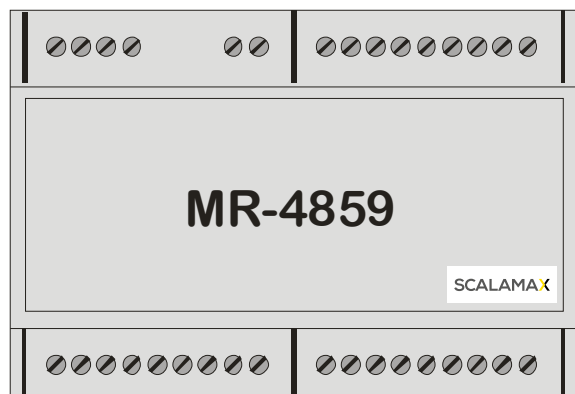


# SCALAMAX

by Tesights+



## SCALAMAX Protocol Multifunction Actuator MR-4859



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## Index

Warning.....	2
Disclaimer.....	2
1. Introduction.....	3
1.1 MR-4859 Multifunction Actuator.....	3
1.2 MR-4859 Block Diagram.....	4
1.3 Wiring.....	5
2. Electrical Specifications .....	7
3. Environment.....	7
4. Connection.....	8
5. Dimensions and weight.....	9
6. Certificaciones.....	10
7. Cautions and warnings.....	10
8. Product Limited Warranty.....	10
9. Release dates.....	11

## Warning

This guide is for persons 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

All illustrations and specifications contained in this document are based on the most recent product information available at the time of this publication. The content may vary from the final specifications. SCALAMAX LLC, reserves the right to make any changes at any time, without prior notice, to any content, including, but not limited to, technical specifications, general characteristics or functionality.

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# 1. Introduction

## 1.1 MR-4859 Multifunction Actuator

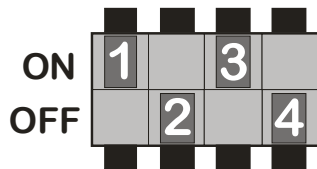
The multifunction actuator MR-4859 is a device that works in conjunction with the B-PLC head end of SCALAMAX. The MR-4859 allows to act on several elements of an electrical panel, to supervise functions and states thereof, as well as to enable a remote control mechanism of the installation in question. The most important functions can be:

- Identify open doors
- Detect disconnection of independent lines
- Alert about general supply failure
- Remotely intervention in the associated lines

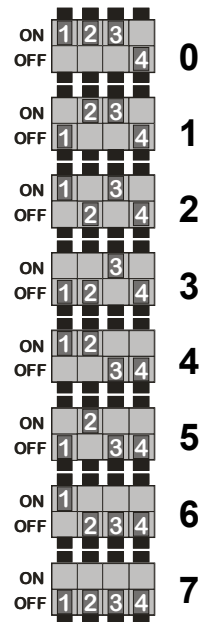
Communication:

- Two RS-485 ports allow the MR-4859 module to be integrated into an RS485 communication network, housing two terminals to ease the linking of several modules in the same network.
- In case of being the last element in this network, the termination resistance of 120Ω can be activated, necessary for the correct operation of any RS-485 network. It must be ensured that there is **only one** termination throughout the network. Enabling the termination of 120Ω in several elements, will damage the carrier signal preventing proper communication. Termination resistor is enabled with position 1 of "DIP-Switch".
- The two lines A and B must connect correctly. Crossing these lines leaves the network without communication.
- Each device in an RS-485 network must have its own identifying address. This is defined with the "DIP-Switch" type switch.

