



LMP SH-IP & HRNL-25W USER MANUAL

Complete operator and installer guide

DATASHEET

USER MANUAL

v1.3.0 | BUILD 310

www.xichtee.com
office@xichtee.com
Company ID: 56695284
Tax ID / VAT: 2122403635



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Purpose

This Manual explains safe, normal use of the local web interface. It covers initial connection, standalone commissioning, Presets, Custom Effects, segments, Rules, Logic, auxiliary inputs, network services, maintenance, and Cluster configuration and operation.

Interface language

The device interface is English-only. Screenshots retain the original English interface. Literal menu names, buttons, commands and device identifiers are preserved so you can find them on the device.

Scope

Available screens and settings vary with product, access level and licensed features. This Manual covers normal installation, configuration, operation and maintenance. Feature enrolment, user administration and service procedures are handled separately.

CONVENTION	MEANING
NOTE	Useful context or a verification point.
IMPORTANT	A step that prevents loss of access, configuration or service.



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01 • Start here

Products and normal use

PRODUCT	NORMAL WEB-INTERFACE SCOPE
LMPSH-IP	Up to two LED segments, with five Rules per segment.
HRNL-25W	Up to 45 segments where enabled, with five Rules per segment; maximum 120 LEDs total across all segments.
Both products	Ten LED Presets, ten shared Custom Effects, ten Logic banks and two auxiliary connections.

Safety and secure operation

BEFORE YOU START	REQUIRED PRACTICE
Power and wiring	Use the product label and approved installation information. De-energise external wiring before physical changes.
Network	Use an isolated trusted management LAN, or a trusted external HTTPS boundary. Native device HTTP does not encrypt traffic.
Authorisation	Use an authorised account. Make configuration changes only when you understand the affected output and recovery path.
Live output	A Preview, Rule or Logic change can alter physical LEDs immediately. Coordinate work with operations.
Recovery	Keep a protected configuration backup before network, firmware, Cluster or destructive recovery work.

TWO OPERATING MODES

Standalone operation and optional Cluster redundancy

STANDALONE

DEFAULT

The default role is Off. The device owns its own configuration and live writes.

CLUSTER

OPTIONAL

A licensed Primary, optional Backup and 1-32 Followers share selected application state.

Cluster Mode requires the Cluster feature licence.



02 · Connect and sign in

Prerequisites

ITEM	CHECK
Device	Power is stable, Ethernet link is present and the installed output wiring is safe.
Network	By default, the device requests its IPv4 configuration from a DHCP server.
Computer	Connect an authorised management computer to the same routed management network.
Discovery	Download the XICHTEE Discovery Tool from the product page at www.xichtee.com .
Browser	Use a current browser and the configured HTTP port, which defaults to 80.
Access	Obtain an authorised account through the site administrator. Do not place a password in a URL or screenshot.

Find the device

The XICHTEE Discovery Tool finds devices on the same local network and shows the address needed to open the web interface. Discovery traffic normally does not cross routers, VLANs or VPN connections. For a device on another network, use its DHCP lease or the installation record.

A busy device may answer a scan late, or a reply may be missed during network recovery. Wait briefly and scan again before considering a restart. A delayed scan alone does not mean Ethernet has failed. Discovery still uses UDP port 33333 and the same request and reply formats.

Open the interface

STEP	ACTION	VERIFY
1	Connect the computer to the same local network, start the XICHTEE Discovery Tool and scan for devices.	The device appears with its current network address.
2	Select the intended device and open its reported address in a current browser.	The XICHTEE access page opens.
3	Sign in with the authorised account supplied for this installation.	The web interface and section navigation appear.
4	Open HOME and compare Device Type and IP Address with the Discovery Tool or installation record.	You are controlling the intended unit.
5	Leave the page open briefly and confirm that status values update.	The device and browser can exchange live status.

NOTE If a trusted HTTPS gateway or reverse proxy protects the management network, use its approved HTTPS address instead of direct HTTP.

Sign-in security

RULE	OPERATOR GUIDANCE
Account required	Browser management access always requires an active configured account. Product, licence and engineering features do not bypass sign-in.
15-minute idle limit	After 15 minutes without an authenticated request, the sign-in expires and you must sign in again. A page that continues making authenticated status requests is not idle.
Opaque browser state	The browser manages an opaque sign-in value automatically. Treat that browser state like a credential: do not copy or share it, and sign out on a shared management computer.



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If the page does not open

CHECK	ACTION
Link	Confirm device power, Ethernet link indicators, switch port and cable.
Discovery	Scan again from the same local network. A router, VLAN boundary, VPN or local firewall can prevent discovery.
Address	Check the current DHCP lease or installation record.
Subnet	Confirm that the management computer has a valid route to the device.
Port	Use the configured HTTP port. If it is unknown, recover it from the protected site configuration record.
Still unavailable	Stop before destructive recovery. Contact XICHTEE Support at support@xichtee.com with the product, firmware version and observed network state.



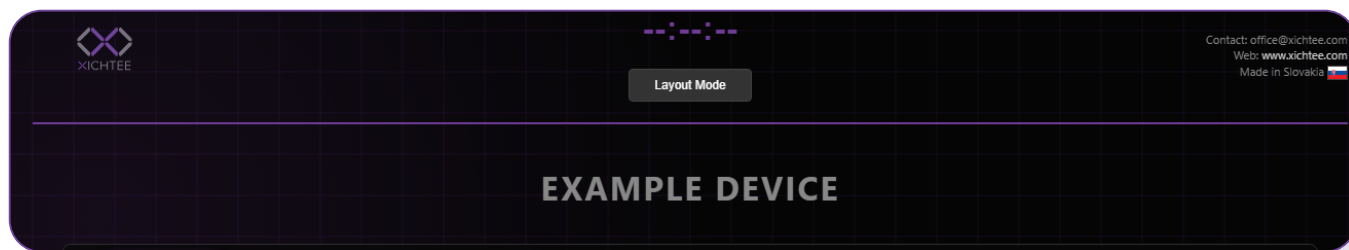
03 · Web interface and HOME

Section map

SECTION LABEL	PURPOSE
HOME	Read device, system-load, input, client and Cluster status.
LED Presets	Define reusable colours and start, constant and stop effects.
Effect Builder	Create ten reusable timeline-based Custom Effects.
Logic Matrix	Combine local conditions and an optional monitored remote Ember+ value into ten named Logic triggers.
LED Configuration	Set segment count, names, LED counts, default colours and five Rules per segment.
Device License	Shows which optional product features are available.
Network Config	Set addressing, time, MQTT, Ember+ Consumer and network service allocation.
User Management	Restricted area; follow the organisation's authorised access policy.
System Management	Information, input/Cluster settings, backup, restore, update and restart.

Layout Mode

Use Layout Mode near the page clock to choose Grid Style or Menu Style. Menu Style shows one task card at a time; Grid Style is useful on a wide display. The preference is stored by the browser and does not change device behaviour.



Web interface navigation.

Concurrent web access

Normal control and monitoring continue while other web content loads. For a temporarily busy response (HTTP 503), wait at least one second before retrying. An incomplete request can delay other web requests: complete headers within 8 seconds and ordinary requests within 15 seconds total, both from the first received bytes. Progress does not restart these limits. Expiry closes the request; reconnect and check current settings before retrying a change. A complete request releases this restriction while its response loads.

Sign-in pages and other short web responses load without pausing normal device control. A response can end after five seconds without progress or 30 seconds overall. If a read ends before completion, wait at least one second, then reopen it. If a settings change loses its reply, check the current settings before repeating the change.



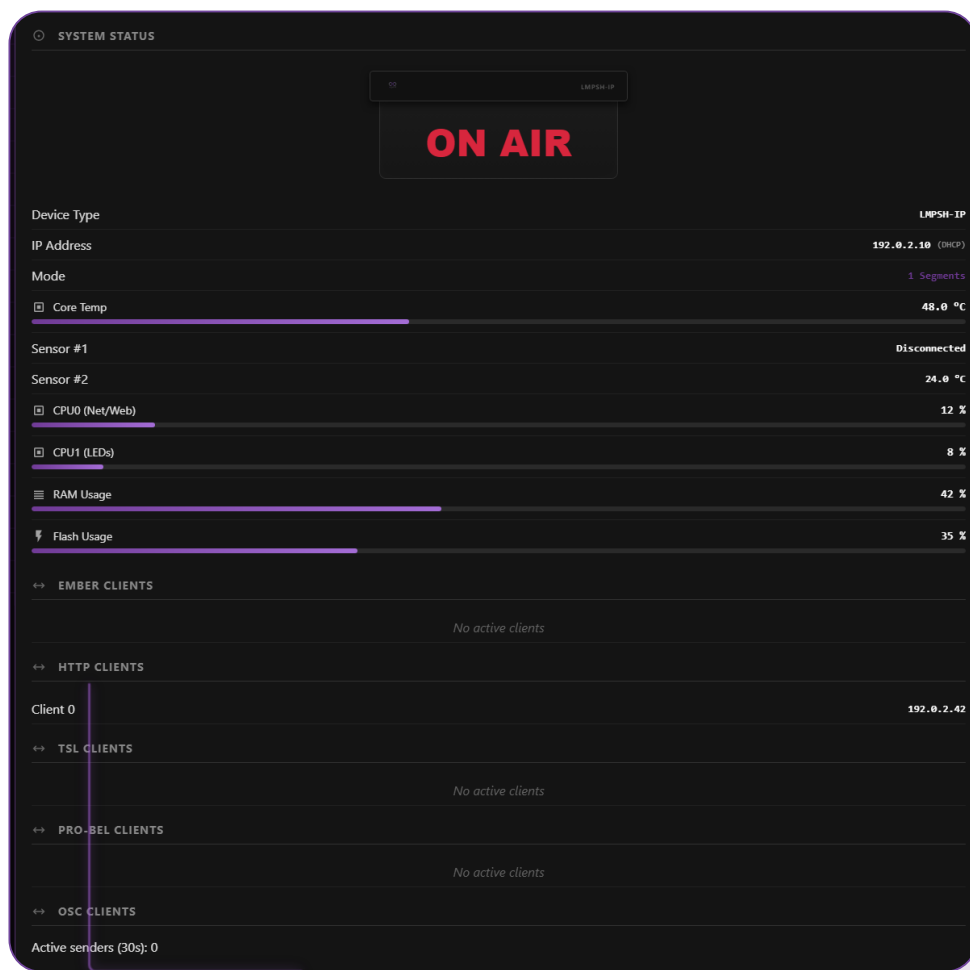
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Read HOME first

NOTE HOME is a monitoring view. Make a change in its owning section, then return to HOME and verify the expected result.



