Remote I/O (RIO) server description

PROTECTA
HUNGARY

PROTECTION, AUTOMATION AND
CONTROL FOR POWER INDUSTRY

VERSION INFORMATION

VERSION	DATE	MODIFICATION	COMPILED BY
1.0	2021-06-02	First edition	Erdős

CONTENTS

1   Introduction

Remote I/O (RIO) server is an IED, which provides remote binary inputs and outputs far from an EuroProt+ protection device.

Figure 1-1 Remote I/O device

Figure 1-2 Front view and rear view with fastening for mounting rail
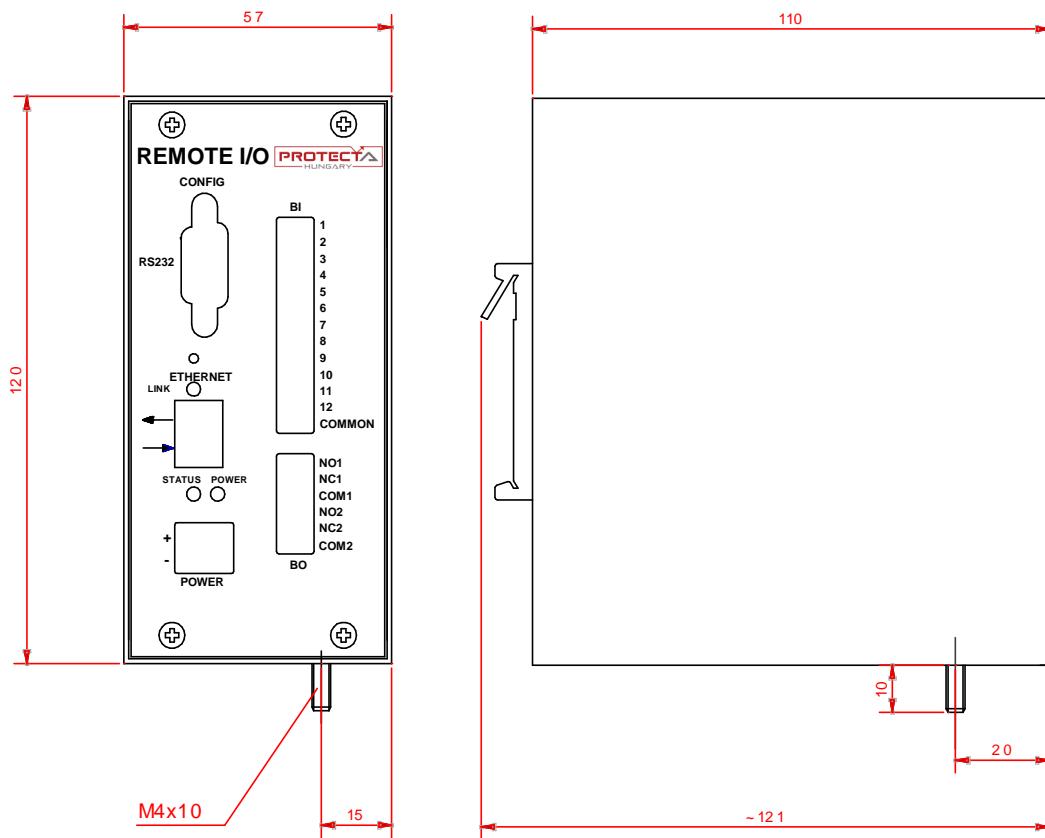
Figure 1-3 Remote I/O dimensions
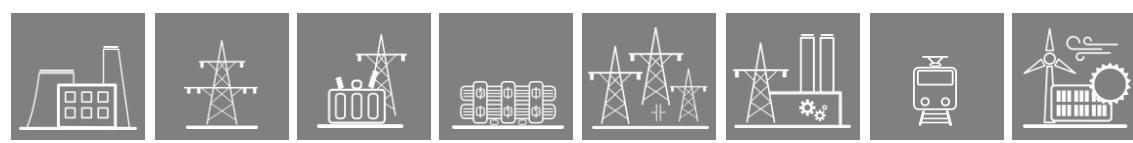
2   Application