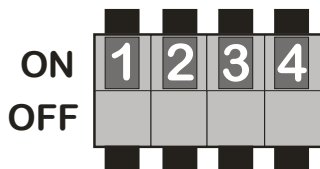
**DIP-Switch:**



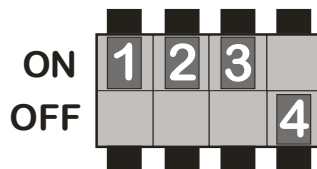
**Address:**



**120 Ω termination resistor:**

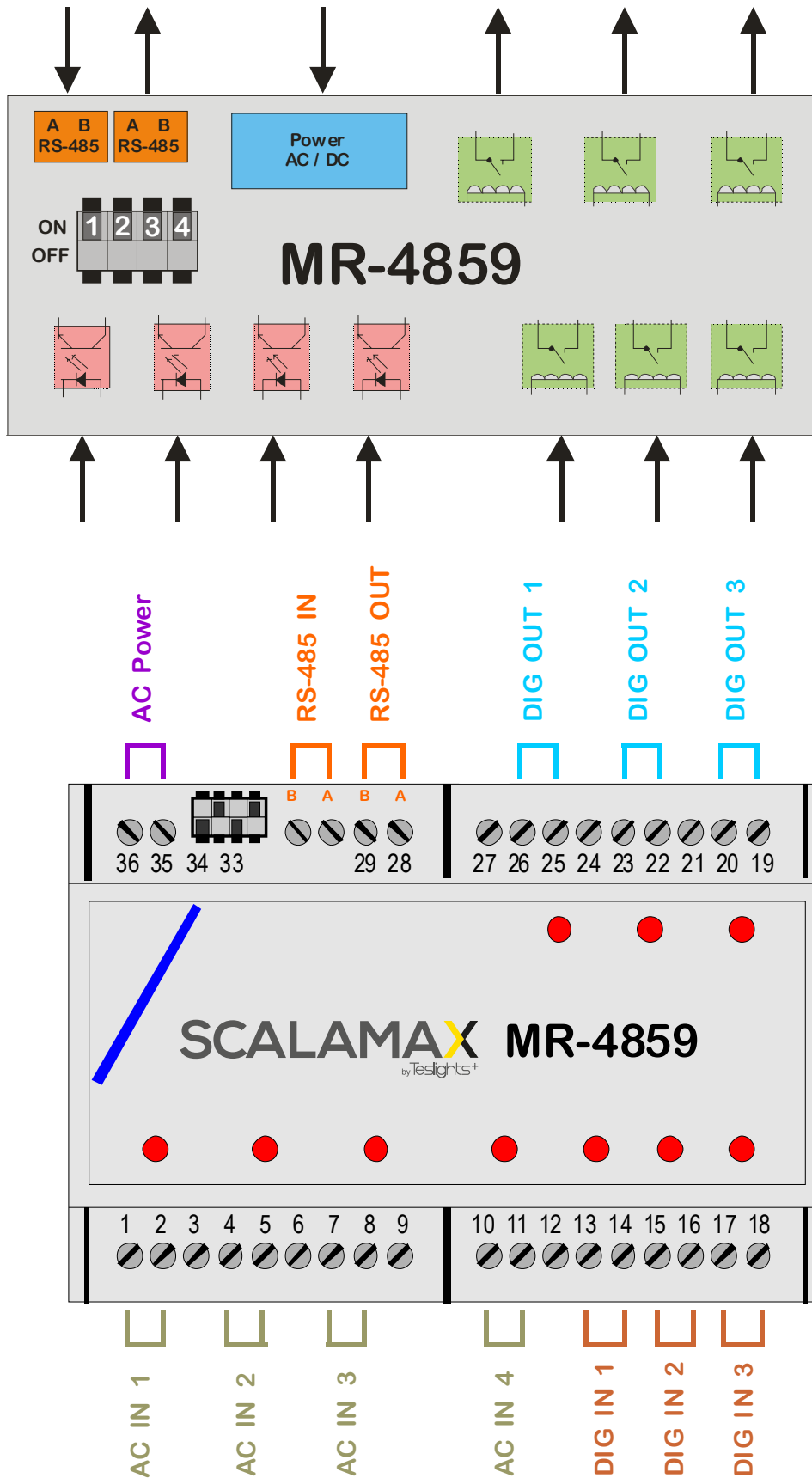


Resistor enabled



Resistor disabled

## 1.2 MR-4859 Block Diagram



## 1.3 Wirings

### Power Supply

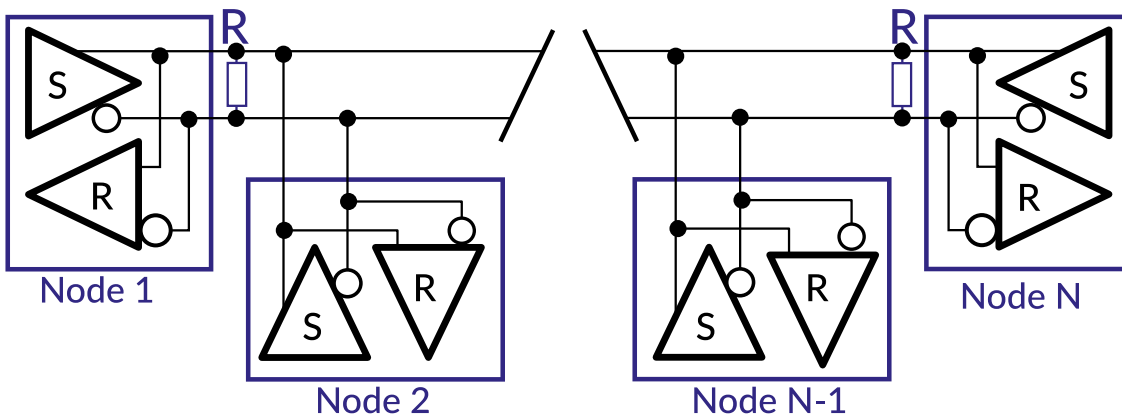
The MR-4859 device is powered from the power supply of the electrical panel, tolerant to AC voltages between 100V-277V. The total consumption is 4W maximum, and depends on the number of Inputs/Outputs activated in the equipment.

An internal 1A fuse and delayed fusion, protects the device from possible failures in it, or from undue external connections. This fuse is not accessible from the outside, so the equipment must be sent to the technical service for repair, in order to maintain the warranty in case it can be applied.

The 100V-277V supply is made from terminals **29** and **28**, regardless of the phase or neutral position.

### Communication

The communication between "The Header" of the SCALAMAX B-PLC system and the device, it is made from an RS-485 bus, with the MODBUS protocol. For this, the device has two double terminals **33/34** and **35/36** for wire A and wire B connection. The first double terminal **36/35** works as an input, and the second double terminal **34/33** works as the communication output, although they could be exchanged without producing any error, since the two A points are internally bridged, as well as the two B points. This is because the RS-485 interface is a one system in transmission bus differential multipoint. The physical transmission medium is an interlaced pair that supports up to 32 devices (stations).



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

### AC Inputs (100V-277V)

These inputs are used to detect circuits under voltage. Its main application is the recognition of an electrified line, or not. That's why they are 100VAC-277VAC inputs. These inputs can inform about the position of a magnetothermic switch, indicating whether it is closed or open. The MR-4859 incorporates 4 inputs with these characteristics, called "AC IN 1" in terminals 1 and 2, "AC IN 2" on terminals 4 and 5, "AC IN 3" on terminals 7 and 8, and "AC IN 4" on terminals 10 and 11.

Being alternating current (AC) inputs, the polarity does not matter, that is, the phase and the neutral can be interchanged.

### Digital inputs (free of potential)

Unlike AC inputs, these Digital Inputs can not carry any voltage. It must be connected to potential-free contacts, and they only detect if the supervised contact and connected to the input is open or closed.

The equipment has a total of three (3) of these inputs, called "DIG IN 1" on terminals 13 and 14, "DIG IN 2" on terminals 15 and 16, and "DIG IN 3" on terminals 17 and 18.















Being contacts inputs without potential, there is no polarity.

