For a Before CSV, use BARCODE,MODEL,STAGE,DATETIME; set Advanced mapping to STAGE=TEXT:START; enable Header if the receiver expects it. For Custom Template, enter STAGE=START literally. Do not require test-step measurements or use an unmapped RESULT field as a START marker.

- Inspect previews, then SAVE MES SETTING.
- Run an approved start and verify the file is saved before hardware testing proceeds. If the configured Before write fails, investigate the blocked start.

Worked example

Illustrative Before CSV: set columns BARCODE,MODEL,STAGE,DATETIME; set Advanced mapping to STAGE=TEXT:START; enable Header. For barcode DEMO001 and model DEMO_MODEL at 2026-10-09 14:05:06, the output is:

```
BARCODE,MODEL,STAGE,DATETIME
```

```
DEMO001,DEMO_MODEL,START,2026-10-09 14:05:06
```

There are no completed measurement rows at this stage. For Custom Template, a literal line STAGE=START provides the equivalent stage marker.

Expected result

The required Before output is saved and its path is logged before normal testing proceeds.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Before file not saved; start blocked	Check root access, locked file, template, path and MES failure evidence.
STEP value blank	Before Testing uses an empty result table; move measured-value output to After Testing.
Before RESULT shows NG or FAIL before testing	The current result formatter treats internal START as non-passing. Use a separate STAGE field mapped to TEXT:START, or literal STAGE=START in Custom Template. Reserve completed-result interpretation for After Testing.

Related instructions: [4.16.2.12 Complete File MES worked examples](#); [4.16.2.7 Profile actions, COPY DEF and save boundaries](#).

4.16.2.10 After Testing output and one-file-per-barcode behavior

Write completed results, including one output per barcode.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

Per-barcode output uses distinct nonempty barcode values, ignoring case for duplicate target values. The current File MES normalization handles numbered slots 1-9; do not assume slot 10 is included merely because the Model editor exposes ten slots. Verify that requirement separately before commissioning a ten-slot integration.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
After Testing Mode	Enable completed-result file output.
Output mode / one file per barcode	Off writes the combined/main-barcode target; on creates targets for the available captured barcodes.
Result text	OK / NG or PASS / FAIL.
Model / logical model / fixture values	MODEL identifies the report model; LOGICALMODEL distinguishes the reusable flow identity when supplied; FIXTURE/DUT identifies the fixture position.

Procedure

1. Enable After Testing and choose combined or per-barcode mode.
2. Choose Result text and content columns/template.
3. Use {CURRENT_BARCODE} or {BARCODE} in the file name for an explicit per-target identity. Numbered barcode tokens remain the captured slot values.
4. Save the configuration and complete a controlled multi-barcode run.
5. Compare the number of created targets and their current-barcode values with the captured barcode set.

Worked example

With captured B1=DEMO001 and B2=COMP001 and filename {CURRENT_BARCODE}_{RESULT}.csv, an OK result produces DEMO001_OK.csv and COMP001_OK.csv. BARCODE in each target is that target; BARCODE1 remains DEMO001. If no current-barcode token appears in the folder/name, the writer adds a barcode suffix to prevent one shared filename. Numbered tokens such as {BARCODE1} do not suppress this automatic current-barcode suffix.

Expected result

Each intended target receives the result data; repeated target names append records.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Only one combined file	Check Output mode and captured barcode slots.
Filename points to the wrong identity	Distinguish current target barcode from numbered slot tokens and report model from logical flow.

4.16.2.11 Required values, append behavior and failed writes

Verify append, required values and failure evidence.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

The file writer creates directories and appends content. It does not overwrite an existing file or prove that a separate MES consumer read it. For structured CSV, a blank Req column causes that target write to fail before its header/data is appended. A directory or older file may still exist, so file existence alone is insufficient evidence.

Procedure

1. Write two controlled records to the same test filename and check row count/header behavior.
2. Create an approved negative mapping case where a required step is absent and verify the MES error and lack of a new CSV row.
3. Review the timestamped MES/debug entry and actual target path for each result.
4. Correct permission, lock, capacity or mapping problems before resuming production. For Before Testing, a failed required write blocks start.
5. For After Testing, investigate explicit write failure evidence; do not assume the Report Pending recovery mechanism automatically covers a separately configured File MES output.

Worked example

An existing daily file has a header and 20 rows. A required VOLTAGE value is blank on the next result: the old file can still exist with 20 rows, but the new MES record was not successfully written.

Expected result

Success is established by the new intended content and logged target, not only a pre-existing file.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Access denied / locked file	Release the conflicting reader/editor or correct the intended account permissions.
Required column blank	Check actual completed Test Name and source context; do not clear Req merely to hide a missing required measurement.
Duplicate rows	Repeated writes append. Coordinate unique result identity and deduplication with the receiving contract.

4.16.2.12 Complete File MES worked examples

Commission complete File MES examples with generic data.

Access and preparation

ADMIN with MES view/edit permission; live communication trials additionally require the applicable run permission and an approved test endpoint.

All paths and identities here are illustrative. Choose an approved trial directory and receiving contract. Use the saved runtime values to verify the actual output; preview data alone is not a completed test.

Procedure

1. Daily CSV: enable After Testing; root D:\MesDemo; disable product/model base folders; no extra folder; period Daily; blank filename; CSV Columns; header enabled; Result text OK / NG. Save a DEMO_MODEL structured profile with BARCODE (Barcode/BARCODE), DATE (Date/Time/DATE), TIME (Date/Time/TIME), VOLTAGE (Test Step/Output Voltage, required), RESULT (Result/RESULT). Save the profile and MES settings.
2. Complete a controlled result with DEMO001, actual Output Voltage 5.02 and OK at 2026-10-09 14:05:06. Verify DEMO_MODEL_2026-10-09.csv contains header BARCODE,DATE,TIME,VOLTAGE,RESULT and data DEMO001,2026-10-09,14:05:06,5.02,OK. A second result appends a second row without another header.
3. Per-barcode CSV: enable per-barcode output and set filename {CURRENT_BARCODE}_{yyyy}{MM}{dd}_{HH}{mm}{ss}_{RESULT}.csv. With B1=DEMO001/B2=COMP001, verify separate target names and each target BARCODE value.
4. Custom text: choose Custom Template, filename {BARCODE}_{RESULT}.txt and content BARCODE={BARCODE} followed by a real newline and RESULT={RESULT}. Verify DEMO001_OK.txt contains the two resolved lines.
5. Regex token: save LOT_CODE from Barcode1 using ^([A-Z]{3})-([0-9]{4})\$ group 1, then use {LOT_CODE}_{BARCODE}.txt. With ABC-0123, verify ABC_ABC-0123.txt.
6. Before stage: configure the separate Before stage with CSV columns BARCODE,MODEL,STAGE,DATETIME, Advanced mapping STAGE=TEXT:START and Header enabled. Verify the literal START stage marker before testing; do not expect VOLTAGE until After Testing. An unmapped RESULT column or {RESULT} token resolves to NG or FAIL at this stage; for Custom Template use literal STAGE=START instead.

Worked example

Daily CSV successful content:

BARCODE,DATE,TIME,VOLTAGE,RESULT

DEMO001,2026-10-09,14:05:06,5.02,OK

Custom text successful content:

BARCODE=DEMO001

RESULT=OK

Before-stage CSV with STAGE=TEXT:START:

BARCODE,MODEL,STAGE,DATETIME

DEMO001,DEMO_MODEL,START,2026-10-09 14:05:06

Expected result

The same configuration can be explained from input identities through resolved name and content, including the correct stage and mapping source.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Example path differs	Check base-folder switches, explicit filename, report model and date/time tokens.
Sample measurement blank	Use the actual completed flow Test Name and save the profile for the model selected at runtime.

Related instructions: [4.16.2.8 Advanced fallback mapping and profile precedence](#); [4.16.2.2 Folder presets, filename tokens and Single/Daily/Monthly periods](#); [4.16.2.6 Model CSV Profile Editor and source mapping](#); [4.16.2.11 Required values, append behavior and failed writes](#); [4.16.2.9 Before Testing START file output](#).

4.17 Backup

Protect the database with verified backups.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Backup provides settings, manual backup, history verification, restore and compaction. A backup of SQLite does not automatically establish a complete archive of customer firmware and other external files; retain those through the organization's approved file-backup process.

Procedure

1. Configure and save the backup destination.
2. Create a manual backup before major configuration changes.
3. Verify the selected history file and retain it in an appropriate recovery location.

Expected result

A timestamped, verifiable backup protects the database state.

Related instructions: [4.17.1 Manual backup, automatic backup and destination](#); [4.17.2 Backup verification, recovery and database optimization](#).

Screen reference

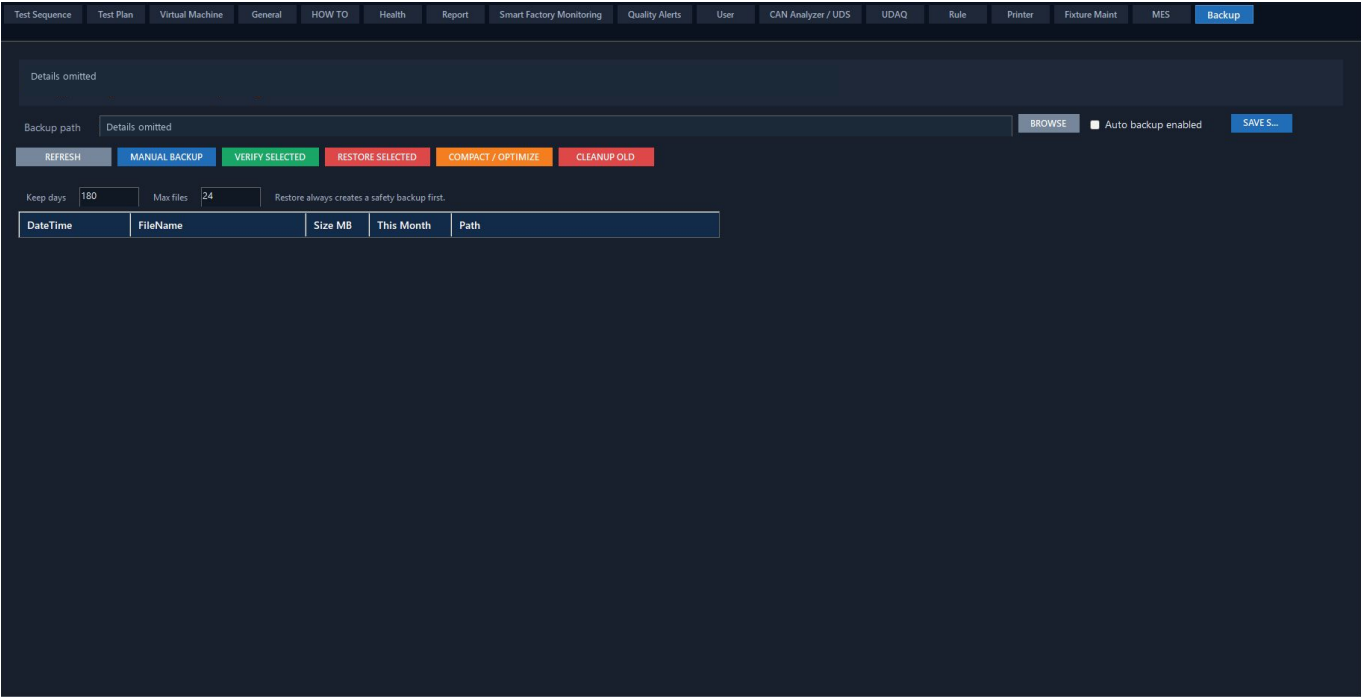


Figure 4.17 - Backup: create, verify and controlled restore. Reference capture: 07 October 2026.

4.17.1 Manual backup, automatic backup and destination

Set the destination and create a manual backup.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Backup path / BROWSE	Select a writable location with sufficient free space.
Auto backup enabled	Enable the application backup policy shown in the panel.
SAVE SETTING	Persist path and automatic setting.
MANUAL BACKUP	Create a backup now.
Status / History	Review path readiness, current-month backup, database size, backup count and latest backup.

Procedure

1. Choose the backup path and automatic option. SAVE SETTING.
2. Check PATH READY and available space.
3. Use MANUAL BACKUP and wait for the completed path.
4. Use REFRESH and verify that exact new backup. Keep recovery copies beyond a single failing disk.

Worked example

Before changing a large flow, create and verify a timestamped database backup, then retain the firmware files referenced by that flow separately.

Expected result

History records the new backup and its location.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Backup fails	Check path access, free space, file locks and database error details. Do not treat a partially created file as verified.

Related instructions: [4.17.2 Backup verification, recovery and database optimization](#).

4.17.2 Backup verification, recovery and database optimization

Verify, restore and optimize using explicit recovery actions.

Access and preparation

ADMIN with the page and action permissions required for this operation.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
VERIFY SELECTED	Read integrity/quick-check result, file size and path.
RESTORE SELECTED	Requires import permission, verifies the file and creates a safety backup of the current database before restoring.
COMPACT / OPTIMIZE	Creates a backup first and reports before/after size and elapsed time. Use only when production is idle.
Keep days / Max files / CLEANUP OLD	Explicit cleanup removes matching RB_TEST_SUITE_*.db backups older than Keep days and also removes newer matching backups beyond Max files, keeping the newest within that count. Both limits apply; a recent file can be removed when the count is exceeded. Review required recovery copies before confirming. The live database is excluded.

Procedure

1. Select the intended history file and click VERIFY SELECTED. Stop if verification fails.
2. For a planned restore, finish production, confirm the selected backup identity and read the restore confirmation. Preserve the current safety backup.
3. Click RESTORE SELECTED only for the intended file. Reopen the application if pages show stale state and check models, devices, settings and relevant history.
4. For space maintenance, run COMPACT / OPTIMIZE while idle and wait for completion.
5. Before CLEANUP OLD, review both Keep days and Max files and preserve required recovery copies outside the cleanup set. Confirm only when the deletion policy is intended.

Worked example

Restore an earlier verified configuration after a controlled setup error, then validate that referenced external files and devices still correspond to that configuration.

Expected result

Restore uses a verified file and retains a safety backup; optimization reports its own result.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Restore blocked	Inspect backup verification and action permission.
Application page appears stale	Reopen after restore and verify the restored records.
Database did not shrink much	Compaction can only reclaim available space; inspect before/after evidence rather than assuming a fixed reduction.

5 Model Setting

Define product identity and barcode acceptance.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Model Setting defines the model and its barcode capture/validation rules. Test Sequence defines hardware steps; Test Plan maps product models to those reusable flows. Model properties, barcode rules and interlocks have three separate save actions.

Procedure

- 1. Create/save the model and required barcode count.
- 2. Save one barcode rule for every required slot.
- 3. Configure model/barcode MES policy and saved interlocks where required.
- 4. Use local rule previews and separate interlock trials, then validate the complete Operator path.

Expected result

The selected model has a complete, testable barcode contract.

Related instructions: [5.2 Model properties and required barcode count](#); [5.3 BARCODE RULES](#); [5.5 INTERLOCKING](#); [7 Test Plan](#).

Screen reference

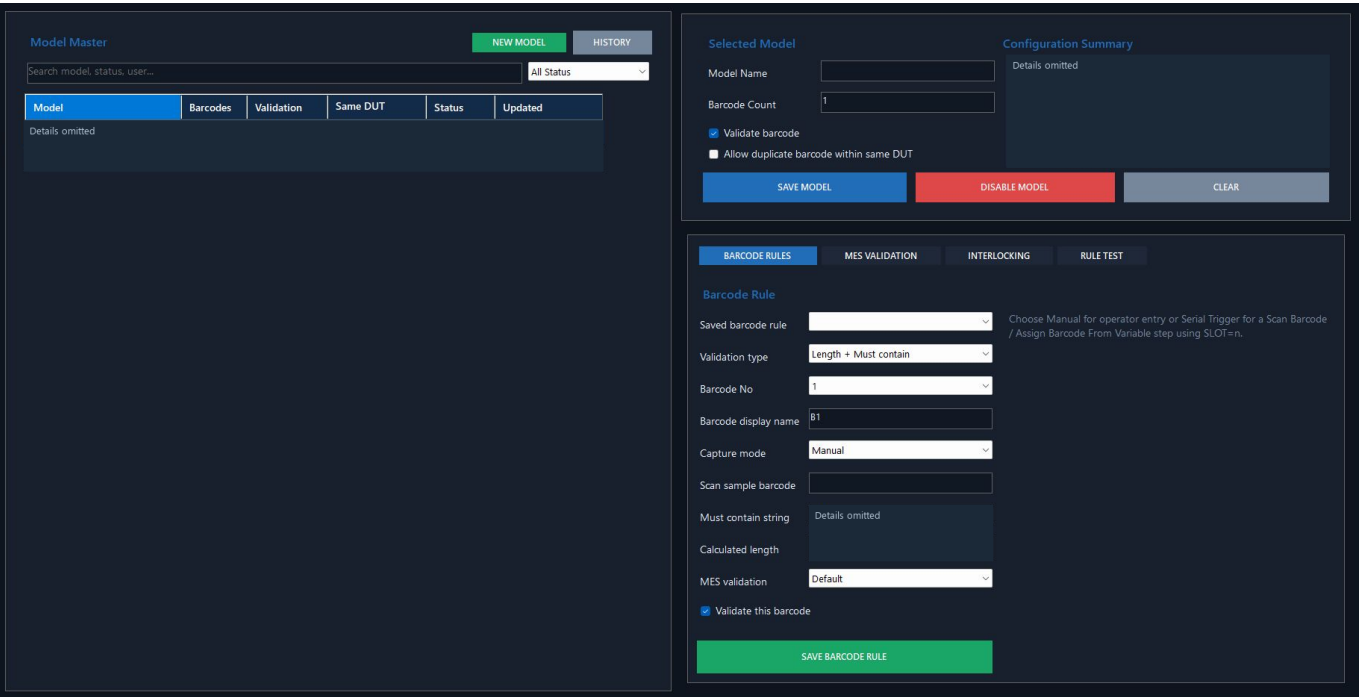


Figure 5 - Model Setting reference layout; the newer Active checkbox and ENABLE MODEL state are described from source and are not shown in this retained capture. Reference capture: 07 October 2026.

5.1 Model list, creation, editing, enabling and disabling

Create, select, disable or re-enable a product model while preserving its related configuration.

Access and preparation

Model Setting access and action permissions are required. Enabling an existing model requires Edit permission; disabling it requires Delete permission.

Disabled models remain available in Model Setting for maintenance. Choose All Status or Disabled Only to find them. The selected saved model determines whether the status button says ENABLE MODEL or DISABLE MODEL.

The status button changes only the saved selected model's active state. It preserves barcode rules, test sequences, UDAQ named sequences, test-plan links and history. Unsaved text in the Model Name field does not change which saved model the status button targets; read its confirmation carefully.

The Active checkbox is in the Selected Model form above the action buttons. Change it and use SAVE MODEL when saving a complete model edit. For a status-only operation on an existing model, use ENABLE MODEL or DISABLE MODEL.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Model list / status filter	Use All Status, Active Only or Disabled Only to locate the saved model. Select the intended row.
CLEAR	Clear the form to create a new model.
Active / SAVE MODEL	Save the intended model properties and active state. Saving other edits is separate from a status-only action.
ENABLE MODEL	Shown for a selected disabled saved model. Confirm its identity and provide the audit reason; it becomes available for operator selection.
DISABLE MODEL	Shown for an active saved model. Confirm its identity and provide the audit reason; it is hidden from operator selection without deleting related configuration.

Procedure

1. To create a model, use CLEAR, enter a unique stable name and its required properties, then SAVE MODEL.
2. To restore a disabled model, choose Disabled Only or All Status and select the saved model row.
3. Confirm its name and disabled status, then use ENABLE MODEL. Read the confirmation and provide the requested audit reason.
4. If the row disappears from Disabled Only, switch to All Status or Active Only and verify the active summary.
5. Review the preserved barcode rules, sequence and plan links; refresh or reselect the plan in Testing before production use.
6. To retire an active model, select it and use DISABLE MODEL. Verify the model named in the confirmation before accepting.

Worked example

A retired DEMO_MODEL can be restored with ENABLE MODEL. Its saved barcode rules and plan links are preserved, so review them before returning the model to production.

Expected result

The saved model has the intended active state and an audited status change; its related definitions remain available.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Disabled model is missing from the list	Change Active Only to All Status or Disabled Only, clear any search text and refresh.
ENABLE MODEL is unavailable	Select a saved disabled row and check Model Setting Edit permission. A new unsaved model has no saved status to change.
DISABLE MODEL is unavailable	Select an active saved row and check Model Setting Delete permission.
Model disappears after enabling	Disabled Only no longer matches it. Choose All Status or Active Only and verify its saved status.
Enabled model is absent from Testing	Refresh/reselect the plan and check its Active state, enabled model rows and product-model links.

Related instructions: [5.2 Model properties and required barcode count](#); [7.1 Finding plans and reading complete plan names](#).

5.2 Model properties and required barcode count

Set barcode count and duplicate policy.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Model Name	Product identity used in selection and reports.
Barcode Count	Number of required barcode slots; configure each slot that will be used.
Validate barcode	Model-level local barcode validation policy.
Allow duplicate within DUT	Controls reuse of the same barcode in multiple slots of one DUT. Separate from the global previously-passed barcode policy.
Active	Availability for normal selection.

Procedure

1. Enter model identity and intended number of barcodes.
2. Choose local validation and within-DUT duplicate behavior.
3. SAVE MODEL, then configure the corresponding numbered barcode rules.
4. Verify the Operator scan panel requests the expected slots through the intended Test Plan.

Worked example

For a product and component identifier, Barcode Count=2 requires B1 and B2. Leave duplicates disallowed when the two identities must be distinct.

Expected result

Required slots and duplicate checks match the product contract.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Repeated barcode rejected despite valid length	Check within-DUT duplication and global previously-passed barcode policy separately.
Too many scan slots	Check saved Barcode Count and selected plan/product model.

Related instructions: [4.4.2.1 Execution options and Operator group target permissions](#).

5.3 BARCODE RULES

Save capture and format rules for every barcode slot.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Saved barcode rule / Barcode No	Choose an existing rule and target numbered slot.
Barcode display name	Operator-facing meaning of the slot.
Validation type	Length and contains, Length only, Contains only or No validation.
Capture mode	Manual or Serial Trigger.
Scan sample barcode / Calculated length	A sample calculates the read-only expected length.
Must contain string	Required substring for validation types that include contains.
MES validation	Default, On Capture or Disabled.
SAVE BARCODE RULE	Persist this slot's barcode settings.

Procedure

1. Select the model and Barcode No.
2. Enter display name, capture mode and sample barcode. Confirm Calculated length.
3. Choose validation type and required substring where applicable. Set the barcode's MES policy.
4. SAVE BARCODE RULE and repeat for all required slots.
5. Use RULE TEST for positive and negative local examples, then verify the intended capture workflow.

Worked example

B1 named Product serial, sample ABC-0123, length 8, contains ABC- accepts that format under length-and-contains validation; ABC0123 fails the length contract.

Expected result

Each required slot has a saved and independently testable rule.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Length cannot be typed	It is calculated from Scan sample barcode. Change the sample to establish the correct length.
Wrong rule changed	Confirm Barcode No and selected saved rule before saving.

Related instructions: [5.6 RULE TEST](#); [5.3.2 Manual versus serial-trigger barcode capture](#).

5.3.1 Barcode ID, length and validation settings

Choose local barcode validation precisely.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Length and contains requires both checks. Length only checks the sample-derived size. Contains only checks the required text. No validation disables these local format checks; it does not imply that MES, previous-station interlock or duplicate policies are disabled.

Procedure

1. Select the intended Barcode No.
2. Scan a representative sample without unintended scanner prefixes/suffixes.
3. Choose the matching validation type and inspect the calculated length.
4. SAVE BARCODE RULE and test a valid sample, a wrong-length sample and a wrong-prefix sample.

Worked example

For ABC-0123, Calculated length is 8. With Must contain string ABC-, ABC-9999 meets both local checks; XYZ-0123 does not meet contains.

Expected result

Local accepted/rejected cases reflect the exact chosen checks.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Every scan is too long	Inspect the actual captured text for scanner suffix/prefix or whitespace; align scanner configuration and the approved sample.

Related instructions: [5.4 MES VALIDATION](#); [5.5 INTERLOCKING](#).

5.3.2 Manual versus serial-trigger barcode capture

Choose manual capture or a sequence-driven barcode assignment.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Manual capture is operator entry/scanning into the selected slot. Serial Trigger is intended for Scan Barcode or Assign Barcode From Variable sequence steps using SLOT=n. Selecting Serial Trigger alone does not configure a serial device or insert a sequence step.

Procedure

1. Choose the model and slot. Set Manual for operator scanning, or Serial Trigger for the intended sequence-driven capture.
2. For Serial Trigger, configure the scanner/device and appropriate flow step with the correct SLOT number; for variable assignment, ensure the source variable contains the barcode before assignment.
3. SAVE BARCODE RULE and save the flow separately.
4. Verify the resulting value reaches the intended slot and is evaluated by its rule/MES policy.

Worked example

B2 in Serial Trigger mode is populated by an approved capture step using SLOT=2. A step using SLOT=1 would populate a different rule context.

Expected result

Capture source and numbered destination agree.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Serial Trigger slot remains empty	Check enabled capture step, SLOT, device response and whether the flow reaches it.
Barcode in wrong slot	Compare SLOT with Barcode No rather than relying only on display name.

Related instructions: [4.1 Test Sequence](#); [5.3 BARCODE RULES](#).

5.4 MES VALIDATION (Confirm License Package)

CONFIRM LICENSE PACKAGE

Confirm the MES / Customer Server entitlement in your supplied package with Raju Bros Softech Pvt Ltd. Data Link integration requires Data Link access. This manual does not claim that every MES settings screen is locked by a separate MES license.

Set barcode-specific MES validation timing.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Default	Follow plant-wide MES behavior.
On Capture	Validate when this barcode is captured.
Disabled	Use local barcode checks without MES validation for this slot.
MES VALIDATION tab	Review the saved per-slot policy; edit/save it through the barcode rule.

Procedure

1. Determine which slots require a MES transaction and when the server expects it.
2. Set MES validation in BARCODE RULES and SAVE BARCODE RULE.

3. Review the MES VALIDATION summary and the station Before Testing MES configuration.
4. Verify a controlled accepted and rejected capture through the complete Operator workflow.

Worked example

A component barcode may be local-only while the product serial validates On Capture; the two slots can have different saved policies.

Expected result

MES validation follows the intended slot timing. RULE TEST alone does not verify a MES response.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Local rule passes but Operator rejects	Inspect the actual MES response and per-slot policy.
Unexpected duplicate transaction	Review On Capture, station Before Testing and explicit Data Link steps together.

Related instructions: [4.16 MES](#); [5.6 RULE TEST](#).

5.5 INTERLOCKING

Require previous-station evidence for a barcode.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

INTERLOCKING saves named rules per barcode. Configure the current per-barcode Search folder and pattern; the old Common path control is hidden in this UI. File existence, content and CSV lookup are different checks. TEST performs a real file lookup and does not replace SAVE INTERLOCK.

Procedure

1. Select model and Barcode No.
2. Enable and name the interlock; choose folder, pattern and check mode.
3. Configure the mode-specific content/CSV rule and failure policy.
4. Use a generic Test barcode and inspect both pass and fail evidence.
5. SAVE INTERLOCK, then verify the Operator flow.

Expected result

Start/capture acceptance requires the configured previous-station evidence.