2.1   Connectors, LEDs

The connectors of the device are illustrated in the following figure.
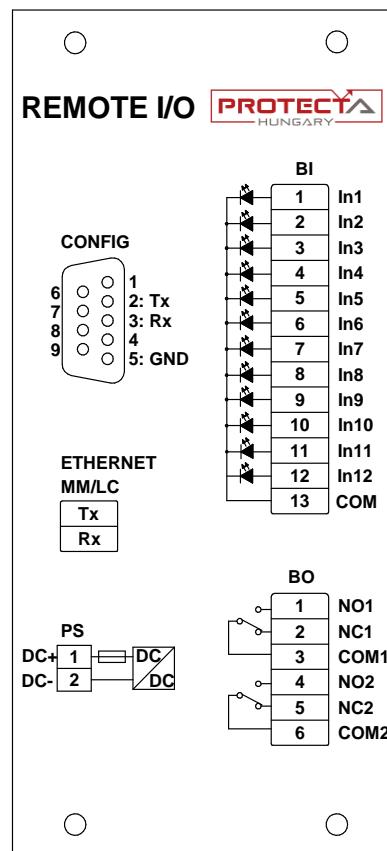
Figure 2-1 Connectors of the device

The RIO server has three LED indicators:
- **LINK**: located at the Ethernet connector; it shows active communication (green color)
- **POWER**: located above the power connector; it lights up if the device is operating (green color)
- **STATUS**: located also above the power connector. The behavior and color of this LED shows different situations:
    - o   Blinking red: there are no clients connected
    - o   Blinking alternatively red-green: the server has one client connected
    - o   Blinking green: two or more clients are connected
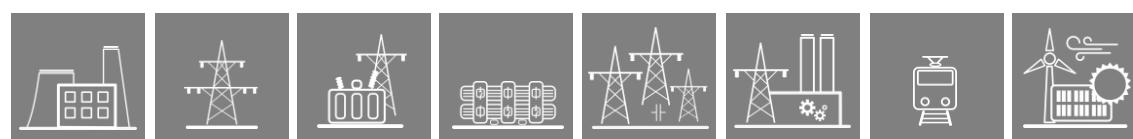
2.2   Wiring, usage

The device communicates with the EP+ device using the MODBUS/TCP protocol, via either of the COM+/1202, COM+1324, COM+/1335, COM+/6603 or COM+/6663 modules.
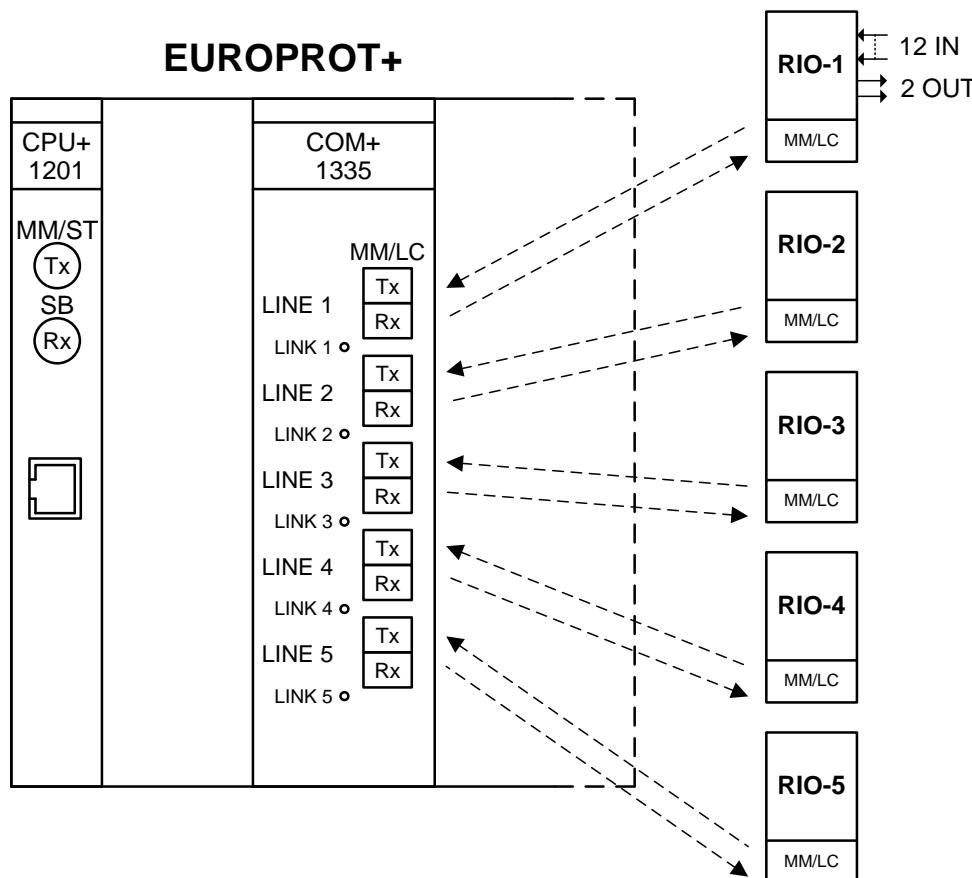

