Datasheet

STR-3221-R1 Stair LED Controller Module

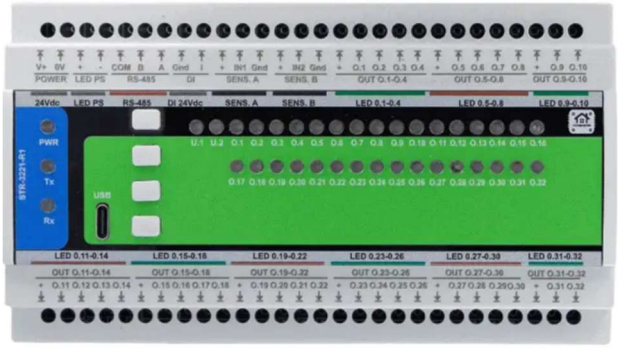
Part No.: STR-3221-R1

Manufacturer: ISYSTEMS AUTOMATION S.R.L.

Hardware Version: V1.0

Architecture: Modular (MCU Board + Field Board)

Controller: RP2350A



Functional Overview

The STR-3221-R1 is a DIN-rail mounted multi-channel LED and I/O control module for 12-24 V DC systems. It provides 32 low-side MOSFET outputs for LED loads, 1 wetted 24V DI + 2 opto presence inputs, local user interface, RS-485 Modbus RTU communication, and USB-C configuration interface.

Board	Function
MCU Board	RP2350A controller, RS-485 communication, USB-C interface, power conversion
Field Board	32 MOSFET outputs, Digital inputs, protection and filtering

The module operates as a Modbus RTU slave over RS-485 and supports configuration and firmware update via USB-C.

Technical Specifications

Specification	Details
Microcontroller	RP2350A dual-core microcontroller
Storage	External QSPI Flash (32 Mbit)
Power Input	24 V DC nominal
Input Protection	1 A time-lag fuse, reverse polarity diode, TVS surge suppression, EMI filtering
Main Logic Supply	Buck regulator 24 V → 5 V (~4.96 V nominal), 3.3 V LDO regulator
LEDs supply input	External 12–24 V DC (independent from logic supply)
Output Voltage	External, separate 12–24 V DC supply, for LEDs only
LED Outputs	32 × low-side MOSFET outputs (O1–O32)
LED Output Voltage	External 12-24 V DC supply
Maximum Total LED Current	Limited by 5 A input fuse (shared across channels)
Recommended Current per Channel	≤ 500 mA per channel (recommended)
Output Structure	Open-drain, grouped by VCC rails, each channel with gate resistor + RC + ferrite
Digital Inputs	1 × module-wetted 24 V DC discrete input (ISO1212, Gnd+24Vdc, terminals 8-9); F6/F7 PTC/TVS protected. 2 × opto-isolated presence inputs (SFH6156 IN1/IN2); fused +5 V SENS.A/B via F9/F10 (1206L150, max 150 mA per rail).
User Interface	4 buttons, 38xLEDs(Power, 3 user LEDs, RX, TX, 32xLEDs state)
RS-485	Half-duplex Modbus RTU with surge protection and fail-safe biasing
USB	USB-C, 5 V logic, ESD protected
Typical Power Consumption	0.2–0.5 W

Typical module power consumption: 0.2–0.5 W (logic only).

Maximum module power consumption: approximately 1W.

Top Terminal Block (1–9)

Front view – terminals numbered from left to right.

Term. No.	Marking	Signal	Description
1	V+	POWER	24 VDC module power input (+)
2	0V	POWER	Module power return
3	+	LED PS	External LED/load supply input (+)
4	-	LED PS	External LED/load supply return
5	COM	RS-485	RS-485 common/reference
6	B	RS-485	RS-485 B
7	A	RS-485	RS-485 A
8	Gnd	DI	DI ground
9	24Vdc	DI	DI supply
10	+	SENS.A	Sensor supply A (+)
11	IN1	SENS.A	Sensor input 1
12	Gnd	SENS.A	Sensor ground A
13	+	SENS.B	Sensor supply B (+)
14	IN2	SENS.B	Sensor input 2
15	Gnd	SENS.B	Sensor ground B
16	+	OUT O1.0–O1.4	Shared supply for O1–O4
17	O1	OUT O1.0–O1.4	Output 1
18	O2	OUT O1.0–O1.4	Output 2
19	O3	OUT O1.0–O1.4	Output 3
20	O4	OUT O1.0–O1.4	Output 4
21	+	OUT O5.0–O5.8	Shared supply for O5–O8
22	O5	OUT O5.0–O5.8	Output 5
23	O6	OUT O5.0–O5.8	Output 6
24	O7	OUT O5.0–O5.8	Output 7
25	O8	OUT O5.0–O5.8	Output 8
26	+	OUT O9.0–O10	Shared supply for O9–O10
27	O9	OUT O9.0–O10	Output 9
28	O10	OUT O9.0–O10	Output 10

Bottom Terminal Block (9–18)

Front view – terminals numbered from left to right.