Related instructions: [5.5.3 File Exists, File Contains and Line Contains checks](#); [5.5.2 CSV Lookup interlocking](#); [5.5.4 File-age, timeout and network failure rules](#); [5.5.5 SAVE INTERLOCK and test/cancel workflow](#).

5.5.1 Per-barcode interlock modes, templates, CSV lookup and rule trials

Resolve a per-barcode previous-station path.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Barcode No / Rule name / Enabled	Identify the slot and rule state.
Search folder / BROWSE	Root containing previous-station evidence.
File name pattern	Use supported {BARCODE}, {MODEL}, {yyyy}, {MM}, {dd} tokens.
Include subfolders	Allow recursive search only when the evidence layout requires it.
Operator message	Explain the expected evidence and recovery action in language the Operator can use.

Procedure

1. Choose the numbered slot and name its rule.
2. Set the approved root and pattern matching the prior station's actual output.
3. Enter Test barcode and use TEST to inspect the resolved evidence.
4. SAVE INTERLOCK for this slot; repeat explicitly for other slots as needed.

Worked example

Search folder D:\PreviousStationDemo and pattern {BARCODE}.txt with DEMO001 seeks the corresponding DEMO001.txt evidence. File content is checked only if a content mode is selected.

Expected result

The lookup is tied to the selected barcode rather than an unrelated common file.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Old path instructions do not match screen	Use the current per-barcode INTERLOCKING editor; the legacy common-path checkbox is not shown.

5.5.2 CSV Lookup interlocking

Look up a barcode and result from the same CSV row.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Check mode	CSV Barcode Result Lookup.
File name pattern	The CSV filename, for example results.csv, within Search folder.
Header / Delimiter	Choose header presence and Comma, Semicolon, Tab, Pipe or Auto.
Barcode column / Result column	Header name or 1-based index.
PASS values / FAIL values	Comma-separated accepted result text sets.
Duplicate barcode	Block, Use First Row or Use Last Row.
Barcode not found	Block Test, Warn Only or Allow Test.
Trim values	Trim CSV value whitespace before evaluation.

Procedure

1. Select CSV mode and the actual prior-station CSV path.
2. Set delimiter/header and the two columns. Enter the approved pass/fail values.
3. Choose explicit duplicate and missing-barcode policies.
4. TEST a known passing row, failing row, absent barcode and duplicate barcode.
5. Inspect results and SAVE INTERLOCK.

Worked example

CSV:

BARCODE,RESULT

DEMO001,PASS

DEMO002,FAIL

With header enabled, Barcode column=BARCODE, Result column=RESULT, PASS values=PASS,OK and FAIL values=FAIL,NG, DEMO001 passes and DEMO002 fails. DEMO001 must not use DEMO002's result. Duplicate policy Block rejects ambiguous repeated DEMO001 rows.

Expected result

The exact barcode and its result come from the same row.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Column not found	Check Header state, delimiter and header spelling or use the correct 1-based index.
Barcode missing	Check trimming and exact captured identity before weakening the missing-barcode policy.
Duplicate row blocked	Resolve upstream duplication or deliberately choose the approved first/last-row contract.

5.5.3 File Exists, File Contains and Line Contains checks

Choose file-existence or content matching.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
File Exists Only	Require the matching file; its presence alone does not prove a PASS value inside it.
Read File Contains Text	Read file content and evaluate PASS text with the chosen match type.
Specific Line Contains Text	Evaluate the configured Line No.
PASS text / Match type	Contains, Exact or Regex, with optional case sensitivity.
Line No	The line selected for the specific-line mode.

Procedure

1. Choose the mode based on the prior station's documented output format.
2. For content checks, enter the exact PASS text/pattern and case policy; for a line check, set its line number.
3. TEST a passing evidence file, a failing file and a missing file.
4. Save only after the results match the expected acceptance contract.

Worked example

A file containing STATUS=PASS can match PASS using Contains; choose a tighter exact/regex contract if another line could contain text such as NOT PASS. Existence-only should be used only when file creation itself is the approved pass signal.

Expected result

The result reflects the chosen evidence strength and match behavior.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unrelated text produces pass	Inspect the entire matched content and tighten the mode/pattern.
Specific-line check fails	Check the actual line structure, including header and blank lines.

5.5.4 File-age, timeout and network failure rules

Set file-age and lookup-failure behavior.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Check file age / Maximum file age (days)	Uses last modified time; enabled age must be a whole number from 1 to 36500 days. Stale evidence blocks testing even when Warn/Allow is selected.
Timeout ms	Limit for the lookup operation.
Network fail	Block Test, Warn Only or Allow Test for the applicable access/network failure.
Include subfolders	May broaden search and increase lookup work.

Procedure

1. Choose the maximum acceptable age for previous-station evidence.
2. Set timeout according to the expected approved storage response, not an indefinitely long wait.
3. Choose Network fail and missing-barcode behavior according to the traceability requirement.
4. TEST fresh, stale, absent and inaccessible evidence separately.
5. Save and verify the Operator message identifies the actual failed condition.

Worked example

With a seven-day age limit, a ten-day-old matching PASS file is stale and blocks even when Network fail is Warn Only. That switch does not convert stale product evidence into current evidence.

Expected result

Stale evidence and network failure are handled as distinct conditions.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Warn/Allow still blocked	Check file-age failure; old evidence intentionally remains blocking.
Lookup slow	Check recursive scope, large folders, remote availability and timeout.

5.5.5 SAVE INTERLOCK and test/cancel workflow

Save an interlock independently from its trial.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test barcode	Generic barcode used for a lookup trial.
TEST / CANCEL	Run or cancel the current lookup. CANCEL does not save or delete the rule.
SAVE INTERLOCK	Persist the named per-barcode rule.
Result/status area	Read lookup result and file/path evidence; long paths can be selected and scrolled.

Procedure

1. Select model/slot, enable and name the rule, then complete its configuration.
2. Enter Test barcode and TEST. Read the result/path, not only its color.
3. Use CANCEL if the lookup must be stopped. Correct the configuration and retest.
4. SAVE INTERLOCK, then reselect the rule to verify persistence.
5. Verify the saved rule through a controlled Operator capture/start.

Worked example

A successful trial using unsaved folder changes proves the trial lookup only. SAVE INTERLOCK is still needed for production to use those changes.

Expected result

Saved production behavior matches the tested rule.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Trial passes but production uses old path	Save and reselect the interlock for the correct model/slot.

5.6 RULE TEST

Preview local barcode format without network side effects.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

RULE TEST is a local rule preview only. It does not perform MES validation or previous-station interlocking. Those are evaluated in the real Operator workflow; INTERLOCKING also offers its own separate file trial.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Selected rule	Confirm which saved barcode rule is being tested.
Sample barcode / TEST RULE	Enter sample text and inspect the local result.

Procedure

1. Select the intended model and barcode rule.
2. Open RULE TEST and enter a representative valid sample.
3. Use TEST RULE and then test wrong-length and wrong-content examples.
4. Validate MES and interlocking separately after local format checks succeed.

Worked example

ABC-0123 can pass the local format rule while a missing prior-station file still blocks production.

Expected result

The preview explains only the local rule outcome.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
RULE TEST passes but production blocks	Check duplicate history, MES, interlock and other production gates.

Related instructions: [5.4 MES VALIDATION](#); [5.5 INTERLOCKING](#).

5.7 SAVE MODEL, SAVE BARCODE RULE, history and troubleshooting

Save all model configuration layers and diagnose rejection.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SAVE MODEL	Model identity, required count, model validation, within-DUT duplicate and active state.
SAVE BARCODE RULE	Selected slot's display/capture/format/MES policy.
SAVE INTERLOCK	Selected slot's named evidence rule.

Procedure

1. Save model properties first.
2. Save each required barcode rule and each interlock independently.
3. Reselect the model/slot and verify the saved summaries.
4. Test local format, then file interlock, then the complete Operator path.

Worked example

Changing Barcode Count to 2 does not create a valid B2 capture/interlock contract by itself; configure and save those layers explicitly.

Expected result

The selected product has consistent saved model, slot and evidence settings.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Format rejection	Compare actual captured text with sample-derived length and contains policy.
Duplicate rejection	Check within-DUT and previously-passed-barcode policies.
MES rejection	Inspect the received reply and validation timing.
Interlock rejection	Check resolved file, same-row CSV result, age and access.
Unsaved change	Use the save action belonging to that layer.

6 Wiring Diagram (License Required)

LICENSE REQUIRED

Wiring Diagram license for the drawing workspace and its tools. Account permissions still determine which editing and management actions are allowed. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Create, review and maintain electrical drawings with traceable project files.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Wiring Diagram opens ADVANCED WORKSPACE by default. LEGACY PROJECTS retains existing database-backed drawings. They are separate stores: an advanced drawing is not missing merely because it is absent from the legacy list, and a database-only backup does not include every advanced project/library file.

Use actual dimensions, approved pinouts and verified library data. Drawing checks and reports support engineering review; they do not replace physical continuity or safety tests.

Procedure

1. Choose the appropriate advanced or legacy workspace.
2. Create/open the intended project and confirm its editable/read-only status.
3. Build or review drawings, run checks, save and export the required evidence.

Related instructions: [6.1 ADVANCED WORKSPACE](#); [6.2 LEGACY PROJECTS](#); [6.3 License gates, permissions and troubleshooting](#).

6.1 ADVANCED WORKSPACE

Build an advanced project from drawings through checks and deliverables.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

The command bar contains project/file commands, Panel Setup, Quick Add, Engineering Center, Productivity Center, Shop-Floor Wiring and exports. PROJECT shows sheets/layers; OBJECTS locates placed items; HISTORY tracks changes. The center canvas and right inspector operate on the active sheet/selection. F1 opens contextual help.

Procedure

1. Create/open an editable project or import a customer review package.
2. Use + ADD SHEET for Panel Layout, Schematic or Fixture drawings.
3. Enter real millimetre panel dimensions and place verified components.
4. Route electrical connections and inspect the resulting nets.
5. Run Checks, resolve findings and save.
6. Export PDF drawing sheets or a portable review package as needed.

Worked example

A panel defined as 600 × 700 mm remains that physical size; zoom changes the view, not geometry.

Related instructions: 6.1.1 New/open/save, project files and imported packages; 6.1.2 Canvas, sheets, drawing tools and properties; 6.1.8 Engineering Center data and reports; 6.1.10 Productivity Center.

Screen reference

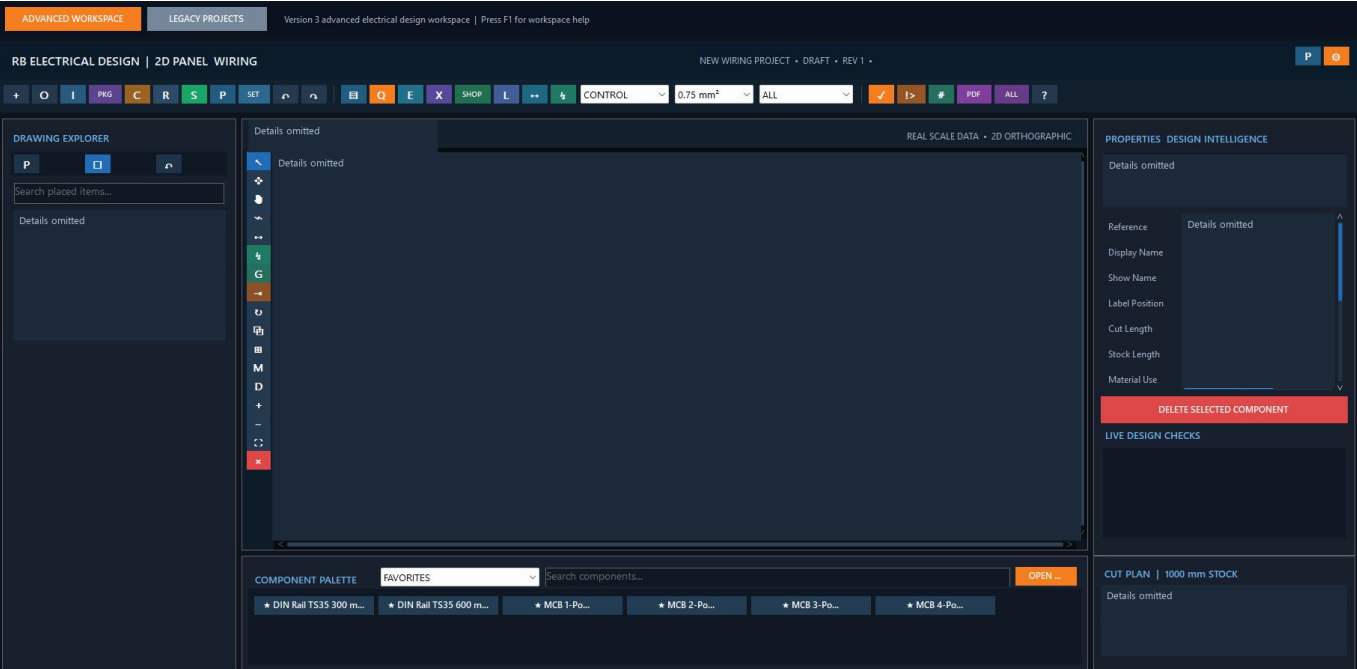


Figure 6.1 - Advanced Wiring: explorer, canvas, properties and palette. Reference capture: 07 October 2026.

6.1.1 New/open/save, project files and imported packages

Choose the correct file operation for authoring, review and backup.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
New / Ctrl+N	Create a new editable project.
Open / Ctrl+O	Open supported editable JSON or RB Wiring Project.
Import	Validate/open a .rbwproj customer package read-only.
Save / Ctrl+S	Save editable work; imported projects start the editable-copy workflow.
Save Project As	Save editable data to another JSON file.
Export Project	Create a portable read-only .rbwproj with used component definitions.

Procedure

1. Choose New or Open for editable authoring.

2. Confirm name, destination and mode in the status bar.
3. Save before significant engineering changes and keep the file-backed workspace in backup scope.
4. For customer review, export .rbwproj and retain editable JSON as the source.
5. Use Import for received packages; create a separately named editable copy if authorized changes are needed.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Imported project cannot be edited	Expected behavior; use Save As Editable Copy with a different name/file.
No drawing sheets	Open a valid project or known backup; PDF is not an editable recovery source.

Related instructions: [6.1.7 Customer review packages, comments and editable copies](#); [6.1.11 Project settings, status/revisions, backup and autosave recovery](#).

6.1.2 Canvas, sheets, drawing tools and properties

Use sheets, canvas tools and properties without changing physical scale.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
+ ADD SHEET	Add Panel Layout, Schematic or Fixture drawing.
Panel Setup	Real panel/mounting-plate dimensions, material, clearance and grid.
Quick Add (Q)	Search/select component, variant, assembly or array and place it.
Select (V) / Move (M)	Select or follow cursor until click commits; Esc/right-click cancels an active move.
Properties (E)	Contextual settings for selected item.
Grid / zoom / pan	Grid controls placement; zoom/pan change the view only.

Procedure

1. Select the correct sheet and enter physical dimensions.
2. Place a known component using Quick Add; confirm its footprint dimensions.
3. Use M to move, R to rotate and the inspector to edit precise values.
4. Add dimensions/text as needed, then FIT to inspect the whole sheet.
5. Save and verify objects remain within panel/clearance boundaries.

Worked example

A 35 mm-wide component on a 600 mm panel must remain 35 mm wide. Use zoom for readability rather than resizing its footprint.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Move blocks export	Left-click to commit or Esc/right-click to cancel the active move.
Position jumps	Review grid/snap and magnetic attachment; Alt temporarily bypasses magnetic attachment while moving.

Related instructions: [6.1.3 Symbols, component libraries and physical footprints](#); [6.1.6 Import, export, print and keyboard shortcuts](#).

6.1.3 Symbols, component libraries and physical footprints

Create reusable symbols with independent logical and physical dimensions.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

A schematic symbol favors readability; its linked panel footprint uses actual millimetres. Do not use schematic symbol size as the physical enclosure size. Component Studio/library changes require Manage permission and belong to file-backed library data.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Name / category / reference prefix	Reusable identity and default reference naming.
Manufacturer / part / mount style	Engineering identity and mounting method.
Schematic Width / Height	Logical drawing dimensions.
Footprint Width / Height / Depth / clearance	Verified physical size and space requirements.
Smart pins / terminals	Unique number/name, electrical type/direction, position, required state and ratings.

Procedure

1. Obtain manufacturer dimensions and pinout.
2. Open CREATE SYMBOL/Component Studio and create a custom definition.
3. Enter identity, logical size and exact footprint/clearance data.
4. Add geometry primitives and every required terminal.
5. CHECK and resolve duplicate/missing pins or geometry problems.
6. SAVE and TEST PLACE; confirm schematic connectivity and panel size.

Worked example

A small logical power-supply symbol can link to a much larger physical DIN-rail footprint. Both representations refer to the same electrical component.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cannot edit system definition	Create a permitted custom definition/revision rather than overwriting protected data.
Wire cannot attach	Verify a real smart-pin/terminal anchor, not merely a drawn line or text label.

Related instructions: [6.1.8 Engineering Center data and reports](#).

6.1.4 Wires, terminals, layers, locks and connections

Route intentional electrical connections and protect reviewed geometry.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

A visual crossing does not automatically mean an electrical connection. Snap/connection indications and Net Tracking determine whether wires share a net. Layer visibility and locking are separate: hiding a layer does not delete its objects.

Procedure

1. Press W and click a compatible terminal/start point.
2. Add orthogonal bends and click the destination; Tab cycles nearby snap candidates, Enter finishes at the preview, Esc cancels.
3. For a branch use START BRANCH FROM HERE on an existing wire and verify snapping.
4. Edit wire number, net, color, conductor size, cable/core, shielding, ferrules and ratings using its properties.
5. Use layer visibility/locks and object Ctrl+L to protect reviewed content.
6. Trace the resulting net and run checks before saving.

Worked example

Two wires crossing visually should remain separate unless intentionally snapped/connected. Trace each net to verify the intended outcome.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Cannot edit an object	Check object/layer lock and project mode.
Unexpected net joining	Inspect branch merging, snapped endpoints and labels; correct source connectivity.

Related instructions: [6.1.9 Net Tracking](#), [Global Labels and external connectors](#); [6.1.5 Engineering Center](#).

6.1.5 Engineering Center

Validate drawing and engineering data together in Engineering Center.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Engineering Center holds logical components, parts, nets, terminals, cables, signals and I/O linked to drawing representations. Use mapping/synchronization rather than creating unrelated duplicate records. A visually neat drawing can still contain missing pin connections or inconsistent engineering data.

Procedure

1. Open Engineering Center and refresh/sync the active page.
2. Review mapping and engineering records for the placed objects.
3. Run 09 CHECKS > RUN ALL CHECKS. Select a finding and LOCATE OBJECT.
4. Correct the underlying record/connection, rerun checks and confirm resolution.
5. Use 10 REPORTS and RELEASE PREFLIGHT before a controlled drawing release.

Worked example

A dangling required terminal should be located and connected or deliberately marked according to the design; exporting a PDF does not clear the finding.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Finding returns after edit	Check linked representations and the actual source record, then refresh/sync.
Preflight blocker	Resolve it before treating the package as released.

Related instructions: [6.1.8 Engineering Center data and reports](#).

6.1.6 Import, export, print and keyboard shortcuts

Export correct drawing scope and use shortcuts in the intended workspace.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PDF Sheet / Ctrl+P	Export the active drawing sheet.
PDF All	Export all drawing sheets.
Export Project	Portable .rbwproj review package, not a PDF.
Ctrl+S / Ctrl+Shift+S	Save / Save As or imported editable-copy workflow.
Ctrl+Z / Ctrl+Y / Ctrl+D	Undo / redo / duplicate drawing selection.
Arrow / Shift+Arrow	Nudge by active grid / exactly 1 mm in the advanced drawing workspace.
F1 / Ctrl+F1	Context help / keyboard-shortcut help.

Procedure

1. Finish/cancel any active cursor move.
2. Save editable work and run checks.

3. Choose active-sheet or all-sheet PDF scope.
4. Inspect exported page count, dimensions, line/text readability and scale before using it for fabrication.
5. Keep editable JSON and libraries as the recovery source; distribute the intended reviewed package/PDF only.

Worked example

A dimension marked 100 mm should be checked against the drawing's export/print scale. Viewer "fit to page" can change printed scale; drawing dimensions remain authoritative.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Shortcut acts on text/grid instead	Leave text editing and focus the intended canvas; page/action permissions still apply.
Missing sheets	Use PDF All rather than active-sheet export.

Related instructions: [14.2.4 Advanced Wiring Diagram keyboard shortcuts](#); [6.1.7 Customer review packages, comments and editable copies](#).

6.1.7 Customer review packages, comments and editable copies

Review a protected package, record comments and create a separate editable copy.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Export Project includes drawing data and used component definitions in .rbwproj. Import validates structure, schemas, limits, lengths and declared SHA-256 checksums. This is integrity checking, not a digital signature or publisher authentication.

Review comments are local sidecar data associated with the verified package identity. Exporting an imported package copies the original package and does not insert local comments. Keep the original package and related review evidence together when managing review work.

Procedure

1. Designer: finish/check editable work and Export Project to .rbwproj. Retain the JSON engineering source.
2. Reviewer: Import the package and confirm IMPORTED PROJECT - READ ONLY.
3. Inspect with Net Tracking and Smart Measurement. Right-click the relevant location and ADD REVIEW COMMENT HERE, then ADD COMMENT.
4. Open Comments / CUSTOMER REVIEW COMMENTS to locate, RESOLVE or REOPEN an item.
5. For authorized editing choose Save As Editable Copy, enter a different project name and JSON destination, and verify read-only mode is gone.

Worked example

A reviewer can flag an incorrectly numbered terminal without altering package drawing data. Creating an editable copy branches the project; existing comments remain associated with the original package.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Comments missing from exported package	Expected: local comments are not inserted into the original .rbwproj.
Comment sidecar belongs to another package	Reopen the matching original package; do not transplant comment files.

Related instructions: [6.1.1 New/open/save, project files and imported packages](#); [6.1.9 Net Tracking, Global Labels and external connectors](#).

6.1.8 Engineering Center data and reports

Maintain engineering records, resolve checks and create an accountable report package.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Engineering Center pages are 01 OVERVIEW, 02 MAPPING, 03 PART MASTER, 04 NETS, 04A NET CLASSES, 05 CROSS-SHEET SIGNALS, 05A CONNECTOR PAIRS, 06 TERMINALS, 07 CABLES & CORES, 08 PLC / UDAQ I/O, 09 CHECKS, 10 REPORTS, 11 SMART CIRCUITS, 12 REVISIONS, 13 2D INTERCHANGE, 14 MOUNTING and 15 SETTINGS. REFRESH / SYNC (F5) refreshes the active page; APPLY commits pending edits. Ctrl+K here opens the engineering page/action palette.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Mapping / Part Master	Link logical electrical components with actual drawing representations and approved part data.
Nets / Net Classes	Electrical connectivity and wire-class defaults; display color is not electrical validation.
Cross-Sheet Signals / Connector Pairs	Synchronize endpoints and verify compatible connector pairing.
Terminals / Cables & Cores	Terminal identities, conductor/core assignments and associated connection data.
PLC / UDAQ I/O	Signal-to-I/O assignments for engineering documentation.
Checks / Reports	Locate findings, rerun after correction, generate outputs and release preflight.
Smart Circuits / Revisions	Generate supported circuit templates; CAPTURE SNAPSHOT and COMPARE SELECTED for revision evidence.
2D Interchange / Mounting	Supported DXF import/export, PDF underlays and mounting plans/reports.
Settings	Project rules; APPLY SETTINGS and reviewed numbering operations.

Procedure

1. Save the project and open Engineering Center.
2. Refresh/sync Mapping, then correct missing links before creating duplicates.
3. Review parts, nets, terminals, cables and I/O against actual design intent; APPLY each intended edit.
4. RUN ALL CHECKS, select findings and LOCATE OBJECT. Correct root records and repeat.

5. Create needed BOM, wire/cable/terminal/connector/I/O/continuity outputs from Reports.
6. Run RELEASE PREFLIGHT and resolve blockers before treating the package as released. Capture revision evidence and save.

Worked example

A conductor may appear on a sheet but lack cable/core assignment. Complete that engineering data, rerun checks and regenerate the cable report so drawing and installation list agree.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Report disagrees with drawing	Refresh/sync linked data and inspect mapping; do not patch only the exported report.
PDF exports despite blocker	Export capability does not mean release validation passed.

Related instructions: [6.1.5 Engineering Center](#); [6.1.11 Project settings, status/revisions, backup and autosave recovery](#).

6.1.9 Net Tracking, Global Labels and external connectors

Verify electrical connectivity across branches, labels and external connectors.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Net Tracking highlights the complete selected electrical net and dims unrelated objects. It is available in imported read-only review. Global labels connect design intent across sheets; external connections describe panel-edge connectors/cables and their destinations. A matching-looking label or crossing must still be verified by tracing/checks.

Procedure

1. Select a wire, terminal or supported global label. Press Ctrl+T or Net Tracking.
2. Use Alt+Left/Alt+Right or PREVIOUS/NEXT to step through connections. Clear with Ctrl+T or Esc.
3. For a new global label, press G, enter net name/direction and PLACE GLOBAL LABEL. Review label spelling and intended electrical grouping.
4. For panel-edge connection, use External Connection / ADD EXTERNAL CONNECTION HERE; enter type, edge, reference, pin geometry, destination and cable/core data.
5. Use ADD CONNECTION; subsequent inspector changes apply with Ctrl+Enter. Synchronize/validate endpoints in Engineering Center.

Worked example

Trace a supply net through its branch and cross-sheet label to the intended connector. An unrelated return net should remain outside the highlighted group.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Trace reaches unintended object	Inspect snapped crossings, labels and branch merging.
External connector changes not applied	Use APPLY CONNECTION and then save the project.

Related instructions: [6.1.4 Wires, terminals, layers, locks and connections](#); [6.1.8 Engineering Center data and reports](#).

6.1.10 Productivity Center

Use assisted drawing tools on a deliberately selected scope.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Open Productivity Center with Ctrl+J. Review selected objects and dialog scope before RUN TOOL. Assisted operations can change many objects at once; inspect the result and use Undo before saving if the scope was wrong.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Smart DIN Rail Builder	Arrange selected rail-mounted parts against actual panel dimensions.
Assisted Wire Routing	Route selected/unlocked wires; locked routes are protected.
Terminal Strip Generator	Generate a reviewed terminal arrangement.
Batch Property Editor	Only checked properties are applied to selected objects.
Auto Wire Numbering	Renumber unlocked wires according to project settings.
Circuit Macro Placement	Place a supported reusable circuit.
Smart Replace Component	Replace selected parts; verify terminal compatibility and dimensions.
Sequential Connection Tool	Uses selection order and entered wire data.
Error Navigator / Panel Space Optimizer	Locate findings and analyze panel utilization.

Procedure

1. Save and select only the intended objects.
2. Open the matching tool and inspect parameters/scope.
3. RUN TOOL and visually inspect changed geometry, numbering and connections.
4. Verify terminal mapping after replacement or sequential wiring.
5. Run checks, correct issues and save the reviewed result.

Worked example

When applying a new wire color to several selected wires, check only that property in Batch Property Editor; do not inadvertently overwrite conductor size or cable assignment.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected objects changed	Undo, refine selection/scope and reapply.
Some routes unchanged	Check locks and the tool's supported scope.

Related instructions: [6.1.8 Engineering Center data and reports](#); [6.1.6 Import, export, print and keyboard shortcuts](#).

