Datasheet

WLD-521-R1 Water Leak Detection Module

Part No.: WLD-521-R1

Manufacturer: ISYSTEMS AUTOMATION S.R.L.

Hardware Version: V1.0

Architecture: Modular (MCU Board + Field Board + Relay Extension)

Controller: RP2350A

Functional Overview

The WLD-521-R1 is a modular water leak detection and water metering + I/O module for monitoring and automation. It provides 5 opto-isolated digital inputs, 2 SPDT relay outputs, 1-Wire sensor support, and optional 4 buttons / 4 user LEDs for local control and indication. The module connects to a PLC, MicroPLC, MiniPLC, SCADA, or other Modbus master as a Modbus RTU slave over RS-485 and is configured via USB-C Web Serial (WebConfig).

Board	Function
MCU Board	RP2350A controller, RS-485 communication, USB-C configuration interface, power conversion
Field Board	5 isolated digital inputs, isolated sensor power rails, 1-Wire interface
Relay Extension	2 × SPDT relay contact outputs

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 (W25Q32JV, 32 Mbit)
Power Input	24 V DC nominal (V+ / 0V); recommended range 18–30 V DC
Input Protection	1 A time-lag fuse, reverse polarity diode, TVS surge suppression, EMI filtering
Main Logic Supply	Buck regulator 24 V → 5.0 V (~4.96 V nominal), 3.3 V LDO regulator
Digital Inputs	5 × isolated 5 V DC discrete inputs
Max Input Voltage	5 V DC continuous
Relay Outputs*	3 × SPDT dry-contact relays
Rated Load (System Limit)	3 A @ 250 VAC (resistive contact rating)
Max Load @ 250 VAC	750 VA (system limit)
Max Load @ 30 VDC	90 W (system limit)
Relay Component Rating (Informative Only)	Relay components are rated up to 12 A @ 250 VAC (resistive); however, this rating does not apply to the complete module
Isolated +12 V Output	12 V isolated rail, 2 W; max 167 mA theoretical (≤150 mA recommended)
Isolated +5 V Output	5 V isolated rail, 1 W; max 200 mA theoretical (≤150 mA recommended)
RS-485	Half-duplex Modbus RTU with surge protection and fail-safe biasing
USB	USB-C, 5 V logic, ESD protected
1-Wire	1 × protected 1-Wire interface (+5 V, DATA, GND)
User Interface	4 buttons; 9 LEDs (Power, 4 user, RX, TX, Relay1, Relay2)
File System	LittleFS persistent configuration storage

*Relay outputs are **not internally fused**. External overcurrent protection must be provided in accordance with applicable standards and installation requirements. Use appropriately rated fuses or circuit breakers and consider external contactors for loads exceeding 3 A or for inductive and high inrush loads.

Typical module power consumption: 3 W typ. / 5 W max.

Maximum module power consumption: approximately 3 W (relays ON + ISO outputs loaded).

Top Terminal Block (1–11)

Front view – terminals numbered from left to right.

Position	Marking	Signal	Description
1	V+	+24V	24 V DC supply input
2	0V	0V	Power supply return
3-7	I1-I5	IN1-IN5	Digital Inputs 1-5 (5 V isolated)
8	GND	GND_ISO	Isolated input return
9	+5V	+5V	1-Wire 5 V sensor supply

10	DATA	1W_DATA	1-Wire data line
11	GND	1W_GND	1-Wire ground

Bottom Terminal Block (12–22)

Front view – terminals numbered from left to right.

Position	Marking	Signal	Description
12	A	RS485_A	RS-485 A line
13	B	RS485_B	RS-485 B line
14	COM	RS485_COM	RS-485 COM
15	NO	R1_NO	Relay 1 Normally Open
16	C	R1_COM	Relay 1 Common
17	NC	R1_NC	Relay 1 Normally Closed
18	NO	R2_NO	Relay 2 Normally Open
19	C	R2_COM	Relay 2 Common
20	NC	R2_NC	Relay 2 Normally Closed
21	+5V	+5V_ISO	Isolated 5 V sensor supply
22	+12V	+12V_ISO	Isolated 12 V sensor supply

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

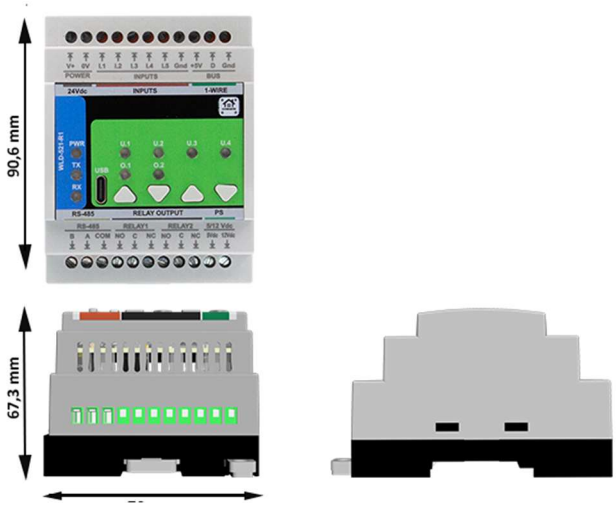
Specification	Details
Operating Temperature	0 °C to +40 °C
Storage Temperature	−10 °C to +55 °C
Relative Humidity	0–90 % RH, non-condensing
Ingress Protection	IP20 (inside cabinet only)
Maximum Altitude	2000 m
Pollution Degree	2

Specification	Details
Dimensions	71.5 × 90 × 59 mm (L × W × H)
DIN units	4 division units (≈ 72 mm DIN rail mounting width)
Net weight	Xxx g
Gross weight	Xxx+98 g
Pack size	140× 125 × 94 mm (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

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.

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 WLD-521-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 · LVD 2014/35/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. Relay output terminals may switch hazardous voltage up to 250 VAC.

Adequate insulation and separation must be ensured during installation.Installation by qualified personnel only.

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