HOME with Rule 1 active: ON AIR in red.

HOME AREA	HOW TO USE IT
Device identity	Confirm Device Type, current address and configured segment mode before changing anything.
Output visual	Use the LMPSH strip or HRNL lamp/rack representation as a quick indication; confirm the physical output where required.
Inputs and sensors	Check whether each auxiliary connection is shown as GPI or temperature Sensor and whether its state is plausible.
CPU, RAM and Flash	Use the current values as context. A single high reading does not identify a fault by itself.
Protocol clients	Shows currently observed Ember+, HTTP, TSL, Pro-Bel or OSC activity where available.
Cluster block	Appears only for configured Cluster roles. Full interpretation is deferred to Section 11.

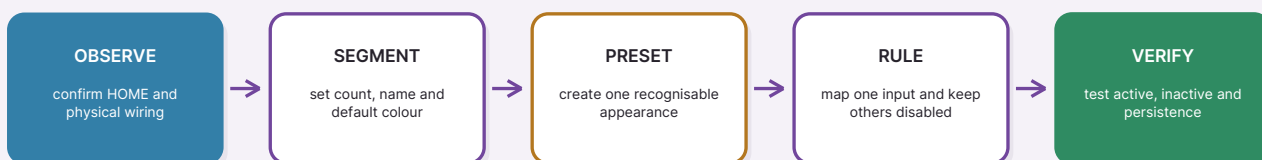


04 · Standalone commissioning

Reach a controlled first-light result

STANDALONE COMMISSIONING PATH

One small verified output establishes the foundation for every later workflow



Record the intended values before expanding to more segments or controls.

Commission one device

STEP	ACTION	VERIFY
1	Confirm Cluster role is Off for standalone work and read HOME.	No upstream authority is expected.
2	Open LED Configuration. Select the required segment count without exceeding the product or feature limit.	Only intended segments are present.
3	For Segment 1, enter a clear name, installed LED count and safe default colour.	The segment summary matches the installation.
4	Open LED Presets. Give Preset 1 a recognisable name and colour; keep effects simple for the first test.	Preset 1 is visually distinct.
5	Assign Preset 1 to Rule 1. Leave its input Disabled, then use the Active switch for a controlled test.	Rule 1 changes the intended segment only.
6	Turn Rule 1 off and verify return to the default colour. Then test the intended input source.	Both active and inactive behaviour are correct.
7	Allow the ordinary configuration save to finish, then follow the Rule Active retention guidance in Section 7 before removing power. Reopen the section and recheck the physical LEDs.	The accepted configuration remains correct.

IMPORTANT Change one setting group at a time. If the physical result is unexpected, restore the previous known value before continuing to another segment.



05 • LED Presets

Ten reusable appearances

A Preset defines how a segment should look when a Rule selects it. Each Preset has a name, base colour, a start transition, a loop or constant effect, and a stop transition. Several Rules can reuse the same Preset.

The screenshot shows a software interface titled "LED PRESETS". It contains a list of 10 presets, each with a name, a color swatch, a hex code, and an "Effects" button. The presets are as follows:

Preset	Name	Color	Hex Code	Effects
1	Preset 1	Red	#D7263D	Effects
2	Preset 2	Green	#2E8B57	Effects
3	Preset 3	Blue	#3D5A80	Effects
4	Preset 4	Purple	#5E35B1	Effects
5	Preset 5	Orange	#F4A261	Effects
6	Preset 6	Teal	#277DA1	Effects
7	Preset 7	Brown	#8D6E63	Effects
8	Preset 8	Purple	#6D597A	Effects
9	Preset 9	Blue	#457B9D	Effects
10	Preset 10	Teal	#2A9D8F	Effects

LED Presets.

AREA	OPTIONS AND PURPOSE
Name	Use an operational name such as ON AIR, PREVIEW or WARNING; avoid ambiguous colours-only names.
Colour	Choose with the colour control or enter a hexadecimal RGB value.



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AREA	OPTIONS AND PURPOSE
Start Transition	Instant, Wipe, Blink, Fade, Breathing, Strobe, Chase, Phone Ring, or an available Custom Effect.
Loop / Constant Effect	Static Color, looping Wipe/Blink/Fade/Breathing/Strobe/Chase/Phone Ring, Morse Code, Audio Monitor, or a Custom Effect.
Direction and duration	Set movement direction and timing where the selected effect uses them. Center Out is available for supported two-channel behaviour.
Stop Transition	Controls how the segment leaves the Preset when its selecting Rule becomes inactive.
Audio Monitor	Select channel 1-32, thresholds and colours only after the service and source are proven. Levels return to zero after about three seconds without valid meter data, including during long-running operation.

Edit and verify a Preset

STEP	ACTION	VERIFY
1	Choose a Preset that is not currently critical to operation and enter its intended name and colour.	The row shows the new name and hexadecimal colour.
2	Open Effects; choose the simplest start, constant and stop behaviour that meets the requirement.	Only relevant controls are used.
3	Select the Preset from a controlled Rule.	The physical LEDs match colour, direction and timing.
4	Turn the selecting Rule off and confirm the stop transition and return state.	No unexpected lingering output remains.
5	Allow about 30 seconds of quiet time for the ordinary save before removing power, then reopen the Preset.	The saved settings read back correctly.

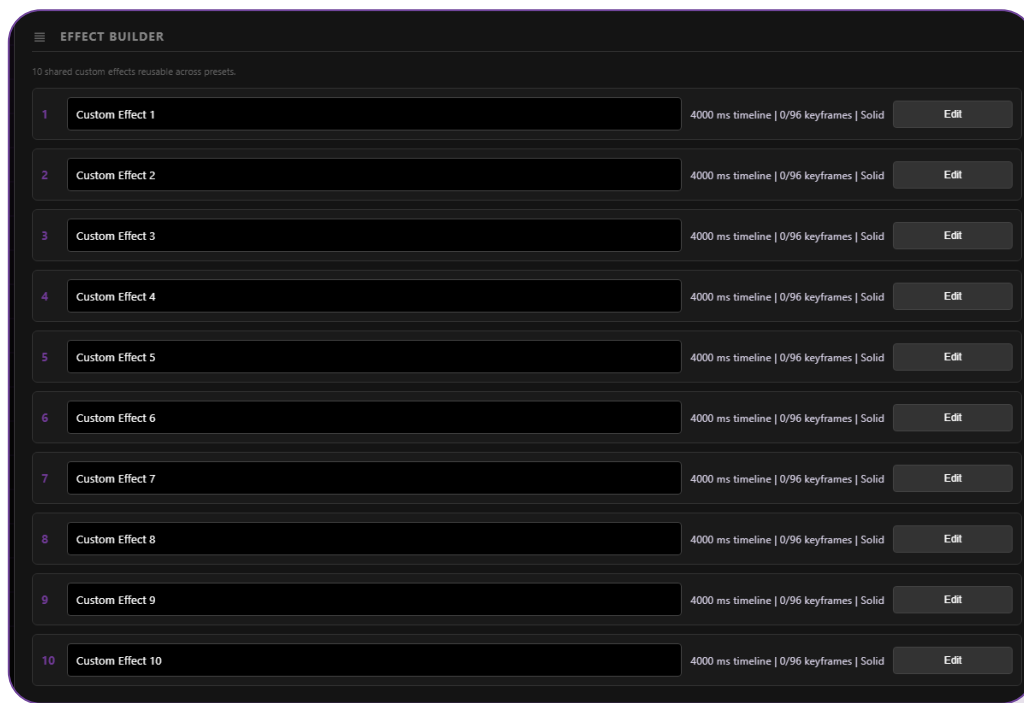
NOTE Presets define appearance; Rules, Logic, protocol commands or other configured controls decide when an appearance is selected.



06 • Effect Builder

Shared Custom Effects

Effect Builder provides ten shared Custom Effect slots. A saved effect can be selected in a Preset's start, constant or stop Effect list. Rename each slot for its purpose before wide reuse.



Effect Builder.



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Timeline workspace

CUSTOM EFFECT 1

Timeline

4000 ms timeline | 0/96 keyframes | Solid

NAME

Custom Effect 1

Export

Import

Restart Timeline

Save

Close

LED PREVIEW

0.00s / 4.00s 100% fits. >100% scrolls.