### Digital outputs (free of potential)

These outputs are potential-free contacts, which allow to act as simple switches. The maximum switching capacity and power of these contacts is 230VAC/2A. This allows to act on contactors of greater power to enable control circuits and electric lines.

There are a total of three (3) Digital Outputs, called "DIG OUT 1" on terminals 19 and 20, "DIG OUT 2" on terminals 22 and 23, and "DIG OUT 3" on terminals 25 and 26.

The Low Voltage Regulations of the European Union require that all cables that enter terminals carry their corresponding dropouts.

Deutscher Farbcode	DIN 46228	Querschnitt
		0,50 mm <sup>2</sup>
		0,75 mm <sup>2</sup>
		1,00 mm <sup>2</sup>
		1,50 mm <sup>2</sup>
		2,50 mm <sup>2</sup>
		4,00 mm <sup>2</sup>
		6,00 mm <sup>2</sup>



## 2. Electrical Specifications


### Power Supply

Single phase voltage ( $V_{AC}$ ):	100 ~ 277 VAC
Maximum Current ( $I_{AC}$ ):	15mA – 40mA
Frequency:	50 ~ 60Hz
Power Factor:	> 0.92
Max. power consumption:	4W

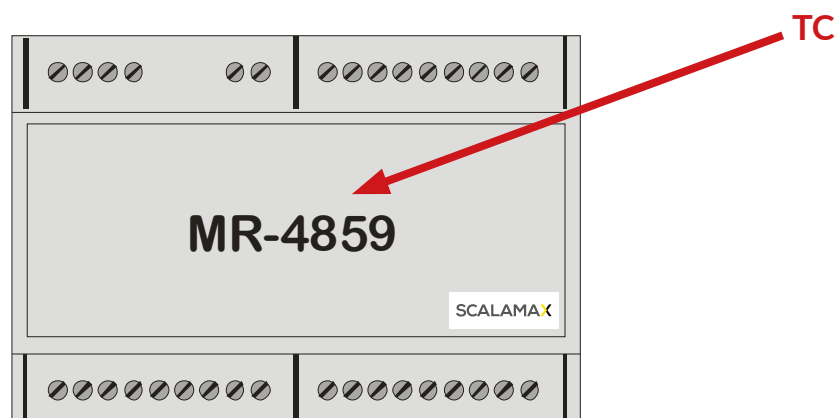
The equipment incorporates a PTC type protection to limit the input current to the equipment at 60mA.

## 3. Environment

The device has a protection degree of:

- IEC<sup>1</sup> 60529, IP-24 and pollution degree 2
- Nema<sup>2</sup>, Type-12.
- UL94-V0 (fireproof)
- Class II equipment 

Working temperature:	-40 °C ~ 50°C.
Storage temperature:	-40 °C ~ 75°C.
TC:	35 °C



1. International Electrotechnical Commission, 3 Rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland  
2. National Electrical Manufacturers Association, 1300 North 17th Street, Rosslyn, VA 22209

## 4. Conections

To be able to easily manipulate and disconnect the equipment from the electrical network, it is always advisable to have a switch that allows the disconnection of the equipment to the electrical network, in addition to being mandatory by the regulations. As the equipment is mostly installed in electrical panels with DIN rail, it is advisable to use magneto-thermal switches according to the commercial model shown in the following image.



**ATTENTION:** In order to comply with the regulations in force, it is essential to connect an appropriate switch near the equipment, for connection and disconnection from the electrical network. A single-phase or three-phase switch must be installed according to the power supply of the equipment. We recommend commercial circuit breakers.

