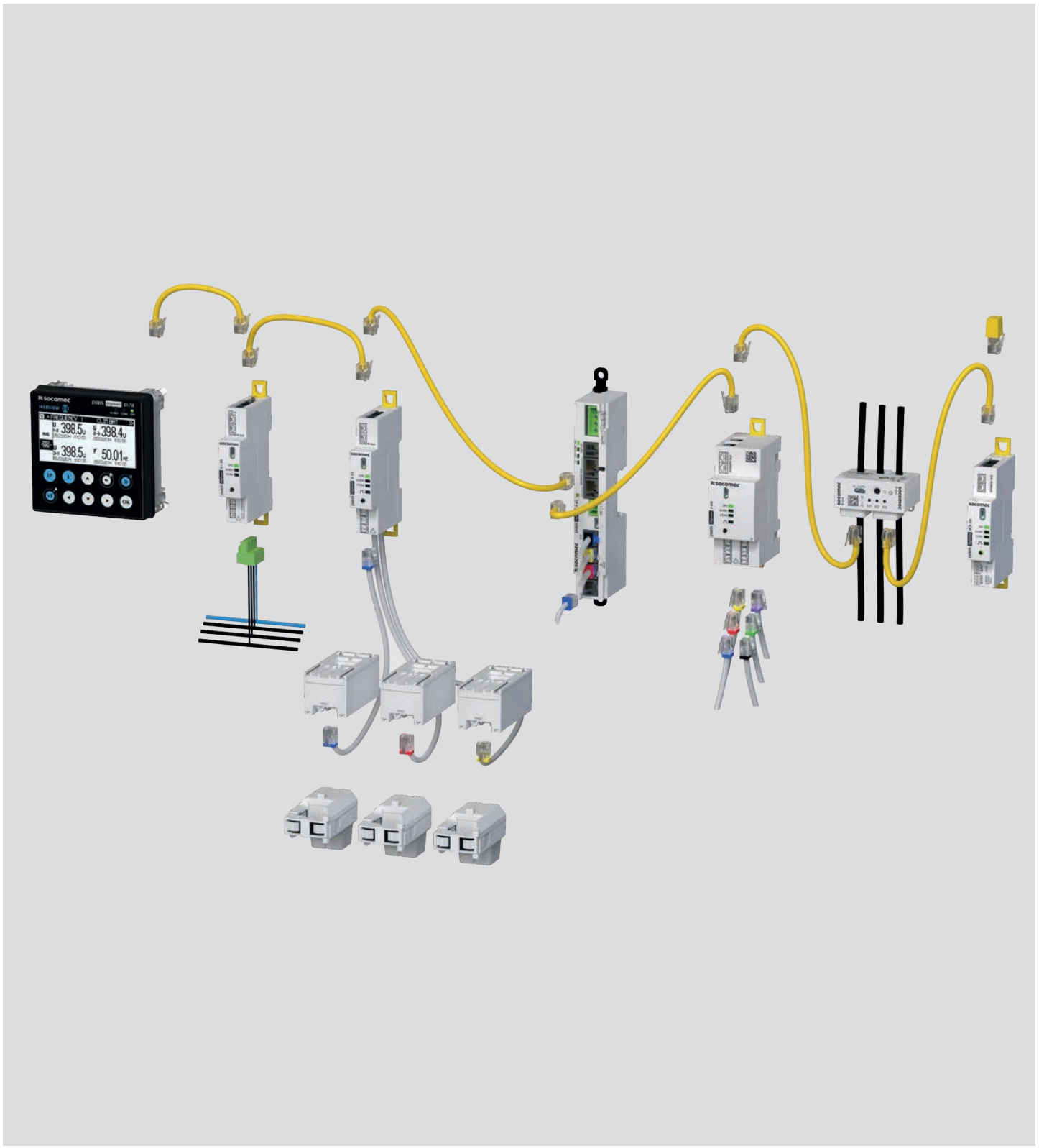
DIRIS Digiware AC

Multi-circuit Power Metering and Monitoring System



www.socomec.com/en/diris-digiware

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EN CONTENTS

EN CONTENTS

1. DOCUMENTATION

All documentation relating to DIRIS Digiware and its associated sensors is available on the SOCOMEC website at the following address:
www.socomec.com/en/diris-digiware