PREVIEW LEDs

24

-

+

100

%

+

Hide Preview

No keyframes

Play

Undo

Redo

PLAYHEAD (MS)

0

TIMELINE LENGTH

4000

-

+

100

%

+

TIMELINE ZOOM

100

%

+

☒ LIVE PREVIEW

TIMELINE

Playhead - 0 ms Move playhead, edit to auto-key. Ctrl+click keyframes to multi-select.

SELECTED

Output Style

EFFECT	VALUE	CURRENT	EASING	0.00s	0.40s	0.80s	1.20s	1.60s	2.00s	2.40s	2.80s	3.20s	3.60s
Position	0	0 LED	Linear										
Active LEDs	10	10 LED	Linear										
Trail	0	0 LED	Linear										
Feather	0	0 LED	Linear										
Repeat Clones	Off	Off	Linear										
Brightness	100	100%	Linear										
Color		#ff0000	Linear										
Output Style	Solid	Solid	Linear										
Accent A		#ffffff	Linear										
Accent B		#0080ff	Linear										
Band Width	1	1 LED	Linear										

Custom Effect timeline editor.

CONTROL	MEANING
Preview LEDs	Use 1-120 example LEDs to view the effect shape without changing the installed segment count.
Timeline Length	Set 100-60,000 ms for one effect cycle.
Playhead	Move to a time, then edit a property to create or update its keyframe.
General properties	Position, Active LEDs, Trail, Feather, Repeat Clones, Brightness and Colour.
Repeat	Repeat count 1-8, gap 0-120 and optional gap colour.
Output properties	Solid, Gradient or Bands, with Accent A, Accent B and Band Width where applicable.
Easing	Choose how each property moves between keyframes.



CONTROL	MEANING
Undo / Redo	Reverse or restore staged editor actions before Save.
Import / Export	Move one effect definition through an authorised protected workflow; Import changes only the local editor until Save.
Live Preview	Temporarily sends the editor result to the device output. Timeline Sync follows the playhead.

Build an effect safely

STEP	ACTION	VERIFY
1	Open an unused slot, rename it and choose a short Timeline Length.	The heading and summary identify the intended effect.
2	Set an initial keyframe at 0 ms, then add one property change at a later playhead position.	The preview clearly shows the transition.
3	Use Play and adjust easing, trail or colour one property at a time.	The movement remains predictable.
4	Enable Live Preview only during an agreed output test; disable it immediately after verification.	Normal Rule-driven output resumes.
5	Save, close, reopen the slot and verify its summary. Then assign it to one test Preset.	The saved effect reads back and performs as intended.

Loading a saved effect

Normal control and status updates continue while a saved Custom Effect loads. A load may be temporarily busy or end before completion. If the effect cannot be loaded, it is not opened for editing and the saved effect remains unchanged. Follow the retry message: wait at least one second, then open the slot again. Check the network if the problem persists. Loading an effect does not require a device restart.

Retrying a busy save

If a Custom Effect save is temporarily busy (HTTP 503), wait at least one second before retrying the same content. A rejected busy retry leaves previously accepted save work in progress. Do not repeatedly change and resubmit the effect while waiting. After completion, close and reopen the slot to verify the intended effect before continuing.

IMPORTANT Live Preview changes the physical output. Do not use it on an on-air or safety-significant segment without operational coordination.



07 • LED Configuration and Rules

Limits and segment structure

ITEM	OPERATING LIMIT
LMPSH-IP	Up to 2 active segments.
HRNL-25W	Up to 45 active segments where enabled; maximum 120 LEDs total across all segments.
Firmware LEDs per segment	1-120 per active segment.
Firmware LED ceiling	5,400 LEDs; observe the lower product hardware limit.
Rules	5 per segment; Rule 1 has highest priority.
Presets	10 reusable Presets.



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LED CONFIGURATION

Segment Mode

1 SEG

2 SEG

SEGMENT SETTINGS

SEG 1 Segment 1

LEDs 1 to 24

24 #000000 Active 0/5

Name

Segment 1

Count

24

#203A5F

Default color is used when all rules are disabled for this segment.

PRIORITY RULES (TSL & OSC)

#	PRESET	INPUT	TSL Index	Bit	OSC PATH	EN
#1	Preset 1	Disabled	TSL	0	/osc/path	<div>Live Select</div> <div>OSC Settings</div>
	Time Trigger	No NTP actions				
#2	Preset 2	Disabled	TSL	1	/osc/path	<div>Live Select</div> <div>OSC Settings</div>
	Time Trigger	No NTP actions				
#3	Preset 3	Disabled	TSL	2	/osc/path	<div>Live Select</div> <div>OSC Settings</div>
	Time Trigger	No NTP actions				
#4	Preset 4	Disabled	TSL	3	/osc/path	<div>Live Select</div> <div>OSC Settings</div>
	Time Trigger	No NTP actions				
#5	Preset 5	Disabled	TSL	0	/osc/path	<div>Live Select</div> <div>OSC Settings</div>
	Time Trigger	No NTP actions				

LED Configuration.

SETTING	GUIDANCE
Segment Mode	Select the number of installed segments. Changing mode changes which segment records are active.
System Status Visualization	HRNL-25W can show a Custom LED Strip or Rack 42U Alarm view. Rack view maps Segments 1-42 to U1-42.
Swap Physical Order	Available in two-segment mode when Segment 2 is physically first.
Name	Use a physical location or purpose that operators recognise.
Count	Match the installed LEDs. On HRNL-25W, the sum of all active segment counts must not exceed 120.
Default colour	Displayed when no active Rule selects another Preset.
Preset	Appearance selected when this Rule wins priority.
Input	Disabled, GPI 1/2, or Logic 1-10.



SETTING	GUIDANCE
TSL / OSC	Optional external selectors. Use the separate protocol guide for complete integration details.
EN	The Rule's current Active state. Accepted Active states are saved and restored; a maintained input or current Cluster authority may then override them.

FIVE-RULE PRIORITY

The first active Rule wins; the default colour is used only when all five are inactive

RULE 1

Highest priority. Reserve for the condition that must always win.

HIGHEST

RULES 2-4

Ordered alternatives. A lower row waits while an earlier Rule is active.

ORDERED

RULE 5

Lowest Rule priority, but still overrides the segment default.

LOWEST

DEFAULT

Used when Rules 1-5 are all inactive.

FALLBACK

Test every Rule both alone and while a higher-priority Rule is active.

Rule Active retention and restart

Accepted Active changes from manual controls, protocols, GPI, Logic and Cluster are retained for all 45 segments and five Rules per segment. On startup, the device restores its last verified saved state. A maintained input or current authoritative Cluster state can then set a different value.

Automatic saving becomes eligible after 30 seconds without an Active change, or after 120 seconds of pending changes. Automatic saves are at least 120 seconds apart. Network activity, another save, a firmware update or Cluster recovery may delay completion; an ordinary configuration save may retain the state earlier. These intervals are not a guarantee that an arbitrary power cut preserves the latest change.

A controlled restart captures the accepted Active state and waits for that snapshot to be saved and verified before continuing. Changes received after the restart was accepted are not part of that snapshot. If saving cannot complete, restart may remain pending: check the connection and current status instead of repeatedly requesting restart.

IMPORTANT Sudden power loss or an emergency reset restores the last verified snapshot and can lose more recent changes. Verify the restored Rule values and physical output after startup.

External Rule selectors

TSL uses an Index and Bit 0-3. OSC accepts a path and advanced matching for trigger, exact numeric value, range or string match. Enter only reviewed values, then use the separate protocol guide to verify the sending system.



GPI and Logic input behaviour

Input Trigger Settings

Configure how **GPI 1** controls Segment 1, Rule 1.

ACTIVE LEVEL

☒ **Input is TRUE (normal)**
The selected input is active while its value is TRUE.

☐ **Input is FALSE (inverted)**
Reverse logic: the selected input is active while its value is FALSE.

BEHAVIOR

☒ **Follow input (maintained)**
Keep the rule enabled only while the configured active level is present.

☐ **Trigger once (latch ON)**
Set the rule ON on the active edge; releasing the input does not turn it OFF.

HOW THE MODES BEHAVE

Follow input
The input owns this rule and forces it ON and OFF. TSL, OSC, Pro-Bel, Ember+, MQTT and manual commands have lower priority while this mode is selected.

Trigger once
Each detected transition into the active level sets the rule ON immediately. The release edge is ignored; another controller may change the rule later.

Fast GPI pulses: pulse duration is not configured here. A detected GPI edge is acted on immediately at the minimum duration supported by the hardware monitor.

CANCEL

SAVE

Input Trigger Settings.

CHOICE	BEHAVIOUR
Input is TRUE / FALSE	Choose the active level. FALSE inverts the selected GPI or Logic condition.
Follow input (maintained)	The input owns the Rule and forces it on and off. Other controllers have lower priority while maintained ownership is selected.
Trigger once (latch ON)	An active edge sets the Rule on. Releasing the input does not turn it off; another controller may change it later.



Scheduled actions

NTP Scheduled Actions

Device time: ---:---:---
Device date: YYYY-MM-DD
NTP configured, waiting for sync.

UTC (GMT+0)
Actions run only when the device has valid NTP time.

ACTION SLOT 1

MODE

ACTION

TIME

Disabled

Set TRUE

12:00 AM

Disabled

ACTION SLOT 2

MODE

ACTION

TIME

Disabled

Set FALSE

12:00 AM

Disabled

NTP actions set this rule once at the scheduled time. TSL, OSC, or manual changes can still change the rule later.

