

SWISSPRO[®] **SMART CITIES**

B-PLC Systems

MR-4859 Actuator

Technical Manual

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Contact Information

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- General Information: info@swissprocity.sg
- Sales Information: sales@swissprocity.sg
- Tech Support: sat@swissprocity.sg
- Web Site: <http://www.swissprocity.sg>

Warning

This guide is for professionals who have received training and are qualified to work with electricity and electrical metering equipment. All applicable national and local electrical codes and standards must be followed. Failure to follow proper procedures may result in serious bodily harm including death.

Disclaimer

The product described herein may be changed or enhanced from time to time. This information does not constitute commitments or representations by SWISSPRO and is subject to change without notice.

Images shown are a representation only. They may not match exactly with the real equipment.

1. Overview

1.1. MR-4859 Multifunction Actuator

The MR-4859 multifunction actuator is a device that works together with SWISSPRO Concentrators (Gateways).

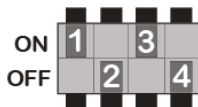
The MR-4859 allows to control several elements in an electrical cabinet, monitor device states of the same, as well as enable remote control of the electrical circuits in the installation. The most relevant functions are:

- Open door detection
- Sensing of voltage states of independent circuits
- Warning on open/closed circuits
- Remote control of all electrical circuits within the cabinet.
- ...

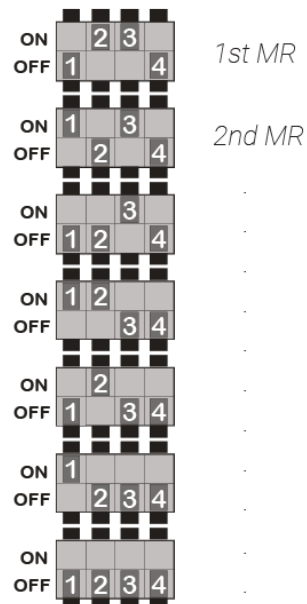
Communication

- Two RS-485 ports enable easy hook up of the device into an RS-485 bus in a daisy chain wiring scheme.
- If the device is the last unit in the network, a 120Ω termination resistor is required to comply with the RS-485 bus impedance. Make sure there is only one such termination resistor in the entire network. Enabling the 120Ω termination on more than one device will alter the bus impedance preventing it from a proper data exchange between the different devices. The termination resistor is enabled with position 4 of the “DIP-Switch”.
- The two lines A and B must be connected correctly. Crossing these lines leaves the network bus without communication.
- Each device in an RS-485 network must have its own identification address. This is defined with the “DIP-Switch”.

DIP-Switch:

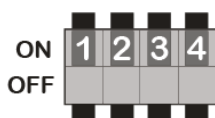


Addresses: *(Termination Resistor NOT active)*

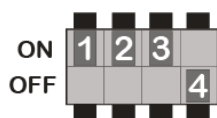


Termination Resistor (120Ω):

(Activate it only for the last device in the network)