Related instruction manuals

Additional instruction manuals linked to the DIRIS Digiware system can be found on the Socomec website:

Instruction manual	Reference
Easy Config System - Configuration Software	551765
Product Upgrade Tool - Software for firmware upgrade	545534
WEBVIEW-M - Energy Server embedded DIRIS Digiware M & D	551295

2. HAZARDS AND WARNINGS

The term "device" used in the following paragraphs encompasses DIRIS Digiware and its associated current sensors (TE, TR/iTR or TF).
The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals.

SOCOMEC shall not be held responsible for failure to comply with the instructions in this manual.

2.1. Risk of electrocution, burns or explosion

	Caution: risk of electric shock	Ref. ISO 7000-0434B (2004-01)
	Caution: refer to the accompanying documentation each time this symbol is shown	Ref. ISO 7000-0434B (2004-01)

- Only duly authorised and qualified personnel may work or install/uninstall the device.
- The instructions are valid together with the specific instructions for the device.
- The device is designed only for its intended purpose as set out in the instructions.
- Only accessories authorised or recommended by SOCOMEC may be used in association with the device.
- Before proceeding with installation, maintenance, cleaning, disassembly, connection, or maintenance work, the device and system must be cut off from the mains to avoid electrocution and damaging the system and device.
- This device is not designed to be repaired by the user.
- For any questions related to the disposal of the device, please contact SOCOMEC.

Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

Failure to comply with the instructions of the device and this safety information can cause bodily injury, electric shock, burns, death or damage to property.

2.2. Risk of damaging the device

	Caution: risk of electric shock	Ref. ISO 7000-0434B (2004-01)
	Caution: refer to the accompanying documentation each time this symbol is shown	Ref. ISO 7000-0434B (2004-01)

To ensure that the device operates correctly, make sure that:

- The device is correctly installed.
- The auxiliary power supply voltage indicated on the device is observed: 24 VDC ± 10%.
- The use of a SOCOMEC 230 VAC / 24 VDC power unit or a 24 VDC max 20 W class 2 power unit / SELV according to UL1310. The device must be protected with a 1A 24 VDC fuse.
- The network frequency indicated on the device is observed: 50 or 60 Hz.
- A maximum voltage at the voltage input terminals of 520 VAC phase/phase or 300 VAC phase/neutral is observed.
- Always connect the TE, TR/iTR or TF current sensors using the recommended connection cables and observing the maximum prescribed currents.
- Only use RJ45 SOCOMEC cables to interconnect the modules via the Digiware bus.

Failure to respect these precautions could cause damage to the device.

2.3. Responsibility

- Assembly, connection and use must be carried out in accordance with the installation standards currently in force.
- The device must be installed in accordance with the rules given in this manual.
- Failure to observe the rules for installing this unit may compromise the device's intrinsic protection.
- The device must be placed in a system which itself complies with the applicable standards and safety regulations of the country of installation.
- Any cable which needs to be replaced may only be replaced with a cable having the correct rating.
- Despite constantly striving for quality in preparing this manual, errors or omissions are always a possibility and are not the responsibility of SOCOMEC.

3. PRELIMINARY OPERATIONS

To ensure the safety of personnel and the device, please carefully read the contents of these instructions before installation.

Check the following points as soon as you receive the package containing the device, one or several sensors:

- The packaging is in good condition
- The device has not been damaged during transit
- The device part number match your order
- The packaging includes the device fitted with removable terminal blocks and a Quick Start Guide.

4. PREREQUISITES

Before commissioning your DIRIS Digiware system, make sure all equipment operate under the latest firmware versions.

The latest firmware versions are available on the Socomec website.

The firmware upgrade is done using the Product Upgrade Tool software, by connecting a laptop to the Micro USB port of your DIRIS Digiware equipment.

For DIRIS Digiware M-50/M-70 and D-50/D-70, firmware upgrade can also be done remotely directly from their embedded webserver.