CANCEL

SAVE

NTP Scheduled Actions.

FIELD	USE
Prerequisite	Configure an NTP server and time zone in Network Config, save and restart, then confirm valid time.
Action Slot 1 / 2	Each Rule has two independent scheduled action slots.
Mode	Disabled, Once, Daily or Weekly.
Action	Set the Rule TRUE or FALSE at the scheduled time.
Once	Choose a date and time.
Weekly	Choose at least one weekday and a time.
After the action	The schedule sets the Rule once; TSL, OSC or manual control can change it later.

08 · Logic Matrix and auxiliary inputs

Ten independent Logic triggers

Each Logic bank can evaluate up to 12 inputs through five internal output branches. The bank's final state becomes a selectable Logic 1-10 source in Segment Rules.

LOGIC MATRIX

10 LOGIC BANKS • 12x5 EACH

INDEPENDENT LOGIC BANK

Choose the trigger to configure

Each Logic has its own inputs, five internal outputs, and one final OR state.

SELECTED LOGIC

Logic 1

L1

L2

L3

L4

L5

L6

L7

L8

L9

L10

Internal output matrix

Click a crosspoint to cycle Off, Direct and Inverted. Any enabled internal output can make this Logic true.

TRIGGER NAME

LOGIC 1

Logic 1

OR

FINAL LOGIC STATE

Disabled

Available as Logic 1 segment trigger

Off

Direct

Inverted

Contributing now

Condition inputs	SOURCE / CONDITION / VALUE / DELAY	01 OUTPUT 1	02 OUTPUT 2	03 OUTPUT 3	04 OUTPUT 4	05 OUTPUT 5
01	Unused input slot					
02	Unused input slot					
03	Unused input slot					
04	Unused input slot					

No pending changes

Apply saves Logic 1 only. Other Logic banks are not rewritten.

DISCARD

APPLY

INTERNAL OUTPUT AGGREGATION

The final Logic state is TRUE when any enabled output below is TRUE

OUTPUT 1

ANY (OR)

0/0

ANY

OUTPUT 2

ANY (OR)

0/0

ANY

OUTPUT 3

ANY (OR)

0/0

ANY

OUTPUT 4

ANY (OR)

0/0

ANY

OUTPUT 5

ANY (OR)

0/0

ANY

Logic Matrix.

AREA	HOW IT WORKS
Selected Logic	Choose one of ten banks. Name it for the condition it represents.



AREA	HOW IT WORKS
Condition inputs	Select an available source, comparison/value and optional on-delay up to 3,600,000 ms.
Sources	Unused, GPI, TSL tally, supported local System/Ember+ parameter, Rule state, another Logic output, or the one configured Remote Ember+ value.
Crosspoint	Off ignores the input; Direct uses its result; Inverted uses the opposite result.
Internal outputs	Each of five branches combines connected inputs with ANY, ALL, At least K, Exactly K or At most K.
Final Logic state	TRUE when any enabled, valid internal output branch is true.
Live indicators	Text, symbols and status lights show raw, delayed, contributing, unavailable and final states.
APPLY	Saves the selected Logic bank only. DISCARD restores its last saved values. No restart is required.

Loading the Logic Matrix

Normal control and status updates continue while the Logic Matrix loads. The configuration is captured for that request; later changes appear when you reopen the view. If loading reports HTTP 503 or ends before completion, wait at least one second, then select RETRY. Finish or close another large web download if necessary. A response can end after five seconds without progress or 30 seconds overall. Check the connection if loading keeps failing.

Configure one bank

STEP	ACTION	VERIFY
1	Select an unused Logic bank, give it a clear trigger name and keep it disabled while editing.	No Rule can use an incomplete live result.
2	Add only the required input rows; choose source, comparison and delay.	Every input shows a valid live state.
3	Set each needed crosspoint to Direct or Inverted and choose the branch combination mode.	The formula matches the written requirement.
4	Enable the bank and test false, true, delayed and unavailable input cases.	The final state and contributing indicators are correct.
5	Apply the bank, then select Logic N as a Segment Rule input and configure maintained or one-shot behaviour.	The Rule follows the proven Logic result.

NOTE The interface rejects a nested Logic reference that would create a cycle. Treat an unavailable required input as a commissioning fault; do not bypass it by weakening the formula.

Remote Ember+ monitored parameter

The optional device-local Ember+ Consumer can supply one Boolean or signed-x1000-representable Integer/Real value to Logic. Configure its remote provider and numeric path in Network Config / Socket Config, then choose Remote Ember+ monitored parameter for the Logic input.

STATUS	OPERATOR MEANING
Monitoring / value available	The remote scalar value is fresh, online and available to the Logic comparison.
Connecting / browsing	The consumer is opening the remote session or requesting the configured Parameter.
Unavailable / stale	Logic does not have a trustworthy remote value. Check the endpoint, path, remote online state and stale timeout.
Unsupported	The path is not an ordinary supported scalar Parameter. Streaming, text, non-finite and out-of-range numeric values are not supported.



IMPORTANT Remote Ember+ is monitoring-only: the device never writes the remote provider. Its numeric path can change meaning if that provider is reconfigured or renumbered, so verify the path after provider changes.

Auxiliary connections

The two auxiliary connections are configured in System Management - Special / Cluster Settings. Each connection operates as either a debounced GPI or a 1-Wire temperature Sensor. Select the physical mode that matches the installed wiring.

HRNL-25W seven-pin XLR

The current HRNL-25W uses a locking seven-pin XLR-F connector marked LED. Pins 3 and 4 carry the two auxiliary connections. Confirm the hardware revision before wiring; this assignment applies to the seven-pin HRNL-25W.

HRNL-25W has a 25 W PoE power supply and supports a maximum of 120 LEDs in total across all segments. Additional segments divide this LED total; an Extended Segments licence does not increase it.

XLR PIN	ASSIGNMENT
1	GND
2	LED Data
3	GPI1 / Temp1
4	GPI2 / Temp2
5	N/C
6	N/C
7	+5V

N/C means no connection. Select GPI or Sensor mode to match the wiring of each auxiliary connection.

MODE	VISIBLE AND CONTROL BEHAVIOUR
GPI	HOME shows TRUE/FALSE. The input can drive Segment Rules and Logic.
Sensor	HOME shows temperature or connection state. The same connection is unavailable as a GPI source.
After changing mode	The device restarts. Reopen the setting, confirm readback, then verify HOME before using the input.

IMPORTANT Use the approved sensor wiring for the installation. Do not change an input mode solely to clear a Logic warning without checking the physical connection.



09 • Network and integrations

Addressing and time

The screenshot shows the 'NETWORK CONFIG' interface. The 'Use DHCP (Automatic IP)' checkbox is checked. Below it, the 'IP CONFIG (STATIC FALLBACK)' section contains fields for 'IP Address' (192.0.2.10), 'Mask' (255.255.255.0), and 'Gateway (optional)' (192.0.2.1). The 'TIME CONFIGURATION' section has a red status indicator and fields for 'NTP Server IP (0.0.0.0 = Disabled)' (192.0.2.123) and 'Time Zone' (UTC (GMT+0)). At the bottom, there is an 'MQTT' section with an 'MQTT License' field showing 'AVAILABLE'.

Network Config - addressing and time.

SETTING	GUIDANCE
Use DHCP	Use a recorded DHCP reservation. Disable DHCP when applying a fixed static address.
Static IP / Mask / Gateway	Use a unique, approved address and correct subnet values. A wrong value can make the interface unreachable after restart.
NTP Server IP	Use 0.0.0.0 to disable, or enter the approved IPv4 time source.
Time Zone	Select the fixed offset used by scheduled Rule actions.
SAVE & REBOOT	Applies the complete Network Config and restarts the device.

Change network configuration

STEP	ACTION	VERIFY
1	Record the current working address, mask, gateway, HTTP port and a physical recovery route.	The existing access path can be restored if needed.
2	Choose DHCP with a reservation, or enter the approved static values. Check for address conflicts.	The planned address is unique and routable.
3	Review NTP and enabled network services before selecting SAVE & REBOOT.	No unrelated field changed accidentally.
4	Wait for restart, then open the new address and read back Network Config and HOME.	Address, time and link are correct.



IMPORTANT A successful save deliberately interrupts the current browser connection. Do not repeat the submission while the device is restarting.

DHCP lease and fallback

The device does not extend a short lease beyond the server's grant. If the lease expires or the server sends a valid rejection (DHCPNAK), it stops using that address and requests a new configuration. If DHCP is unavailable, allow up to two minutes for IPv4 link-local fallback and address-conflict checks. Network connections can close; use Discovery to reconnect. Do not repeatedly restart during recovery.

MQTT and network services

Network Config - services and MQTT.

SERVICE	DEFAULT	OPERATOR ACTION
HTTP	80	Keep enough HTTP capacity for intended management clients.
Ember+ Provider	9000	Allocate intended inbound clients; verify browsing, control and notifications.



SERVICE	DEFAULT	OPERATOR ACTION
Ember+ Consumer	9000	Optional one-connection monitor of one remote Parameter for Logic; enter the remote provider port.
TSL 3.1	8900	Allocate required TCP clients and verify the documented protocol behaviour.
Pro-Bel	5000	Set the intended port and required client capacity.
OSC	8000	Use 0 for Off or 1 for On.
Audio Monitor	9001	Use 0 for Off or 1 for On; prove the source before Audio Presets.
MQTT	1883	Requires feature availability. Set broker, keepalive 5-600 s, prefix and optional credentials.