6.1.11 Project settings, status/revisions, backup and autosave recovery

Preserve file-backed projects and controlled revisions through changes and recovery.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Project Settings edits controlled metadata and can rename the corresponding project file. Released and Archived states are read-only. Editable JSON, custom component definitions and related workspace data need file backups in addition to the application database. Autosave/recovery is supplementary; inspect recovered work before accepting it as the engineering source.

Procedure

1. Save a known good editable project before major edits.
2. Use Project Settings for intended metadata/name changes and verify the resulting file location.
3. Capture a revision snapshot in Engineering Center before a controlled change; compare revisions after work.
4. If recovery is offered after interruption, review project identity, sheets and recent edits before resuming. Preserve the previous known-good file.
5. Run checks and save the reviewed recovery/copy to the intended destination.
6. Keep Released/Archived work under its controlled revision process; use the supported editable-copy route for imported packages.

Worked example

A database backup can restore legacy records while leaving an advanced JSON project or custom library outside its scope. Include those file-backed sources in the station backup plan.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Recovered project looks older	Compare file identity/time and revision evidence before overwriting anything.
Released project locked	Follow controlled revision rules instead of editing its file externally.

Related instructions: [6.1.7 Customer review packages, comments and editable copies](#); [6.1.8 Engineering Center data and reports](#).

6.1.12 Shop-Floor Wiring

Record wire installation and verification against the drawing.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Shop-Floor Wiring uses the project's wire checklist. Marking a row changes project data and therefore requires an editable project and the relevant action permission. Its workflow status does not replace physical continuity or electrical tests.

Procedure

1. Open Shop-Floor Wiring and build/update the checklist for the current design.
2. Select a wire row and LOCATE & HIGHLIGHT, or double-click, to find it on the drawing.
3. Install the correct conductor/endpoints, then MARK WIRED.

4. After the required independent inspection, MARK VERIFIED.
5. Use NEXT PENDING to continue; RESET PENDING if a workflow state must be corrected.
6. Save and retain the checklist with the corresponding reviewed drawing revision.

Worked example

A wire can be marked Wired after installation but remain unverified until endpoint, numbering and the station's required checks are complete.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Read-only checklist	Open an authorized editable project; imported packages cannot receive workflow-state mutations.
Checklist differs after design change	Update against the current design and review changed wire identities before retaining old verification states.

Related instructions: [6.1.9 Net Tracking, Global Labels and external connectors](#); [6.1.8 Engineering Center data and reports](#).

6.2 LEGACY PROJECTS

Open existing database-backed wiring documents in LEGACY PROJECTS.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

The legacy workspace remains available for earlier saved drawings and uses its own project list/tabs. Advanced file-backed projects and legacy database projects are separate. Do not delete or recreate an old project merely because it is absent from ADVANCED WORKSPACE.

Procedure

1. Choose LEGACY PROJECTS.
2. Select the existing project in its PROJECT area.
3. Use the relevant drawing/library/check/report/revision tab.
4. Save changes and inspect the revision/evidence in that workspace.

Related instructions: [6.2.2 Legacy workspace tabs](#); [6.2.1 Legacy project access, editing and transition](#).

6.2.1 Legacy project access, editing and transition

Maintain a legacy project without assuming automatic conversion.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Open and save a legacy drawing through its own project controls. Preserve the database and related exports before substantial changes. Exported reports/drawings serve review or output purposes; they do not prove an editable conversion into advanced JSON.

Procedure

1. Locate the correct project in LEGACY PROJECTS and inspect its metadata/revision.
2. Choose the appropriate drawing tab and make an authorized edit.
3. Save through the legacy workspace and review checks.
4. Export the required report/drawing and retain revision evidence.
5. If moving work to advanced authoring, use only an explicitly supported import/open operation; retain the original legacy record.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Old project not in advanced list	Switch to LEGACY PROJECTS.
Export cannot be edited in advanced workspace	Do not rename file extensions to simulate conversion; preserve source and use supported formats.

Related instructions: [6.2.2 Legacy workspace tabs](#); [6.1.1 New/open/save, project files and imported packages](#).

6.2.2 Legacy workspace tabs

Navigate the nine legacy workspace tabs without mixing their purposes.

Access and preparation

Wiring Diagram entitlement, View and relevant action permission; project mutations require editable state.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PROJECT	Select/manage the intended legacy project and metadata.
SCHEMATIC	Logical electrical drawing and connections.
PANEL LAYOUT	Physical panel arrangement.
FIXTURE WIRING	Fixture connectors/test points and equipment wiring.
SYMBOL LIBRARY	Locate reusable legacy definitions.
CREATE SYMBOL	Author permitted legacy symbols and pins.
CHECKS	Review legacy drawing consistency findings.
REPORTS	Generate legacy outputs appropriate to the selected project.
REVISIONS	Inspect retained legacy revision history.

Procedure

1. Choose LEGACY PROJECTS and select the correct project in PROJECT.
2. Open the drawing tab corresponding to the task.
3. Use library definitions or create a permitted symbol, keeping physical dimensions separate from schematic representation.

4. Save edits, run CHECKS and review findings.
5. Generate REPORTS and inspect REVISIONS for traceability.

Worked example

Use PANEL LAYOUT for enclosure placement and FIXTURE WIRING for fixture connections; a component drawn in one view does not automatically prove all required information is complete in another.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Expected file-backed project absent	Return to ADVANCED WORKSPACE; the legacy project list uses its own store.
Unexpected old revision	Verify project selection and revision before editing.

Related instructions: [6.2.1 Legacy project access, editing and transition](#).

6.3 License gates, permissions and troubleshooting

Resolve unavailable wiring actions by identifying the actual gate.

Access and preparation

Wiring Diagram entitlement and View permission; Add/Edit/Delete/Import/Export/Manage are checked separately. Editing requires an editable project.

Wiring Diagram requires its feature entitlement plus page View access. Add, Edit, Delete, Import, Export and Manage are distinct permissions. Imported packages and Released/Archived project states impose further editing restrictions. An unavailable button can therefore be correct even when the page opens.

Procedure

1. Read project mode/status and the exact message.
2. Check the action permission and relevant feature availability through the authorized administrator.
3. For an imported package, create a different-name editable JSON copy when changes are intended.
4. For controlled Released/Archived work, follow the revision workflow rather than bypassing its read-only state.
5. Preserve exact diagnostic text if the issue persists.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Checksum mismatch	Obtain a fresh valid .rbwproj export; do not use corrupted/changed content.
Unsupported schema	Use a compatible application or request a compatible re-export.
Wrong editable-copy name/file	Choose a different project name and JSON destination.
Comments unavailable	Comments require an imported review package, not ordinary editable JSON.

Related instructions: [6.1.7 Customer review packages, comments and editable copies](#); [6.1.11 Project settings, status/revisions, backup and autosave recovery](#).

7 Test Plan

Map product models to test flows and DUT positions.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

A Test Plan is the production selection. Product Model names identify the product in reports; Test Flow owns the reusable hardware steps; Fixture / DUT identifies the physical lane. Plan settings and model rows are saved separately. Parallel operation requires a commissioned hardware arrangement. Any licensed feature used by a flow retains its own entitlement requirement.

Procedure

- 1. Create the required product models and saved test flows first.
- 2. Create/save the plan header.
- 3. Add DUT model/flow mappings and SAVE MODELS.
- 4. Verify the plan in Testing with controlled barcode and failure cases.

Expected result

Production selection resolves to the intended products, flows and fixtures.

Related instructions: [7.2 Creating, editing, saving and deleting plans](#); [7.3 Model, DUT, flow and device assignments](#); [7.7 Parallel batch scanning and rolling lane scanning](#).

Screen reference

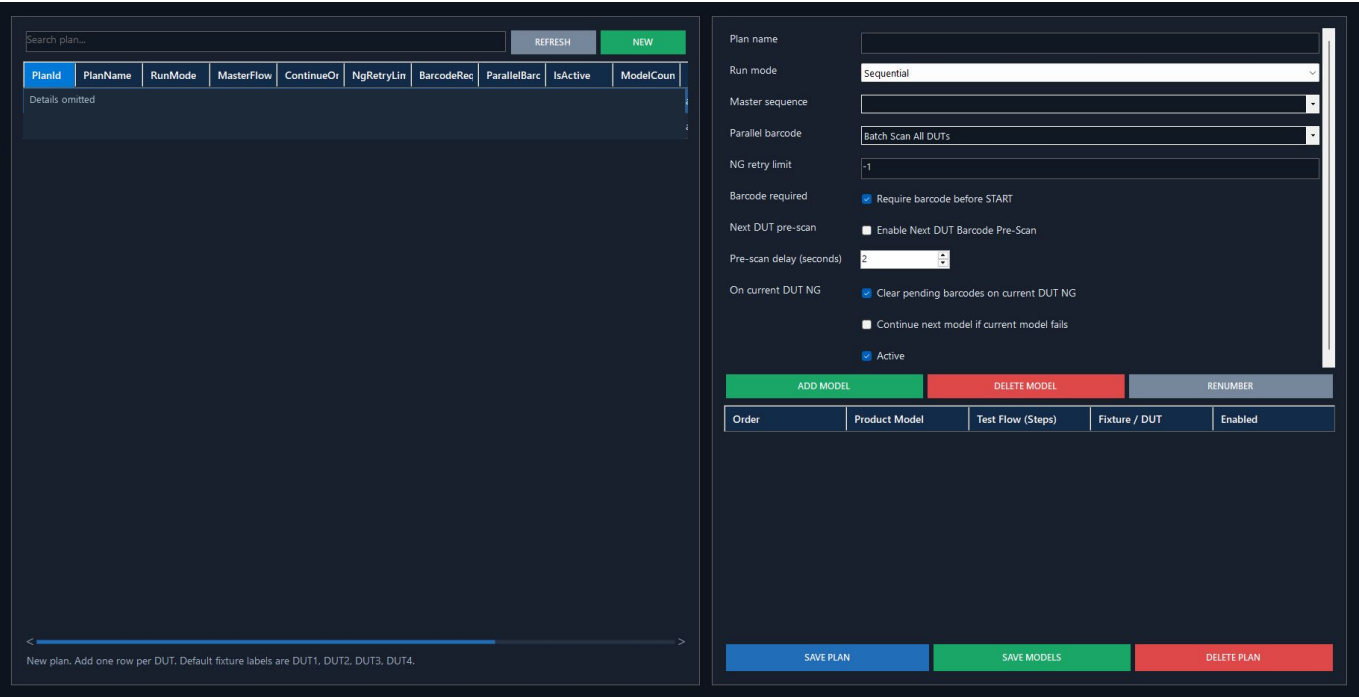


Figure 7 - Test Plan: properties and DUT assignments. Reference capture: 07 October 2026.

7.1 Finding plans and reading complete plan names

Select and inspect a saved plan.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

The left plan list supports adjustable column widths. Drag the right edge of the PlanName header to widen it, or double-click its divider to fit displayed contents. Use the horizontal scrollbar when the columns exceed the list width. Hover over a PlanName cell to read its complete saved name in a tooltip.

Adjusted widths are retained through search, refresh and save while the current page instance remains open. They are not saved as a workstation preference across application restarts. Resizing is a viewing adjustment and does not rename or save a plan.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Search plan / REFRESH	Find and reload plans.
NEW	Clear the editor for a new plan.
Plan name / Active	Production identity and availability.
Plan list / model grid	Selecting a saved plan loads its header and mapped rows; unsaved edits require their respective save action.
PlanName header divider	Drag to set the width or double-click to fit displayed contents.
PlanName cell tooltip / horizontal scrollbar	Read the complete plan name and reach columns outside the visible list.

Procedure

1. Search for the intended plan. Widen PlanName or hover over its cell until the full name is readable.
2. Select the row and verify the full name in the right-hand Plan name field before changing or deleting a plan.
3. Verify run mode, barcode policies and each enabled model row.
4. After editing, use SAVE PLAN and/or SAVE MODELS as appropriate. Width adjustments alone need no save.
5. Refresh/reselect and confirm saved values before selecting the plan in Testing.

Worked example

Two plans can reuse a flow while mapping different product models; identify the plan by its saved name and row bindings, not the flow name alone.

Expected result

The selected editor state corresponds to the saved production plan.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Plan not available in Testing	Check Active, enabled model rows and saved model/flow references.
Plan name is truncated	Drag the PlanName header divider wider, double-click its divider, or hover over the cell for its complete name.
Widths reset after reopening the application	Widths are retained only for the current page instance; adjust the columns again.

7.2 Creating, editing, saving and deleting plans

Create, edit, save or delete a plan.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

The current editor provides NEW, SAVE PLAN, SAVE MODELS and DELETE PLAN. It does not provide a Copy Plan command. To make a similar plan, create a new plan and deliberately enter its intended settings and rows.

Procedure

1. NEW, enter a unique Plan name and configure run/barcode/failure policies.
2. SAVE PLAN to establish the plan record.
3. ADD MODEL for each DUT. Set Product Model, Test Flow, Fixture / DUT, order and enabled state.
4. RENUMBER if needed and SAVE MODELS.
5. Refresh/reselect to verify both header and rows. Use DELETE PLAN only after reviewing the confirmation and its operational dependencies.

Worked example

Create DEMO_PLAN with Sequential mode, require barcodes, save it, then add the intended DEMO_MODEL/FLOW_DEMO row and SAVE MODELS.

Expected result

The plan header and model rows persist independently.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
New header saved but no DUT runs	Add and SAVE MODELS with enabled rows.
Looking for Copy	Use NEW and explicit configuration; no Copy command is present.

7.3 Model, DUT, flow and device assignments

Bind each DUT to its product and hardware flow.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Order	Execution/display order; RENUMBER helps restore a simple sequence.
Product Model	Product identity for reports and its barcode rules.
Test Flow (Steps)	Saved flow containing IO/measurement/programming actions.
Fixture / DUT	Physical lane identifier used by production and scoped rules.
Enabled	Whether this mapping participates.
ADD MODEL / DELETE MODEL / SAVE MODELS	Edit and persist rows.

Procedure

1. ADD MODEL for each physical DUT position.
2. Choose Product Model and the appropriate Test Flow.
3. Enter distinct Fixture / DUT identities and verify device selections inside each flow.
4. Order/enable the rows and SAVE MODELS.
5. Select the plan in Testing and compare its DUT layout with the fixture.

Worked example

DUT_A maps DEMO_MODEL to FLOW_A; DUT_B maps the same product to FLOW_B. The product names may match, but FLOW_A/FLOW_B must bind their intended lane devices or use the commissioned shared-hardware coordination.

Expected result

Each result identifies the correct product and fixture and executes the intended flow.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Device not selectable in plan	Device bindings belong to the selected flow, not an independent plan device column.
Missing flow	Save an enabled flow with its required steps before selecting the plan.

7.4 Order, parallel execution and barcode requirements

Choose sequential, parallel batch or rolling capture behavior.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Run mode	Sequential runs the configured model rows in order; Parallel uses the configured DUT arrangement concurrently.
Parallel barcode	Batch Scan All DUTs collects required barcodes for the batch; Rolling Lane Scan supports independent lane scanning.
Barcode required	Require barcode before START.
Continue next model if current model fails	Sequential fail-continuation policy.
NG retry limit	-1 unlimited, 0 blocks after the first NG; a positive value limits additional NG retries according to barcode history.
Next DUT pre-scan / delay / clear pending on NG	Batch pre-scan policy; see the detailed constraints below.

Procedure

1. Choose Sequential for ordered execution or the commissioned Parallel setup.
2. For Parallel choose batch or rolling based on physical lane independence.
3. Set barcode, failure continuation and retry policy.
4. SAVE PLAN and verify start/failure behavior with controlled identities.

Worked example

Two separate lanes can use Rolling Lane Scan; a setup with shared supply coordination through a Master sequence must use Batch Scan All DUTs.

Expected result

Scan/start behavior matches the hardware arrangement and saved policies.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Rolling configuration rejected	Remove Master sequence and use truly separate lane hardware, or select Batch mode.
Pre-scan rejected	It requires barcodes and Batch mode.

Related instructions: [7.6 Master sequence, NG retry and pending pre-scan policy](#); [7.7 Parallel batch scanning and rolling lane scanning](#).

7.5 Validation, production selection and worked example

Validate the saved plan through its production view.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Procedure

1. Confirm every Product Model is active with the intended barcode rules.
2. Confirm each referenced flow has enabled steps and correct device/action bindings.
3. Save the header and model rows, then select the plan in Testing.
4. Verify displayed DUT positions, barcode slots and expected start mode before initiating a controlled trial.
5. Run approved pass, fail, stopped and blocked-start cases; inspect per-DUT result/report identity and cleanup.
6. Correct mapping errors in the plan or hardware behavior in the flow, save and repeat only the affected validation.

Worked example

A one-DUT DEMO_PLAN uses DEMO_MODEL, FLOW_DEMO and DUT_A. The Testing page should request the model's required barcode slots and record DUT_A with DEMO_MODEL after its controlled result.

Expected result

The saved configuration is traceable from selected plan to scanned product, device flow and report.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Start blocked	Read the active gate: barcode format/history, MES/interlock, Golden Sample, start condition, pending report, fixture maintenance or missing flow/device.
Wrong report model	Check Product Model, not only the Test Flow column.

7.6 Master sequence, NG retry and pending pre-scan policy

Configure master coordination, NG retry and next-DUT pre-scan.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Master sequence	Optional shared-hardware coordinator. DUT barrier keys must match its barrier keys; shared supply commands are owned by the master in that coordinated arrangement. It must have enabled steps.
NG retry limit	-1 permits unlimited retries; 0 blocks once a previous NG exists. With limit 1, one previous NG allows a retry; two previous NG results block the next attempt. Counts are checked for report model and barcode. This policy does not authorize automatic reprogramming.
Next DUT pre-scan	Requires barcode capture and Batch Scan All DUTs. Rolling already provides independent lane scanning.
Pre-scan delay (seconds)	Allowed range 0-600.
Clear pending barcodes on current DUT NG	Controls whether scanned-next identities are discarded after the current DUT fails.

Procedure

1. Use a Master sequence only for a deliberately coordinated batch design and verify matching barriers in master and DUT flows.
2. Set retry limits according to product traceability; separately preserve single-attempt programming safeguards.
3. For batch pre-scan, require barcodes, enable pre-scan and choose delay/NG clearing.
4. SAVE PLAN and validate current-DUT OK and NG cases with clearly distinguishable next-DUT barcodes.

Worked example

Current barcode DEMO001 runs while DEMO002 is pre-scanned. If Clear pending barcodes on current DUT NG is enabled and DEMO001 fails, verify DEMO002 is cleared and must be rescanned. Rolling mode cannot combine this batch pre-scan option with independent lane scanning.

Expected result

Master coordination, retry history and pending identities have explicit, tested behavior.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Missing master sequence	Save enabled master steps and matching DUT barrier keys.
Pending identity unexpectedly cleared	Check the current-DUT NG policy and trace the exact barcode.
Rolling rejects master	Choose batch coordination or a separate-hardware rolling plan.

7.7 Parallel batch scanning and rolling lane scanning

Commission batch and rolling parallel plans.

Access and preparation

ADMIN with Model Setting or Test Plan permissions appropriate to the action.

Parallel testing requires a verified hardware arrangement. Features used within each flow retain their own license guards; there is no separate parallel-test license claim in this manual. Rolling Lane Scan requires separate hardware

lanes and no Master sequence. A shared device must not be assumed safe for independent concurrent commands merely because both lane rows select it.

Procedure

1. Batch example: create a Parallel plan with two enabled rows, DEMO_MODEL/FLOW_A/DUT_A and DEMO_MODEL/FLOW_B/DUT_B. Choose Batch Scan All DUTs and require barcodes. SAVE PLAN and SAVE MODELS.
2. Select it in Testing and fill all required batch barcode slots. Check that each slot identifies its intended DUT before starting. Verify per-DUT results and any deliberately configured master/barrier coordination.
3. Rolling example: use commissioned separate lane hardware and flows, Parallel + Rolling Lane Scan, require barcodes, no Master sequence and no batch Next DUT pre-scan. Save both layers.
4. In Testing, scan/start DUT_A according to its lane readiness, then independently scan/start DUT_B. Verify one lane's scan/reset work does not change the running lane's identity.
5. Complete controlled NG/STOP/recovery trials and verify report identity, output cleanup and lane readiness before approving production.

Worked example

DUT_A records barcode DEMO_A001 and DUT_B DEMO_B001. Their reports must retain those identities even when lane completion times differ. In batch mode the scanned batch is prepared together; in rolling mode each ready independent lane can accept its next item through its own workflow.

Expected result

The chosen parallel workflow preserves per-lane identity and the intended hardware ownership.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Wrong lane barcode	Check selected lane/slot and Fixture / DUT mapping.
Resource conflict	Review actual device ownership and flow bindings; use coordinated batch operation when hardware is shared.
Parallel start unavailable	Check role/page permissions, saved plan configuration, hardware readiness and any licensed feature invoked by the flow.

8 Printer (License Required)

LICENSE REQUIRED

Printer / Label Printing license for printing operations, label rules and linked print actions. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Configure a complete label workflow from connection and template through printing and scan evidence.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

The Printer page separates Printers, Templates, Serial Rules, Print Rules and Print Log. Configure them in that order. A template defines content, a serial rule allocates numbers, and a print rule decides the production context in which printing is requested.

Begin with command preview or a Log Only/File Drop profile, then validate one physical label and scan before production. Those dry checks cannot prove media alignment, readability or a real printer's behavior.

The Printer screen identifies the function as Beta testing. Validate physical output, serial rules and scan behavior on the intended station before production use.

Procedure

1. Create an enabled printer profile with actual language/media/connection.
2. Create and preview an active template.
3. Define a serial rule only when a generated serial is required.
4. Create a targeted print rule or reviewed PRINTER sequence integration.
5. Trial, inspect the physical label, validate scan and examine Print Log before release.

Related instructions: 8.2 Printers; 8.3.1 Label Template Designer; 8.8 Serial Rules: format, scope, counters and allocation; 8.4 Print Rules; 8.5 Test printing and production/sequence integration.

Screen reference

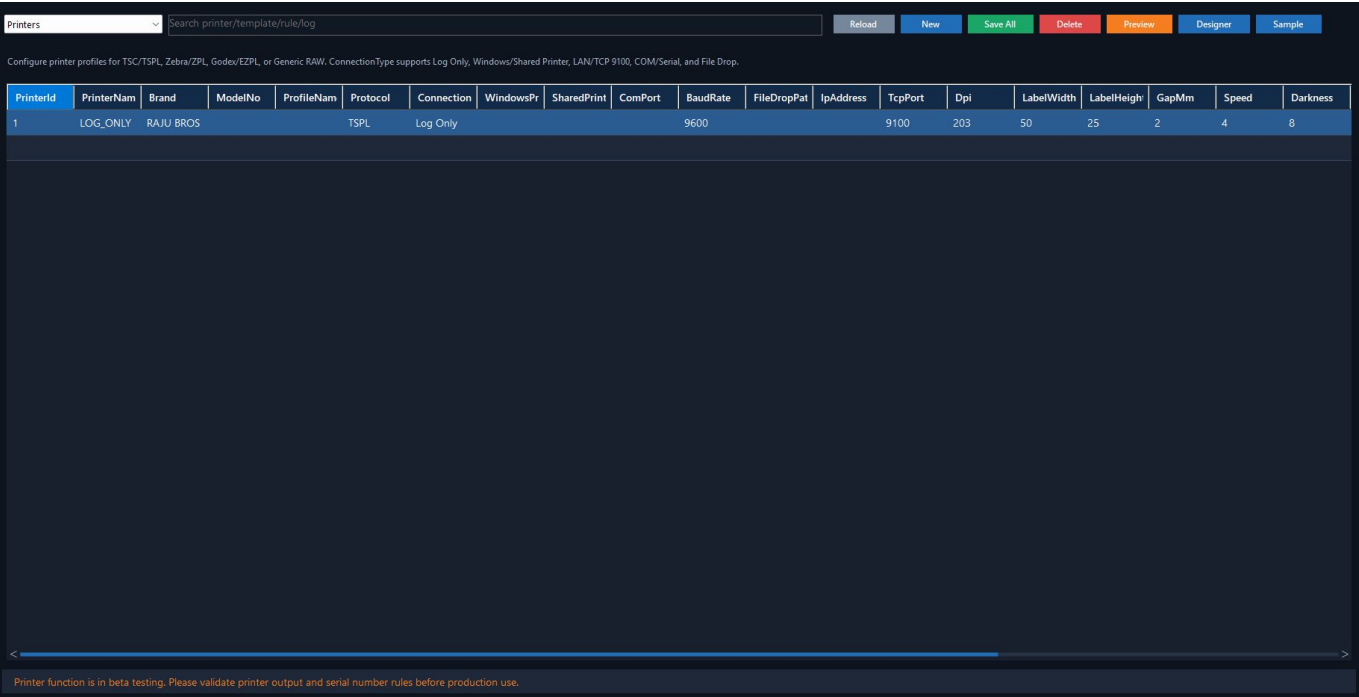


Figure 8 - Printer workspace with a Log Only profile and Beta notice; this capture is not proof of physical printing. Reference capture: 07 October 2026.

8.1 Screen overview, section selection and feature access

Navigate settings and understand locked/view-only behavior.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Use the section selector to switch between five record types. Search applies to printer/template/rule/log content and Enter refreshes its results. With no Printer entitlement, existing rows/logs can remain visible for review while setup, designer and preview actions are locked. Page visibility is not evidence of execution access.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Section selector	Printers, Templates, Serial Rules, Print Rules or Print Log.
Search	Narrow the selected section; clear it to locate a hidden record.
Preview	Inspect resolved command content using sample context; no physical label is required.
Test Print / TRIAL PRINT	Can send a physical job to the selected connection. Designer trial saves the template first.
Presets / Sample	Starting values needing review; not proof of production correctness.

Procedure

1. Select the intended section and record.
2. Check feature/access status before editing.

3. Review sample/preset values and replace them with the actual profile/rule.
4. Save and reselect the record to verify persistence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Records visible, actions locked	Check entitlement and action permissions separately.
Unexpected print	Distinguish Preview from Test Print/Trial Print and inspect the selected printer connection.

Related instructions: [8.7 Printers / Templates / Serial Rules / Print Rules / Print Log](#); [8.5 Test printing and production/sequence integration](#).

8.2 Printers

Set the actual printer transport, language and media.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PrinterName / IsEnabled	Stable profile name and availability.
Protocol / ProfileName	TSPL, ZPL, EZPL or RAW-compatible setup for the real printer; brand text alone is insufficient.
Windows Printer / Shared Printer	Use the installed queue/share name; raw commands still require compatible printer language.
LAN/TCP	IP Address and TCP Port; initial port is 9100 but use the actual printer setup.
COM/Serial	Actual COM endpoint and BaudRate; check port ownership/identity handling.
File Drop	FileDropPath receives generated .prn commands; downstream printing is a separate process.
Log Only	Records the application path without sending hardware output.
Dpi / LabelWidthMm / LabelHeightMm / GapMm	Match printhead resolution and loaded stock.
Speed / Darkness / Copies	Use media-approved values; default form examples are not universal print settings.

Procedure

1. Choose Printers and add a distinct profile.
2. Set connection and its required endpoint/queue/path.
3. Match language, DPI, width/height/gap and safe print settings to loaded media.
4. Save, then preview a template using this profile.
5. Use one test print after checking printer readiness; inspect placement and scan readability.

Worked example

Illustrative lab setup: a 50 × 25 mm label at 203 DPI with one copy can be checked through File Drop first. Use those values only if they match the real stock/prINTER. A Windows queue does not translate arbitrary ZPL into TSPL.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Blank/garbled label	Check actual printer language and raw template protocol.
Wrong size/position	Check DPI and media dimensions; do not compensate blindly with object scaling.
File exists but no label	File Drop only writes the command file; inspect the downstream print process.