5. INTRODUCTION

5.1. DIRIS Digiware System

DIRIS Digiware is a measurement system (PMD*) with modular format. It always comprises a voltage measurement module (U-xx) and one or several current measurement modules.

The current measurement modules can be of two types:

- DIRIS Digiware S with 3 integrated current sensors to measure circuits up to 63A
- DIRIS Digiware I (with 3, 4 or 6 current inputs) associated with TE, TR /iTR and TF sensors for the measurement from 5A up to 6000A

DIRIS Digiware is an innovative concept based on centralising the voltage measurement by a dedicated DIRIS Digiware U module and the current by dedicated DIRIS Digiware I or S modules. The voltage and current measurements are interconnected by the Digiware bus. Several modules may be connected to the Digiware bus. This approach offers the possibility of characterising a high number of loads from a single voltage tap.

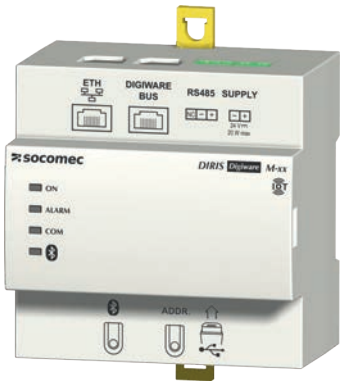
Cabling is made simple by a single voltage measurement connection. The connection mode for the current sensors also contributes to quick, easy installation and the automatic identification of the sensor (type and rating) significantly reduces the risk of installation errors. In addition, combining the current sensor with DIRIS Digiware means the overall accuracy of DIRIS Digiware + Current sensor measurement chain can be guaranteed for all values measured.

DIRIS Digiware is configured from its remote display or via the Easy Config System software. The measurements can be viewed on WEBVIEW-M, a web-based visualisation and analysis software embedded in the DIRIS Digiware M-70/D-70.

Thanks to its architecture, DIRIS Digiware can be easily integrated into an energy management system which requires a large number of loads to be monitored.

* PMD: Power Metering and Monitoring Device in accordance with IEC 61557-12.

5.1.1. Range

Communication and power supply interface		
		
DIRIS Digiware C **System interface*** DIRIS Digiware C-31 Ref. 4829 0101 *if there is no multipoint display DIRIS Digiware C-32 Ref. 4829 0103	**DIRIS Digiware M** **Communication gateway** DIRIS Digiware M-50 Ref. 4829 0219 (without Bluetooth) Ref. 4829 0221 (with Bluetooth) DIRIS Digiware M-70 Ref. 4829 0220 (without Bluetooth) Ref. 4829 0222 (with Bluetooth)	**DIRIS Digiware D** **Multi-point display** DIRIS Digiware D-50 Ref. 4829 0204 DIRIS Digiware D-70 Ref. 4829 0203

