XICHTEE

LMPSH-IP & HRNL-25W
OSC 1.0
PROTOCOL GUIDE

Public protocol integration guide

DATASHEET

OSC 1.0

v1.1.193 | BUILD 193

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

Document control

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Purpose

This guide explains the implemented OSC 1.0 input on LMPSH-IP and HRNL-25W devices: exact message encoding, per-rule address mapping, numeric and string matching, LED priority, bundles, Cluster authority and a byte-validated sender.

NOTE This is a public guide to the implemented product interface. Verify the running firmware version before relying on version-specific behaviour.

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Tax ID / VAT: 2122403635

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01 · Overview

From OSC message to visible tally

The device is an OSC receiver. A sender transmits one UDP datagram to the configured port. The first OSC message argument is evaluated by every eligible rule with the same exact address; a changed Rule Active value then enters the normal per-segment priority engine.

OSC CONTROL PATH

One datagram can address one message or a bundle of messages; OSC has no device reply.

OSC changes Rule Active; the selected rule's preset/effect creates the visible output.

ITEM	IMPLEMENTED CONTRACT
Protocol	OSC 1.0 input over IPv4 UDP.
Default	Port 8000; OSC Sockets 0 means disabled.
Session	Stateless. No handshake, acknowledgement, reply, keepalive or OSC readback.
Mapping	Exact, case-sensitive address per rule. One address may map to multiple rules.
Control value	Only the first argument participates in matching.
State	Rule Active is runtime state and remains latched until another accepted writer or restart.

NOTE OSC carries a control value, not an LED colour or effect. Configure each rule's target preset and understand priority before commissioning.

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02 · Configure the device

Enable the UDP listener

In Socket Config, set an unused OSC port, set OSC Sockets to 1, save, and perform the requested restart. Then configure the OSC Path and Match Mode on each target rule in Segment Settings.

SETTING	VALUE / GUIDANCE
OSC Port	1–65535; stored default 8000.
OSC Sockets	0 = Off, 1 = On. The service uses one shared network socket.
OSC Path	1–63 ASCII bytes, beginning with /. Empty disables OSC matching for that rule.
Match Mode	Trigger, Exact, Range or String Match.
Value A / B	Finite numeric comparison values; Range should use A ≤ B.
OSC String	Exact case-sensitive target, up to 31 bytes.
Preset	The preset/effect shown when this rule wins segment priority.

Live Select

Use OSC Live Select in Segment Settings to observe real incoming addresses, types and recent values. Assign copies an address into the selected rule. For a one-argument numeric address, Use for scaling selects Range and fills A/B from the observed minimum and maximum.

NOTE The configured listener may be blocked when the shared socket budget is full. Review Free Sockets with HTTP, Ember+, TSL, Pro-Bel, MQTT and other enabled services.

IMPORTANT OSC has no authentication or encryption. Restrict the UDP port to authorised senders on a trusted control LAN, VPN or firewall boundary.

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03 · Message anatomy

OSC strings are 4-byte aligned

A standard message contains an address string, a type-tag string beginning with a comma, and argument bytes. OSC strings include their terminating NUL and enough NUL padding to reach a multiple of four bytes. Integer and floating-point arguments are big-endian.

OSC MESSAGE · /STUDIO/TALLY/1 = 1.0

The validated example is 24 bytes. Padding belongs to the encoded strings.

Address: /studio/tally/1 followed by one NUL; already 4-byte aligned.

Type tags: ,f followed by two NUL bytes; first argument is float32.

Argument: 3F 80 00 00 is IEEE-754 big-endian 1.0.

VALIDATED FIELD BYTES

All labels and examples are vector text and remain searchable in the PDF.

REQUIREMENT	DETAIL
Datagram	One complete OSC message or OSC bundle per UDP datagram.
Address	Starts with /, is NUL-terminated, padded to 4 bytes and no longer than 63 bytes before NUL.
Type tag	Required; starts with comma, is NUL-terminated and padded to 4 bytes.
Numeric bytes	int32 and float32 use network byte order (big-endian).
Maximum payload	1536 bytes. Larger UDP payloads are ignored.

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04 · Addresses and argument types

Exact address, first argument

The incoming address must equal the configured OSC Path byte-for-byte. Wildcards and pattern expansion are not applied. Every unowned rule with that same path is evaluated, so one message can deliberately fan out to several segments or rules.

FIRST TAG	WIRE VALUE	MATCHING USE
f	32-bit IEEE-754 float, big-endian	Numeric modes 0–2.
i	Signed 32-bit integer, big-endian	Converted into the numeric comparison domain.
T	True; no argument bytes	Numeric 1.0.
F	False; no argument bytes	Numeric 0.0.
s	NUL-terminated, 4-byte-padded string	String Match; received match value must fit 31 bytes.
Other / missing	Not used for control	Address may match, but Rule Active stays unchanged.

ADDRESS AND TYPE OUTCOMES

These outcomes are local observations; OSC sends no acknowledgement datagram.

APPLIED

Address and argument suit the mode and Rule Active changed.