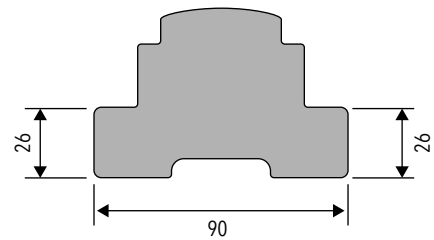
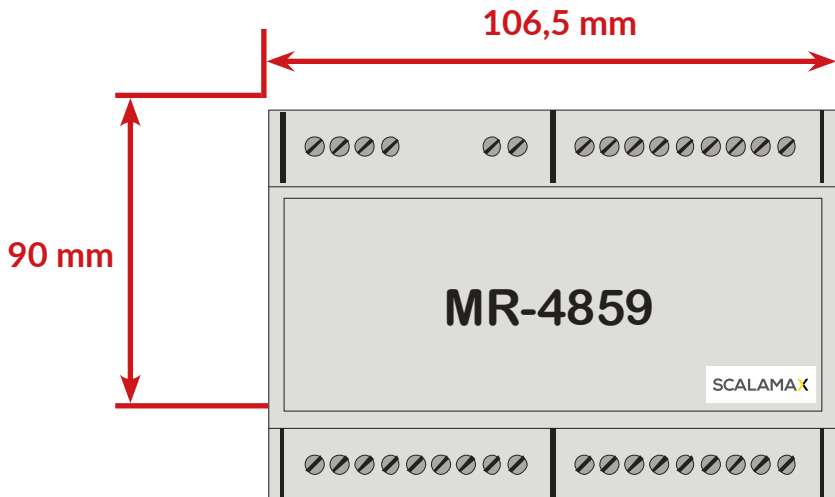
This need to insert switches in the signals of 100V - 277V, is also necessary for the signaling lines AC1, AC2, AC3 and AC4. Usually these signaling lines are already served by a line protection switch, however, the installer must ensure that they comply with current regulations at all times.

It is therefore why only authorized and certified personnel for these tasks attends the installation or removal of these equipment.



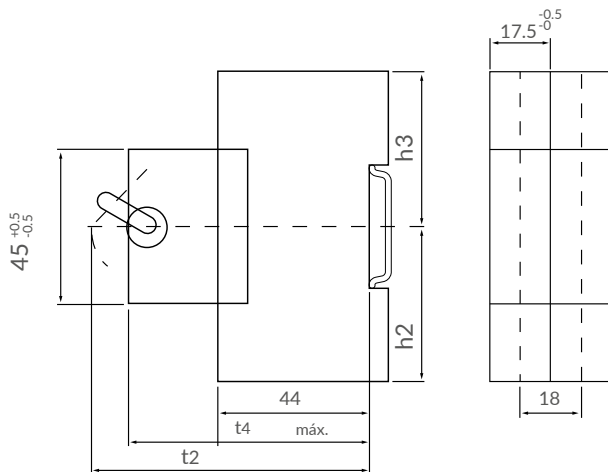
## 5. Dimensions and weight

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



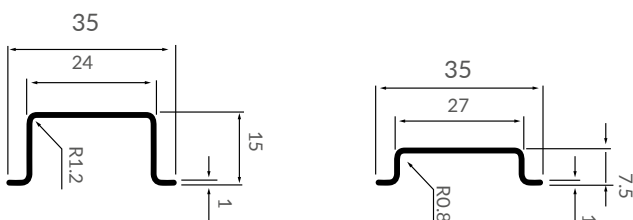
- Mounting on a DIN Rail

Norme DIN 438883 / Standard DIN 43880



Dimensions	1	2	3
H2 max	45	55	75
H3 max.	45	55	75
Ampere	Max 25 A	Max 63 A	Max 100 A
T2 max.	55	70	92,5
T4 min.	52	52	52
T4 máx.	T2 max	T2 max	T2 max

Norme EN 60715 / Standard EN 60715



## 6. Certifications

2014/35/UE	Ver documentación adjunta de las certificaciones relacionadas
2014/30/UE	Ver documentación adjunta de las certificaciones relacionadas
UL 916, 4 Edition, 2010-06-04 FCC CFR47 PART 15 SUBPART B ICES-003 ISSUE 5	