Related instructions: [1.4.10 Printer and custom communication](#); [8.3.1 Label Template Designer](#).

8.3 Templates

Build label content from supported tokens and a reviewed template.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Designer templates generate language-specific commands from objects. PRN File and Raw Command templates preserve raw command content. Tokens are substituted from the print context; a token name must be supported and its source value present. A preview uses sample values and does not allocate the production serial.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
{SERIAL_NO} / {QR_VALUE} / {EXPECTED_SCAN}	Generated serial, chosen QR payload and resolved scan expectation.
{BARCODE} / {PLAN} / {MODEL}	Run barcode, plan and report model (falling back to logical model).
{LOGICAL_MODEL} / {REPORT_MODEL} / {FIXTURE} / {TARGET}	Explicit model identity and target context.
{RESULT} / {TRIGGER_RESULT} / {FINAL_RESULT} / {SCOPE}	Print-trigger outcome/context.
{OPERATOR} / {USER} / {MACHINE} / {MESSAGE}	Runtime user/station/context text; review privacy before printing/sharing.
{DATETIME} / {DATE} / {TIME} / {COPIES}	Resolved time and copy count.

Procedure

1. Choose Templates and create Designer or import a reviewed PRN/raw command.
2. Insert the required supported tokens into text/QR/barcode content.
3. Set ValidationExpression to the intended scan payload.
4. Preview command and confirm no unintended literal tokens remain.

5. Save and link the active template in the correct Print Rule.

Worked example

Illustrative text: {MODEL} / {BARCODE}; QR value: {SERIAL_NO}. If no serial rule allocates a serial, review whether QR/scan should use {BARCODE} instead.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Token prints literally	Check exact supported token spelling and the actual saved command/template.
Empty serial	Verify active serial-rule linkage or use the intended barcode payload.

Related instructions: [8.3.1 Label Template Designer](#); [8.3.2 PRN file import and raw-template workflow](#); [8.8 Serial Rules: format, scope, counters and allocation](#).

8.3.1 Label Template Designer

Create a label whose physical geometry and data payload can be verified.

Access and preparation

Printer entitlement and page access; settings/designer/import/trial actions require the applicable authorized editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Template / Type	Saved identity and Designer, PRN File or Raw Command mode.
Brand / Model / Protocol	Printer compatibility; protocol choices TSPL, ZPL, EZPL and RAW.
Width mm / Height mm / DPI	Physical stock and resolution; DPI choices 203, 300, 600 must match the printer.
Copies / Notes / Validate	Default copies, review notes and scan expression.
Object Type	Text, QR, Barcode, Box or Line.
Value	Literal text or supported tokens.
X mm / Y mm / Width / Height	Object position/size within the media.
Font size / Rotation / Border / Bold	Presentation properties applicable to the selected object.
PREVIEW COMMAND / SAVE / TRIAL PRINT	Inspect generated commands, persist definition, or save then send a test job.

Procedure

1. Open the Label Template Designer with an authorized account.
2. Choose/create a distinct template, set Designer, language, stock size and DPI.
3. Add a Text object for human-readable identity and a QR/Barcode object for the intended scan payload.
4. Position/size every object within the label; review rotation/font and contrast.
5. Set Validate to the intended payload and PREVIEW COMMAND.
6. SAVE. If using TRIAL PRINT, select Test Printer and remember it saves first.
7. Inspect a physical sample and scan its content before linking production rules.

Worked example

Illustrative 50 × 25 mm label: human text {MODEL} and QR {BARCODE}. Use actual stock/printer DPI and keep the QR's quiet space clear; determine readable dimensions through a real sample.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Content clipped	Check stock dimensions, object bounds, rotation and printer DPI.
Raw template ignores designer objects	Use the correct Type; PRN/Raw Command prints raw content, not the canvas objects.

Related instructions: [8.3.2 PRN file import and raw-template workflow](#); [8.5 Test printing and production/sequence integration](#).

8.3.2 PRN file import and raw-template workflow

Import a PRN command file and review its stored raw content.

Access and preparation

Printer entitlement and page access; settings/designer/import/trial actions require the applicable authorized editing permission.

BROWSE/import accepts .prn, .zpl, .tspl, .ezpl and text command files. The application creates a stored copy, retains source-path metadata, switches Type to PRN File, loads CommandTemplate and infers protocol/brand. Inference is a starting point; confirm the actual printer language. Raw mode does not reconstruct editable canvas objects.

Procedure

1. Open an authorized template in the designer and choose the PRN browse/import control.
2. Select a reviewed command file and inspect the stored-copy success message.
3. Verify Type, inferred Protocol/Brand and raw CommandTemplate.
4. Replace intended variable text with supported tokens without damaging command syntax.
5. Preview resolved commands; check media setup, quantities and scan payload.
6. Save and perform a controlled test through the intended profile.

Worked example

A known ZPL file containing ^XA...^XZ should remain ZPL-compatible. Substituting {BARCODE} in its reviewed data field can make it dynamic, but does not convert the command language.

Expected result

The saved template uses the stored raw commands and intended token values.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Import fails	Check file existence/readability, permissions and Printer entitlement.
Incorrect inferred protocol	Select the actual language and review the complete raw command.
Source file later moved	Check saved stored-copy/template linkage; do not assume the original external path is the only retained content.

Related instructions: [8.3 Templates](#); [8.3.1 Label Template Designer](#).

8.4 Print Rules

Control when a label prints, which DUT it belongs to and whether failures block progress.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Rule name / Enabled	Identity and participation in matching.
Scope	DUT or PLAN; match the event being handled.
Trigger	PASS, FAIL or ANY.
Run mode	Both, Production or DryRun.
Plan / Model / Target	Narrow the rule; target choices include ALL and DUT positions. Blank/broad matching needs deliberate review.
Printer / Template / Copies	Enabled profile, active content and requested copies.
Serial rule / Scan / Mode / Expected	Optional generated serial and scan requirement/expectation.
Print fail / Scan fail	Whether the respective failure blocks the next operation through the production workflow.
Order	Controls matching-rule execution order; multiple matching rules can each print.

Procedure

1. Choose Print Rules and New or a preset.
2. Set scope/trigger/run mode and narrow plan/model/target.
3. Select printer/template and copies; attach a serial rule only if needed.
4. Set scan mode/expected payload and both blocking policies deliberately.
5. Save, Preview, then use a controlled Test Print.
6. Test matching and non-matching production cases before enabling broadly.

Worked example

Illustrative single-DUT PASS rule: Scope DUT, Trigger PASS, Run mode Production, specific model and target DUT1, one copy. A second overlapping ANY rule can create another label, so inspect all active matches.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No automatic label	Check every match condition plus enabled/active linked records.
Duplicate labels	Check overlapping rules, broad target matching, copies and separate sequence-triggered printing.

Related instructions: [8.4.1 Easy Print Rule presets and scan-validation modes](#); [8.6.1 Print and scan records, failed print recovery and duplicate prevention](#).

8.4.1 Easy Print Rule presets and scan-validation modes

Use presets and validation modes without leaving broad or empty expectations.

Access and preparation

Printer entitlement and page access; settings/designer/import/trial actions require the applicable authorized editing permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Pass / Fail / Any	Starting trigger presets; review scope/target/run mode before saving.
Pass+Scan	Starting point for a PASS label requiring validation; configure exact expected payload.
Log Only	Creates an inactive starting rule. Review the selected profile explicitly; preset defaults/lookups can select an available printer. Keep the rule disabled until the connection is confirmed Log Only and targeting is reviewed.
ExactSerial	Equality comparison against the resolved expected value, normally {SERIAL_NO}.
Barcode	Equality comparison; fallback expectation is {BARCODE} only when rule/template expectation is absent.
Contains	Case-insensitive substring match; an empty expected substring is not meaningful validation.
Regex	Case-insensitive regex against the scanned value. Anchor the expression if the entire value must match.
None	Validation function accepts the scan; do not use when content verification is required.

Procedure

1. Choose the closest preset, then fill all target/profile/template fields.
2. Select Scan when production must ask for a scan.
3. Set Mode and explicit Expected; rule expectation takes precedence over template ValidationExpression, then mode fallback.
4. Use QR preview as a content check, not physical print verification.
5. Set Print fail and Scan fail blocking deliberately.
6. Save and test both a matching and an intentionally wrong sample in a controlled workflow.

Worked example

Illustrative Regex `^LAB[0-9]{5}$` accepts LAB00001 and rejects extra prefix/suffix characters. Contains LAB would accept additional content and is a weaker condition. Choose the mode that represents the actual requirement.

Expected result

Correct payload passes; the planned wrong payload fails when validation is required.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Barcode mode compares serial	A saved explicit Expected or template expression can override the mode fallback; inspect both.
Almost anything passes	Check None mode, empty Contains expectation or an unanchored regex.

Related instructions: [8.4 Print Rules](#); [8.6.1 Print and scan records, failed print recovery and duplicate prevention](#).

8.5 Test printing and production/sequence integration

Verify printing in stages and integrate it into the intended production path.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Preview renders command text. Test Print uses sample context; it does not prove production-rule matching or final scan behavior. Designer TRIAL PRINT first saves the template, then sends the job. Log Only bypasses hardware output, while File Drop creates a command file. A successful transport write does not prove a physical label emerged.

Procedure

1. Preview the saved template and inspect resolved text, QR/barcode payload and command language.
2. Use a Log Only or File Drop profile for command-path review where appropriate.
3. Select the actual printer, confirm media/readiness and print one sample.
4. Inspect size, clipping, orientation and scan readability.
5. For sequence-based printing, create a reviewed PRINTER action/sequence and link it to the intended completion phase; avoid a duplicate overlapping rule path.
6. Run a controlled production-context example, scan when required and inspect Print Log including serial and validation status.

Worked example

A sample label that looks correct can still fail production scanning if Expected uses {SERIAL_NO} but the actual QR contains {BARCODE}. Verify the printed payload and expected value together.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Trial changed template	Expected: the designer saves before trial printing.
Sample passes, production does not print	Check real rule scope/trigger/model/run mode rather than only the test-print result.

Related instructions: [8.4 Print Rules](#); [8.6.1 Print and scan records, failed print recovery and duplicate prevention](#).

8.6 Print Log

Use separate print and scan evidence to recover without creating duplicate labels.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

PrintStatus records command-path outcome; ValidationStatus records the scan workflow. PRINTED generally means the application sent its command successfully, not that paper exit or physical label quality was independently detected. Scan-required jobs begin PENDING; jobs without validation use NOT_REQUIRED.

A generated serial can already be consumed before a later transport failure. Do not assume the same number is available for an automatic repeat. Inspect the actual printer queue/output and log before authorizing another job.

Procedure

1. Choose Print Log and find the correct time, model/target, barcode and rule.
2. Read PrintStatus, ValidationStatus, expected/scanned payload, serial and ErrorMessage separately.
3. Check whether a label physically printed or remains queued.
4. Resolve endpoint/media/template/scan cause, then follow the approved reprint/recovery procedure.
5. Retain the original failed/pending evidence and avoid manual counter rollback.

Worked example

PRINTED plus PENDING means sending succeeded but the required scan has not completed. FAILED after serial allocation can leave a number consumed even when no label is visible.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Scan rejected	Compare payload with Expected and validation mode; confirm the scanned label belongs to this DUT.
Uncertain print outcome	Inspect spooler/physical printer before repeating, since a delayed job may still emerge.

Related instructions: [8.6.1 Print and scan records, failed print recovery and duplicate prevention](#); [8.8 Serial Rules: format, scope, counters and allocation](#).

8.6.1 Print and scan records, failed print recovery and duplicate prevention

Investigate a label job and scan outcome before issuing another print.

Access and preparation

Printer entitlement and page access; settings/designer/import/trial actions require the applicable authorized editing permission.

Print Log includes DateTime, scope/result, plan/model/report model, fixture, barcode, SerialNo, ExpectedScanValue, ScannedValue, ValidationStatus, PrintStatus, printer/template/rule, copies and error. Print and validation status are independent. A failed send can still retain PENDING validation because that field is initialized from the rule's scan requirement; interpret the complete row.

Sending raw commands to a TCP/serial/spooler connection does not independently confirm paper exit. Log Only returns without physical sending, so its successful application outcome must not be called a physical print test.

Procedure

1. Find the job using its barcode/target, rule and time.
2. Read PrintStatus and ErrorMessage first, then expected/scanned values and ValidationStatus.
3. For PRINTED/PENDING, complete the required scan of that exact label; do not create a new job merely to remove the pending status.
4. For FAILED or uncertain outcome, inspect connection, spooler queue, printer media and any already printed label.
5. Check SerialNo before a repeat; serial allocation may already have committed.
6. Use the station's controlled recovery/reprint procedure and retain original evidence.

Worked example

One DUT can have PRINTED with PENDING until scan, then a saved pass/fail validation. Another can have FAILED after allocating a serial; a later intentional job may allocate the next number. Neither row should be silently rewritten as a successful original print.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Duplicate label after retry	A delayed original job may still have been queued; inspect queue and overlapping rules.
Correct scan rejected	Confirm it belongs to this job and compare resolved Expected, whitespace trimming and selected mode.
Print works but next DUT blocked	Inspect scan/print blocking policy and unresolved validation rather than disabling the interlock without diagnosis.

Related instructions: [8.6 Print Log](#); [8.8 Serial Rules: format, scope, counters and allocation](#).

8.7 Printers / Templates / Serial Rules / Print Rules / Print Log

Use the five Printer sections as a configuration dependency chain.

Access and preparation

Printer entitlement and page access. Add/Edit/Delete permissions govern settings; designer/import/trial actions require the corresponding authorized editing action.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Printers	Connection, language, media and enabled profile.
Templates	Saved label geometry or raw commands and scan expression.
Serial Rules	Number format, reset period and counter scope.
Print Rules	Event matching, linked printer/template/serial and blocking.
Print Log	Read-only evidence for actual requests and validation outcomes.

Procedure

1. Start in Printers and save/test the profile.
2. Create an active Template and inspect preview.
3. Create Serial Rules only if generated numbering is required.
4. Create a targeted Print Rule and review overlapping matches.
5. After a controlled run, use Print Log to correlate the job and scan result.

Worked example

If a Print Rule references a disabled printer or inactive template, its own Enabled setting does not make the missing dependency usable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Lookup empty	Check that the required printer/template/serial rule is saved and active/enabled.

Related instructions: [8.2 Printers](#); [8.3 Templates](#); [8.4 Print Rules](#); [8.6 Print Log](#).

8.8 Serial Rules: format, scope, counters and allocation

Configure serial format and understand when a number is consumed.

Access and preparation

Printer entitlement and page access; settings/designer/import/trial actions require the applicable authorized editing permission.

A serial counter is allocated transactionally per rule and counter key. Allocation commits before the later printer send; a subsequent print/scan failure does not automatically return that number. Preview/sample test output is not proof that production counters advanced correctly. Do not reset counters to hide failed jobs.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Prefix / FormatTemplate	Prefix and tokens such as {PREFIX}, {MODEL}, {LOGICAL_MODEL}, {PLAN}, date components and {COUNTER}.
Padding	Digit padding used by {COUNTER} without an explicit numeric format.
{COUNTER:00000}	Illustrative five-digit numeric formatting; verify preview/output for the exact format you choose.
ScopeMode Global / Plan / Model	Independent counter key across all work, per plan, or per report/logical model.
ResetMode Never / Monthly / Yearly / Daily	Period key ALL, calendar month, calendar year or date.
ResetMode Shift	Current implementation uses the date plus a fixed SHIFT suffix; it does not distinguish individual shift-master names within a day.
ResetMode Lot / Batch	Uses context barcode when present, otherwise date; it is not an independent lot-entry field.

Procedure

1. Create an active Serial Rule with a unique name and approved format.
2. Choose scope and reset behavior according to actual key semantics above.
3. For a simple padded counter use {COUNTER} and Padding, or a reviewed explicit all-zero numeric format.
4. Link the rule to the intended Print Rule.
5. Run a controlled example and inspect actual SerialNo and counter behavior across the required scope/period transitions.
6. Retain consumed numbers in failure evidence rather than manually decrementing counters.

Worked example

Illustrative Prefix LAB, FormatTemplate {PREFIX}{COUNTER}, Padding 5: first allocations are LAB00001 and LAB00002 within one counter key. A different model creates a different series only when ScopeMode Model applies.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Unexpected reset at each barcode	Check Lot/Batch mode, which keys by barcode.
No reset between shifts	Shift currently uses one date bucket with a fixed suffix; do not claim separate shift numbering.
Gap after failure	Allocation may have committed before send failure; inspect logs before any recovery.

Related instructions: [8.6.1 Print and scan records](#), [failed print recovery](#) and [duplicate prevention](#).

9 CAN Analyzer / UDS (License Required)

LICENSE REQUIRED

Either CAN Analyzer or CAN access is accepted for this workspace. A second Analyzer license is not needed when CAN access is already included. This does not by itself unlock CAN Calibration. Separate feature license required. The feature must be enabled in your purchased license package. It may already be included in a bundle. Contact Raju Bros Softech Pvt Ltd for activation.

Observe CAN traffic, build controlled diagnostic requests and retain evidence.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

CAN Analyzer / UDS is for bus observation and controlled diagnostic requests. It includes a one-shot builder, cyclic transmission list and multiple traffic-analysis tabs. Confirm the adapter, channel and bitrate before interpreting traffic or transmitting.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
START MONITOR / STOP	Receive-monitor lifecycle.
CAN / UDS Builder	One-shot frame or diagnostic request.
Cyclic transmission	Separate repeated-send lifecycle.
Traffic / DBC / Trace / R&D / UDAQ	Different views/tools sharing the selected bench context.

Procedure

1. Select correct adapter/channel and confirm approved bitrate and bus setup.
2. Begin with passive observation and inspect filters/raw traffic.
3. Use one-shot or cyclic sending only for an approved controller operation.
4. Stop active transmitters before adapter handoff and export relevant evidence.

Worked example

A stopped monitor does not by itself establish that a separately started cyclic sender has stopped; use STOP CYCLIC for that owner.

Expected result

Observation, sending and export have explicit scope.

Related instructions: 9.1 Device/channel selection, filters and monitor controls; 9.2 CAN / UDS Builder; 9.3 Cyclic transmission; 9.4 TRAFFIC SUMMARY; 9.5 DBC SIGNALS; 9.6 TRACE; 9.7 UDAQ / DIO; 9.8 R&D COCKPIT; 9.9 DBC import, decoding, trace export and troubleshooting.

Screen reference

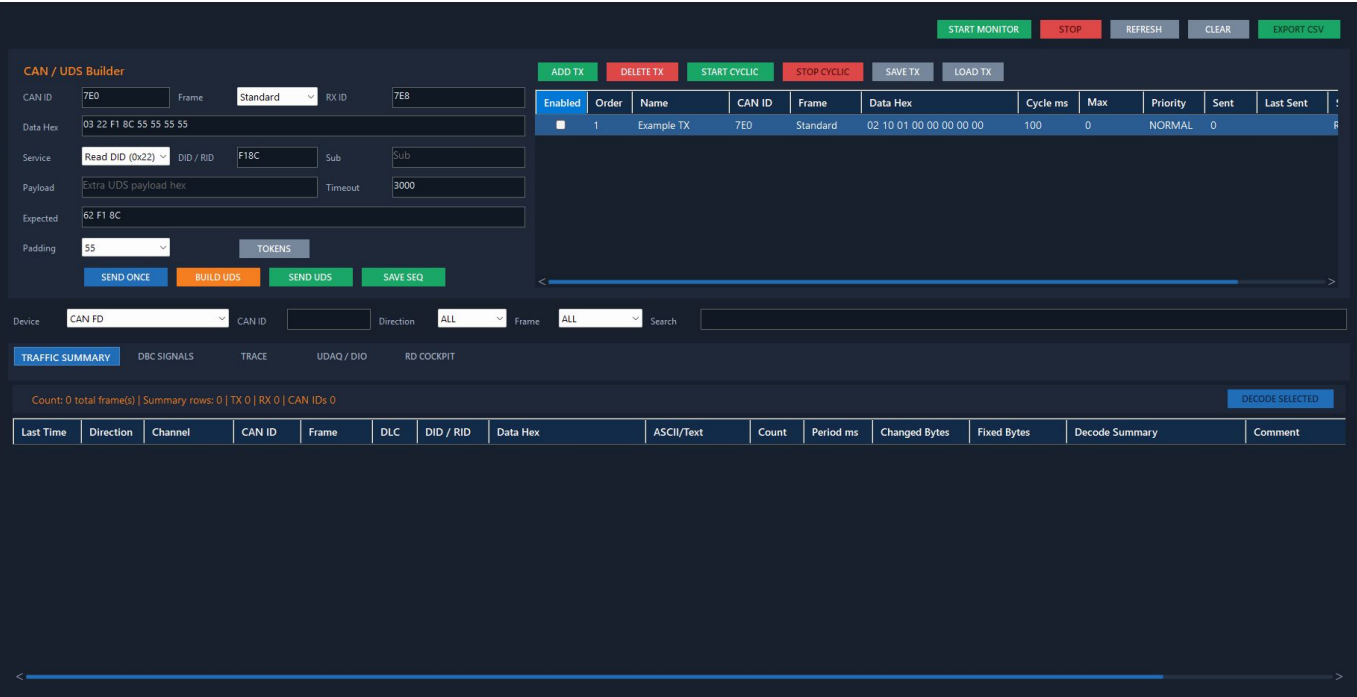


Figure 9 - CAN Analyzer / UDS: builder, cyclic list and traffic tabs. Reference capture: 07 October 2026.

9.1 Device/channel selection, filters and monitor controls

Select the intended CAN device and distinguish hidden traffic from absent traffic.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Select Device and use CAN ID, Direction, Frame and Search filters. START MONITOR begins observation; STOP ends it; REFRESH updates the view; CLEAR clears the visible capture as offered; EXPORT CSV creates an evidence file. A filter can hide traffic that is still present on the bus.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Device / REFRESH	Choose configured or detected supported CAN target and refresh inventory.
CAN ID / Direction / Frame / Search	View filters; Direction ALL/TX/RX and Frame ALL/Standard/Extended/CAN FD.
START MONITOR / STOP	Starts/stops observation.
CLEAR / EXPORT CSV	Clears displayed capture content or exports relevant analyzer evidence.

Procedure

1. Select Device and verify its channel/bitrate configuration.
2. Start with ALL filters, START MONITOR and check fresh timestamps/counts.
3. Narrow filters for the question; retain unfiltered context when diagnosing missing messages.

4. STOP, inspect evidence and export before CLEAR if needed.

Worked example

An RX-only filter hides transmitted requests, so use ALL when studying request/reply order.

Expected result

Visible traffic reflects deliberate filters and a current capture.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No traffic	Reset filters, check power/wiring/termination/bitrate and target activity.
Wrong channel	Refresh and reselect the actual adapter/channel before sending.

9.2 CAN / UDS Builder

Build a CAN frame or UDS request with separate request and response settings.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAN ID / Frame / Data Hex	Raw transmit definition.
RX ID / Expected / Timeout	Reply destination/content/wait.
Service / DID-RID / Sub / Payload	UDS request construction fields.
BUILD UDS / SEND UDS	Preview versus actual diagnostic execution.

Procedure

1. Obtain the approved ECU operation and request/reply identifiers.
2. Choose raw frame or service builder deliberately.
3. Build and inspect bytes and expected response before sending.
4. Send once, inspect raw/decoded evidence and preserve any negative response.

Worked example

Read DID and Write DID are different operations even when they address the same identifier.

Expected result

The prepared request is reviewable before transmission.

Related instructions: 9.2.1 CAN ID, frame, RX ID, data, service and payload; 9.2.2 Timeout, expected response, tokens and padding; 9.2.3 SEND ONCE, BUILD UDS, SEND UDS and SAVE SEQ.

9.2.1 CAN ID, frame, RX ID, data, service and payload

Enter CAN identities and UDS fields for the documented target service.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

CAN ID is the transmit identifier; RX ID identifies the expected reply. Frame selects the addressing format. Data Hex is the byte payload. Service, DID/RID and subfunction help build UDS requests. Consult the approved controller protocol before using a service, especially writes, routines or resets.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAN ID / RX ID	Transmit identifier and expected reply identifier.
Frame	Standard or Extended format.
Data Hex	Raw bytes; distinguish CAN frame transport bytes from UDS payload.
Service	Read/Write DID, I/O control, routines, session, reset, security, tester-present, DTC operations, transfer or Raw UDS.
DID / Routine / DTC group / Sub / Extra payload	Fields depend on selected service; service selection can fill illustrative defaults that must be reviewed.

Procedure

1. Select service and inspect all auto-populated fields.
2. Replace defaults with approved target-specific identifiers and data.
3. Build preview, verify length/order and required response.
4. Use read-only confirmation before any approved state-changing operation.

Worked example

An example DID prefilled by the builder is not evidence that the connected product supports it.

Expected result

The request matches the approved protocol rather than unreviewed defaults.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
ECU negative response	Check service/session/security, identifier, payload length and current target state.

9.2.2 Timeout, expected response, tokens and padding

Configure response timing, expected content, token resolution and padding.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Timeout bounds reply waiting. Expected defines the required response pattern. Padding fills unused bytes according to the protocol. Tokens insert supported runtime values. Inspect the resolved frame and expected reply together before sending; a matching CAN ID alone does not prove success.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Timeout ms	Maximum wait for the requested reply path.
Expected UDS payload	Blank uses the generated positive-response expectation; explicit content further constrains it.
Padding byte	Offered values 55, 00 or CC, according to target protocol.
TOKENS	Supported substitutions; inspect resolved bytes before sending.

Procedure

1. Set timeout from actual ECU response requirements.
2. Choose expected response scope: appropriate service-positive prefix versus explicit content.
3. Set documented padding and resolve required tokens.
4. Build preview and inspect both payload and transport frames.

Worked example

A received frame on RX ID can still be a negative response; matching identifier alone is insufficient.

Expected result

Reply content and timing are intentionally checked.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Timeout despite traffic	Inspect RX ID, service response, transport segmentation and expected payload.
Unresolved token	Provide the required context/value instead of sending guessed bytes.

9.2.3 SEND ONCE, BUILD UDS, SEND UDS and SAVE SEQ

Distinguish building, sending and saving a diagnostic definition.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

BUILD UDS assembles the request from the selected service fields. SEND ONCE transmits the current frame; SEND UDS executes the diagnostic request workflow. SAVE SEQ stores the prepared definition for reuse. Building or saving does not establish that the real controller accepted the request.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
BUILD UDS	Builds preview without target execution.
SEND ONCE	Sends the current raw frame.
SEND UDS	Runs the UDS request/response workflow.
SAVE SEQ	Opens Save CAN Calibration with target flow/method and optional supported readback step.

Procedure

1. Build and inspect the approved request.
2. Select the correct sending action; do not treat an ISO-TP preview as arbitrary raw bytes.
3. Send on controlled hardware once and inspect full reply.
4. SAVE SEQ only after reviewing destination flow/method and any offered readback.
5. Review saved calibration in its workspace before linking/running in production.

Worked example

Saving a successful read request does not automatically approve a subsequent write or create a production parent link.

Expected result

The saved definition retains reviewed configuration; execution evidence remains separate.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Write outcome uncertain	Preserve first result and establish target state before a deliberate new operation.

Related instructions: [4.1.7 CAN CALIBRATION](#).

9.2.4 Selected-frame decode and reuse as RX ID / Expected

Decode a selected frame and reuse only the reviewed reply fields.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
DECODE SELECTED	Available for a chosen traffic/trace row.
USE AS RX ID	Copies selected identifier into the builder's reply field.
USE AS EXPECTED	Copies available decoded expected payload; unavailable when no complete usable expected HEX exists.
COPY DECODE	Copies explanatory text to clipboard without transmitting.
CLOSE	Returns without selecting a reuse action.