MQTT reboot commands

Publish reboot commands without retention. Saved reboot commands replayed by the broker with RETAIN=1 are ignored in full, including accompanying value fields. Other supported retained value commands keep their existing behaviour. Clear any old saved reboot command at the broker before testing a new restart.

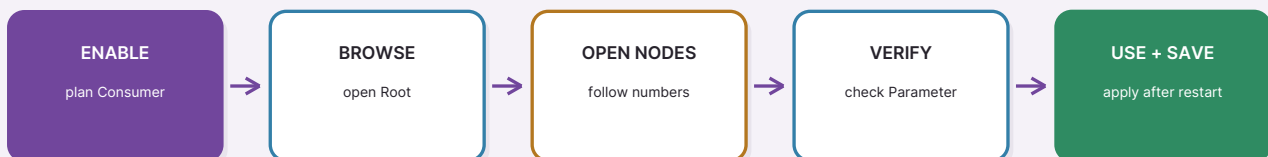
Incoming commands do not postpone MQTT keepalive messages. Status updates continue while commands arrive, subject to the connection's ability to send. If the connection fails, the device reconnects automatically. Use recent status and current Cluster authority when deciding whether a command took effect.

Configure the Ember+ Consumer

FIELD	GUIDANCE
Enable Ember+ Consumer	Requires the Ember+ feature licence and a usable endpoint/stale timeout. Checking it immediately plans one Consumer connection; if no capacity is available, the unchecked control is unavailable.
Provider IPv4 / Port	Remote provider unicast address and TCP port 1-65535; default 9000.
Numeric Glow Path	One to six dot-separated non-negative numbers. A blank saved path is awaiting selection and does not monitor. Use Browse provider to obtain and verify it.
Stale Timeout	1,000-3,600,000 ms in 100 ms steps; default 5,000 ms. The device refreshes the value halfway through this interval.
Browse provider	With Consumer enabled and a valid provider endpoint, opens Root. Open Nodes one level at a time, then verify a compatible Parameter before using its numeric path.
Live Status	Confirm monitoring, value available, reasonable age and no error after restart.

CHOOSE THE MONITORED PARAMETER

Browse only the required branch and verify the exact scalar before it is used by Logic.



Use copies the path into the form. SAVE & REBOOT is the only step that applies it.



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STEP	ACTION	VERIFY
1	Enter the provider address, port and stale timeout, then enable the Consumer.	The Socket Config immediately plans the Consumer connection; free another allocation if the control is unavailable.
2	Select Browse provider. Open only the required Nodes. Each row shows a numeric number, kind and Identifier; Filter searches the current page and Load more continues that directory.	The tree is explored one branch at a time rather than loaded all at once.
3	Select the intended ordinary scalar Parameter and choose Verify. Use it only when the modal reports a compatible Boolean, Integer or finite Real value, then select Use parameter.	A verified 1-6 component numeric path is copied into the Network Config form without saving or writing the provider.
4	Select SAVE & REBOOT, reconnect and inspect the Consumer status.	State reaches Monitoring and value available. A blank saved path remains awaiting selection without monitoring.
5	Choose Remote Ember+ in one disabled Logic bank, configure the comparison, then test normal and unavailable cases.	Logic changes only for the intended fresh value.

Plan the required connections

Allocate only the clients the installation needs. An enabled Ember+ Consumer uses one outbound socket once a verified path is configured, so the maximum simultaneous inbound Ember+ Provider clients becomes three. Checking the box reserves the planned allocation in the current form immediately; a saved blank path remains awaiting selection and has no runtime Consumer connection. If the interface rejects a combination, reduce unused allocations and verify every required connection after restart.

NOTE Use separate XICHTEE Pro-Bel, TSL, Ember+, REST API, OSC and MQTT guides for complete integration contracts. This Manual covers configuration and verification, not protocol framing.

Integration security

RULE	PRACTICE
Trusted boundary	Keep native HTTP and unencrypted control protocols on an isolated management network or behind an approved secure boundary.
Credentials	Do not embed credentials in source code, URLs, screenshots or shared support records.
Least exposure	Disable unused services and allocate only the connections the installation requires.
Verification	After restart, confirm HOME client state and the external application's expected readback.

DHCP background recovery

After link-local fallback, DHCP retries continue even when all configured network services are in use. Discovery and NTP time synchronisation pause briefly during each retry, then resume between retries. An unsuccessful retry keeps the existing link-local address and protocol connections. If Discovery misses the device, wait and scan again. When a lease succeeds, reconnect at the new address shown by Discovery or the DHCP reservation.

Protocol monitor views

Ember+, Pro-Bel, OSC and TSL monitor responses show a fixed set of entries captured for that request. New traffic appears in later refreshes. Normal control and status updates continue while the view loads. If it is temporarily busy (HTTP 503), wait at least one second, then reopen the view. A response can end after five seconds without progress or 30 seconds overall; close an incomplete view and retry after checking the connection. Avoid opening several large monitor or download views at once.



10 · System management and maintenance

System Management actions

SYSTEM MANAGEMENT

DEVICE INFORMATION

SPECIAL / CLUSTER SETTINGS

SAVE CONFIG

LOAD CONFIG

FIRMWARE UPDATE

RESTART DEVICE

System Management.

ACTION	GUIDANCE
DEVICE INFORMATION	Read product and firmware information for support.
SPECIAL / CLUSTER SETTINGS	Set auxiliary connection modes and Cluster role. A role change saves and restarts; Section 11 gives the required readback.
SAVE CONFIG	Download a protected application backup before material changes.
LOAD CONFIG	Restore only reviewed application and approved auxiliary settings.
FIRMWARE UPDATE	Upload the customer UF2, stage it to the inactive slot, then apply and verify.
RESTART DEVICE	Performs a controlled restart without intentionally clearing configuration.

Backup and restore

STEP	ACTION	VERIFY
1	Select SAVE CONFIG and store the downloaded file in the organisation's protected configuration repository.	A dated backup exists before the change.
2	Before restore, confirm product, firmware compatibility, source and intended sections. Treat the file as sensitive.	The file belongs to the intended installation.
3	Select LOAD CONFIG, choose the reviewed file and restore only the approved application/input sections.	The interface accepts the selected sections.
4	Wait for completion or requested restart. Read back each restored section and test the physical output.	Configuration and behaviour match the recovery plan.

IMPORTANT During a network restore, an omitted MQTT password entry keeps the existing stored password. A present but empty entry clears it; a present non-empty entry replaces it. Treat every backup that contains this entry as sensitive. The device-local Ember+ Consumer configuration is also part of the network backup section; verify its endpoint, numeric path and status after restore.

NOTE An ordinary application backup contains configuration, not the live Rule Active bitmap. Cluster topology is device-local and is not restored by the ordinary application backup. Keep a separate protected topology record for every Cluster member.

Firmware update

Firmware Update

Upload the single customer update file **ethernet_update.uf2**. The device automatically programs the inactive slot (A/B).
Apply switches the boot slot and reboots. If the new firmware fails to boot, the bootloader will automatically roll back.

Current firmware slot: **A**. Upload **ethernet_update.uf2** to update slot **B**, then click **APPLY**.

CHOOSE .UF2

No file chosen

State: **idle** (example)

UPLOAD

APPLY & REBOOT

CANCEL

Firmware Update.

STEP	ACTION	VERIFY
1	Save a protected configuration backup and obtain the authorised ethernet_update.uf2 plus its SHA-256 value from the same approved release package. Compare the complete SHA-256 value before upload.	File source, checksum and target device are confirmed.
2	Open FIRMWARE UPDATE, choose the UF2 and select UPLOAD. Keep power and network stable.	The dialog reports a staged image.
3	Select APPLY & REBOOT only after staging is complete.	The device waits for required verified saving, then restarts into the prepared slot. A save failure can leave apply pending.
4	Allow the device to complete boot confirmation; temporary HTTP unavailability is expected.	The web interface returns without repeated intervention.
5	Read Device Information/HOME, verify the expected firmware, network services, Rules and physical LEDs.	The new release is operational.



IMPORTANT The device checks UF2 framing, completeness, RP2040 target, inactive-slot layout, boot vectors and CRC-32 before apply. It also verifies that the stored image matches the uploaded content. These checks detect corruption, but CRC-32 does not prove who published it. It does not verify a cryptographic publisher signature. Use only the file whose complete SHA-256 value matches the approved release package.

Upload progress and retry

CONDITION	OPERATOR ACTION
Upload headers	TCP fragmentation is supported, including a split request method or upload path. Complete the headers within 8 seconds from the first received bytes, before upload admission.
Upload in progress	Normal control and monitoring continue to be serviced during upload. This is not a guarantee of uninterrupted output during apply or restart.
Upload timeout	After the upload is admitted, it ends after 10 seconds without progress or 300 seconds in total. Correct the connection problem, confirm the previous upload has ended, then upload the complete approved file again.
Upload rejected or interrupted	Do not apply an incomplete or failed upload. Reopen the update dialog and check its state before retrying. Apply only after a complete upload reports a staged image.
Device temporarily busy	Wait for the current save or Cluster recovery to finish before another upload or apply. Do not repeatedly submit the same operation.

IMPORTANT Network OTA changes the inactive application slot only. Network OTA does not replace the bootloader. Automatic rollback therefore depends on a compatible installed bootloader; when its condition is unknown or physical service is requested, stop and follow the approved USB/BOOTSEL support procedure.