Pos	Marking	Signal	Description
29	+	OUT O11.0–O11.14	Shared supply for outputs O11–O14
2	O11	OUT O11.0–O11.14	Output O11
3	O12	OUT O11.0–O11.14	Output O12
4	O13	OUT O11.0–O11.14	Output O13
5	O14	OUT O11.0–O11.14	Output O14
6	+	OUT O15.0–O15.18	Shared supply for outputs O15–O18
7	O15	OUT O15.0–O15.18	Output O15
8	O16	OUT O15.0–O15.18	Output O16
9	O17	OUT O15.0–O15.18	Output O17
10	O18	OUT O15.0–O15.18	Output O18
11	+	OUT O19.0–O19.22	Shared supply for outputs O19–O22
12	O19	OUT O19.0–O19.22	Output O19
13	O20	OUT O19.0–O19.22	Output O20
14	O21	OUT O19.0–O19.22	Output O21
15	O22	OUT O19.0–O19.22	Output O22
16	+	OUT O23.0–O23.26	Shared supply for outputs O23–O26
17	O23	OUT O23.0–O23.26	Output O23
18	O24	OUT O23.0–O23.26	Output O24
19	O25	OUT O23.0–O23.26	Output O25
20	O26	OUT O23.0–O23.26	Output O26
21	+	OUT O27.0–O27.30	Shared supply for outputs O27–O30
22	O27	OUT O27.0–O27.30	Output O27
23	O28	OUT O27.0–O27.30	Output O28

24	O29	OUT O27.0–O27.30	Output O29
25	O30	OUT O27.0–O27.30	Output O30
26	+	OUT O31.0–O31.32	Shared supply for outputs O31–O32
27	O31	OUT O31.0–O31.32	Output O31
28	O32	OUT O31.0–O31.32	Output O32

Installation, Environmental & Mechanical

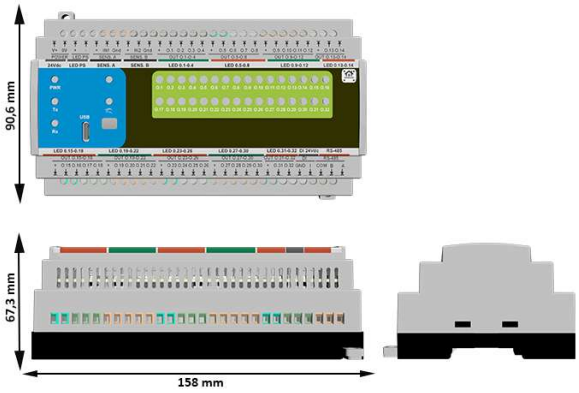
Specification	Details
Terminal Type	Pluggable screw terminal blocks, 5.08 mm pitch
Wire Cross Section	0.2–2.5 mm² (AWG 24–12)
Tightening Torque	0.4–0.6 Nm

Specification	Details
Operating Temperature	0 °C to +40 °C
Storage Temperature	−10 °C to +55 °C
Relative Humidity	0–90 % RH, non-condensing
Ingress Protection	IP20 (inside cabinet only)
Maximum Altitude	2000 m
Pollution Degree	2

Specification	Details
Dimensions	157.4 × 91 × 58.4 mm (6.2 × 3.58 × 2.3 in) (L × W × H)
DIN units	9 division units (≈ 158 mm DIN rail mounting width)
Net weight	Xxx g
Gross weight	Xxx+98 g
Pack size	230 × 140 × 87 mm (9 × 5.5 × 3.4 in) (L × W × H)
Mechanical drawing	Front + side views with DIN-clip depth (see below)
Notes	All dimensions shown in millimeters unless stated otherwise
Mounting	35 mm DIN rail (EN 50022)
Enclosure Material	PC/ABS, UL94-V0

Install only inside a control cabinet with ventilation; the cabinet must include a protective front plate covering all module connection terminals and a closing protective door; not for outdoor or exposed installation.

All wiring terminals must be protected against accidental contact by an insulating front plate, wiring duct, or terminal cover. Exposed live terminals are not permitted.



Cable Recommendations & Shield Grounding

This section applies to RS-485. Use shielded, twisted constructions and bond shields correctly to reduce EMI and ground-loop issues.

General Routing Rules

- Route low-level signal cables separately from power wiring.
- If crossing power cables is unavoidable, cross at 90°.

- Keep cable runs as short as practical.
- Avoid parallel runs with high-current conductors.

RS-485 Cable

- Twisted pair recommended (120 Ω characteristic impedance).
- Shielded cable recommended in industrial environments.
- Use one twisted pair for A/B.
- Use second conductor as COM reference if required.

Examples: J-Y(ST)Y 2×2×0.5 mm² or LI2YCY PiMF 2×2×0.50

Shield Grounding

- Bond cable shield(s) to cabinet PE/EMC ground at one end (PLC side recommended).
- Do not connect shields directly to signal terminals (A/B/COM).

Compliance & Certifications

The STR-3221-R1 module is CE marked and designed to comply with applicable European Union directives. The manufacturer maintains technical documentation and a signed EU Declaration of Conformity (DoC).

EMC 2014/30/EU · RoHS 2011/65/EU

Standards: EN 61000-6-1 · EN 61000-6-3 · EN 62368-1 · EN IEC 63000

Safety Notice

The power input and signal terminals are SELV circuits.

Installation by qualified personnel only.

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