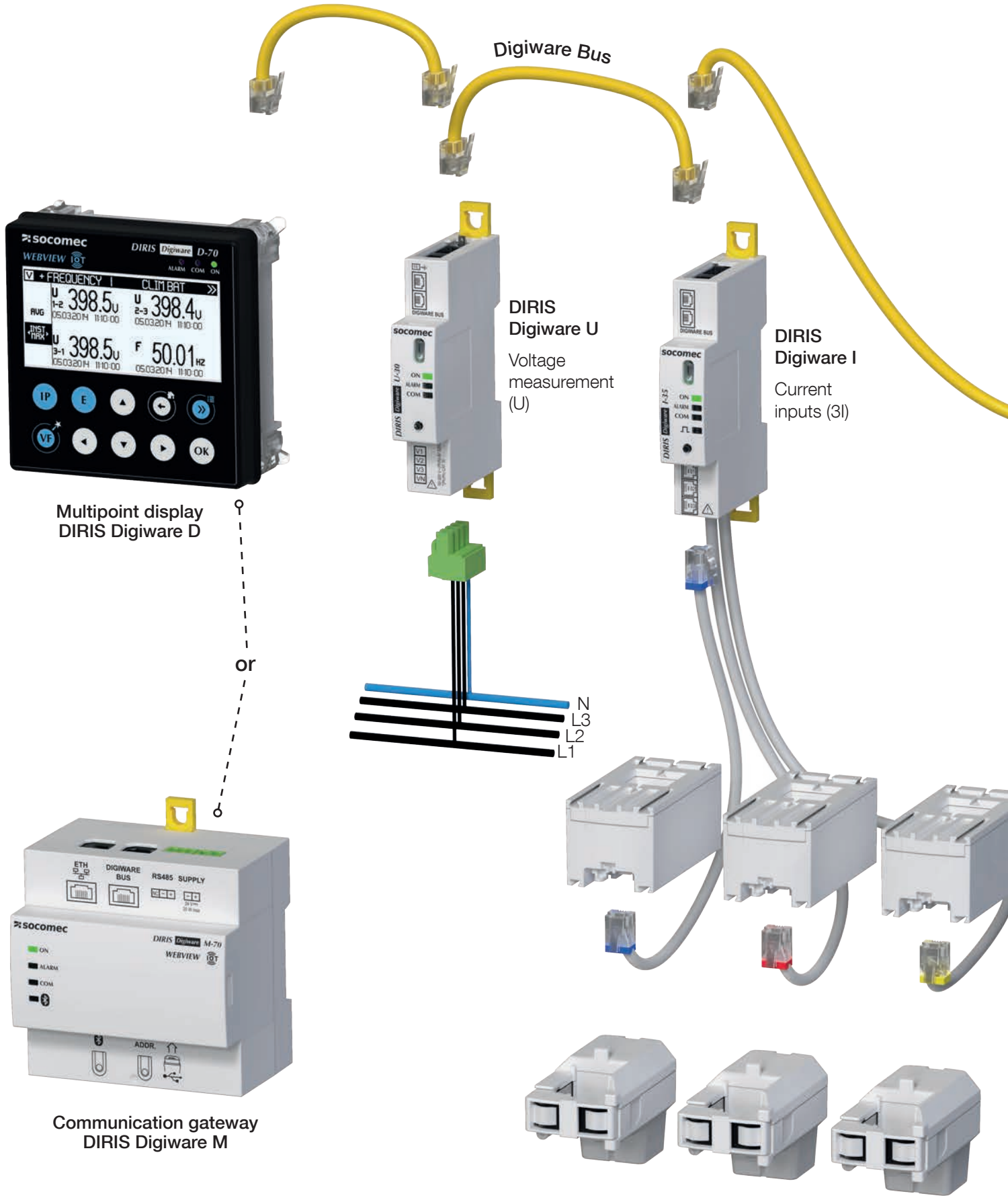
Voltage measurement module	Current measurement module		
			
DIRIS Digiware U-x **Voltage measurement** DIRIS Digiware U-10 Ref. 4829 0105 DIRIS Digiware U-20 Ref. 4829 0106 DIRIS Digiware U-30 Ref. 4829 0102	**DIRIS Digiware I-3x** **3 current measurement inputs** DIRIS Digiware I-30 Ref. 4829 0110 DIRIS Digiware I-31 Ref. 4829 0111 DIRIS Digiware I-33 Ref. 4829 0128 DIRIS Digiware I-35 Ref. 4829 0130	**DIRIS Digiware I-4x** **4 current measurement inputs** DIRIS Digiware I-43 Ref. 4829 0129 DIRIS Digiware I-45 Ref. 4829 0131	**DIRIS Digiware I-6x** **6 current measurement inputs** DIRIS Digiware I-60 Ref. 4829 0112 DIRIS Digiware I-61 Ref. 4829 0113