Procedure

1. Select the exact event from TRACE when ordering matters, or the intended traffic summary row.
2. DECODE SELECTED and inspect transport bytes, decoded payload and any negative/incomplete-response indication.
3. Use RX ID or EXPECTED only after confirming this is the intended response.
4. Return to builder and review all fields before BUILD/SEND; copied response content does not select the correct request automatically.

Worked example

A diagnostic negative response should not become the expected successful reply merely because it was the selected recent frame.

Expected result

Reuse reduces transcription while preserving explicit review.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Expected action disabled	Check whether the selected event yields a complete expected payload.
Copied bytes unstable	Review counters/dynamic content and choose an appropriate supported match rule.

Related instructions: [9.2 CAN / UDS Builder](#).

9.3 Cyclic transmission

Transmit a reviewed repeated CAN list with a clear stop condition.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Cyclic table	Enabled ordered messages with interval and send count.
START CYCLIC / STOP CYCLIC	Repeated-transmit lifecycle separate from monitor.

Procedure

1. Build a minimal list and verify all enabled rows.
2. Review bus load and maximum sends for each interval.
3. Start under controlled conditions and observe sent counts and traffic.
4. Stop explicitly and verify no unwanted traffic remains.

Worked example

A one-shot command placed in a 100 ms cyclic row will repeat; use this only when the protocol requires repetition.

Expected result

Repeated traffic exists only for the intended bench interval.

Related instructions: [9.3.1 ADD TX, DELETE TX, START/STOP CYCLIC](#) and [SAVE/LOAD TX](#).

9.3.1 ADD TX, DELETE TX, START/STOP CYCLIC and SAVE/LOAD TX

Edit, save/load and operate the cyclic transmit table.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

ADD TX and DELETE TX edit cyclic entries. Set enabled state, data and Cycle ms deliberately. START CYCLIC begins repetition and STOP CYCLIC stops it. SAVE TX/LOAD TX manage the list. Confirm bus load and safe stop behaviour before using repeated frames on a real DUT.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
ADD TX / DELETE TX	Creates/removes selected transmit row.
Enabled / Order / Name / CAN ID / Frame / Data Hex	Definition and participation.
Cycle ms / Max Sends / Priority	Schedule controls; inspect intended stop count and bus load.
Sent / Last Sent / Status	Runtime evidence, not editable configuration.
SAVE TX / LOAD TX	Saved list persistence.

Procedure

1. ADD TX and enter descriptive name, correct ID/frame/data and interval.
2. Enable only reviewed rows; remove stale examples.
3. SAVE TX, then START CYCLIC and inspect counts/status.
4. STOP CYCLIC before edits or LOAD TX; inspect loaded content before starting.

Worked example

Two enabled rows with the same protected ID can compete. Inspect list ownership before starting even if both rows individually look valid.

Expected result

Loaded/saved lists and actual transmission counts are distinguishable.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
More sends than expected	Check duplicate rows, other transmit owners, interval and Max Sends.

9.4 TRAFFIC SUMMARY

Use aggregated traffic to find patterns and attach bench observations.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

TRAFFIC SUMMARY groups observed traffic by identifiers and related attributes. Count, period, changed/fixed bytes and decode summary help locate patterns. Select a frame for decoding. Summary rows aggregate events; use TRACE when individual ordering matters.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Last Time / Count / Period ms	Freshness, observed count and period summary.
Changed Bytes / Fixed Bytes / Decode Summary	Changes and interpreted evidence for the grouped message.
Comment / Tag	Editable annotation; does not alter raw payload.
DECODE SELECTED	Detailed interpretation of the selected frame.

Procedure

1. Capture traffic under a known operating condition.
2. Select an ID and inspect count/period/changed bytes.
3. Record a concise comment/tag for a controlled change.
4. Open TRACE for exact ordering and decode a relevant individual frame.

Worked example

A changing low nibble may be an alive counter; count/changed-byte evidence locates it but does not establish its physical meaning.

Expected result

Summary supports discovery without replacing event-level trace.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Timing conclusion inconsistent	Compare capture duration and inspect individual timestamps in TRACE.

9.5 DBC SIGNALS

Decode messages with the correct DBC and validate at least one reference signal.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

DBC SIGNALS decodes supported signals using the selected DBC definition. Check message ID, byte order, signedness, scaling and units. The wrong DBC can produce plausible but incorrect values. Compare at least one signal against a known input/reference.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IMPORT DBC / CLEAR DBC	Load or remove the active definition.
DBC SIGNALS	Decoded message/signal values, types, scale, limits and units.
EXPORT SIGNALS	Exports signal evidence.

Procedure

1. Import the approved DBC for the exact product/bus variant.
2. Capture its expected message and select the signal.
3. Compare raw bytes, start bit/length, endian/signedness, scale/offset and units.
4. Apply one controlled known condition and verify decoded change; export evidence if required.

Worked example

Raw 100 with scale 0.1 and offset -5 represents 5 units. The wrong DBC can still produce a plausible number.

Expected result

Decoding has a verified relationship to raw traffic.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Signal absent	Check matching ID/frame/DLC and fresh traffic.
Value wrong	Check DBC variant and bit ordering before changing limits.

9.6 TRACE

Inspect individual frame order and preserve the relevant trace.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

TRACE preserves individual frame timing and direction. Use it to inspect request/reply order, intermittent traffic and diagnostic timing. Export the relevant capture for authorized investigation. Keep real payloads and product identifiers out of public manuals or support examples.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
TRACE	Individual timestamp, direction, channel, ID, frame, DLC, data and decode/status evidence.
DECODE SELECTED / EXPORT TRACE	Inspect one event or save the trace.

Procedure

1. Capture from before the trigger through the response/failure.
2. Use both TX and RX while reconstructing request/reply order.
3. Select the exact event for decoding, then export before clearing.
4. Store the file with bench condition and target identity in the authorized evidence location.

Worked example

An aggregate last payload cannot reveal whether a transient negative response preceded success; TRACE can show the individual events.

Expected result

The relevant event sequence is available for review.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Missing earlier frames	Check capture start/buffer scope and repeat the controlled observation only when safe.

9.7 UDAQ / DIO

Correlate deliberate digital I/O actions with captured bus behavior.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

UDAQ / DIO correlates supported digital I/O with the bus investigation. Confirm channel mapping and whether a value is input feedback or a commanded output. Any manual output action needs the same physical review as Maintenance output control.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
REFRESH DIO / Device	Load/select a supported enabled UDAQ/DIO target.
Relay / DO / DI CH / Pulse ms	Output channel, input channel and pulse duration.
DO ON / DO OFF / PULSE / DI READ	Physical output actions versus input read.
Command / SEND COMMAND	Explicit approved manual command.
STOP DIO	Requests cancellation and waits for operation/output cleanup.

Procedure

1. Verify physical channel wiring and fixture-safe state before manual output.
2. Select Device and intended Relay/DO or DI channel.
3. Use DI READ for feedback or one reviewed output action while monitoring CAN.
4. Inspect response's device, command, port/target and result.
5. Stop and verify actual end state before leaving the fixture.

Worked example

DO ON indicates a command request/result; DI READ or an instrument confirms actual feedback where required.

Expected result

Commanded and observed states remain distinct.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No device	Configure/enable the supported UDAQ, relay, PLC or DIO device and refresh.
Output did not recover	Inspect stop/cleanup evidence and the actual fixture state before further actions.

9.8 R&D COCKPIT

Use the R&D cockpit to validate definitions, watch signals and compare captures.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
DBC DOCTOR	Definition/capture issue review.
SIGNAL WATCH	Focused list of selected decoded signals.
GOLDEN TRACE COMPARE	Current message snapshot compared with an approved captured reference.
SAVE BLACK BOX	Raw trace buffer export.

Procedure

1. Import the correct DBC and capture representative traffic.
2. Run DBC Doctor and inspect each issue rather than relying only on health score.
3. Watch a small relevant signal set during a controlled condition change.
4. Capture/save a known-good reference and compare an equivalent current capture.
5. Save black-box evidence before clearing the investigation.

Worked example

For an intermittent signal, watch its decoded value while retaining raw trace to establish whether a missing update or changed payload caused the symptom.

Expected result

Definition, live interpretation and raw evidence support the same investigation.

Related instructions: [9.8.1 DBC DOCTOR](#); [9.8.2 SIGNAL WATCH](#); [9.8.3 GOLDEN TRACE COMPARE](#); [9.8.4 Black box evidence and diagnostic export](#).

9.8.1 DBC DOCTOR

Review DBC issues against both file structure and observed traffic.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

DBC DOCTOR helps inspect definition problems. Review the reported message/signal issue and correct the approved DBC source deliberately. A clean check cannot prove that the file describes the connected product variant.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
RUN DBC DOCTOR	Checks the loaded messages/signals against current captured frames.
Severity / CAN ID / Message / Issue / Detail / Action	Locates the issue and suggested corrective check.
Health score	Summary derived from errors, warnings and information; not a production acceptance certificate.

Procedure

1. Import the approved DBC and capture relevant traffic.
2. RUN DBC DOCTOR and read all ERROR/WARNING rows.
3. Compare the named signal/message with approved bit layout, length and observed DLC.
4. Correct the authoritative DBC through the approved engineering process, reimport and rerun the check.
5. Use COPY TEST CHECK only after selecting and validating the intended signal.

Worked example

A clean structural check cannot prove that a file describes the connected product variant; verify at least one known physical input.

Expected result

Definition issues remain visible with enough context for correction.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Issue persists after edit	Confirm the corrected DBC was reimported and traffic belongs to the same variant.
High health score but wrong values	Check real signal semantics, units and known input independently.

Related instructions: [9.8.1.1 Copy an analyzer signal check into a test recipe](#).

9.8.1.1 Copy an analyzer signal check into a test recipe

Copy a signal-check reference and translate it into a reviewed test definition.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
COPY TEST CHECK	Copies text for the selected DBC signal to clipboard.
Copied fields	CAN_CHECK message.signal, CAN_ID, DLC, StartBit, Length, Endian, Signed, Scale, Offset, Min, Max and Unit.

Procedure

1. Import approved DBC and select the intended decoded signal.
2. Verify it against a known raw frame/input.
3. COPY TEST CHECK and inspect the generated fields in the destination engineering draft.
4. Configure the actual CAN sequence decoder/limits using those reviewed facts; it is reference text, not an automatically executed command.
5. Save and trial the resulting sequence with known passing/failing input.

Worked example

A copied DBC Min/Max can represent signal encoding range rather than the product acceptance specification. Replace test limits only through approved engineering review.

Expected result

The reference assists configuration without silently creating or running a production row.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Nothing copied	Select a valid DBC signal first.
Wrong check semantics	Inspect bit numbering/endian and distinguish DBC representable range from acceptance limits.

Related instructions: [9.8.1 DBC DOCTOR](#).

9.8.2 SIGNAL WATCH

Watch selected decoded signals while keeping source freshness in view.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

SIGNAL WATCH focuses on selected decoded signals. Choose the exact signal and units, then observe it over the intended condition change. Verify that the source traffic is fresh. A stable value can mean a stable DUT or a missing update.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
WATCH SIGNAL	Adds the selected DBC signal to the focused watch list.
REMOVE WATCH / CLEAR WATCH	Removes one/all watch selections, not the bus source itself.
Watch values	Derived from current decoded message updates.

Procedure

1. Select the intended signal in DBC SIGNALS.
2. WATCH SIGNAL and confirm its exact message/name/unit.
3. Apply a controlled known condition and observe both decoded value and fresh source traffic.
4. Remove unrelated signals to keep the list readable; export relevant evidence through the analyzer tools.

Worked example

An unchanged temperature value can mean a stable target or no new frames. Check source timestamps/counts before concluding it is stable.

Expected result

Watch focuses attention without replacing raw evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No update	Inspect monitor state, filters, source ID and DBC compatibility.
Wrong signal watched	Remove it and select the exact message/signal before WATCH SIGNAL.

9.8.3 GOLDEN TRACE COMPARE

Compare equivalent captures using the actual fixed snapshot comparison.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CAPTURE GOLDEN	Copies the current raw trace into the reference buffer.
SAVE GOLDEN / LOAD GOLDEN	Persists/loads .cantrace.json reference frames.
COMPARE	Compares message presence, latest DLC/payload and frame counts.
Severity / Golden / Current / Action	Explains each difference.

Procedure

1. Capture a known-good product under the approved mode for a documented interval.
2. CAPTURE GOLDEN, then SAVE GOLDEN with its context.

3. Capture the current product under equivalent bus/mode/duration conditions or load the appropriate reference.
4. COMPARE and inspect every missing/extra/DLC/payload/count row.
5. Use TRACE and DBC SIGNALS to investigate differences before deciding product acceptance.

Worked example

Missing live message and changed DLC are errors; extra live message/payload change are warnings. Count drift is informational when the difference exceeds max(5, one-fifth of reference count). Changing an alive counter can legitimately change the latest payload.

Expected result

The comparison describes fixed snapshot differences; it is not a time-aligned waveform tolerance test.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No golden/current trace	Capture/load reference and capture current frames first.
Many count differences	Match capture duration and operating conditions.
No adjustable tolerance control	This view uses built-in comparison rules; inspect exported raw trace for a separate timing study.

9.8.4 Black box evidence and diagnostic export

Preserve the actual raw trace buffer as a portable black-box file.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SAVE BLACK BOX	Writes current raw trace records to .cantrace.json.
Included record fields	Event number/time, direction/channel/ID/frame/DLC, DID/RID, HEX/ASCII data, message, decode summary and status.

Procedure

1. Capture the period surrounding the symptom.
2. STOP observation when appropriate and inspect whether required events are present.
3. SAVE BLACK BOX and choose an authorized location.
4. Check success status and retain accompanying bench context; review sensitive payloads before sharing externally.

Worked example

The file is the current trace buffer, not an automatic export of all application settings, database rows or unlimited historical traffic.

Expected result

Raw captured events are preserved with their decoding context.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No frames available	Start a relevant capture first; a blank buffer cannot produce useful black-box evidence.
Save failed	Check directory availability/permissions and keep capture until export succeeds.

9.9 DBC import, decoding, trace export and troubleshooting

Diagnose missing traffic, incorrect decoding and contention in a controlled order.

Access and preparation

Open CAN Analyzer / UDS with the applicable page/action permissions. CAN Analyzer or CAN entitlement provides access (License Required); either qualifying entitlement is sufficient.

If decoding is wrong, inspect raw frames first, then DBC variant, ID format and scaling. If traffic is absent, check adapter/driver, bus speed, wiring, power, termination and filters. Stop active transmit jobs before disconnecting or handing the adapter to another tool.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
IMPORT DBC / CLEAR DBC	Correct definition selection.
Filters	Can hide relevant traffic without removing it from the bus.
STOP CYCLIC / STOP / STOP DIO	Stop the corresponding distinct operation owners.
EXPORT TRACE / EXPORT SIGNALS / SAVE BLACK BOX	Choose event, decoded or structured evidence for the issue.

Procedure

1. For no traffic, first widen filters and verify selected device/channel, bitrate, power, wiring and termination.
2. For incorrect values, inspect raw bytes before DBC variant, bit layout, signedness, scale/offset and units.
3. For UDS failures, inspect service-specific negative response, session/security and ISO-TP/reply IDs.
4. For intermittent replies, stop competing cyclic/trial owners and reproduce a reviewed minimal operation.
5. Export the smallest sufficient evidence with exact bench conditions before clearing.

Worked example

If the raw bytes are correct but the value is wrong, changing timeout will not repair a decoder/DBC scaling error.

Expected result

Troubleshooting changes one relevant cause at a time and preserves first evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Plausible wrong decode	Validate a known input independently.
Write timed out	Establish target state/readback through the approved recovery process; do not automatically resend.

10 KPI Dashboard

KPI Dashboard opens the production Reports view. Select a model or barcode and a date period before applying filters. Trial activity is excluded from the production analysis shown by this workspace. Use the selected scope consistently when comparing charts and exported rows.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

KPI Dashboard summarizes saved production records. Barcode Search provides detailed attempt evidence. Engineering trials and records excluded from production totals do not have the same counting scope as production analytics.

PROCEDURE / Review production results

Analyze production output, pass/fail trend, model comparison, and detailed result history.

Access and preparation

ADMIN or authorized user. Know date range, model, barcode, or operator filter.

Steps

1. Open Reports.
2. Select date range and model filter.
3. Review summary, trend, failure analysis, or detailed result table.
4. Export when customer or quality sharing is needed.

Expected result

Production data can be reviewed without changing setup or machine state.

Avoid these errors

Do not use report filters as proof that data is missing until all date/model filters are checked.

If it does not work

If expected results are missing, check test completion logs, database path, and retention settings.

Related instructions: [10.1 Date, model and production filters](#); [10.3 Barcode Search](#); [10.5 Model Analysis](#).

Screen reference

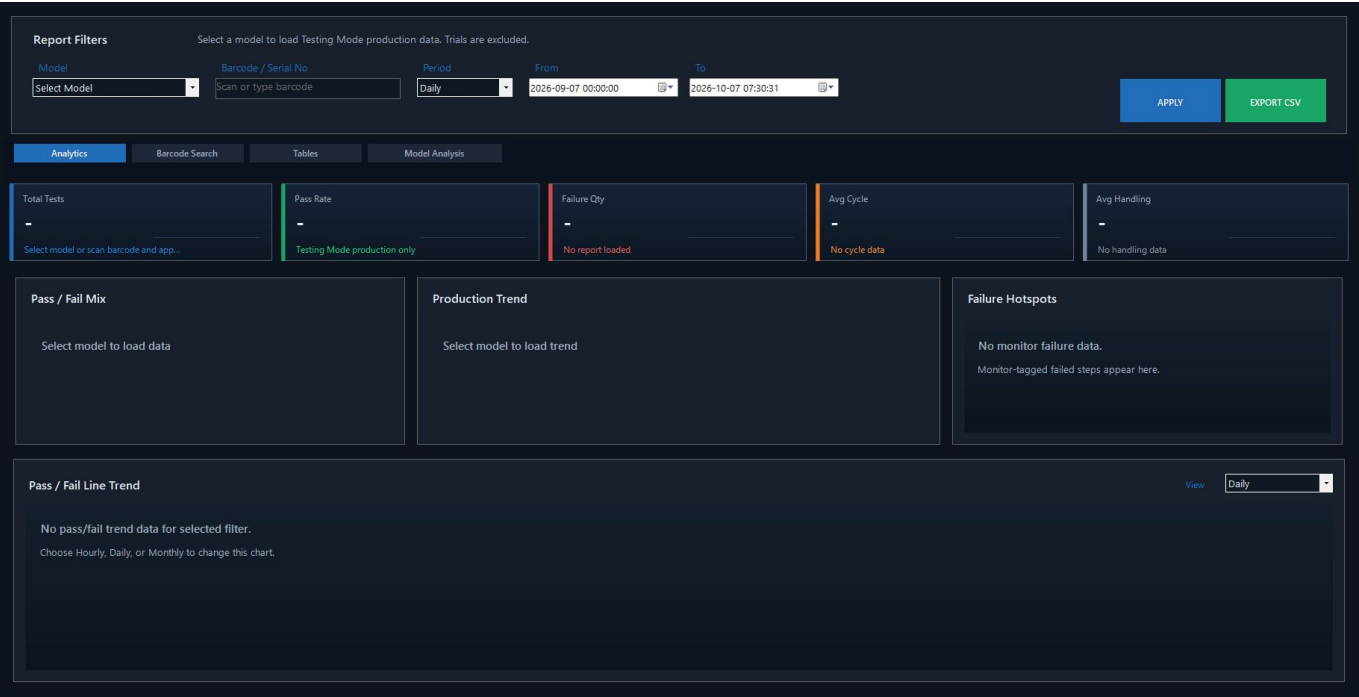


Figure 10 - KPI Dashboard / Reports: filters and analysis tabs. Reference capture: 07 October 2026.

10.1 Date, model and production filters

Choose Model, optional Barcode / Serial No, Period and From/To, then APPLY. Use the intended local production time range. A blank dashboard before applying a valid selection is not a zero-production conclusion. EXPORT CSV uses the current report context.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Model	Select the model for model-specific analytics. Model Analysis compares models over the date range.
From / To	Set the intended interval before refreshing; records outside it are excluded.
Period / trend mode	Summary periods and analytics trend modes are separate selectors. Use the grouping needed for the question.

Procedure

1. Select the required model and date/time interval.
2. Refresh/load the view using its displayed action.
3. Read the active filters before comparing a chart to a table or exporting it.

Worked example

Compare one shift for DEMO_MODEL with that same model and interval in Detailed Results. A barcode history search across all models and dates will intentionally return a broader set.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No data	Check the model, dates, saved Testing records and production-count inclusion. Do not assume a blank chart means no test was ever run.

10.2 Analytics

Analytics displays Total Tests, Pass Rate, Failure Qty, average cycle/handling time, pass/fail mix, production trend and failure hotspots. Inspect the filter scope and sample count before acting on a percentage or average.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Pass / Fail distribution	Counts in the applied production scope. Repeated attempts can each contribute according to saved counting policy.
Trend	Shows time grouping; change Hourly/Daily/Monthly for the desired scale.
Failure hotspots	Identifies repeated failed checks for further investigation.
Average cycle / handling	Separate measures; a long handling period is not necessarily a slow measurement step.

Worked example

If 95 of 100 counted attempts are OK, the pass fraction is 95%. Investigate the five failures through saved step details rather than inferring causes from the chart color alone.

Related instructions: [10.4.3 Failure Analysis](#); [10.4.4 Detailed Results](#).

10.3 Barcode Search

Barcode Search locates recorded evidence for a particular unit. Check the exact barcode and any repeated tests, dates or DUT positions. Open the corresponding result detail before deciding which record represents the released unit.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Barcode Search uses an exact barcode and saved attempts. It can show multiple tests of the same unit, including saved metadata and retained detail. Search changes must be applied before paging or export uses them.

Related instructions: [10.3.2 Exact barcode search, applied filters and attempt navigation](#); [10.3.1 Compare attempts and inspect saved attachments](#); [10.3.3 Open Archive and review historical attempts](#); [10.3.4 PDF / Print, Export attempt and Export all matches](#).

10.3.1 Compare attempts and inspect saved attachments

Compare two saved database attempts or open their original attachments.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Search a barcode and select the first attempt. Click Compare to pin its Test ID.
2. Select a second attempt and click Compare again. Review rows marked Changed and the two attempts' values.
3. For original evidence, select an attempt, open Attachments and double-click an available file.
4. Double-click a step row to inspect all saved fields for that step.

Worked example

Pin the first NG attempt, then compare the later OK attempt. A changed measured value can explain the verdict, but does not prove which maintenance action caused it.

Expected result

Comparison highlights changed evidence; it does not edit either result or recalculate the original test.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No file opens	The attachment must still exist at its retained location and be accessible to the account. Ask support to restore approved archive access; do not fabricate replacement evidence.

Related instructions: [10.3.3 Open Archive and review historical attempts.](#)

10.3.2 Exact barcode search, applied filters and attempt navigation

Find every saved attempt matching an exact barcode and the applied optional filters.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Barcode + Search / Enter	Trimmed exact barcode; an empty value prompts Enter a barcode.
All models / model	Restricts the search to one model when selected.
From / To checkboxes	Unchecked means the boundary is not applied.
All history	Keeps the barcode and removes model/date restrictions, then searches.
Latest / Previous page / Next page	Use the applied filter; pages contain up to 100 attempts.
Previous attempt / Next attempt	Moves the selected attempt and crosses result pages when needed.
Failures only	Filters the selected attempt's step grid to NG/FAIL; it does not filter the attempt list.

Procedure

1. Enter the complete barcode, choose optional model/date boundaries, then Search.
2. Read the Applied summary and totals. If empty, try All history before concluding the barcode was never tested.
3. Select an attempt by Test ID and timestamp. Read fixture, operator, sample type and storage as context.
4. Change filters and press Search again before exporting a new scope.

Worked example

Two tests of DEMO000001 at different times remain two attempts. Select the earlier Test ID to inspect its original NG rather than the later OK.

Expected result

The selected attempt loads its saved steps; stale details are cleared while another attempt is loading.

Related instructions: [10.3.1 Compare attempts and inspect saved attachments](#); [10.3.4 PDF / Print, Export attempt and Export all matches](#).

10.3.3 Open Archive and review historical attempts

Open an archived attempt through its verified manifest when detailed evidence has been moved out of live storage.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Choose Open Archive in Barcode Search.
2. Select the archive's manifest.json through the file dialog.
3. Wait for verification, then read the archive source and step details.
4. Use Attachments or PDF / Print when the corresponding retained file is present.

Expected result

The view switches to the archived attempt; live search totals and database attempt navigation are cleared.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Archive fails validation or is incomplete	Keep the error and the archive unchanged. Have the archive owner verify the manifest and retained files.
Compare or export does nothing	Database attempt actions require a live selected Test ID; an independently opened archive uses its retained attachments.

Related instructions: [4.4.9.1 Verified archive cleanup and searchable historical results](#); [10.3.4 PDF / Print, Export attempt and Export all matches](#).

10.3.4 PDF / Print, Export attempt and Export all matches

Export saved test evidence using the applied search or one selected attempt.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PDF / Print	Opens a generated historical PDF for the selected live attempt; the viewer provides zoom/pages/print. An independently opened archive uses an existing PDF attachment.
Export attempt	Exports one selected live attempt.
Export all matches	Exports all matching Test IDs in the applied search, not only the visible page.

Procedure

1. Apply the barcode search and verify its summary. Select the intended attempt for a single export.
2. Choose PDF / Print to review first, or choose an export action and a destination folder.
3. Wait for export completion and inspect the created RB_History folder containing per-attempt PDF, CSV and Excel evidence.
4. If cancelled or failed, retain the status and treat the folder as partial until its files have been checked.

Worked example

A search with 145 matching attempts shows only one page at a time, but Export all matches targets all 145. Export attempt targets only the selected Test ID.

Related instructions: [10.3.2 Exact barcode search, applied filters and attempt navigation](#).

10.4 Tables

Tables provide the rows behind report summaries. Select the appropriate inner tab, confirm the same applied interval/model and compare the table to saved attempt evidence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [10.4.1 Model Summary](#); [10.4.2 Period Trend](#); [10.4.3 Failure Analysis](#); [10.4.4 Detailed Results](#).

10.4.1 Model Summary

Model Summary compares production by model within the selected period. Read totals and pass/fail rates together. Different product mixes or volumes can make percentages misleading when viewed without counts.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Model / Total / Pass / Fail	Model and counted attempt totals in the report scope.
PassRate / FailRate	Percentages based on the corresponding counted total.
Average cycle / handling	Review timing units and unavailable values before ranking models.

Worked example

For 20 counted attempts with 18 OK, pass rate is 90%. Repeated tests are attempts, not a guaranteed count of 20 unique physical units.

Related instructions: [10.5.1 Model Comparison](#).

10.4.2 Period Trend

Period Trend groups production over time. Choose the relevant hourly/daily/monthly view and check shift boundaries. A gap can mean no recorded production, a filter exclusion or unavailable records; investigate before assigning a cause.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Period grouping	The summary selector offers Daily, Weekly and Monthly. Analytics has a separate Hourly/Daily/Monthly trend mode.
Date boundary	The selected interval limits the saved records before they are grouped. A partial first/last period is not a full-period throughput measure.

Procedure

1. Set the interval and desired grouping.
2. Compare a period total with Detailed Results within the same dates.
3. For an apparent gap, check whether records exist in that interval and meet production-count filters.