Figure 2-2 Wiring of the Remote I/O-s

The RIO inputs and outputs appear among the other binary inputs and outputs of the EuroProt+ device, and they can be utilized the same way.
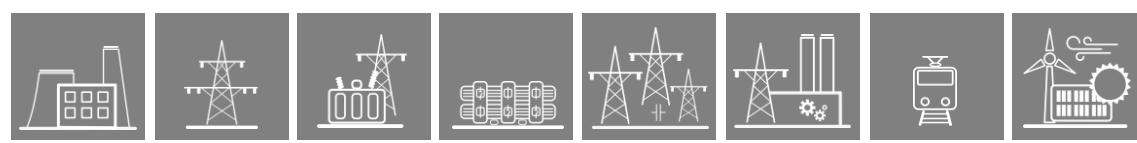
3 Sub-modules

The RIO server consists of two mixed function modules:

- SCPU/PS: combination of a CPU and power supply module
- SO12/R2: binary I/O module with 12 inputs and 2 relay outputs

3.1 SCPU/PS sub-module

The SCPU/PS module contains all the control, communication and the power supply functions of the device.

3.1.1 CPU

Table 3-1 Technical data of the RIO CPU

CPU TYPE	ETHERNET INTERFACE	SERVICE PORT
SCPU+0011	MM/LC 1300 nm, 50/62,5/125 µm connector, 100Base-FX	RS232*

The service port labeled "CONFIG" is only for factory usage

3.1.2 Power supply, external MCB

Table 3-2 Technical data of the RIO power supply

PS TYPE	INPUT VOLTAGE	NOMINAL POWER	INPUT VOLTAGE INTERRUPTION TIME	INRUSH CURRENT (< 0.1 s)	CONNECTOR TYPE
PS+1101	65-180 V DC	9 W	min. 140 ms @ 110 V DC input voltage	< 10 A	Weidmüller BLA 2/180
PS+2301	176 – 264 V DC 160 – 250 V AC	9 W	min. 50 ms @ 230 V AC input voltage	< 10 A	Weidmüller BLA 2/180

The power supply must be protected by an **external midget circuit breaker**. Note that it is not part of the RIO device:

- Characteristics: **6A C**

3.2 SO12/R2 sub-module

The SO12/R2 module contains 12 binary inputs in one grounding group, and 2 relay outputs with dry contacts.

3.2.1 Binary inputs

Main features:
- Digitally filtered per channel
- Current drain approx.: 2 mA per channel

Table 3-3 Technical data of the binary inputs

BI TYPE	CHANNEL NUMBER	TIME SYNC.	RATED VOLTAGE	THERMAL WITHSTAND VOLTAGE	CLAMP VOLTAGE	CONNECTOR TYPE
SO12+4801	12	-	48 V	72 V	falling 0.71 U_N rising 0.76 U_N	Weidmüller BL 3.5/13/180
SO12+1101	12	-	110 V	250 V	falling 0.7 U_N rising 0.73 U_N	Weidmüller BL 3.5/13/180

Thermal withstand voltage: continuous with 60 % of the input channels energized.

3.2.2 Binary outputs

Main features:
- Breaking capacity, (L/R = 40 ms) at 220 V DC: 0.2 A
- Breaking capacity, (L/R = 40 ms) at 110 V DC: 0.3 A

Table 3-4 Technical data of the relay outputs

BO TYPE	RATED VOLTAGE	CONTINUOUS CARRY	CONTACT VERSIONS	GROUP ISOLATION	CONNECTOR TYPE
R2+0001	250 V AC/DC	6 A	CO	2 independent	Weidmüller BL 3.5/6/180
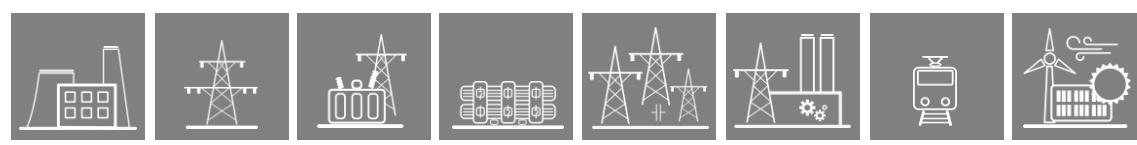
4   General data

- Storage temperature: - 40 ºC … + 70 ºC
- Operation temperature: - 20 ºC … + 55 ºC
- Humidity: 10 % ... 93 %
- Altitude: up to 2000 m
- Atmospheric pressure: 86 ... 106 kPa

4.1 Standard conformance

- Electrostatic discharge immunity (ESD), IEC-EN 60255-26:2013, Level 4
  - Test voltages: 15 kV air discharge, 8 kV contact discharge

- Radiated, radio-frequency, electromagnetic field immunity, IEC-EN 60255-26:2013 Level 3
  - Test field strength: 10 V/m