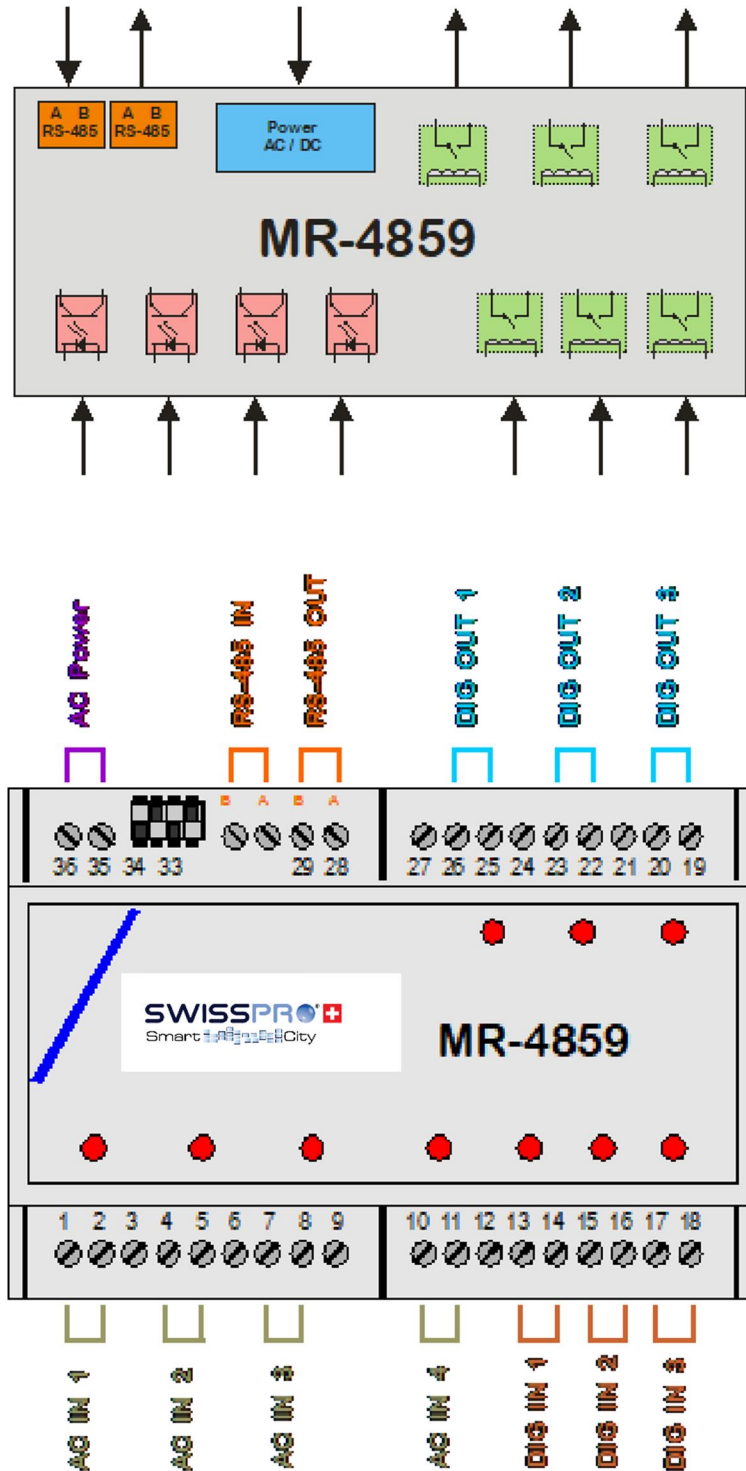


Resistor Active



Resistor Inactive

1.2. MR-4859 Block diagram



1.3. Wiring

Power supply

The MR-4859 device is powered from the mains within the electrical cabinet, tolerating a voltage range between 100V-277V. The maximum own consumption is 4W, depending on the number of active Inputs/Outputs.

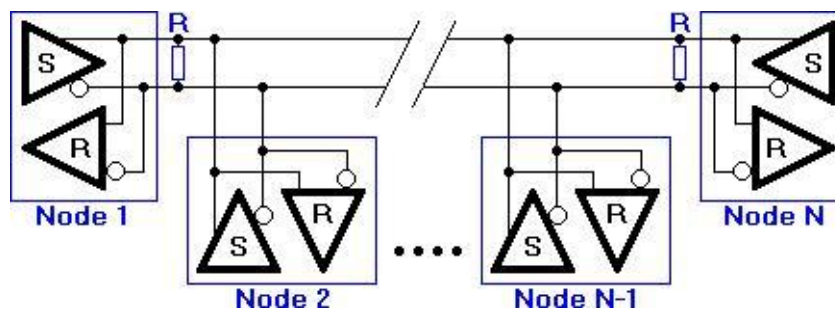
A PTC resistor protects the device from possible failures within it. This fuse is not accessible from the outside, so no replaceable parts in the device, and therefore, the user should never open the device. The device has to be sent back to the supplier for any repair or maintenance work.

The 100V-277V power is supplied to the device through terminals 35 and 36. There is no polarity, and therefore the lines can be crossed without any harm to the equipment.

We recommend protecting the MR-4859 with a dedicated external circuit breaker for easy maintenance and operation.

Data channel

The communication between the Concentrator of a SWISSPRO B-PLC system and the Actuator is through the RS-485 bus with the MODBUS protocol. For this, the device has two double terminals 30/31 and 28/29 for the connection of lines A and B. The first double terminal 30/31 serves as input, and the second double terminal 28/29 as the communication output, though both double terminals could be exchanged without producing any error, since the two lines A are internally bridged, as are the two terminals B. This is because the RS-485 interface is a differential multipoint transmission bus system. The physical transmission medium is an interlaced pair that supports up to 32 devices (stations).