Application firmware updates remain available on compatible older bootloaders and do not install a bootloader. A separately serviced watchdog-capable bootloader can restart the device if protected boot processing stalls; additional application startup coverage requires compatible firmware. Older firmware retains its existing startup behavior. Repeated startup failures require technical support; automatic restart does not guarantee a usable system.

IMPORTANT The A/B update design can roll back if the new image fails to boot. Do not remove power, repeatedly reconnect, or start another update while the device is confirming the trial image.

Read device logs

Use LOGS at the bottom of the web interface to open the log view. Normal control and status updates continue while logs load.

LOG VIEW	OPERATOR ACTION
Loading	Wait for the current request to finish. Avoid opening several log views at once.
Temporarily busy (HTTP 503)	The device is handling another response. Wait at least one second, then close and reopen LOGS.
Failed or incomplete view	A log response can end after five seconds without progress or 30 seconds overall. Check the connection, close the view and reopen LOGS. Loading logs does not require a device restart.



Management Console access

When the TCP Management Console is enabled, a User account can use only read-only commands. Over TCP, configuration changes, restarts, firmware actions and manual time synchronisation require an Admin account. Operations marked USB-only still require physical USB access, even for an administrator. Keep physical USB access under site control. Long-running sessions do not need periodic reconnection just to keep log output flowing. If a slow or unresponsive console connection is closed, reconnect and sign in again before continuing.

Complete Management Console sign-in within 60 seconds of connecting. Typing or restarting the sign-in does not extend this limit. If the connection closes before sign-in completes, reconnect and sign in again. The configured idle timeout still applies after sign-in.

LED-output stall recovery remains active during long operation. Recovery can restart the device; verify physical output afterwards.



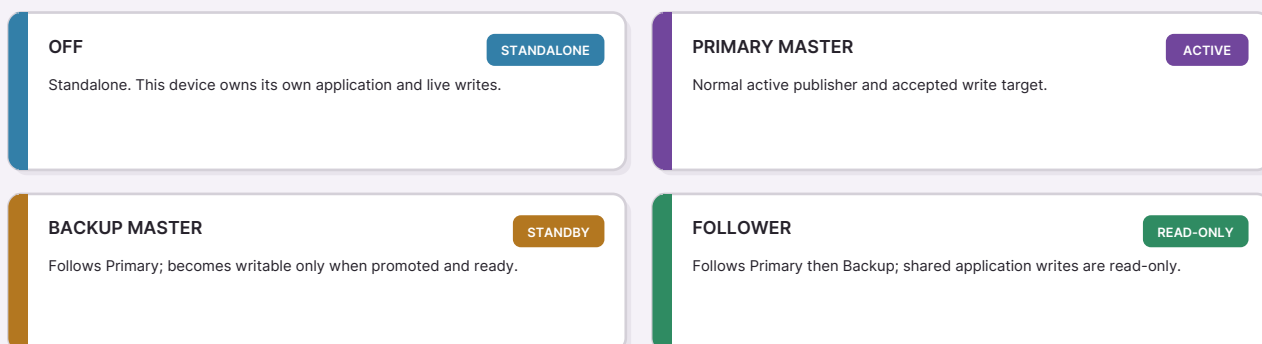
11 • Cluster Mode

Purpose and roles

Cluster Mode is an optional licensed redundancy feature. It separates one active configuration authority from the devices that follow its shared application and live Rule state.

CLUSTER ROLES

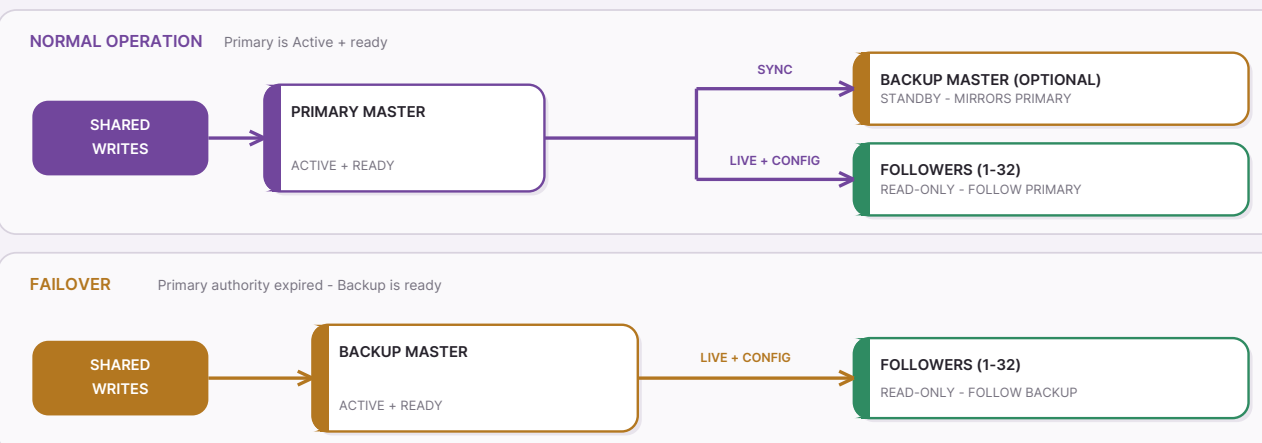
Every member has one device-local role



A Follower remains fail-safe read-only while a valid Cluster role is enabled.

CLUSTER TOPOLOGY AND OWNERSHIP

Primary is preferred; the optional Backup takes authority only after failover.



Send shared writes only to the Active + ready master. Presence alone does not grant authority.



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What Cluster shares

SHARED FROM THE ACTIVE MASTER	DEVICE-LOCAL - NOT REPLICATED
LED mode and status visual	Device identity and product-local information
Segment names, counts and colours	Network addressing and service allocations
Segment Rules, mappings and schedules	Accounts and access policy
LED Presets	Licence and Cluster role
Logic Matrix	Primary/Backup/follower addresses and Group Key
Custom Effects	Local auxiliary sensor telemetry
Live Rule state and live Preset colours	Ordinary application backup does not contain topology

NOTE Do not describe Cluster as synchronising every device setting. Network, access, licence, role, peer list and Group Key remain local to each unit.

Plan the topology

ITEM	REQUIREMENT
Primary	Exactly one Primary address; it must match that device's live address.
Backup	Optional. When used, its address differs from Primary and matches the Backup device's live address.
Followers	1-32 unique addresses in an intentional order. Both masters use the identical ordered list.
Follower record	Contains no downstream follower list and uses a live address different from both masters.
Group Key	Exactly eight hexadecimal digits, non-zero and identical on every member. Protect it as sensitive.
Addressing	Use static or DHCP-reserved addresses for every Cluster member.
Authoritative configuration	Choose the one proven Primary application configuration that should be distributed.

Protect before change

STEP	ACTION	VERIFY
1	Confirm every device's product, firmware, current address and intended role.	The worksheet maps one physical unit to one role/address.
2	Save each device's application backup and a separate protected topology record.	Every submitted unit can be reconciled.
3	Confirm the intended Primary application configuration and pause ordinary configuration writes.	There is one authoritative starting point.
4	Prepare the complete Primary, optional Backup, ordered Followers and Group Key before opening settings.	All records can be compared before submission.

Allow time for verified synchronisation

Preparing a Backup for a configuration transfer, or waiting for saved configuration or an individual Custom Effect to be verified, can take up to 180 seconds. This is a limit per preparation or verification phase, not for the whole transfer. Repeated pending acknowledgements do not restart the phase limit. The normal 1.5-second authority timeout is unchanged. Keep power and network stable; wait for readiness and read back the intended configuration before allowing takeover or further shared changes. Upgrade both sending and receiving members to use the extended wait at both ends.



Cluster fields on a master

Cluster Mode

Device Role

Primary Master

Primary Master sends configuration and live rule state to all followers.

Primary Master IP

Backup Master IP (optional)

192.0.2.10

192.0.2.46

Use static or DHCP-reserved addresses for all Cluster members.

Group Key (8 hexadecimal digits)

XXXXXXXX

GENERATE

Use the same Group Key on both masters and every follower.

Followers 1 shown / 32

192.0.2.21

Online / Following Primary

Required for Primary and Backup Master. Configure the same list on

Cluster settings - Primary Master.



Cluster fields on a Follower

Cluster Mode

Device Role

Follower

▼

Follower accepts configuration and live rule state only from the configured masters.

Primary Master IP

Backup Master IP (optional)

192.0.2.10

192.0.2.40

Use static or DHCP-reserved addresses for all Cluster members.

Group Key (8 hexadecimal digits)

XXXXXXXX

GENERATE

Use the same Group Key on both masters and every follower.

Cluster settings - Follower.

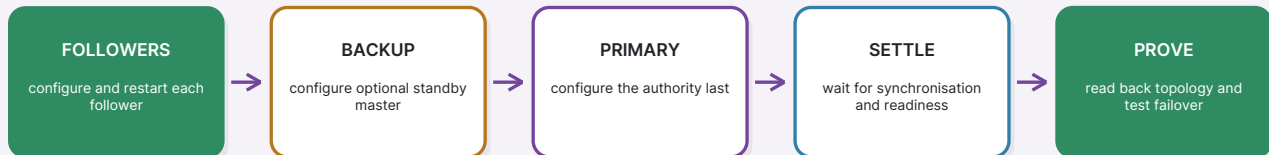
FIELD	PRIMARY / BACKUP	FOLLOWER
Device Role	Select the intended master role.	Select Follower.
Primary Master IP	Same approved Primary address on every member.	Address of the upstream Primary.
Backup Master IP	Same optional Backup address on every member.	Optional upstream Backup.
Group Key	Same protected eight-digit value.	Same protected eight-digit value.
Followers	Identical ordered list on both masters.	Hidden; a Follower has no downstream list.