- Electrical fast transient/burst immunity (EFT/B), IEC-EN 60255-26:2013, Level 4
  - Test voltage: 4 kV

- Surge immunity test, IEC-EN 60255-26:2013
  - Test voltages: 2 kV line-to-earth, 1 kV line-to-line

- Immunity to conducted disturbances, induced by radio-frequency fields, IEC-EN 60255-26:2013, Level 3
  - Test voltage: 10 V

- Damped oscillatory wave immunity test, IEC-EN 60255-26:2013
  - Test frequency: 1 MHz
  - Test voltage: 2.5 kV in common mode, 1 kV in differential mode

- Voltage dips, short interruptions and voltage variations immunity, IEC-EN 60255-26:2013
  - Voltage dips: 40 % (200 ms), 70 % (500 ms), 80 % (5000 ms)

- Ripple on d.c. input power port immunity, IEC-EN 60255-26:2013
  - Level 4, 15 % of rated d.c. value

- Power frequency magnetic field immunity test, IEC-EN 60255-26:2013, Level 5
  - Test field field strength: 100 A/m continuous, 1000 A/m for 3 s

- Power frequency immunity test on the binary inputs, IEC-EN 60255-26:2013, Class A
  - Test voltages: 300 V in common mode, 150 V in differential mode

- Insulation tests, IEC-EN 60255-27:2013
  - Impulse voltage test
    - Test levels: 5 kV (1 kV for transducer and temperature measuring inputs)
  - Dielectric test
    - Test levels: 2 kV AC 50 Hz (0.705 kV DC for transducer inputs)
  - Insulation resistance
    - Insulation resistance > 15 GΩ

- Radiated emission, IEC-EN 60255-26:2013
  Limits:
  - 30 MHz to 230 MHz: 50 dB(µV/m) quasi peak, 3 m
  - 230 MHz to 1 000 MHz: 57 dB(µV/m) quasi peak, 3 m
  - 1 GHz to 3 GHz: 76 dB(µV/m) peak,3 m
  - 3 GHz to 6 GHz: 80 dB(µV/m) peak,3 m

- Conducted emission, IEC-EN 60255-26:2013
  Limits:
  - 0,15 MHz to 0,50 MHz: 79 dB(µV) quasi peak, 66 dB(µV) average
  - 0,5 MHz - 30 MHz: 73 dB(µV) quasi peak, 60 dB(µV) average

- Vibration, shock, bump and seismic tests on measuring relays and protection equipment
  - Vibration tests (sinusoidal), Class I, IEC 60255-21-1:1988
  - Shock and bump tests, Class I, IEC 60255-21-2:1988
  - Seismic tests, Class I, IEC 60255-21-3:1993
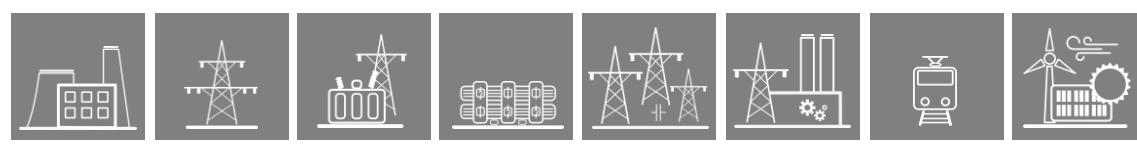
5 Mechanical data

5.1 General mechanical data

- Construction
    - Painted steel surface
- IP protection:
    - IP2x
- Size:
    - See Figure 1-3 for the device dimensions
- Weight:
    - 0.7 kg

5.2 Connectors

Table 5-1 Connectors on the RIO

CONNECTOR NAME	CONNECTOR TYPE	STRIP LENGTH [MM]	CONDUCTOR AREA [MM²]	CONDUCTOR DIAMETER [MM]	TIGHTENING TORQUE [NM]	MINIMUM BEND RADIUS*
BLA	Weidmüller BLA 2/180	7	0.2 – 1.5 solid: 0.2 – 2.5	0.5 – 1.4 solid: 0.5 – 1.8	0.4 – 0.5	3 × OD**
BL 3.5	Weidmüller BL 3.5/6/180 BL 3.5/13/180	6	0.2 – 1.5	0.5 – 1.4	0.2 – 0.25	3 × OD**
PE FASTON TERMINAL	TE Connectivity 6.3x0.8	7	min. 4	min. 2.3	-	3 × OD**

* Bend radius is measured along the inside curve of the wire or wire bundles.
** OD is the outer diameter of the wire or cable, including insulation.

The tightening torque of the screw for protective earth connection must be approx. 5 Nm.

During the installation, make sure that the shortest possible length for PE (Protective Earth) cable.

The minimum distance between the device and its wire channel must be at least 3 cm.