## 7. Cautions and warnings

- Do not install if the device is damaged. Inspect the box for obvious defects such as cracks in the housing.
- This device doesn't have replaceable or interchangeable elements, so it mustn't be manipulated.
- If the device is installed or used in a manner not specified by the accompanying documents, the safety of the device may be impaired.
- If the device functions abnormally, proceed with caution. The safety of the device may be impaired.
- Do not install around combustible gas or gas vapor.
- Do not install in an electrical service with current or voltage outside of the specified limit of the device.
- Do not operate this device with the cover removed.
- Beware of working around this device when the voltage is live. There is a risk of electric shock.
- Check that all connections are reliable and correct before connecting the device to the voltage line.
- Do not install with electrical voltage.
- See instructions for connection diagrams.
- Provide the installation or the point of connection of the equipment to the electrical network with elements and devices for protection against overvoltage and transients.

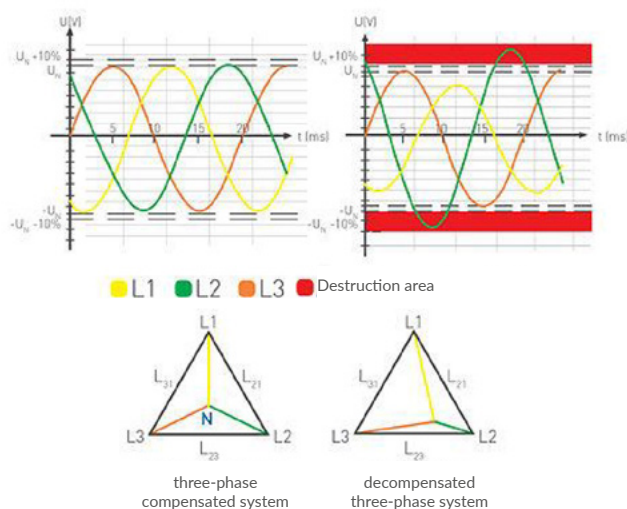
## 8. Product Limited Warranty

SCALAMAX, LCC warrants its equipment for 1 year from the ship date against defects in material or workmanship when installed in accordance with manufacturer's instructions by qualified personnel.

This warranty does not cover installation, removal, reinstallation or labor costs and excludes normal wear and tear. The warranty does not cover product which has been altered from its original manufactured condition due to faulty installation, tampering, accident, neglect, abuse, force majeure or abnormal conditions of operation.

In case of install the SCALAMAX products in environments connected to power lines subjected to overvoltage or electrical disturbances, it's installer responsibility to protect the equipment of SCALAMAX LLC, from dedicated devices. For reference and example, the following section provides information on the French manufacturer CITEL, whose products are oriented towards such protection. It is recommended to use Type 2 protections similar to the DS40 family.

Overvoltages, peaks or permanent, are increases in voltage greater than 10 percent of the nominal voltage and indeterminate duration, usually due to the decompensation of the phases, usually caused by the breakage of the neutral. The break of neutral causes a decompensation in the simple tensions, what produces in the equipment reduction of useful life, immediate destruction and even fires.



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 electrical power supply of equipment with a higher voltage than that for which it has been designed can generate:

- Overheating of equipment
- lifespan reduction
- fires
- destruction of equipment
- service interruption

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

In the SCALAMAX equipments, such deterioration or permanent failure is manifested in the deficient or abnormal operation of the power supply integrated in the equipment itself. Therefore, will be excluded from any guarantee, all equipment supplied and installed, if they show these symptoms.

We reiterate the importance of installing protection devices.

Annex Im reveals more information in this regard, and preventive measures to mitigate the problems related to these interferences or disturbances.

The obligation under this warranty is limited to the repair and/or replacement, at the option of SCALAMAX LLC, of the manufactured products and in no case shall SCALAMAX LLC be liable for consequential and incidental damages.

## 9. Release dates

Manual	Revision No.	Release Date (dd/mm/yyyy)
MR-4859	R1	12/09/2015
MR-4859	R2	17/04/2017
MR-4859	R3	05/09/2017
MR-4859	R4-R10	22/09/2017