Configure in controlled waves

SAFE CLUSTER DEPLOYMENT ORDER

Stop at the first mismatch; temporary lack of authority is expected during setup



Do not resume shared writes until the final Primary-led state is healthy.

STEP	ACTION	VERIFY
1	On each Follower, open System Management - SPECIAL / CLUSTER SETTINGS. Set role, both master addresses and Group Key.	Follower list is absent; unrelated Special fields remain unchanged.
2	Confirm the dialog. Let the device save and restart; temporary web unavailability can occur. Reconnect, reopen settings and read back the exact record before making another change.	The Follower record matches the worksheet.
3	If used, configure the Backup with both master addresses, Group Key and the complete ordered follower list. Restart and read back.	Backup record matches the worksheet.
4	Configure the Primary last with the same addresses, key and ordered follower list. Restart and read back.	Primary record matches the worksheet.
5	Wait for HOME status to progress through Checking/Synchronizing to the expected Primary-led state.	Every peer is online, ready and following Primary.
6	Make one harmless shared change on the Active Primary and verify it on Backup and Followers.	Shared configuration reaches every intended peer.

IMPORTANT The same Special Settings dialog also contains auxiliary and advanced fields. Change only the values in the approved Cluster worksheet.

Remove a device from Cluster

STEP	ACTION	VERIFY
1	Save the device application backup and its separate Cluster topology record before changing the role.	A recovery basis exists for this device.
2	On the device being removed, set Device Role to Off in System Management - SPECIAL / CLUSTER SETTINGS and confirm the dialog once.	The device starts its save and controlled restart.
3	Wait for the web interface to return at the same configured address. Reconnect, reopen the settings and confirm Device Role is Off.	The role readback is Off and the device is operating standalone.
4	Only after that readback, make any local application changes required for standalone use.	The device no longer follows shared Cluster changes.

IMPORTANT Do not repeat the role change, remove power, or make application changes while the restart outcome is unknown. If the browser temporarily reports that the device is busy, wait briefly, reconnect and read back the role before deciding what to do.

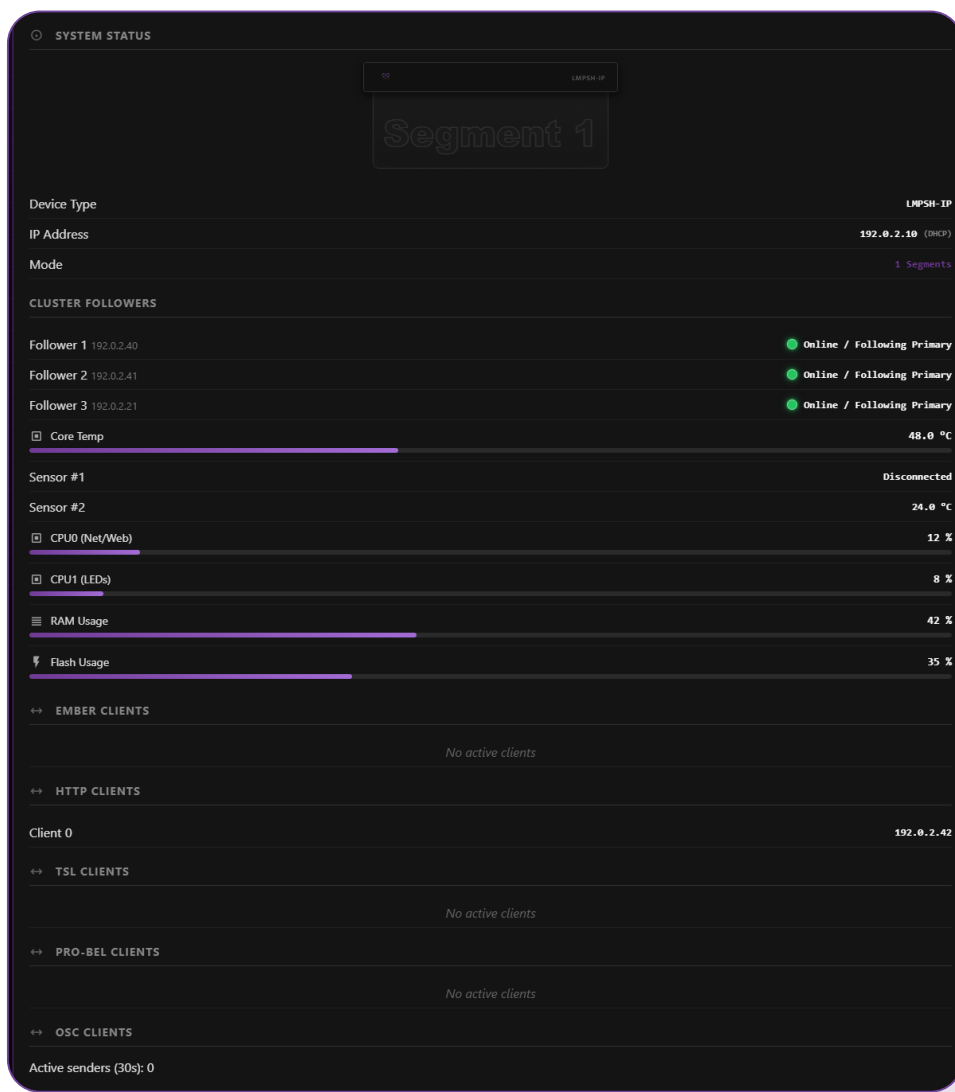


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Verify HOME on both role types



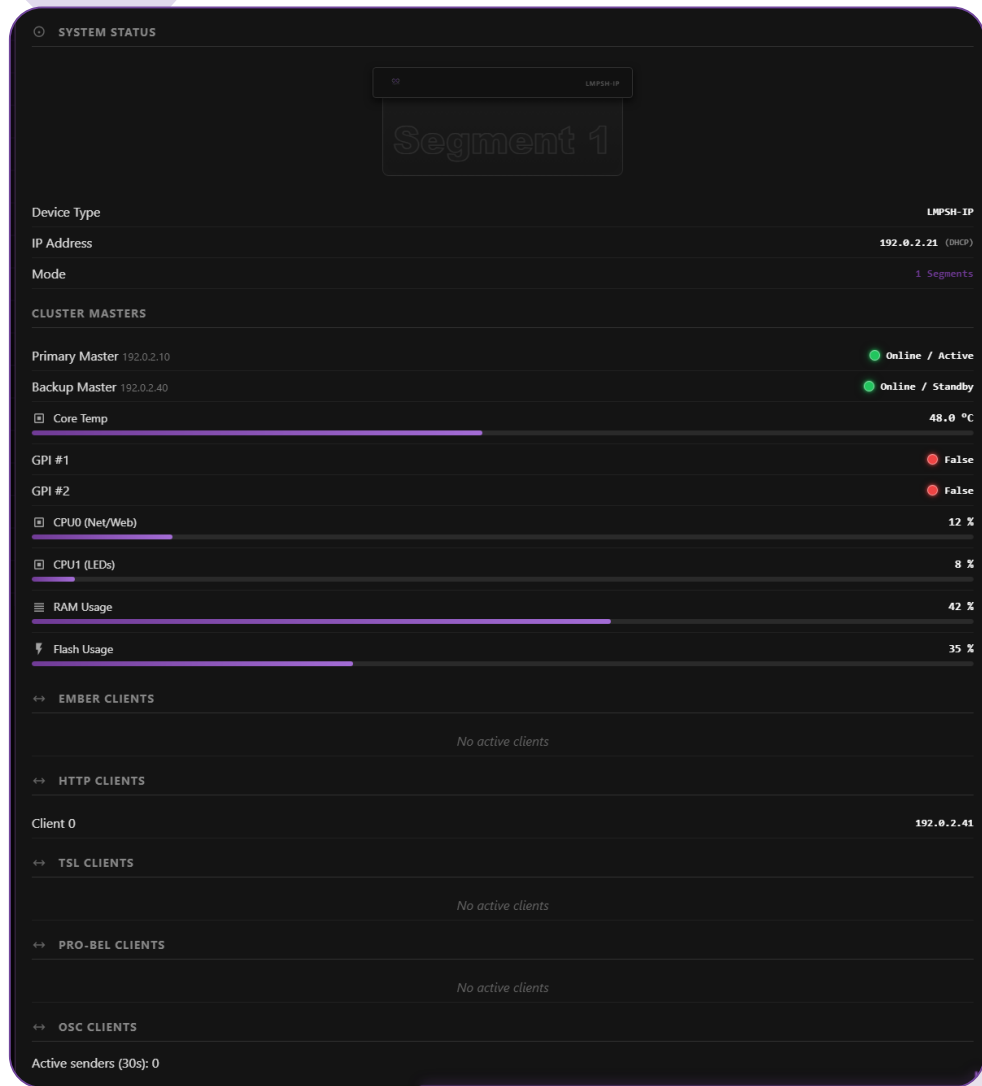
HOME status - Primary Master.



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HOME status - Follower.