Remember, if the device is the last in the RS-485 chain, you must enable with selector 4 (DIP-Switch) the 120Ω termination resistor.

AC inputs (100V-277V)

These inputs are used to detect live circuits. Its main application is the recognition of an electrified (or not) line. Therefore, they are 100VAC-277VAC inputs. These inputs can monitor the position of a circuit breaker, indicating if it is closed or open. The MR-4859 incorporates 4 such inputs called "AC IN 1" on terminals 1/2, "AC IN 2" on terminals 4/5, "AC IN 3" on terminals 7/8, and "AC IN 4" on terminals 10/11.

Being these alternating current (AC) inputs, the polarity does not matter, that is, the phase and the neutral can be exchanged. Although for safety reasons, we recommend while installing to follow a common logic to connect the neutrals and phases. Keep it simple!















Digital inputs (GPIOs) (potential free – dry contacts)

Unlike the AC inputs, these Digital Inputs CANNOT carry any voltage. They must be connected to potential free contacts (dry contacts), and detect only if open or closed. The MR-4859 Actuator has a total of three (3) of these inputs, called “DIG IN 1” on terminals 13/14, “DIG IN 2” on terminals 15/16, and “DIG IN 3” on terminals 17/18. Being dry contacts., there is also no polarity issue.

Digital outputs (GPIOs) (potential free relay contacts)

These outputs are potential free contacts, which allow to work as simple switches. The maximum switching capacity and power of these contacts is 230VAC/2A. This allows to control contactors of greater power enabling switching ON/OFF high power circuits. There are a total of three (3) Digital Outputs, called “DIG OUT 1” on terminals 25/26, “DIG OUT 2” on terminals 22/23, and “DIG OUT 3” on terminals 19/20. Although not mandatory, it is recommended to use this relays to open/close the phase of an AC circuit, as the phase is usually the “hot” wire, and removes power from the load.

The Low Voltage Regulation of the European Union makes it mandatory for all cables entering terminals or terminal blocks to carry their corresponding ferrules.

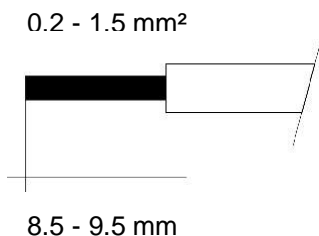
Deutscher Farbcode	DIN 45228	Querschnitt
		0,50 mm ²
		0,75 mm ²
		1,00 mm ²
		1,50 mm ²
		2,50 mm ²
		4,00 mm ²
		6,00 mm ²



Cable type, wire gauge and stripping recommendations.

Most suitable are stranded cables with a wire gauge of 0.2 - 1.5 mm² (32-15 AWG). Strip the wires 8.5 - 9.5 mm to make sure there will be a perfect electrical contact inside the terminals.

Stripped stranded cable:



2. Technical specifications

Input voltage range (1-phase) (V_{AC}):	100 - 277 V
Maximum input current range:	40mA
Input frequency:	50/60 Hz
Power factor:	> 0.80
Maximum power consumption:	4 W

Internal "Current limiting" PTC protection device on each power line input.

3. Environmental data

Usage for open type applications:

- IEC 60529: IP-24
- Nema: Type-1

Operating temperature range:	-25°C - 55°C
Storage temperature range:	-25°C - 85°C
Maximum temperature at the case (T_c):	35°C
Pollution grade:	2

4. Connections

It is recommended for easy power ON/OFF the device, to install an external circuit breaker as shown. In many standards and low voltage regulations such a circuit breaker is mandatory.

Make sure to use an appropriate circuit breaker. The current limiting capacity of the circuit breaker can be as low as 1A.



WARNING: Some Low Voltage Directives, such as the EU (LVD) 2014/35/EU make it mandatory to provide equipment (as the one described in this manual) with external devices to disconnect power from the equipment, providing additional safety measures to the low voltage installation.