Related instructions: [10.1 Date, model and production filters](#).

10.4.3 Failure Analysis

Failure Analysis groups failed operations and related evidence. Start with the most frequent or severe failure, then inspect individual unit records. Repeated NG does not by itself distinguish product defects from fixture or communication problems.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Select a high-count failure item in Failure Analysis and note the step/test name.
2. Find affected attempts in Detailed Results or exact Barcode Search.
3. Compare actual values, device names and saved responses across attempts before changing configuration.

Worked example

Ten failures under a current-measurement step can arise from different devices or fixtures. Grouped counts identify where to investigate, not a proven common cause.

Related instructions: [10.3.1 Compare attempts and inspect saved attachments](#); [13.1.1 Commands, responses, timeouts and exceptions](#).

10.4.4 Detailed Results

Detailed Results lists individual production records. Use it to reconcile a chart or exported total with actual runs. Check result, model, barcode, DUT and time together, especially when retests exist.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test identifier / time	Distinguishes repeated attempts; do not identify a run by barcode alone.
Model / barcode / fixture	Links the saved attempt to the product and lane.
Result and step detail	Use the saved final result together with the detailed measurement evidence.

Procedure

1. Find the relevant row in the applied model/date scope.
2. Record Test ID, time and barcode.
3. Open Barcode Search with that barcode and select the matching attempt for complete retained evidence.

Related instructions: [10.3.2 Exact barcode search, applied filters and attempt navigation](#).

10.5 Model Analysis

Model Analysis provides the supported model-specific comparisons. Match the selected model, period and measurement context. Numeric display policy helps readability, while original recorded verdicts remain historical evidence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Model Analysis contains Model Comparison and Model Efficiency. These views compare all models over the selected date interval; they are not simply a copy of the single-model analytics filter.

Related instructions: [10.5.1 Model Comparison](#); [10.5.2 Model Efficiency](#).

10.5.1 Model Comparison

Compare counted production attempts across models over the selected From/To interval.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Total / Pass / Fail	Counted Testing attempts; Pass is OK and Fail is non-OK in this comparison.
PassRate / FailRate	Pass or fail count divided by total, expressed as percent.
AvgCycleSec / AvgHandlingSec	Average saved seconds. Missing cycle data can use saved start/end times; handling averages use positive recorded values.
FirstTest / LastTest	First and last saved timestamps in the selected interval.

Procedure

1. Set From and To, refresh the report, and open Model Analysis > Model Comparison.
2. Compare total volume and pass rate together; a small sample can have an unstable percentage.
3. Investigate a model using its detailed results before acting on a ranking.

Worked example

Model A: 100 attempts, 95 OK = 95%. Model B: 10 attempts, 10 OK = 100%. The table does not establish that B is more reliable from those unequal sample sizes alone.

10.5.2 Model Efficiency

Read model quality and timing indicators with their calculation limits.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
QualityPercent	GoodQty / Total x 100. GoodQty is OK; RejectQty is non-OK.
TotalPerHour / GoodPerHour	Counts divided by the span between first and last test timestamps. With no positive span, the count itself is used.
EfficiencyScore	Quality fraction x (3600 / average cycle seconds), or zero without positive average cycle time. It is a comparative score, not a measured plant OEE percentage.
AvgHandlingSec	Separate positive handling-time average; it is not subtracted inside the efficiency-score formula.

Procedure

1. Open Model Analysis > Model Efficiency for the intended interval.
2. Check Total, quality, average cycle and handling before reading the score.
3. Use the detailed evidence and physical line context to explain a difference.

Worked example

Illustrative quality 95% and average cycle 30 seconds give EfficiencyScore = $0.95 \times 120 = 114$. This is not 114% efficiency. Sparse timestamps and missing timing values can distort comparisons.

10.6 Result detail, exports and report interpretation

Export only the report scope needed for the authorized recipient. Review identifiers before sharing. If a total appears wrong, compare filters, production versus trial scope, repeated barcodes, time range and detailed rows before altering data or counters.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Choose the report view and apply filters before export.
2. Select the destination using the displayed export action and wait for completion.
3. Open the generated files and confirm model, date interval, row counts and units.
4. For unit-level evidence, use Barcode Search export so the attempt identifier and saved steps remain together.

Worked example

Model comparison and efficiency exports can contain multiple models even while another report tab shows one selected model.

Related instructions: [10.3.4 PDF / Print, Export attempt and Export all matches](#); [10.5.1 Model Comparison](#); [10.5.2 Model Efficiency](#).

11 Cycle Time Audit

Cycle Time Audit supports controlled timing experiments. It shows configurable waits, not a guarantee of the total real cycle. Communication response time, processing and hardware behaviour also affect duration. Change only timings justified by the approved trial.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Cycle Time Audit separates a timing trial from its approval for production. Shorter configured waits are not proof of an improved or safe physical cycle.

PROCEDURE / Optimize cycle time with a controlled trial

Load every timing parameter that can affect a Test Seq, edit it in one place, prove the change on the real machine, and keep a traceable rollback path.

Access and preparation

ADMIN. Stop production changes, select one saved Test Seq, keep an approved OK sample available, and know the present customer cycle time. Timing changes immediately affect the active trial, so use a controlled machine state.

Steps

1. Open Cycle Time Audit.
2. Select one Test Seq and press LOAD. Only that flow and its linked command rows, CAN, LIN, UDAQ, Communication Studio, programming, vision, calibration stabilization, retry/loop waits are shown. GLOBAL timing is not mixed into a model load. Select GLOBAL explicitly when built-in runtime timing must be reviewed.
3. Review Test Name, Device, Command, Delay After, Stabilize, Timeout, Retry, Retry Delay, Recovery Delay, Group Retry, Loop, Sweep Dwell, Repeat, and interval values. Blue timing cells are editable; protected cells are read-only.
4. Watch the DIFF tile while editing. A reduced estimated wait is negative and green, for example -4.0 sec. An increased wait is positive and red, for example +4.0 sec.
5. Change only the measured timing fields required for the experiment. Enter a clear Change reason.
6. Press SAVE TRIAL. The values become an active TIMING TRIAL and every changed field is written to audit/history.
7. Run that Test Seq from Operator. Operator shows TIMING TRIAL and automatically records PASS/FAIL and cycle time.
8. Complete three consecutive PASS runs. Any FAIL resets the consecutive-pass count. Use MARK PASS or MARK FAIL only for a supervised engineering confirmation when an automatic Operator result is unavailable.
9. Review the History column for the latest three changes. If the trial is unsafe or causes NG, press RESTORE PASS to restore the pre-trial values.
10. After three consecutive PASS results and quality approval, press APPLY PRODUCTION. Export CSV when an engineering or customer comparison is required.

Expected result

The approved timing values remain in production, the trial status and last three changes stay visible, and every save/pass/fail/restore/approval is traceable in Audit Log.

Avoid these errors

Do not reduce a timeout because a good sample responds quickly; timeout protects the no-response path. Do not remove stabilization until repeatability is proven. Do not approve after only one PASS. Do not change limits to hide an NG caused by an aggressive timing change.

If it does not work

If a changed value is not editable, it is not mapped to a saved runtime field. If SAVE TRIAL reports no changes, verify that one Test Seq is selected and a blue cell differs from its loaded value. If Operator fails, record the failed step and use RESTORE PASS. If APPLY PRODUCTION is blocked, complete three consecutive PASS runs first.

Related instructions: 11.1 Baseline selection and controlled trial setup; 11.2 SAVE TRIAL, MARK PASS, MARK FAIL and RESTORE PASS; 11.3 Cycle comparison and APPLY PRODUCTION; 11.1.1 Timing field dictionary, Risk and Source filters.

Screen reference

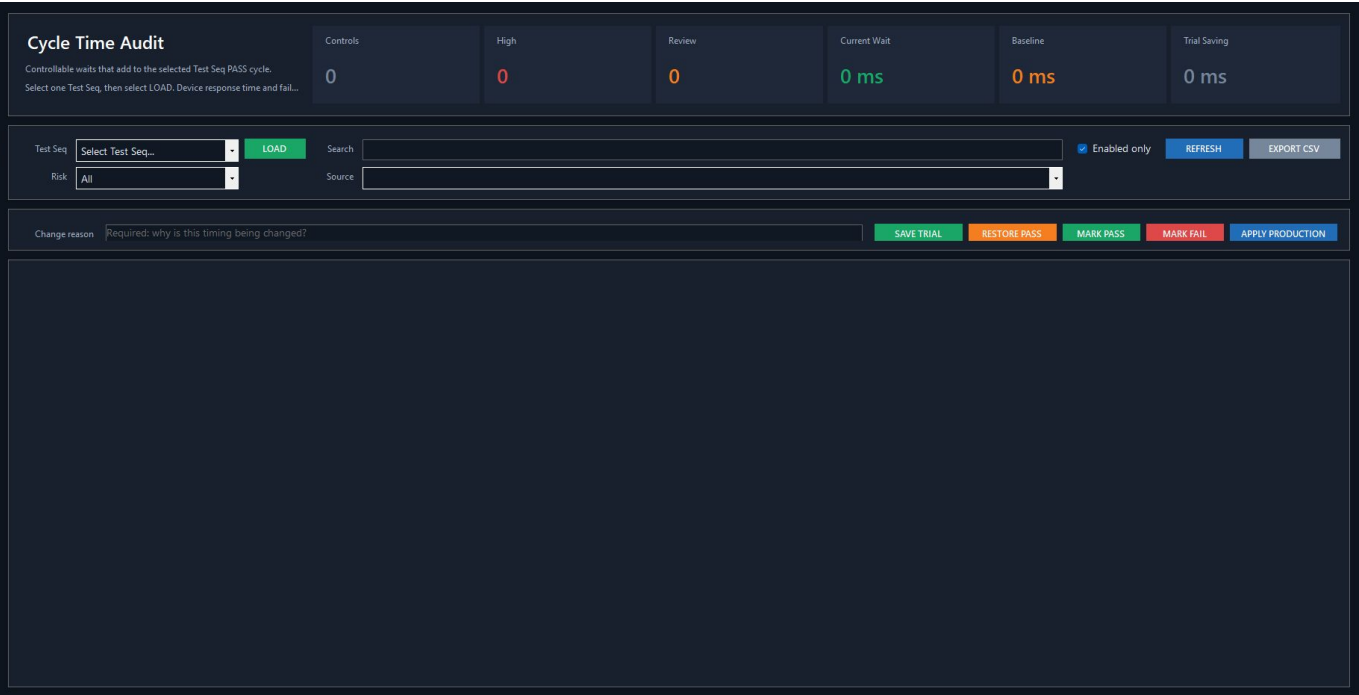


Figure 11 - Cycle Time Audit: controlled trial controls. Reference capture: 07 October 2026.

11.1 Baseline selection and controlled trial setup

Select one Test Seq and LOAD. GLOBAL timings are reviewed separately. Blue timing cells are editable; protected cells are not. Review the current values and baseline before changing Delay After, timeout, retry, stabilization or loop timing.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Select Test Seq and LOAD its audit rows.
2. Use Enabled only, Search, Risk and Source to isolate the timing family being studied.
3. Record the current baseline and edit only permitted trial-value cells. Enter a specific Change reason.
4. Save and evaluate a controlled trial using the station's approved validation process.

Worked example

A 100 ms reduction repeated ten times suggests 1 second less configured waiting. Device settling, branching and retries mean actual cycle saving must still be measured.

Related instructions: [11.1.1 Timing field dictionary](#), [Risk](#) and [Source filters](#).

11.1.1 Timing field dictionary, Risk and Source filters

Use the timing inventory to find controllable waits without confusing their units or scope.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Test Seq / LOAD	Choose the saved sequence whose timing controls are inspected.
Risk	All, High, Review, Check or Normal. Risk is a review aid, not authorization to reduce a wait.
Source	Filters the source family of timing controls.
Enabled only	Limits displayed rows to enabled controls.
Current Wait / Baseline / Trial Saving	Summary of configured timing values and difference; these are not a substitute for measured hardware cycle time.
Change reason	Required explanation accompanying trial changes.
Protected/read-only cells	Identify the control and baseline. Edit only allowed trial cells; keep the displayed unit.
DelayMs / StabilizationMs	Millisecond delay and settling wait for the source operation. Reductions require evidence that the device/fixture has settled.
TimeoutMs	Maximum response/operation wait in milliseconds; not a fixed delay on every successful operation.
RetryCount / RetryDelayMs / RetryRecoveryDelayMs	Retry allowance and waits between attempts/recovery. Runtime safety policy can disallow automatic retries, especially for programming.
GroupRetryCount / GroupRetryDelayMs	Group retry allowance and wait; group loops are a separate setting.
LoopCount / LoopDelayMs	Loop repetitions and inter-loop delay. A duration-based group has its own termination behavior.
SweepDwellMs	Time to hold each sweep point before collecting/evaluating its evidence.
RepeatCount / RepeatIntervalMs / ContinuousIntervalMs	Repeated-send count and intervals for the particular source family. Refer to the linked editor for the supported range and stop semantics.

Procedure

1. LOAD the intended sequence, then start with High and Review rows.
2. Inspect source, control name, baseline and unit before entering a trial.
3. Reset filters when a needed timing family is absent.
4. Use EXPORT CSV to retain the audit inventory and compare it with the controlled trial evidence.

Worked example

A duration in seconds must not be entered as though it were milliseconds. Review units at the row rather than inferring them from a neighboring control.

Related instructions: [11.2 SAVE TRIAL, MARK PASS, MARK FAIL and RESTORE PASS](#).

11.2 SAVE TRIAL, MARK PASS, MARK FAIL and RESTORE PASS

Enter a change reason and SAVE TRIAL to activate the timing trial. Operator trial results build the consecutive-PASS evidence. MARK PASS/FAIL is for supervised engineering confirmation where automatic evidence is unavailable. RESTORE PASS restores the pre-trial settings when the trial is unsuitable.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

Record an illustrative baseline of 20.0 s and a controlled trial of 19.4 s only after the station has actually measured them. Mark the trial PASS only if all acceptance checks pass; a faster failed trial remains FAIL.

Related instructions: [11.3 Cycle comparison and APPLY PRODUCTION](#); [11.4 History, permissions and troubleshooting](#).

11.3 Cycle comparison and APPLY PRODUCTION

The DIFF/Trial Saving indication estimates the changed wait. Confirm actual cycle time and product results. Three consecutive PASS results are required for APPLY PRODUCTION; a failure resets the consecutive count. Apply only after the site's engineering/quality approval.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

APPLY PRODUCTION is a separate action after a passing trial. Verify that the selected sequence and reviewed trial still match the intended production flow. A trial saving in the table is insufficient evidence on its own.

Related instructions: [11.2 SAVE TRIAL, MARK PASS, MARK FAIL and RESTORE PASS](#).

11.4 History, permissions and troubleshooting

Review History for recent changes and export the comparison when needed. If APPLY PRODUCTION is blocked, check the selected flow, active trial, pass evidence and permission. A faster estimated wait is not acceptance evidence when the measurement has not stabilized.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
History/evidence	Relate saved trial values to reason, result and the sequence inspected. Retained records cannot prove an unperformed hardware trial.
EXPORT CSV	Save the current audit data to the chosen folder for review.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
SAVE or APPLY rejected	Read the validation/permission message. Confirm the intended sequence, a meaningful reason and required passing-trial state.
Trial made the station worse	Mark FAIL and preserve the evidence. RESTORE PASS restores the active trial's pre-trial values; it does not choose a historical proven PASS configuration. Review the restored values and revalidate the affected machine behavior.
A control is absent	Clear Risk/Source/Search filters and review Enabled only. Confirm that the source family is represented by this audit.

12 Service Records

Service Records shows engineering logins and close-out notes, with date/engineer analytics and a more narrowly filtered event table.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
From / To / Engineer	Apply to service analytics and rows.
Event	All Events, Login or Close-Out; applies to table rows.
Search	Matches engineer, work note and PC name in rows.
Machine Status chart	Summarizes status; it is not a separate status filter.

Related instructions: [12.1 Service record list, filters and detail](#); [12.3 Service close-out and next actions](#); [12.4 Record history and audit evidence](#).

Screen reference

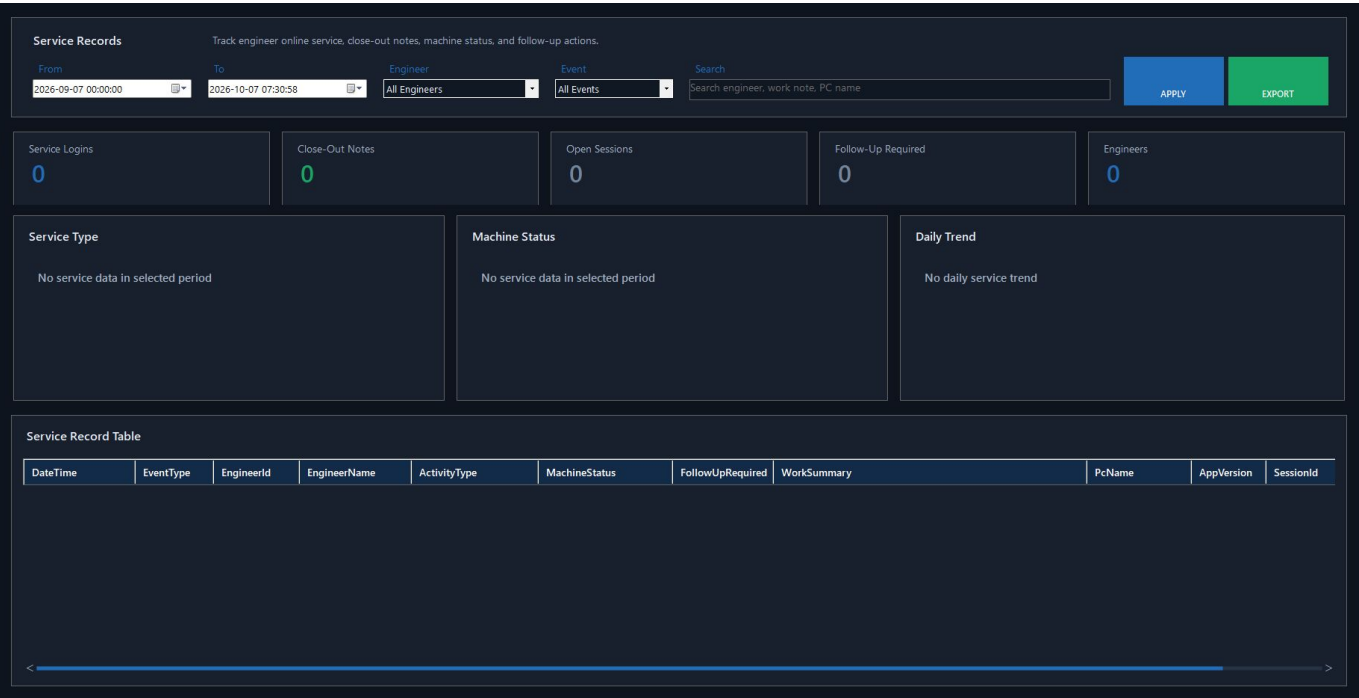


Figure 12 - Service Records: filters, summary and table. Reference capture: 07 October 2026.

12.1 Service record list, filters and detail

Select the intended date range and filters. Review Service Logins, Close-Out Notes, Open Sessions, Follow-Up Required and Engineers, then inspect individual rows. Empty results apply only to the selected scope.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Set From/To and Engineer, then refresh the view.
2. Choose Login or Close-Out under Event and enter a search term when needed.
3. Read event time, engineer, activity, machine status, follow-up, work summary and session identity in the table.
4. Clear Event/Search to compare the row set with the broader date/engineer cards and charts.

Worked example

Filtering rows to Close-Out does not change the Service Logins card into a close-out count. The cards use the broader date/engineer scope.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No rows but cards show counts	Clear Event/Search and check the date interval. The cards and rows intentionally use different filter scopes.

12.2 Engineer activity, work summary and machine status

A service record associates the activity with its work summary and machine status. Record what was found, what changed and what remains outstanding. Avoid placing passwords, private endpoints or unnecessary personal data in work notes.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Service Logins / Close-Out Notes	Counts of the respective events for the analytic scope.
Open Sessions	Sessions without recorded completion in that scope; investigate before assuming work is still occurring.
Follow-Up Required	Close-outs that explicitly request more work.
Engineers	Distinct participating engineers in scope.

Worked example

A login followed by a close-out under the same session lets the reviewer trace the intervention. An open session needs investigation rather than an invented completion note.

Related instructions: [12.3 Service close-out and next actions](#).

12.3 Service close-out and next actions

Complete the service close-out when requested at the end of an authorized service session. State the machine's actual readiness and any follow-up action. An unresolved issue should remain visible to the next responsible person rather than being described as completed work.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Service type	Online Service, Machine Visit, Configuration Change, Validation / Trial, Breakdown Support, Preventive Maintenance or Other.
Machine status	Choose Running OK, Running with observation, Stopped, Need customer action or Need RB follow-up. A selection is required.
Engineer name	At least two characters; use the responsible engineer identity.
Work done	At least eight characters; describe actual work, verification and outstanding action.
SAVE & CLOSE / CANCEL	Save the service record and audit before completing logout; CANCEL leaves the session open.

Procedure

1. When Service Close-Out opens at logout/close, select the activity type and current machine status.
2. Write the work actually completed, checks made, unresolved problem and next action. Set Follow-Up Required where appropriate.
3. Save/finish the close-out using the dialog action. If validation or saving fails, correct the problem before ending the session.
4. Cancel if you need to continue work; cancelling leaves the session open.

Worked example

Illustrative note: Re-seated scanner cable; verified five scans using the approved test labels. Intermittent connector movement remains; replacement requested. Follow-up required. Do not record production acceptance unless it was performed.

Related instructions: [15.3 Service Close-Out](#).

12.4 Record history and audit evidence

Export service records only for authorized review. Compare service timing with configuration audit and test evidence when investigating a change in performance. Service notes explain human work; they do not replace the individual setting-change audit records.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
EXPORT CSV	Exports visible record-grid columns in display order and the displayed filtered rows to service-records-<timestamp>.csv.
History linkage	Session identity connects related service events. Configuration changes have separate audit evidence.

Procedure

1. Apply the desired row filters and verify the displayed count.
2. Choose EXPORT CSV if permitted and select the output folder.
3. Open the generated file and check its headers and work-note content before authorized sharing.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Nothing to export	The app reports that no service records are available. Adjust filters or verify saved close-outs.

Related instructions: [13.3 Advanced Audit](#).

13 Application Log

Application Log is an ADMIN workspace for technical evidence and audited activity. Page permission alone does not grant an operator this workspace.

Access and preparation

Customer ADMIN account with applicable page/action permission.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Debug Log	Technical messages, exceptions and available raw communication.
Activity Log	User actions, sessions and counter-reset activity.
Advanced Audit	Configuration old/new values, reasons, paging, archive access and permitted export.
Test Log	Execution and attempt/group events.

Related instructions: [13.1 Debug Log](#); [13.2 Activity Log](#); [13.3 Advanced Audit](#); [13.4 Test Log](#).

Screen reference

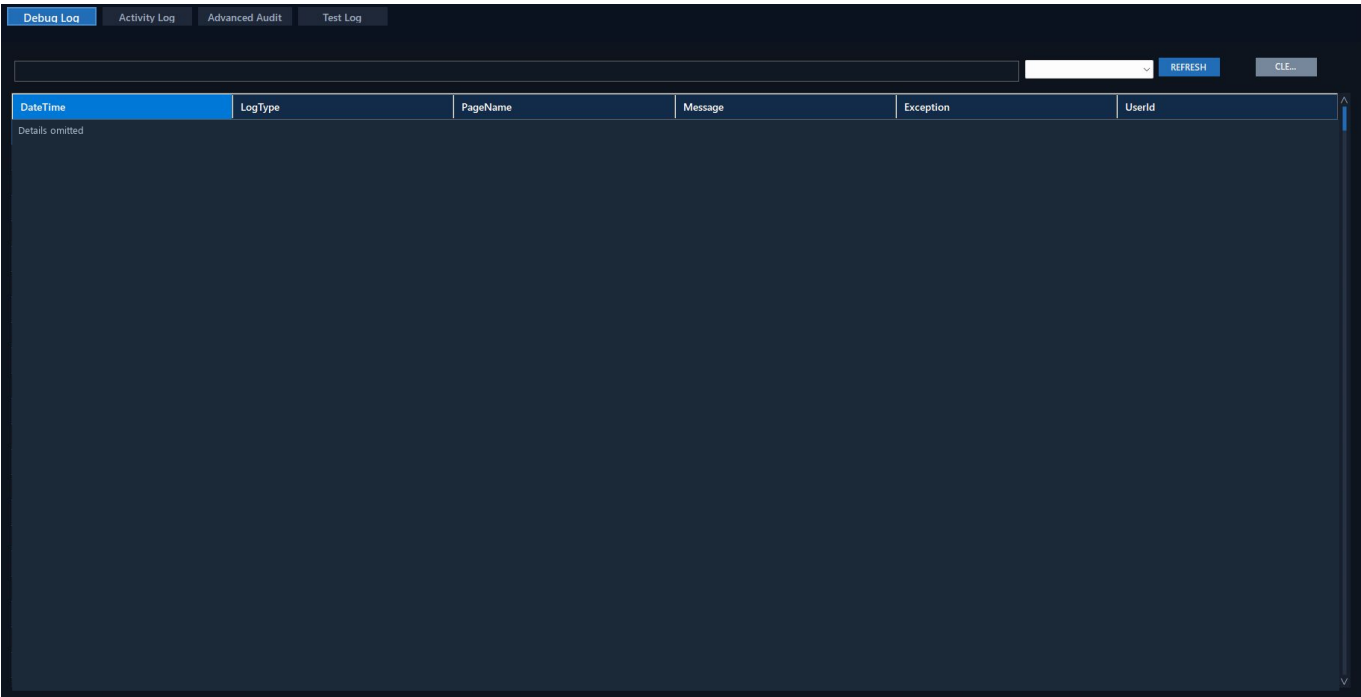


Figure 13 - Application Log: debug fields and navigation. Reference capture: 07 October 2026.

13.1 Debug Log

Find technical details for startup, login, devices, commands, responses, exceptions, barcode validation, MES, and tests.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

PROCEDURE / Review debug log

Find technical details for startup, login, devices, commands, responses, exceptions, barcode validation, MES, and tests.

Access and preparation

ADMIN or authorized user. Know approximate time, page, model, barcode, user, or device involved.

Steps

1. Open Application Log and select Debug Log; Activity Log is the default tab.
2. Enter a message, page or user search term and select the log type. The view shows the newest 1000 matching records.
3. Review DateTime, LogType, PageName, Message, Exception and UserId around the incident.
4. Press REFRESH for new records. CLEAR VIEW empties the displayed grid; REFRESH restores matching records without deleting them.
5. When support evidence is needed, use HOW TO > Support Pack and review what will be included before sharing. Date-range filters and CSV export belong to Advanced Audit, not this Debug Log view.

Expected result

The cause of most machine and setup issues can be traced without disturbing production data.

Avoid these errors

Do not troubleshoot only from the operator message. Always check the technical log for device/MES details.

If it does not work

If logs are missing, confirm debug log setting, database status, log path, and retention settings.

Related instructions: [13.1.1 Commands, responses, timeouts and exceptions](#); [13.1.2 Six-decimal numeric values and raw communication](#); [14.6 SUPPORT PACK workspace and generated contents](#).