STATUS TEXT	MEANING AND ACTION
Checking	No monitoring status has been seen yet. Wait briefly, then check power, addressing, role, key and network reachability.
Offline	A known peer is no longer within its monitoring window. This is not the same as standby.
Online	Presence is known, but there is no stronger ready/leader state to display.
Online / Synchronizing	Peer is reachable but shared configuration is still pending or not ready.
Online / Following Primary	Follower is ready and reports the Primary as its authority.
Online / Following Backup	Follower is ready and reports the promoted Backup as authority.



STATUS TEXT	MEANING AND ACTION
Online / Active	Current selected authority for Cluster control.
Online / Standby	Reachable Backup that is not currently elected.
Not configured	No Backup address is configured; this is valid for a Primary-only topology.

IMPORTANT Online presence alone is not proof of write authority. Make shared changes only on the device shown as Active and ready.

Failover behaviour

EVENT	EXPECTED BEHAVIOUR
Normal	Followers prefer Primary. Backup remains online in Standby and follows the Primary.
Primary authority lost	After about 1.5 seconds without accepted authority traffic, a ready Backup can promote and Followers change to Following Backup. Expired authority stays expired until fresh traffic arrives, even after long uptime.
Primary returns	Primary leadership is preferred again; clients should re-evaluate the Active device.
Failover count	On each Backup or Follower, cluster_failovers advances once after that member has seen Primary and later selects Backup. This includes a brief no-authority state between Primary and Backup; repeated no-authority samples do not add counts, and Backup-only startup is not counted.
Monitoring presence	HOME can retain presence for up to about 3 seconds, so presence and authority may change at different moments.
Configuration transfer	Changes synchronise one peer at a time after about 500 ms. An unavailable or failing peer is retried without preventing other peers from receiving updates. Readiness requires saved state; verify every intended peer is ready and has the intended configuration before testing failover. Only accepted configuration and valid retries of the current transfer maintain authority. Malformed or rejected configuration does not postpone failover.
Interrupted Backup transfer	Before takeover, Backup restores its last complete saved configuration and Custom Effects if the incoming transfer was interrupted. The restored state can precede the latest Primary edits.
Live state	The active master publishes live Rule state every 250 ms and on changes.
Ember+ on Backup	Clients must reconnect after Backup promotion and after its return to Standby.
Local sensors	1-Wire temperature telemetry continues on every role; leader ownership still controls shared Rule mutations.

Local GPI after takeover

A GPI pulse completed while a Backup is in Standby is not replayed when it takes control. Maintained inputs use the current physical level after it remains stable for about 30 ms; earlier input states are not reused. Trigger once responds to new matching edges after takeover. Local 1-Wire temperature monitoring continues on every role.

Recovery and readiness

Backup stays unready until its complete saved state is verified and recovery cleanup finishes. Recovery continues during normal Cluster traffic and after restart. HOME remains available for monitoring; online does not mean ready.

IMPORTANT If the saved recovery data cannot be verified, the device stays unready and does not take control. Monitoring remains available, but further saves, backup downloads and firmware updates may remain unavailable. Keep the last protected recovery records and contact support@xichtee.com before any destructive recovery.



Cluster maintenance and licence loss

Perform firmware or topology maintenance one device at a time under a written authority plan. Wait for synchronisation and recovery to finish before firmware changes; do not downgrade during recovery. Read back each local topology after restart and do not continue when a submitted device has an unknown outcome.

IMPORTANT Loss or removal of the Cluster licence does not erase the saved topology. Cluster authority normally stops and the unit returns to standalone write ownership; a recovery fault continues to block control. Do not rely on Follower read-only protection while the feature is inactive. Contact support@xichtee.com to restore authorised licensing, then verify role, topology and healthy HOME state.



12 · Troubleshooting

Start with the visible symptom

SYMPTOM	LEAST-RISK CHECKS AND RECOVERY
Web interface does not open	Check power/link, current address, route and HTTP port. Do not use destructive recovery before checking the site record.
Wrong or unexpected LEDs	Read HOME; check segment count/default, active Rules in priority order, selected Preset and any Live Preview.
Rule state differs after startup	Check the last verified saved state, recent changes before power loss, maintained inputs and current Cluster authority. Follow the retention guidance in Section 7.
Rule switch will not stay changed	Check whether a maintained GPI or Logic input owns Active. Test the source state and polarity.
Scheduled action does not run	Confirm NTP server, time zone, valid device time, slot mode, date/day and action.
Logic shows Unavailable	Open the named input row; verify source availability, auxiliary mode and any nested Logic dependency.
Protocol client cannot connect	Check service port and allocation, feature availability, network path and the relevant protocol guide.
Ember+ Consumer is unavailable	Check the Ember+ licence, provider address/port, numeric Parameter path, remote online state, stale timeout, Cluster role and socket allocation.
Remote Ember+ Logic input is wrong	Re-browse the remote provider and verify that the numeric path still identifies the intended ordinary scalar Parameter.
Device address is unreachable	Check the saved static address or current DHCP lease. Use Discovery after a network save, lease expiry or rejection.
Update does not complete	Check whether upload failed or apply already began. Retry a failed upload only after it has ended. After apply, keep power stable and allow confirmation or rollback before another update.
Cluster role change is not yet confirmed	Wait for the controlled restart, reconnect at the same address and read back Device Role. Do not repeat the change or make local application edits until the role is known.
Cluster stays Checking	Verify first contact: power, link, distinct reserved addresses, exact roles, same key and UDP/2323 reachability.
Cluster stays Synchronizing	Wait, then compare both master lists and every local record. Avoid repeated edits or restarts.
Follower rejects a write	Expected: send the shared change to the current Active master.
Backup does not become Active	Backup must be ready and Primary unavailable. For persistent recovery or save errors, keep protected records and contact support@xichtee.com before destructive recovery.
Two devices appear Active	Stop writes. Refresh/read status and reconcile topology; one valid authority is expected.



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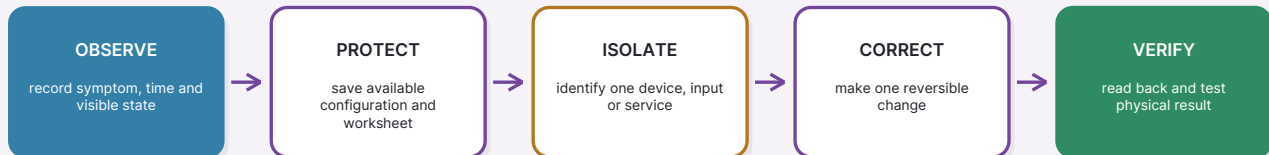
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Safe recovery order

RECOVER WITHOUT HIDING EVIDENCE

Move from observation to the least destructive corrective action



Use restart only when justified; use destructive recovery only with an approved rebuild plan.



13 · Reference

Operating limits

ITEM	VALUE
Firmware LEDs per segment	1-120 per active segment
Firmware LED ceiling	5,400 LEDs; observe the lower product hardware limit.
HRNL-25W LED limit	120 LEDs total across all segments
HRNL-25W PoE supply	25 W
LMP5H-IP segments	Up to 2
HRNL-25W segments	Up to 45 where enabled
Rules per segment	5
LED Presets	10
Custom Effects	10
Logic banks	10; up to 12 inputs and 5 internal outputs per bank
Remote Ember+ inputs	1 device-local monitored Parameter; Boolean or signed-x1000-representable Integer/Real
Cluster Followers	1-32 on a master record
Cluster Group Key	8 hexadecimal digits; protect as sensitive

Default service ports

SERVICE	DEFAULT PORT	NOTES
HTTP	80/TCP	Local web interface and REST API
Management Console	2323/TCP	Availability depends on approved configuration; reconnect if a slow or unresponsive client is closed
USB console	USB CDC	If the connected host cannot keep up, some console output can be omitted. Wait for the truncation notice before relying on a complete transcript.
Cluster	2323/UDP	Independent of the TCP management port
Ember+ Provider	9000/TCP	Allocate intended inbound client capacity
Ember+ Consumer	9000/TCP remote	Default remote provider port; one outbound connection
TSL 3.1	8900/TCP	Allocate intended client capacity
Pro-Bel	5000/TCP	Configured in Network Config
OSC	8000/UDP	0 means Off; 1 means On
Audio Monitor	9001/UDP	0 means Off; 1 means On
MQTT	1883/TCP	Broker port; feature-dependent



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Terms

TERM	MEANING
Segment	One independently controlled range of physical LEDs.
Preset	Reusable colour and effect appearance selected by a Rule.
Rule	One of five priority selectors for a segment.
Custom Effect	Reusable timeline built in Effect Builder.
Logic bank	Named combination of live conditions exposed as Logic 1-10.
Remote Ember+	One monitored scalar Parameter from another provider, available as a device-local Logic input.
Maintained	Input owns a Rule and follows both its active and inactive level.
One-shot	An active edge sets a Rule on without owning its later off state.
Active master	Current accepted Cluster authority for shared writes.
Standby	Reachable Backup that is not currently elected.
Synchronizing	Peer is present but shared configuration is pending or not ready.

Related documents

Use the current XICHTEE Pro-Bel, TSL, Ember+, REST API, OSC and MQTT documents for integration details. Their transport, message, authentication and readback rules take precedence over a short summary in this Manual.

Contact XICHTEE Support

For technical assistance, email support@xichtee.com.

SUPPORT REQUEST	INFORMATION
Include	Product model, firmware version, visible symptom, local date and time, preceding action, expected result, restart result and a useful screenshot.
Do not send	Passwords, Cluster Group Key, licence material, site addresses, complete topology, raw backups or private device identifiers.