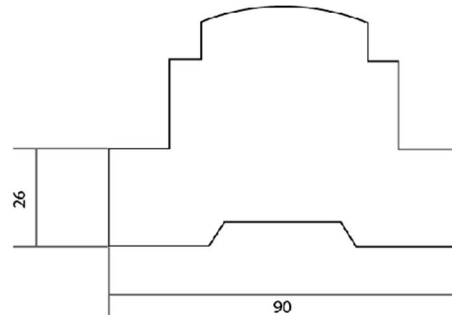
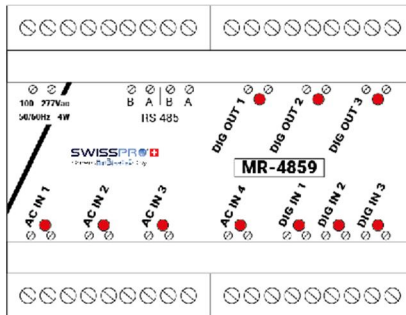
Local regulations may also require to interleave circuit breakers for the 100V-277V control lines AC1, AC2, AC3 and AC4.

These lines have usually already such protections installed, however, the installer must ensure that they comply with regulations at all times.

This is also the reason why only authorized and certified personnel should carry out these tasks of installing and maintain these equipment.

5. Dimensions and weight

- Dimensions: 90mm H x 106,5mm W x 56mm D
- Weight: 210 g
- Color: Gray RAL 7035



The case is a standard 6 module DIN rail type.

6. Safety and warning statements

- Do not install equipment with visual defects. Make sure everything looks right before installing the Nodes.
- There are no replaceable parts in the Nodes, avoiding any kind of maintenance.
- For safety reasons, the installation process has to follow all instructions within this manual or the related product information provided by the manufacturer.
- If the equipment is manipulated or handled differently as specified in this manual or the information provided by the manufacturer, no warranty on performance or safety is granted by the manufacturer or supplier.
- Disconnect the device from the mains and return it to the manufacturer or supplier if it doesn't perform as specified.
- Do not install the equipment in hazardous environments (hazardous areas).
- Never install or disconnect the device with power at the mains terminals.
- Comply with all safety related measures while handling electrical equipment.
- Make sure all electrical connections are correct and comply with all related safety rules.
- Follow all installation guidelines within this manual or related documents.

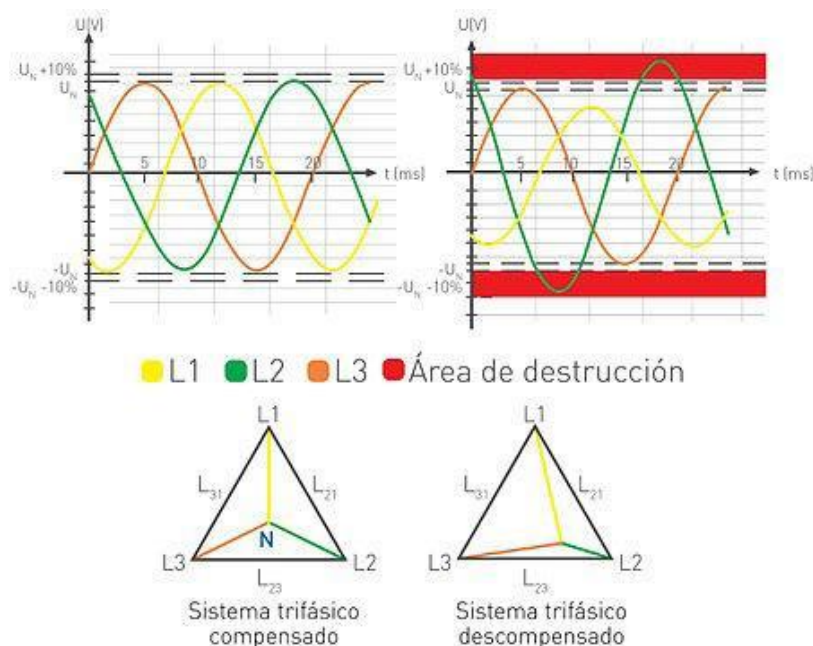
7. Limited product warranty

The Limited Warranty is described and defined in the sales documentation. The Limited Warranty does not apply to ancillary equipment, consumables and components sold separately from the Products, such as, for example, cables, fuses, fans, wires and connectors, whether supplied by SWISSPRO or others.

The Limited Warranty only applies to the buyer who has purchased the Products from an authorized seller of SWISSPRO for use in accordance with their intended purpose, provided that the Products are not moved outside its original installation and any reinstallation is done in accordance with the installation directions and use guidelines accompany the Products (collectively the “Documentation”).