13.1.1 Commands, responses, timeouts and exceptions

Trace a technical failure using search, log type and the newest matching debug records. Debug Log has REFRESH and CLEAR VIEW; it does not provide the date-range/export controls of Advanced Audit.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Search	Use a distinctive device, page, user or message term.
Type	Choose INFO, PROGRAMMER REPLY, WARNING, ERROR or EXCEPTION, or leave unrestricted.
DateTime / Message / Exception	Read the sequence around the incident, including inner exception detail when retained.
CLEAR VIEW	Clears displayed rows only. REFRESH queries matching records again.

Procedure

1. Record the incident time and affected device or barcode from Testing.

2. Search the technical term and choose a useful type, then REFRESH.
3. Read the preceding command/connection and following timeout/exception, rather than only the last message.
4. Use a reviewed Support Pack if the cause remains unresolved.

Worked example

A port-open exception before a timeout points to connection setup; a successful TX with an unexpected RX points instead to response format/addressing. Logs support the distinction but do not independently prove the physical fault.

Related instructions: [14.6 SUPPORT PACK workspace and generated contents](#); [3.1 COMMUNICATION STUDIO](#).

13.1.2 Six-decimal numeric values and raw communication

Numeric debug measurements are formatted to six decimal places, including trailing zeros. Raw TX/RX data retains the device representation. General display decimals therefore may differ from debug text. Use the configured comparison policy and recorded verdict when investigating a boundary case.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Raw response	Text/bytes returned by the device. Preserve units, sign and complete available precision.
Displayed numeric value	Formatted by the applicable precision policy.
Saved verdict	Uses the configured evaluation; do not reverse it using a rounded display alone.

Worked example

An illustrative raw response +5.0000004 V may display as 5.000000 with six decimals. Near a boundary, inspect the saved evaluation and limits rather than assuming the displayed rounded number is the full measurement.

Related instructions: [4.4.4 Limit & Result](#).

13.2 Activity Log

Activity history records user actions rather than a continuous device waveform. Use the action and context fields to find who performed a reset, edit or run action.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

PROCEDURE / Review customer activity

Follow a customer's session, action requests, saved changes, and test activity.

Access and preparation

ADMIN or authorized user. Use an account with Application Log view permission. Know the approximate date, user, page, session, or test run.

Steps

1. Open Application Log. Activity Log opens the simple history by default.

2. Select a login session on the left. The latest session is expanded first; expand an earlier session or select a page inside it. Entries without a recorded login session are labelled Earlier activity.
3. Follow Time, Page, Activity and Result. A saved limit change reads, for example, TEST_A -> Step 5 -> Max limit: 8 -> 10. Selecting the activity opens its changed fields, old/new values, user, time and reason. Double-click a field for its full values.
4. Filter by date, user, page or search. Press ALL 2 YEARS to search the retained history. Use OLDER ACTIVITY to continue beyond the current history page.
5. Open Advanced Audit for internal action codes, session/test run IDs, detailed filters, archives or permitted CSV export. Duplicate navigation markers are combined in the simple presentation; complete stored records remain available there.

Expected result

UI action requests show the steps the customer attempted. Saved configuration records show the values that actually changed. New test-step Min/Max changes also retain the unchanged partner limit as context at save time; it is labelled unchanged in Details. Older entries without that snapshot show only their stored changes. Records remain retained for at least 730 days.

Avoid these errors

REQUESTED does not confirm a successful save or hardware operation. UI input edit records omit typed text; use the saved field changes to establish actual setting values.

If it does not work

If the list looks small, check date range, search, user/page filters and the selected session/page. Press REFRESH after an action or ALL 2 YEARS for the retained range. The history is paged; use OLDER ACTIVITY for additional records. Activity that was never logged by an older version cannot be reconstructed. Check Debug Log for audit write errors.

Related instructions: [13.2.1 User activity, filters and history](#).

13.2.1 User activity, filters and history

Activity Log follows login sessions and user actions. Select a session, then the activity to inspect its detail. Search by sequence, step, user or change and use the page/date filters. Newer/Older Activity loads another range rather than changing the stored history.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

Search a test-run or session identifier to connect a counter reset or page action to the same session. An absent row can reflect filters or retained-history scope, not proof that no action occurred.

Related instructions: [13.3 Advanced Audit](#).

13.3 Advanced Audit

Advanced Audit records configuration changes with actor, reason and old/new values. Use the permitted query and archive tools to reconstruct a change.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Filters / search	Narrow the audit by the available date, user, page/action and critical/configuration scope.
Old / New / Reason	Read the changed value and its explanation as a pair.
Paging / ALL 2 YEARS	Changes how much retained history is queried.
ARCHIVES	Opens retained audit archives when available and permitted.
Export	Use the available permitted export for the applied query.

Procedure

1. Apply filters around the change time and relevant page/record.
2. Select the audit record and compare old/new values, actor and reason.
3. If outside the live scope, use permitted archive access and retain its origin when exporting.

Related instructions: [13.3.1 Old/new values, reasons, paging and archives](#).

13.3.1 Old/new values, reasons, paging and archives

Advanced Audit shows who changed a setting, when, the affected record/field, old and new values and the reason. Use paging and archive access for older records. Confirm the save timestamp when comparing a test with the configuration that was active at that time.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

An illustrative timeout change from 500 to 1000 ms should show the old value, new value, actor and reason. This proves the recorded setting change; successful physical communication still needs its own test evidence.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Expected change absent	Check date boundary, page/action and record key. Broaden the query or use permitted archives; keep protected policy controls to authorized support.

Related instructions: [13.5 Refresh, search, Clear View, settings and export](#).

13.4 Test Log

Test Log shows execution events such as steps, group attempts and stop/error outcomes. Use the saved production report for the final unit evidence, and the log for the path taken to that result.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [13.4.1 Execution results, step retries and group attempts](#).

13.4.1 Execution results, step retries and group attempts

Test Log records execution results and evidence around retries, loops and failures. Identify the run, DUT, group, cycle, attempt and step before comparing records. Hiding the group-attempt label in production output does not erase debug retry history or change a verdict.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Search / Type	Find the run, group or step. Available types include INFO, SUCCESS, PASS, WARNING, ERROR and EXCEPTION.
Group/cycle/attempt labels	Separate a group retry from a child cycle. A displayed later pass does not erase an earlier recorded failure.
REFRESH / CLEAR VIEW	Refresh retrieves matching retained records; clearing the grid does not delete storage.

Procedure

1. Use the incident run/time and group/step name to narrow the view.
2. Read start, attempt and terminal events in order.
3. Compare with the final report and group progress when reconstructing a failure.

Related instructions: [2.3.2.1 Loop progress, group attempts and temporary target editing](#); [10.3 Barcode Search](#).

13.5 Refresh, search, Clear View, settings and export

Use the controls belonging to the selected log tab; clearing displayed rows, querying retained evidence and exporting a copy are distinct actions.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

These tabs do not share identical controls. Clearing a view is different from deleting stored records. Use the specific tab instruction rather than looking for a universal export or retention button.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Debug Log	Search and type; REFRESH/CLEAR VIEW. Use Support Pack for reviewed technical sharing.
Activity Log	Action-oriented filters, search and retained history navigation.
Advanced Audit	Date/query controls, old/new detail, archive access and permitted export.
Test Log	Execution search/type and REFRESH/CLEAR VIEW.

Related instructions: [14.6 SUPPORT PACK workspace and generated contents](#).

14 HOW TO

HOW TO follows the application's feature hierarchy. Select a topic or search for the page, control or task. The help workspace also provides AI Assistance, Troubleshoot and Support Pack entry points. Read the guide for the current page and version.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
HOW TO	Browse/search approved application guides and HOT Key.
AI ASSISTANCE	Ask RAJU BROS AI Assistance (Beta) with the relevant context.
TROUBLESHOOT	Open the available diagnostic guidance/actions for the current problem.
SUPPORT PACK	Create a local evidence package for review and authorized support sharing.

Related instructions: [14.1 Search, topic navigation and context-sensitive help](#); [14.2 HOT Key](#); [14.7 TROUBLESHOOT workspace and diagnostic actions](#); [14.6 SUPPORT PACK workspace and generated contents](#).

Screen reference

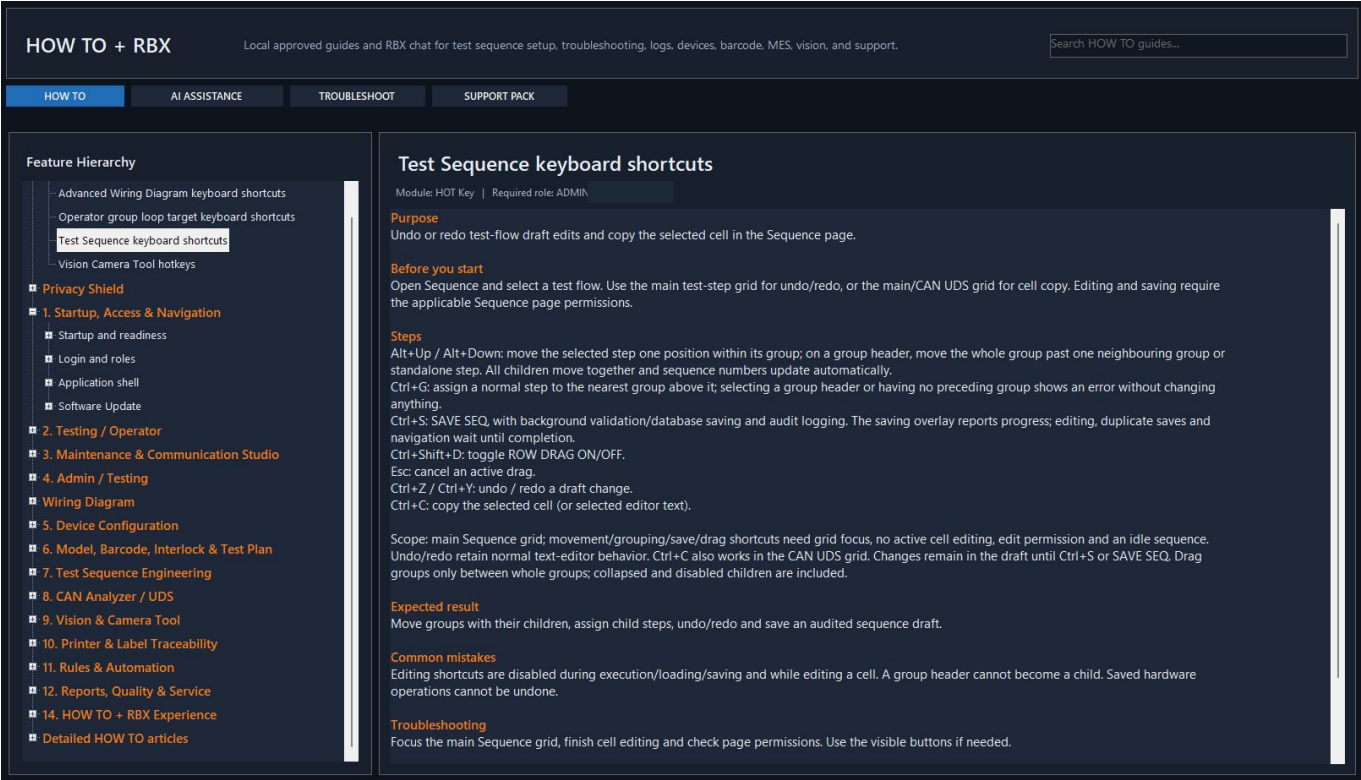


Figure 14 - HOW TO: feature tree and shortcut guide. Reference capture: 07 October 2026.

14.1 Search, topic navigation and context-sensitive help

Expand the relevant branch of Feature Hierarchy and select a topic. Each detailed guide explains purpose, prerequisites, steps, expected result, common mistakes and troubleshooting. F1 or AI HELP can provide context-sensitive guidance where supported. A guide may be hidden if its page or feature is unavailable.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

Search barcode to locate scan/interlock guides; search shortcut for HOT Key; search report for delivery recovery. A guide may be hidden by role or page permissions.

Related instructions: [14.3 Finding setup procedures and troubleshooting topics](#).

14.2 HOT Key

Use the page-specific tables below. Shortcuts obey the same permissions, editing focus and save rules as the visible actions; a key does not make a hardware action safe.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

PROCEDURE / HOT Key

Find the approved keyboard shortcuts for each application page.

Access and preparation

All users. Open the page where you want to use a shortcut. Available shortcut guides follow your role and page permissions.

Steps

1. Open HOW TO and expand HOT Key.
2. Select the guide for the relevant page.
3. Review each key, its action, and when it is active.
4. Finish editing text or grid cells before using segment shortcuts.
5. Use the page's normal Save or Apply action to keep configuration changes.

Expected result

The shortcut guide explains the page scope, key mapping, movement size, and save behavior.

Avoid these errors

A shortcut may have a different meaning on another page. Follow the guide for the active page.

If it does not work

Search HOW TO for hotkey, shortcut, the page name, or the action. Check focus and finish pending edits if a key does not respond.

Related instructions: [14.2.1 Test Sequence keyboard shortcuts](#); [14.2.2 Vision segment keyboard shortcuts](#); [14.2.3 Operator group target dialog shortcuts](#); [14.2.4 Advanced Wiring Diagram keyboard shortcuts](#).

14.2.1 Test Sequence keyboard shortcuts

Test Sequence shortcuts operate on the main grid while idle, with edit permission and no active cell edit: Alt+Up/Down moves a step/group, Ctrl+G joins a normal step to the nearest group above, Ctrl+S saves, Ctrl+Shift+D toggles row drag, Esc cancels drag, Ctrl+Z/Y undo/redo, and Ctrl+C copies the cell. Text editors retain normal text shortcuts.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Run Group and Copy Group are reached through their visible/context-menu actions. The shortcuts in this guide do not add an undocumented keyboard shortcut for either operation.

PROCEDURE / Test Sequence keyboard shortcuts

Undo or redo test-flow draft edits and copy the selected cell in the Sequence page.

Access and preparation

ADMIN. Open Sequence and select a test flow. Use the main test-step grid for undo/redo, or the main/CAN UDS grid for cell copy. Editing and saving require the applicable Sequence page permissions.

Steps

Alt+Up / Alt+Down: move the selected step one position within its group; on a group header, move the whole group past one neighbouring group or standalone step. All children move together and sequence numbers update automatically.

Ctrl+G: assign a normal step to the nearest group above it; selecting a group header or having no preceding group shows an error without changing anything.

Ctrl+S: SAVE SEQ, with background validation/database saving and audit logging. The saving overlay reports progress; editing, duplicate saves and navigation wait until completion.

Ctrl+Shift+D: toggle ROW DRAG ON/OFF.

Esc: cancel an active drag.

Ctrl+Z / Ctrl+Y: undo / redo a draft change.

Ctrl+C: copy the selected cell (or selected editor text).

Scope: main Sequence grid; movement/grouping/save/drag shortcuts need grid focus, no active cell editing, edit permission and an idle sequence. Undo/redo retain normal text-editor behavior. Ctrl+C also works in the CAN UDS grid. Changes remain in the draft until Ctrl+S or SAVE SEQ. Drag groups only between whole groups; collapsed and disabled children are included.

Expected result

Move groups with their children, assign child steps, undo/redo and save an audited sequence draft.

Avoid these errors

Editing shortcuts are disabled during execution/loading/saving and while editing a cell. A group header cannot become a child. Saved hardware operations cannot be undone.

If it does not work

Focus the main Sequence grid, finish cell editing and check page permissions. Use the visible buttons if needed.

Related instructions: [4.1.2.6.1 Copy Group: complete children, linked settings and save](#); [4.1.2.6.4 Run Group: selection, prerequisites, trials and results](#).

14.2.2 Vision segment keyboard shortcuts

Vision visible-light shortcuts use R/C/Q for drawing shape, W/A/S/D for one-pixel movement and Shift for ten pixels. Up/Down and the image mouse wheel select segments as described by the guide. Finish text/grid editing first. Save CAM / APPLY TO STEP, then save the vision sequence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

PROCEDURE / Vision Camera Tool hotkeys

Choose segment shapes and finely adjust selected visible-light segments in Vision Camera Tool.

Access and preparation

ADMIN. Open Vision Camera Tool. Capture or load a visible-light image for movement, then select a segment. R/C/Q can also choose the shape before capture.

Steps

R - Rectangle: choose the shape for the next drawn or auto-added segment.

C - Circle: choose the shape for the next drawn or auto-added segment.

Q - Square: choose the shape for the next drawn or auto-added segment.

Up - select the next segment number.

Down - select the previous segment number.

Mouse wheel over the image - select a segment (wheel up: next; wheel down: previous).

W - move the selected segment up / forward by 1 image pixel.

S - move the selected segment down / backward by 1 image pixel.

A - move the selected segment left by 1 image pixel.

D - move the selected segment right by 1 image pixel.

Shift + W/A/S/D - move by 10 image pixels. Movement stops at the image boundary.

Use the preview, a button, a selected grid row outside editing, or a closed selection-only dropdown for shortcuts.

Up/Down in the grid keeps normal row navigation. R/C/Q are inactive in text fields; movement also works from the selected segment number. Finish grid cell edits and close dropdown lists first.

R/C/Q choose the next drawing or auto-add shape. To change an existing segment, choose the shape and size in AUTO SEGMENT, then click APPLY SHAPE / SIZE. Square and Circle use width as side length or diameter. Ellipse remains available in the shape dropdown.

Click Save CAM / APPLY TO STEP and save the vision sequence to keep changes.

Expected result

Shape selection changes the Draw / add shape dropdown. WASD moves only the selected segment without resizing it, and its X/Y position is shown in the status bar.

Avoid these errors

Choosing a drawing shape does not convert an existing segment. Ctrl+S is not assigned to Square. These visible-light shortcuts are inactive during text/cell editing, open dropdowns, drawing, scale calibration, and thermal editing; Ctrl/Alt combinations keep their normal behavior.

If it does not work

If movement does not respond, verify that an image is loaded and the selected segment has a drawn ROI. Finish editing and select the preview or a grid row. Movement stops at the image edge. See the shortcut helper text below the image.

Related instructions: [4.1.8.2 Vision Camera Tool](#).

14.2.3 Operator group target dialog shortcuts

In the Operator group-target dialog, Enter validates and applies the allowed temporary target; Escape cancels. Admin must enable the feature and define its allowed range. The test and cleanup must be idle. Applying does not save a different engineering sequence or start a test.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

PROCEDURE / Operator group loop target keyboard shortcuts

Apply or cancel a temporary group loop target in the Operator edit dialog.

Access and preparation

OPERATOR or higher. Open Testing > GROUP VIEW and click EDIT on a cyclic group. Admin must enable target editing, and the test must be idle after cleanup. Testing page permission is required.

Steps

Enter: validate and APPLY the target from the open group loop target dialog.

Escape: CANCEL and close the dialog without changing the target.

Scope: this dialog only. The keys work while its target fields or buttons have focus; NumericUpDown arrow keys retain normal number editing. No step movement is assigned. Enter still checks the Admin allowed range, current permission and the execution lock. APPLY stores an audited temporary Operator target; it does not save or change the Admin test sequence.

Expected result

APPLY accepts a valid target for subsequent runs in this Operator session. CANCEL leaves the existing target unchanged.

Avoid these errors

These shortcuts do not start a test, edit the loop mode or save a test recipe. Targets cannot be changed during preparation, execution or cleanup.

If it does not work

Use the dialog's visible APPLY or CANCEL buttons if focus is elsewhere. If APPLY is rejected, review the allowed range and wait until cleanup finishes.

Related instructions: [2.3.2.1 Loop progress, group attempts and temporary target editing](#).

14.2.4 Advanced Wiring Diagram keyboard shortcuts

Advanced Wiring has workspace-specific shortcuts. Open its HOT Key guide or F1 before use; selection, focus and active drawing mode affect behaviour. Use the normal project save action afterward. A shortcut in the wiring editor should not be assumed to have the same meaning in Test Sequence or Vision.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Use the complete workspace key reference carried in the Wiring Diagram instructions for drawing/file actions. Engineering Center and other dialogs have their own focus and shortcut scope.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
F1	Open context-sensitive Help Center
Ctrl+F1	Open Help Center at Keyboard Shortcuts
Ctrl+N	Create a new project
Ctrl+Shift+N	Add a new Panel sheet
Ctrl+O	Open an editable JSON project or an RB Wiring Project
Ctrl+S	Save; imported projects start Save As Editable Copy
Ctrl+Shift+S	Save As, or Save As Editable Copy when imported
Ctrl+P	Export the current drawing sheet to PDF
F2	Open Project Settings / rename
Ctrl+,	Open Wiring Diagram Settings
Ctrl+Z / Ctrl+Y	Undo / redo drawing changes
Ctrl+C / Ctrl+V	Copy / paste selection with an offset
Ctrl+D	Duplicate selection
Delete	Delete the selected component, wire, segment or annotation
Ctrl+L	Lock or unlock the selected object
Ctrl+R	Renumber component references
Ctrl+G	Save selected components as a reusable assembly
Ctrl+K	Open workspace Command Search
Ctrl+J	Open Productivity Center
Ctrl+T	Trace or clear the selected electrical net
Ctrl+Enter	Apply the selected external-connection properties
V	Activate Select
W	Activate Wire
M	Move the selection with the cursor until click
R	Rotate the selected component 90 degrees
E	Focus contextual properties

FIELD / CONTROL	MEANING, VALUES AND EFFECT
G	Place a project-wide Global Label
D	Add an associative drawing dimension
Shift+D	Activate Smart Measurement
Q	Open Quick Add
A	Create a rectangular array
L	Focus the layer list
F	Fit the drawing to the canvas
+ / -	Zoom in / out
Arrow keys	Nudge by one active grid interval
Shift+Arrow	Fine nudge by 1 mm
Tab	Cycle overlapping objects or wire snap candidates
Enter	Finish the active wire at its cursor preview
Esc	Cancel the active tool/move/measurement or clear an active trace
F4	Repeat the last supported CAD command
F8 / Shift+F8	Next / previous design finding
Alt+Left / Alt+Right	Previous / next connection in an active trace
Space (hold)	Temporarily pan the canvas
Mouse wheel	Zoom around the cursor
Middle-drag	Pan the canvas
Ctrl-click	Add or remove an object from the selection
Drag empty canvas	Box-select objects
Alt while moving	Temporarily bypass magnetic rail attachment
Alt while wiring	Temporarily bypass terminal/wire snap
Right-click	Open the context menu for the current tool or selection

PROCEDURE / Advanced Wiring Diagram keyboard shortcuts

Use the Advanced Wiring Diagram workspace shortcuts for project files, drawing tools, selection, inspection and navigation.

Access and preparation

ADMIN or authorized user with Wiring Diagram page permission. Open Wiring Diagram > ADVANCED WORKSPACE with the Wiring Diagram license feature and View permission. Create, edit, delete, import, export and library actions still require their matching page permissions. Imported packages remain read-only until saved as an editable copy.

Steps

Open the workspace shortcut reference with Ctrl+F1 for the complete key list.

Scope: the Advanced Wiring Diagram workspace. Finish text/numeric property edits and leave dropdown controls before workspace drawing/file shortcuts; focused TextBox, NumericUpDown and ComboBox controls retain normal editing keys. F1 and Ctrl+F1 still open help, and Ctrl+Enter can apply an enabled external-connection inspector edit.

Movement: Arrow keys move the unlocked selection by the active document grid interval (minimum 0.1 mm); Shift+Arrow moves it by exactly 1 mm. R rotates a selected component by 90 degrees. Zoom changes the view, not physical dimensions.

Save with Ctrl+S or SAVE. Use Ctrl+Shift+S for Save As; an imported project starts Save As Editable Copy. A shortcut does not bypass editing locks, page permissions or validation. Dialogs such as Engineering Center have their own scope: its Ctrl+K opens that dialog's command palette.

Expected result

The active drawing tool, selection or view changes as described; saved editable projects retain reviewed drawing changes.

Avoid these errors

Do not assume Advanced Workspace shortcuts apply to LEGACY PROJECTS or to another dialog. Shift+Arrow is 1 mm, which can be larger than a fine active grid. Undo cannot reverse external equipment operations.

If it does not work

Select the canvas, finish property editing, check the object/layer lock and editable-project state, and verify the page-action permission. Press Ctrl+F1 for the workspace shortcut reference and use its context-sensitive F1 help for field details.

Related instructions: [6.1 ADVANCED WORKSPACE](#).

14.3 Finding setup procedures and troubleshooting topics

Search by the operation rather than an error alone: examples include barcode, Modbus, retry, vision, programming and backup. Follow prerequisites before the steps. When troubleshooting, retain the original message and actual device response so guidance is based on evidence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Search the action or visible control name, for example barcode, update or shortcut.
2. Select the relevant module, then read prerequisites and expected result before following steps.
3. If nothing appears, clear the search and browse the feature tree; check role/page availability with the administrator.
4. Use TROUBLESHOOT for a current fault and SUPPORT PACK when retained evidence is needed.

Related instructions: [14.7 TROUBLESHOOT workspace and diagnostic actions](#); [14.6 SUPPORT PACK workspace and generated contents](#).

14.4 RAJU BROS AI Assistance (Beta) / AI HELP / RBX

RAJU BROS AI Assistance (Beta), also reached through AI HELP / RBX, explains available context and suggests checks. Treat its answer as guidance requiring review, especially before configuration or hardware actions.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Open the assistance workspace and state the page, feature, action and exact error in generic terms.
2. Use the appropriate context action and review what is attached.
3. Read the answer and RELATED HOW TO. Use DRAFT PLAN for a checklist when useful.
4. Review the proposed action against the approved guide and machine procedure before executing it.

Worked example

Ask: In Testing, a report copy failed after an OK result. What evidence should I inspect? Include the sanitized error and state, not credentials or customer records.

PROCEDURE / Use RBX AI HELP assistant

Use RBX, the local offline assistant, for current-screen help, test-sequence chat, last NG explanation, last error explanation, page checks, and support pack creation.

Access and preparation

All users. Open AI HELP from the top header, F1, HOW TO page, or current page context after selecting the relevant button/control.

Steps

1. Press AI HELP or F1.
2. Ask RBX a question such as how to test with LED analyzer or how to add retry.
3. Use SHOW CURRENT BUTTON HELP for selected control help.
4. Use PAGE CHECK before save/run.
5. Use EXPLAIN LAST NG after a failed product test.
6. Use EXPLAIN LAST ERROR after a software/device error.
7. Use SUPPORT PACK when sharing evidence with support.

Expected result

RBX gives local approved guidance without changing settings or calling a cloud service.

Avoid these errors

Do not treat the assistant as permission to bypass limits, safety, license, audit, or device interlocks.

If it does not work

If the explanation is too general, record the time/model/barcode and create a support pack. Ask an ADMIN or authorized support user to filter Application Log for the same evidence.

Related instructions: [14.4.1 PAGE CHECK, EXPLAIN LAST NG and EXPLAIN LAST ERROR](#); [14.6 SUPPORT PACK workspace and generated contents](#).