MATCH · NOOP

Address and mode match, but the computed state already equals Rule Active.

MATCH · TYPE

Address matches, but the first argument kind does not suit the mode.

IGNORED

No eligible exact path mapping, malformed content or unsupported control type.

Additional arguments may be present, but only argument 1 has a control effect.

NOTE Avoid Exact mode for very large int32 values: integers enter the same float32 comparison domain. Use ordinary finite values and allow for the documented tolerance.

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05 · Match modes

Four per-rule evaluations

Each matching rule computes a desired Boolean state from its configured mode. A matching address with the wrong argument kind preserves the current state.

OSC RULE STATE DECISIONS

A and B are the rule's configured numeric values; target is its configured OSC String.

0 · TRIGGER

Numeric ON when value > 0.001; otherwise OFF. Negative and exactly 0.001 are OFF.

1 · EXACT

Numeric ON when |value − A| < 0.001; otherwise OFF. The tolerance is strict.

2 · RANGE

Numeric ON when A ≤ value ≤ B; otherwise OFF. Both endpoints are inclusive.

3 · STRING

String ON only for an exact, case-sensitive match with target; otherwise OFF.

Repeating a value that computes the existing state is a valid no-op.

Boundary examples

MODE	CONFIGURATION	INPUT	RESULT
Trigger	—	0.001	Off
Trigger	—	0.0011	On
Exact	A = 2.000	2.0009	On
Exact	A = 2.000	2.0010	Off
Range	A = −1, B = 1	−1 or 1	On
String	target = PROGRAM	program	Off

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06 · Rule and LED behaviour

Rule state is not the final pixel value

Each segment has five priority rules. Rule 1 has highest priority. If several are active, the lowest rule number supplies the visible preset/effect while lower-priority rules remain active underneath. When the winner clears, the next active rule becomes visible; with none active, the segment default colour is shown.

ONE PATH CAN FAN OUT; EACH SEGMENT RESOLVES PRIORITY

Example: /studio/program ,T is assigned to three eligible rules.

The same exact address can update multiple rules in one evaluation pass.

CONDITION	RESULT
Rule 1 On; Rule 3 On	Rule 1 preset/effect is visible; Rule 3 remains active.
Rule 1 becomes Off	Rule 3 becomes visible without needing another OSC message.
All five rules Off	The segment's configured default colour is visible.
Maintained Follow GPI / Logic owns rule	OSC is ignored for that rule until ownership is released.
Other accepted writer changes rule	TSL, Pro-Bel, Ember+, MQTT, NTP/manual or Cluster live state may replace it.
Device restarts	Runtime Rule Active boots inactive; reassert the intended OSC state.

IMPORTANT There is no OSC expiry timer. A successfully computed Rule Active level remains latched until another accepted writer/message or restart.

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07 · Working sender example

Send /studio/tally/1 as float 1.0

The address below is a commissioning example; configure the same exact OSC Path on the target rule. The documentation-only address 192.0.2.10 must be replaced with the device or current active-master address.

```
import socket
import struct

DEVICE = ("192.0.2.10", 8000)

def osc_string(text):
raw = text.encode("ascii") + b"\0"
return raw + b"\0" * ((-len(raw)) % 4)

packet = (osc_string("/studio/tally/1") +
osc_string(",f") + struct.pack(">f", 1.0))
expected = bytes.fromhex(
"2F73747564696F2F74616C6C792F3100"
"2C6600003F800000")
assert packet == expected and len(packet) == 24

with socket.socket(socket.AF_INET, socket.SOCK_DGRAM) as udp:
udp.sendto(packet, DEVICE)
print("sent 24-byte OSC message")
```

Equivalent first-argument encodings

VALUE	TYPE / ARGUMENT BYTES AFTER THE 16-BYTE ADDRESS
int32 1	2C 69 00 00 · 00 00 00 01
True	2C 54 00 00 · no argument bytes
False	2C 46 00 00 · no argument bytes
string GO	2C 73 00 00 · 47 4F 00 00

NOTE There is no recv() step: the device sends no OSC acknowledgement or reply. Confirm through the visible result, OSC Monitor/Protocol Health, Ember+ subscription, Pro-Bel readback, or another application-level observation.