In case of installing SWISSPRO products in environments connected to mains power subject to surges or electrical disturbances, it is the installers’ responsibility to protect the equipment with dedicated devices. Reference and examples are cited in the next section based on information from the French manufacturer CITELE, whose products are aimed at such protection. It is recommended to use Type 2 or similar protections as the DS40 family.

Overvoltages (spikes or permanent) are voltage increases greater than 10 percent of the nominal voltage and of indeterminate duration, generally due to unbalanced loads in a three-phase system, or N-Wire breaks. If the N-wire breaks, it is inevitable that the load neutral point will be seriously offset, which produces a reduction in the useful life of the equipment, or even immediate destruction of the same. Such defects won’t be covered by the warranty.



Graph of a permanent overvoltage. If all or part of our installation is single phase and is connected in phase L2, the equipment connected to it will be destroyed (area marked in red).

The supply of equipment with a voltage higher than that for which they have been designed can result in:

- Temperature rise within the equipment
- Reduced lifespan
- Fire hazard
- Equipment fault
- Performance failure

The use of protectors according to those indicated is essential in areas where there are fluctuations in the grid voltage value.

The integrated switched power supply in the equipment can show abnormal behavior or deterioration if said voltage surges occur. Therefore, if the supplied equipment once installed show these symptoms, will be excluded from any warranty.

We reiterate the importance of installing protection devices.

Annex 2 provides more related information, and preventive measures to mitigate issues related to surges and similar interferences in the power source.

SWISSPRO limits its warranty to repair of Products or parts covered by the limited warranty to correct the Product defect; and where UAX decides to replace the Product or part(s) to which the Limited Warranty applies. Warranty coverage does NOT include the cost of the replacement of the Product or part(s). All other costs, including, without limitation, travel and boarding costs of SWISSPRO service personnel that are incurred for repairs of Products on-site, as well as costs related to buyer's employees and contractors repair or replacement activities, are not covered by the Limited Warranty and, unless otherwise agreed in writing in advance by SWISSPRO, shall be borne by the buyer.

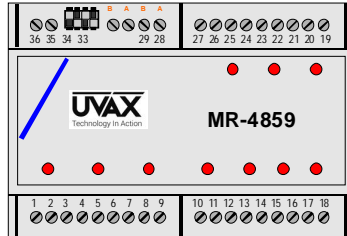
8. Document revisions

Manual	Revision	Date	Origin
MR-4859	R01	12/09/2015	Initial release.
MR-4859	R02	17/04/2017	Modified to comply with CE standards. (ITE)
MR-4859	R03	05/09/2017	Modified to comply with CE standards. (ITE)
MR-4859	R04-R10	22/09/2017	Modified to comply with CE standards. (ITE)
MR-4859	R11	12/12/2019	New design and general review to clean up writing

Annex I. Declaration of Conformity

CE DECLARATION OF CONFORMITY

1. MR-4859 (product name).
2. Swisspro Pte Ltd. / 15 Jalan Kilang Barat / Frontech Centre #04-07 / Singapore 159357
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Multifunction actuator with RS-485 communication interface



5. The object of declaration described above is in conformity with the relevant Community Harmonized Standards:
6. European Directives: 2014/35/EU - LVD and 2014/30/EU - EMC
7. The conformity with the essential requirements of the 2014/35 and 2014/30 has been demonstrated against the following harmonized standards:
EN 62493:2010
EN 55015:2013
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 61547:2009
EN 60950-1:2007 + /CORR:2007+ /A11:2009+ /A1:2011+ /A12:2011+ /AC:2012+ /A2:2015
EN 60950-1:2006+ /A11:2009+ /AC:2011+ /A1:2010+ /A12:2011+ /A2:2013
8. The conformity assessment procedure referred to the EU Directives has been followed by the involvement of the following Notified Bodies:
 - a) ITE (Instituto Tecnológico de la Energía), Parque Tecnológico Valencia, Avda. Juan de la Cierva, 24 - 46980 Paterna/Valencia, Spain.
 - b) TECNOCREA, S.L., Calle Colón, 41 - 46210 Picanya/Valencia, Spain

Thus, the product is marked CE.

9. The technical Construction File (TCF) relevant to the product described above, and which supports this Declaration of Conformity, is held at:

SWISSPRO Pte
15 Jalan Kilang Barat, Frontech Centre #04-07
Singapore 159357

Signed for and on behalf of SWISSPRO Pte
Singapore, 2017/10/02

Antonio Royo