Screen reference

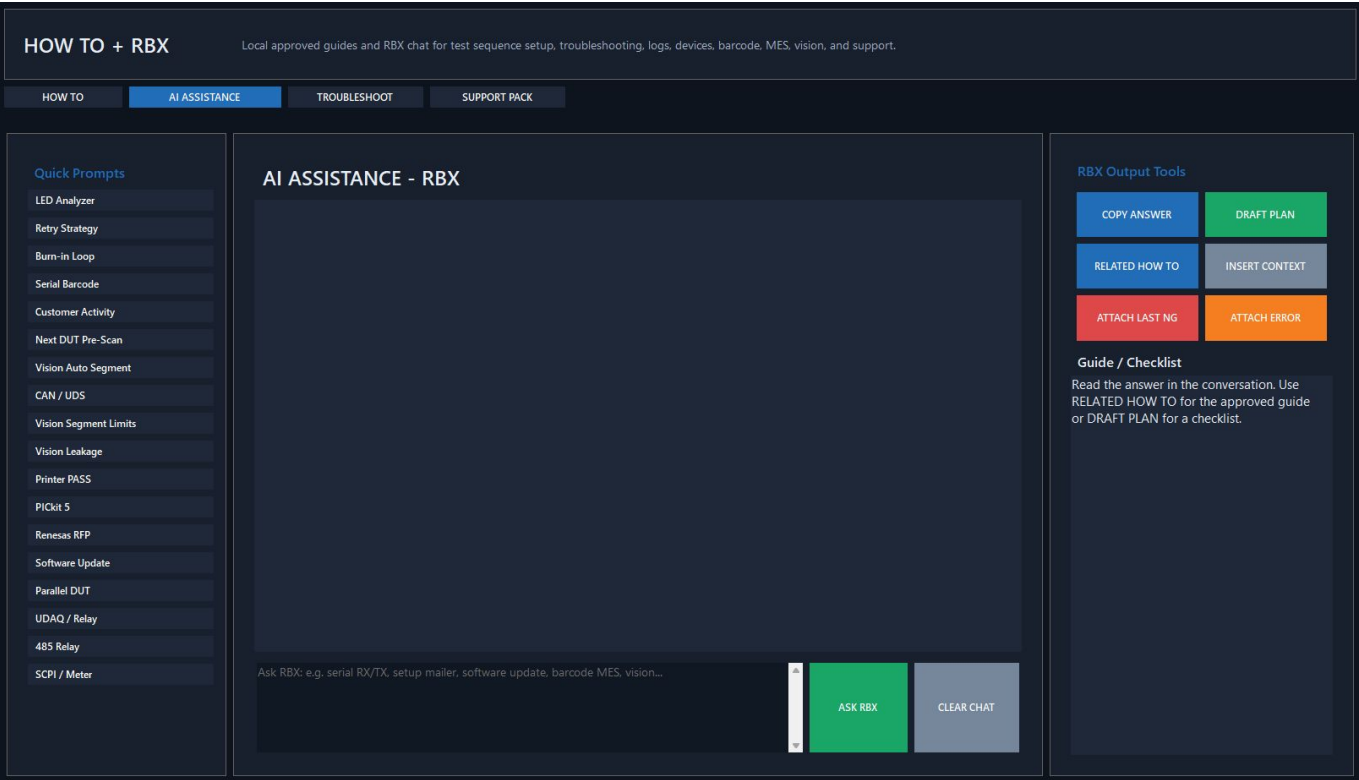


Figure 14.4 - RBX help panel: prompts, answer and evidence tools. Reference capture: 07 October 2026.

14.4.1 PAGE CHECK, EXPLAIN LAST NG and EXPLAIN LAST ERROR

PAGE CHECK provides a preparation checklist. EXPLAIN LAST NG and EXPLAIN LAST ERROR use available recent context to help investigation. Review which event was attached and compare guidance with its recorded evidence. Assistance does not authorize changing settings or rerunning hardware by itself.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Context may be incomplete or stale. RAJU BROS AI Assistance (Beta) does not replace the recorded verdict, raw evidence or an authorized engineering decision.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
PAGE CHECK	Uses the current page context for setup/help guidance.
EXPLAIN LAST NG	Uses available recent failure context; confirm that it belongs to the intended run.
EXPLAIN LAST ERROR	Uses available error context; a historical error can be unrelated to the current symptom.
RELATED HOW TO / DRAFT PLAN	Open relevant approved help or create a checklist from the answer.

Related instructions: [14.7 TROUBLESHOOT workspace and diagnostic actions](#).

14.4.2 SUPPORT PACK and assistance history

SUPPORT PACK collects available diagnostic evidence. Review its contents and remove sensitive data before sharing with authorized support. Keep the time, page, action and concise symptom in the request. Assistance history can help follow an investigation, but final configuration decisions belong in the normal audited settings workflow.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Assistance history is a record of guidance, not a replacement for production reports. Review the intended evidence before copying or sharing an answer or support package.

Related instructions: [14.6 SUPPORT PACK workspace and generated contents](#).

14.5 Reference material: glossary, status colours and error messages

DUT means device under test; ROI is an image region; TX/RX is transmitted/received data; NG is a failed result; Timeout is response wait; Retry is another attempt; Delay After is a post-step pause. Green normally indicates success/connected, red failure/locked, orange warning/action needed and gray idle/disabled. Always read the text because colour alone is not a result.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
OK / PASS	The evaluated check/run passed in its recorded scope. Confirm pending delivery/readiness separately.
NG / FAIL	The check/run failed; inspect the named step and evidence.
RUNNING	Execution is active; wait for its terminal result before reuse.
STOPPED	Execution was interrupted; complete cleanup before another start.
REPORT PENDING	Saved result delivery requires recovery under policy.
REPORT STORAGE ERROR	Recovery storage access failed; next start is blocked.
READY FOR VALIDATION	Pre-scan set is complete but still awaits final admission checks.
STALE / BAD input quality	The live input is too old or invalid for its configured acquisition rules.

Related instructions: [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR recovery](#); [3.4 LIVE INPUT MONITOR](#); [2.2.2 Next DUT Barcode Pre-Scan](#).

14.6 SUPPORT PACK workspace and generated contents

Create a sanitized support package containing failure categories and a machine-health summary; raw technical evidence stays local.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Databases, settings, credentials, user/machine/device identifiers, endpoints, paths, barcodes, raw commands/responses, message text and exception text are excluded from this package. It is not a backup and does not contain the detailed device reply needed for every diagnosis.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CREATE SUPPORT PACK	Creates RB_SUPPORT_PACKAGE_<timestamp> in the selected output folder.
support_manifest.txt / privacy_manifest.txt	Describe the included and excluded evidence.
FailureForensics/failure_###.json	Up to 100 recent available snapshots: minute-rounded time, safe type, area and context-presence flags. Damaged snapshots are skipped.
machine_health_summary.json	Minute-rounded generation time, overall status/score and grouped area counts/statuses.

Procedure

1. Open HOW TO > SUPPORT PACK.
2. Choose CREATE SUPPORT PACK and select an output folder you can write to.
3. Wait until the creation status completes and read the generated location/result.
4. Inspect the package inventory and files. Remove sensitive material from a separate sharing copy under your organization's process; preserve original evidence for diagnosis.
5. Send the reviewed package only to the intended authorized support recipient.

Worked example

A communication failure can appear as a Device Communication category with HasResponseContext false. The package does not expose the raw command or device identity. An authorized administrator may need to inspect the full local log separately.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Creation fails	Check destination permission/free space and the displayed collection error. Retain the incident details even if packaging fails.

Related instructions: [13.1.1 Commands, responses, timeouts and exceptions](#).

14.7 TROUBLESHOOT workspace and diagnostic actions

Use TROUBLESHOOT to follow a symptom-led diagnostic path before changing the station.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
SHOW CURRENT BUTTON HELP	Displays the captured control/page context; verify it belongs to the intended action.
OPEN RELATED HOW TO	Opens the associated approved help topic if available to this account.
PAGE CHECK	Explains the available page context.
EXPLAIN LAST NG / EXPLAIN LAST ERROR	Uses retained recent incident context; check its relevance and time.
OPEN SUPPORT PACK	Switches to the separate support-package workspace.

Procedure

1. Open HOW TO > TROUBLESHOOT and select the applicable available diagnostic action/topic.
2. Record the exact symptom, affected device/page and whether the issue occurs before, during or after a test.
3. Follow the read-only checks first, then route any hardware/configuration action to the authorized role.
4. Collect a Support Pack if the cause remains unresolved.

Worked example

For a timeout, separate disconnected device, wrong port/address, unexpected response and too-short timeout before changing the sequence.

Expected result

The investigation narrows the cause using evidence. Opening a troubleshooting topic does not itself repair hardware.

Related instructions: [3.1 COMMUNICATION STUDIO](#); [13.1.1 Commands, responses, timeouts and exceptions](#); [14.6 SUPPORT PACK workspace and generated contents](#).

15 Logout

Logout ends the current application session and returns to login after required checks. Finish or cancel work through its normal controls first. The next user must log in with their own authorized account and role.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Logout ends the active user session after any required saves, cleanup and service close-out. It is not a method for cancelling an unfinished hardware operation.

Related instructions: [15.1 Logout action and unsaved-change handling](#); [15.2 Active tests, hardware cleanup and close restrictions](#); [15.3 Service Close-Out](#).

15.1 Logout action and unsaved-change handling

Save intended changes before logout. If an unsaved-change prompt appears, Save keeps the changes, Discard abandons them and Cancel returns to the page. Read the named page/project in the prompt so that one editor's draft is not confused with another.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Finish configuration edits and use the owning editor's Save action.
2. Choose Logout. If an unsaved-change prompt appears, review the named workspace.
3. Save and wait for success, discard only the draft you intend to abandon, or cancel to stay in the session.
4. If saving fails validation or storage access, correct the problem before leaving.

Expected result

A successful logout returns to login. Discarding a draft loses unsaved changes; it does not roll back previously saved settings.

Related instructions: [15.4 Login again: role selection, credentials and access problems](#).

15.2 Active tests, hardware cleanup and close restrictions

Stop active testing and allow required hardware cleanup to complete before logout or closing. A busy state can prevent navigation or closure. Do not assume closing a window instantly establishes a physical safe state; inspect any cleanup error under the approved machine procedure.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Production active	Finish or stop through Testing, then wait for its cleanup/readiness path.
Programming or maintenance busy	Allow the controlled operation to complete. Do not close the app to force a programmer to stop.
Background cleanup	Wait for device cleanup to settle. A persistent failure needs technical investigation.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Close/logout is blocked	Read the busy state and return to that workspace. Preserve the error if cleanup cannot finish.

Related instructions: [2.8 START TEST, STOP, RESET and final OK/NG](#); [3.2.6 Arm, Disarm, Safe All Off and automatic disarm](#).

15.3 Service Close-Out

A service session may require Service Close-Out. Enter work performed, machine readiness and follow-up requirements accurately. Preserve unresolved issues for the next authorized person. The close-out record should describe the work, not contain credentials or private connection details.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

A SERVICE session must complete the close-out workflow when required. If you cancel that dialog, the session remains open so work can continue.

Related instructions: [12.3 Service close-out and next actions](#).

15.4 Login again: role selection, credentials and access problems

Enter the assigned Login ID and password and choose the matching role. Check that the account is active and has the required page permissions. If access fails, ask the responsible administrator to review the account. This manual deliberately contains no login credentials.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Use only your assigned account and role. Feature entitlement, page permission and action permission are separate from successful login.

PROCEDURE / Login and role selection

Use the correct login role so the software opens only the pages allowed for that user.

Access and preparation

All users. Confirm the database is connected, the license is active, and the operator has the correct login ID.

Steps

1. Enter your assigned Login ID.

2. Enter your password.
3. Select OPERATOR, MAINTENANCE, SERVICE or ADMIN as assigned to your account.
4. Press LOGIN.
5. If login fails, check account status and the selected role with the responsible administrator.
6. SERVICE users must complete Service Close-Out before logout or closing.

Expected result

The user opens the correct landing page and the audit log records the login result.

Avoid these errors

Do not share admin credentials. Do not use ADMIN for production testing unless setup work is required.

If it does not work

If login is rejected, check user active status, role mismatch, password reset requirement, and license status. Ask an ADMIN or authorized support user to review Application Log when technical evidence is required.

Related instructions: [17.5.1 Customer license activation and CHECK NOW](#); [17.5.2 First-start terms acceptance](#).

15.5 Unexpected shutdown notice and support evidence

Previous Session Ended Unexpectedly means the earlier session did not complete normal shutdown; it may follow a crash, forced close or power interruption. Unsaved edits may be lost. Review Application Log, confirm the last successful save and verify fixture state before continuing. The notice does not identify the root cause by itself.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

After an unexpected-session notice, inspect the station and affected unit before resuming. Preserve the time and recent error evidence. The notice alone does not establish whether the last physical operation completed.

Related instructions: [13.1.1 Commands, responses, timeouts and exceptions](#); [2.9.2 REPORT PENDING](#) and [REPORT STORAGE ERROR](#) recovery; [14.6 SUPPORT PACK](#) workspace and generated contents.

Screen reference

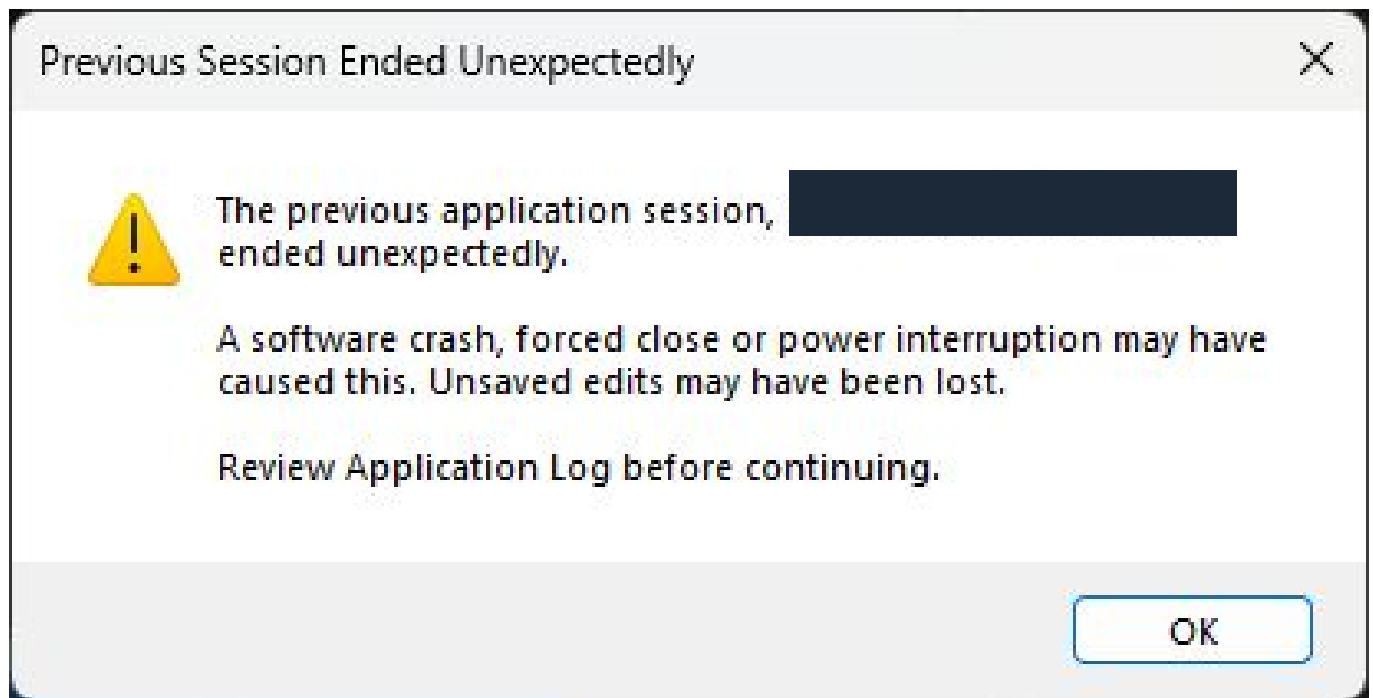


Figure 15.5 - Unexpected-session notice. Reference capture: 07 October 2026.

16 About

About identifies the software product and installed version and offers an Update entry. Use the version when selecting this manual or reporting an issue. Customer-specific licensing/identity information is omitted from the manual illustrations.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

About identifies the installed product and provides the policy viewer. Use the displayed product/build information in an authorized support request without copying account or licensing secrets into shared screenshots.

The software display name is BHARAT TEST SUITE and the developer display is Raju Bros Softech Pvt Ltd. Existing data, report paths and technical integration identifiers can retain their established names; a branding change is not an instruction to rename those files or identifiers.

Related instructions: [16.1 Product version, company and support details](#); [16.2 Feature availability](#); [16.3 TERMS, ANTI-PIRACY & PRIVACY viewer](#).

16.1 Product version, company and support details

Check Software Version before applying a procedure intended for another release. Record the version and a concise description of the page/action when contacting authorized support. The About page's Update button opens the same update workspace as the sidebar entry.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Open About and read the product information shown by the installed application.
2. When reporting a fault, provide the relevant displayed build identifier and incident context privately to support.
3. Use Update for the normal installed-software update workflow.

Related instructions: [17 Update](#).

16.2 Feature availability

Feature availability depends on the installed edition, active entitlement and account permissions. An unavailable feature should be reviewed through the authorized support process. Do not modify license files or bypass startup validation to make a control available.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
License entitlement	Enables the purchased feature or included bundle capability.
Page/action permission	Determines whether the assigned user may view or operate the feature.
Hardware/provider availability	A licensed feature can still need a supported connected device and its provider runtime.

Worked example

A user can log in successfully while a programming workspace remains unavailable because the entitlement or page permission is absent. Changing the user's role alone may not satisfy both conditions.

Related instructions: [17.5.1 Customer license activation and CHECK NOW](#).

16.3 TERMS, ANTI-PIRACY & PRIVACY viewer

Read the application policy without repeating first-start acceptance.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Open About and choose TERMS, ANTI-PIRACY & PRIVACY.
2. Read the policy in the viewer.
3. Use COPY POLICY if you need a local reference, or CLOSE to return.

Expected result

The ordinary viewer is read-only. First-start acceptance uses a different dialog with an acknowledgement checkbox.

Related instructions: [17.5.2 First-start terms acceptance](#).

17 Update

Update is the supported in-app route for an installed application. Plan downtime, finish production and create/verify required backups before installation. The manual covers the customer update workflow; private update infrastructure and privileged administration are omitted.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Use Update for an installed application and the supplied Web Installer for a new installation. Plan downtime with the station idle and retain customer configuration and result evidence.

PROCEDURE / Update software safely

Install an approved update while preserving the machine configuration and customer files.

Access and preparation

ADMIN. Finish production, confirm the machine is idle and verify the required backups.

Steps

1. Open UPDATE from the sidebar or ABOUT.
2. Select CHECK UPDATE.
3. Review current and available versions, status and Release Notes.
4. Run SAFETY CHECK and resolve every failed prerequisite.
5. Select RUN UPDATE and complete the required administrator approval.
6. Allow installation to finish without interrupting power or closing the installer.
7. After successful installation the application starts automatically; a separate success popup is not required.
8. Confirm the installed version, saved configuration, customer file availability and device readiness before production.
9. Review HISTORY for the outcome; contact authorized support if recovery is needed.

Expected result

The approved update is installed, the application reopens and customer configuration remains available.

Avoid these errors

Do not update during production or replace live application files manually.

If it does not work

Retain the displayed error, review Safety Check and backup status, and follow the authorized support process.

Related instructions: [17.1 Overview](#); [17.2 Safety Check](#); [17.4 History / Rollback](#); [17.5 New installation with Web Installer and first startup](#).

17.1 Overview

Overview reports whether the installed application has a newer eligible update and provides the check/run actions.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
CHECK UPDATE	Queries the configured release channel and displays available/current status.
RUN UPDATE	Starts an eligible approved update after required checks and administrator confirmation.
UP TO DATE / SERVER OLDER	No newer eligible release is presented; an older server package is not an instruction to downgrade.
SERVER CHECK FAILED	Availability is unknown until the check succeeds.

Related instructions: [17.1.1 CHECK UPDATE, available version and RUN UPDATE](#); [17.2 Safety Check](#).

17.1.1 CHECK UPDATE, available version and RUN UPDATE

CHECK UPDATE compares the installed version with an available approved release. Review the returned status and notes. RUN UPDATE begins installation only after its checks and authorization. Do not start it during an active test or while required cleanup/reporting is incomplete.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Finish tests, programming and configuration saves. Put the machine in the approved idle state.
2. Open Update > Overview and choose CHECK UPDATE.
3. Review the available release, Release Notes and Safety Check results.
4. If a newer eligible update is available, choose RUN UPDATE and complete the authorized administrator confirmation.
5. Allow backup, package verification, installation and restart to finish. After restart, verify login, devices, model/plan settings and customer report paths before production.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
No newer update available	Keep the installed software unless support gives a separate approved procedure.
Permission denied	Use an authorized administrator; do not share passwords.
Check/start failed	Retain the displayed error, check connectivity and use History evidence.

Related instructions: [17.4.1 Failed updates, recovery and verification](#).

17.2 Safety Check

Safety Check lists update prerequisites with their status and detailed reason. Resolve blocked checks before replacing application files.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
OK	The named check succeeded at that time.
WARNING	Review the detail and resolve any required prerequisite before continuing.
FAIL / blocked	Do not proceed until the stated cause is resolved.
Database backup	A required backup is part of the update path; retain its evidence.

Worked example

An insufficient-disk check requires capacity correction. A network failure requires release access to be restored. Neither is solved by manually copying application files into the installation.

Related instructions: [17.2.1 Integrity, prerequisites, database backup and data preservation](#).

17.2.1 Integrity, prerequisites, database backup and data preservation

Safety Check presents installation prerequisites and backup/readiness evidence. Resolve failed checks before proceeding. Preserve customer models, sequences, device settings, calibration, firmware and reports. An available release does not automatically mean the current machine is ready for downtime.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Do not replace signed application files manually or remove recovery data to make an update start. If integrity verification rejects a package, obtain an approved replacement.

Procedure

1. Read each check's Status and Detail, including prerequisites, integrity and backup readiness.
2. Correct available disk space, runtime or connectivity problems using authorized support.
3. Recheck readiness before starting the update.
4. Keep customer databases, models, device settings, programming files, calibration, reports and logs intact during any recovery.

Related instructions: [17.4.1 Failed updates, recovery and verification](#).

17.3 Release Notes

Release Notes explains the available release's changes and any required actions. Read them before updating, especially for device, reporting, migration or workflow changes. Use the manual matching the installed application version after the update.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Worked example

A release note might describe a barcode-validation change or report-recovery correction. Identify the affected workflow, review its new instructions and include it in post-update checks; a release note is not evidence that your hardware test has passed.

Related instructions: [17.1.1 CHECK UPDATE](#), [available version](#) and [RUN UPDATE](#).

17.4 History / Rollback

History / Rollback is the visible tab name. Customer operation here is to inspect recorded update attempts and retain recovery evidence.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Related instructions: [17.4.1 Failed updates, recovery and verification](#).

17.4.1 Failed updates, recovery and verification

History records update attempts and outcomes. If installation fails, retain the error and use the authorized recovery process. Avoid copying arbitrary application files over a live installation. After recovery, verify the version, login, settings, required files and device readiness before production.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
History entries	Read the attempt time, status and detail for the failed/successful update.
OPEN UPDATE FOLDER / OPEN SELECTED	Open the relevant retained update evidence when available.

Procedure

1. Select the update attempt matching the incident time.
2. Read its recorded stage and error. Open the corresponding evidence using the visible folder/selection actions.
3. If the application restarted, verify its actual running state and customer data before production.
4. Escalate unresolved recovery to authorized support, preserving the previous application/database backups and logs.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Application will not reopen	Keep the exact startup/update error and backup locations. Follow support's approved recovery; do not delete or overwrite the database.

Related instructions: [17.5.3 Startup integrity and identity failure messages](#).

17.5 New installation with Web Installer and first startup

Use the approved Web Installer for a new installation. After startup, complete normal account setup through the authorized process, then configure devices, models and plans. Existing installations should use UPDATE so that the supported backup and data-preservation path is followed.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Use the approved Web Installer for a new workstation.
2. Complete installation prerequisites, then first-start policy and license activation.
3. Log in with the assigned account and configure devices, model, sequence and plan.
4. Perform the required station acceptance checks before allowing production.

Related instructions: [17.5.4 Web Installer prerequisites and installation sequence](#); [17.5.2 First-start terms acceptance](#); [17.5.1 Customer license activation and CHECK NOW](#); [1 Device Configuration](#); [5 Model Setting](#); [7 Test Plan](#).

17.5.1 Customer license activation and CHECK NOW

Complete customer activation through the displayed License Activation dialog.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Hardware ID / License mode	Identify the workstation and verification mode. Treat complete activation identity as support information.
COPY ACTIVATION REQUEST	Copies the complete request for private delivery to authorized Raju Bros Softech Pvt Ltd support.
CHECK NOW	Checks online activation status; disabled while a check is already running or identity verification has failed.
TERMS & PRIVACY / EXIT	Open policy information or exit without bypassing activation.

Procedure

1. Read Status and confirm network access for activation.

2. Choose COPY ACTIVATION REQUEST and send the complete copied request privately through the approved support channel.
3. After support confirms activation, use CHECK NOW or allow the dialog to check again.
4. Continue only after activation is valid; retain errors if the dialog remains blocked.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Hardware identity failed	Preserve the exact error and request authorized repair. Do not alter identity/license files.
Activation not found or server unavailable	Confirm approved network access and that the request belongs to this workstation; ask support to verify the activation record.

17.5.2 First-start terms acceptance

On first start, read and acknowledge the displayed policy before entering the application.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Read the terms presented in the acceptance dialog.
2. If authorized to accept them, select the acknowledgement checkbox; I AGREE AND CONTINUE becomes available.
3. Choose I AGREE AND CONTINUE to save acceptance and proceed, or DECLINE AND EXIT to leave.

Expected result

The app proceeds only after required acceptance succeeds. The About policy viewer does not replace this acceptance step.

Related instructions: [16.3 TERMS, ANTI-PIRACY & PRIVACY viewer](#); [17.5.1 Customer license activation and CHECK NOW](#).

17.5.3 Startup integrity and identity failure messages

A startup identity, integrity or policy error must be resolved before normal login can continue.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Field and control reference

FIELD / CONTROL	MEANING, VALUES AND EFFECT
Integrity rejection	The application/package could not be accepted as the protected release. Preserve the error and use an approved repair package.
Identity/activation failure	Use the customer activation/support route.
Storage/startup exception	Record the complete cleaned error and time; preserve customer data for support.

Procedure

1. Read the startup message and capture its text without exposing private identity values.

2. Stop further installation changes while support identifies the failed stage.
3. Retain the installer/update history and known backup evidence.
4. After approved repair, verify startup, login and saved station configuration before resuming.

Related instructions: [17.5.1 Customer license activation and CHECK NOW](#); [17.4.1 Failed updates, recovery and verification](#).

17.5.4 Web Installer prerequisites and installation sequence

Install the application on a new workstation using the approved Web Installer.

Access and preparation

Use the assigned page/action permissions. Configuration and maintenance actions require the corresponding authorized role.

Procedure

1. Obtain the approved installer from the supplied distribution channel and schedule setup under the intended Windows account.
2. Launch the Web Installer. Read the product/publisher and any internal-certificate notice; request authorized Windows approval when required.
3. Allow prerequisite runtime installation/download and protected application setup to complete. Retain the displayed error if network, prerequisite or signature verification fails.
4. Launch the installed application and complete the first-start policy/activation prompts.
5. Log in, confirm the intended station/configuration location and follow Device Configuration before a controlled acceptance test.

Expected result

A new installation reaches the normal startup/login path after its prerequisites and activation are satisfied. Existing installations use the in-app Update workflow.

Troubleshooting and recovery

SYMPTOM	CHECK AND NEXT ACTION
Runtime/network installation fails	Retain the stage/error, restore approved connectivity or have support install the approved prerequisite, then retry setup deliberately.
Windows approval is unavailable	Ask the workstation administrator to complete the permitted setup. Do not disable signing/integrity checks.

Related instructions: [17.5.2 First-start terms acceptance](#); [17.5.1 Customer license activation and CHECK NOW](#); [1 Device Configuration](#).