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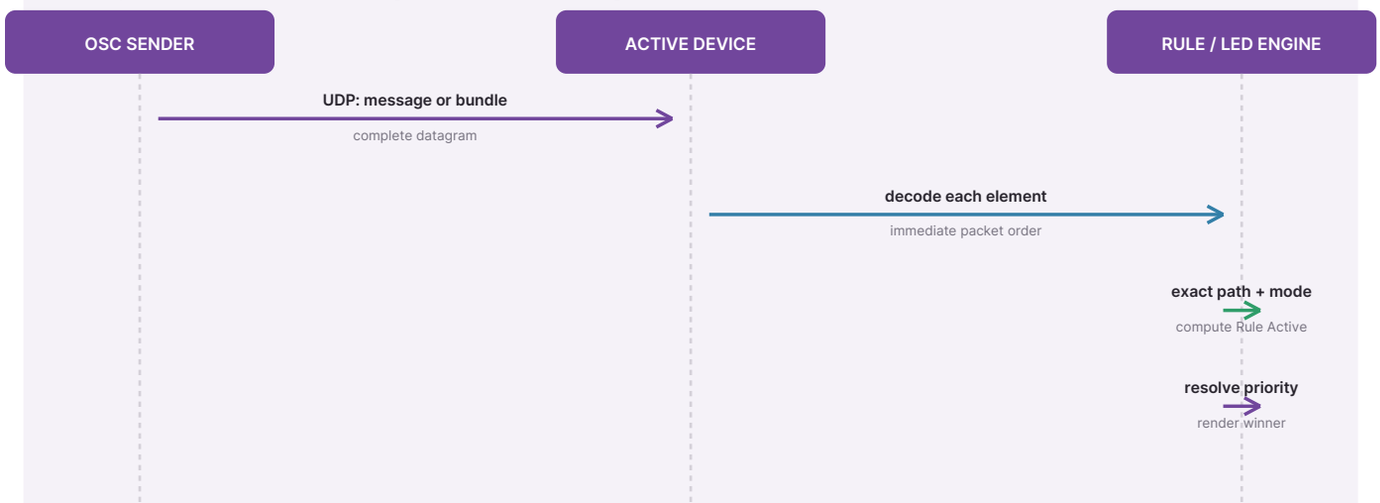
08 · Bundles and exchange

Messages and bundles are applied immediately

A bundle begins with #bundle plus NUL, an eight-byte timetag, and one or more elements. Every element has a big-endian uint32 byte count followed by a complete message or nested bundle. The product accepts the structure but does not schedule timetags; elements are evaluated immediately in packet order.

STATELESS OSC EXCHANGE

No response arrow exists; commissioning must observe state through another interface.



If confirmation is required, pair OSC control with an explicit read-capable protocol.

BUNDLE FIELD	SIZE / MEANING
#bundle + NUL	8 bytes: 23 62 75 6E 64 6C 65 00
Timetag	8 bytes, big-endian. Accepted structurally; not scheduled by the product.
Element size	4-byte big-endian size of the following element.
Element	One complete OSC message or nested bundle. Prefer a single-level bundle.
Validated example	One 24-byte message produces a 44-byte immediate bundle.

IMPORTANT Bundle application is not transactional and has no rollback or acknowledgement. Do not use timetags to request future execution.

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09 · Operations and Cluster

Commission the current writer

SITUATION	CONTROLLER ACTION
Standalone / Primary Master	Send to the configured UDP port and reassert state after restart.
Follower	OSC input is suppressed; do not send control to the follower.
Backup in standby	OSC input is closed while the backup is read-only.
Backup promoted	Send to the promoted backup's IP after it becomes the ready active leader.
Failover / authority transition	Packets can be lost. Reassert the complete intended state after leader selection.
Shared address on several rules	Treat fan-out as intentional and verify every mapped segment.

Troubleshooting

SYMPTOM	CHECK
No message observed	Port, OSC Sockets=1, applied restart, socket budget, routing/firewall and active Cluster leader.
IGNORED	Exact path spelling/case, leading slash, supported first argument and active rule mapping.
MATCH(TYPE)	Use f/i/T/F with numeric modes or s with String Match.
MATCH(NOOP)	The message computed the state already held; this is not an error.
Rule changes but LED differs	Check Rule 1→5 priority and the winning rule's configured preset/effect.
Rule never follows OSC	Check maintained Follow GPI/Logic ownership and Cluster authority.
State wrong after reboot/failover	Rule Active is runtime-only; resend the authoritative state.

NOTE Use one authoritative sender per logical control path. UDP delivery and application are not acknowledged, so periodically reassert durable controller intent where the workflow requires recovery.

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10 · Reference

Quick reference

TOPIC	VALUE
Transport	OSC 1.0 over IPv4 UDP; input only
Port / enable	Stored port 8000; OSC Sockets 0 Off or 1 On
Message	Padded address string + padded comma type tags + big-endian arguments
Control argument	First argument only: f, i, T, F or s
Path	Exact and case-sensitive; 1–63 bytes including leading /, before NUL
String match value	Up to 31 bytes before NUL
UDP payload	Maximum 1536 bytes
Readback	None in OSC; use another public observation path
State persistence	Runtime only; reassert after restart or failover

Validated message

```
/studio/tally/1 ,f 1.0
2F 73 74 75 64 69 6F 2F 74 61 6C 6C 79 2F 31 00
2C 66 00 00 3F 80 00 00
```

Standard reference

OpenSoundControl Specification 1.0:
https://opensoundcontrol.stanford.edu/spec-1_0.html

Compatibility

This guide applies to LMPSH-IP and HRNL-25W firmware v1.1.193 (build 193). It documents product-specific mapping, limits, immediate bundle handling and Cluster behavior in addition to the OSC 1.0 message format.

IMPORTANT OSC provides neither confidentiality nor authenticated control. Network isolation is part of the integration contract.

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