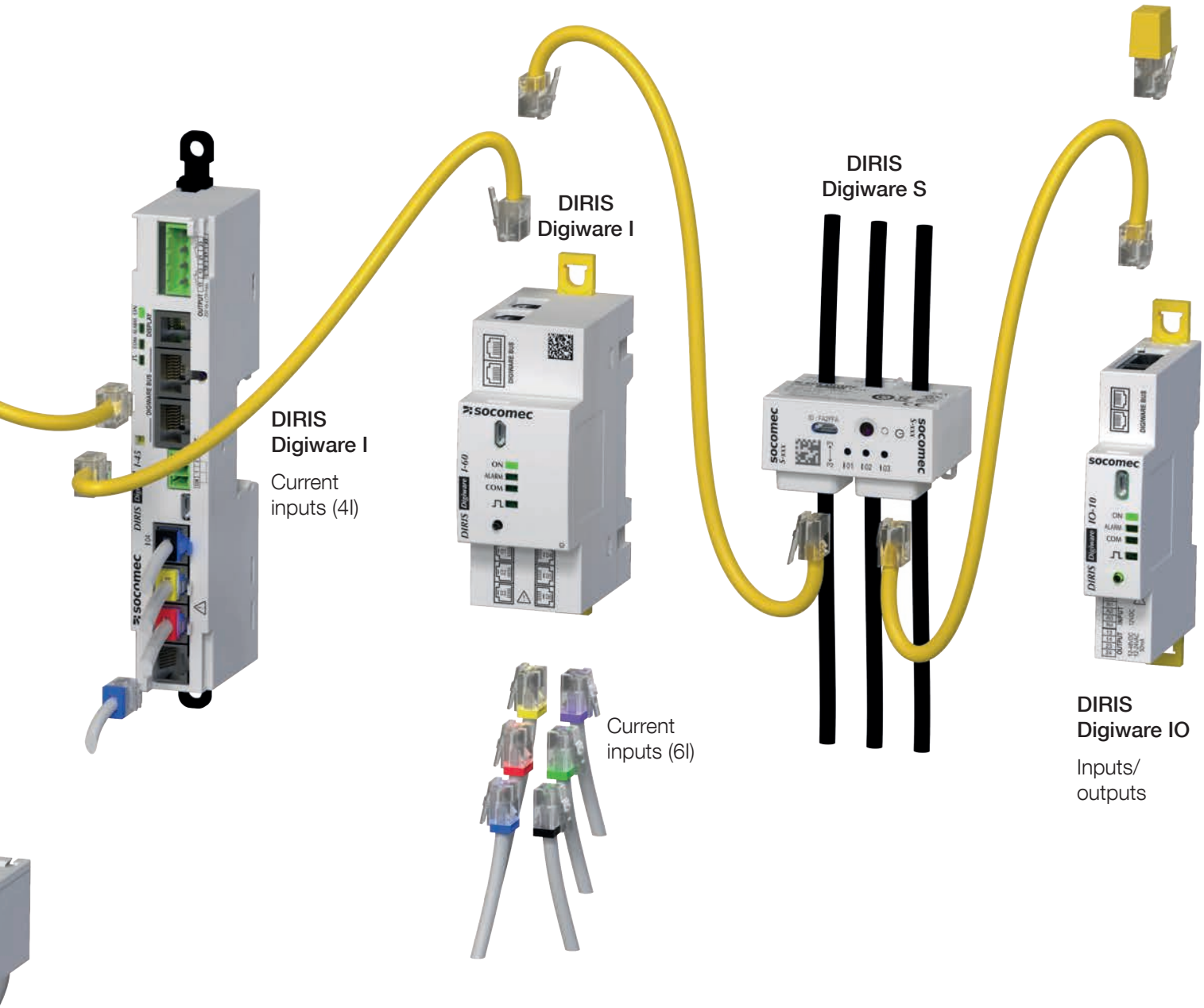
Current measurement and sensing module

DIRIS Digiware S **3 current measurement inputs** DIRIS Digiware S-130 Ref. 4829 0160 DIRIS Digiware S-135 Ref. 4829 0161 DIRIS Digiware S-Datacenter Ref. 4829 0162

IO input/output modules	
	
DIRIS Digiware IO-10 **Digital inputs/outputs** DIRIS Digiware IO-10 Ref. 4829 0140	**DIRIS Digiware IO-20** **Analogue inputs** DIRIS Digiware IO-20 Ref. 4829 0145

5.1.2. Principle





Current sensors
TE, TR/iTR or TF

5.1.3. Functions

DIRIS Digiware offers numerous functions, including:

- General measurements
  - Voltage measurement
  - Multi-load current measurement
  - Power, power factor, phi, cos phi and tan phi
  - Operation across 4 quadrants
  - Predictive power
  - Accuracy of the active energy class 0.5 according to the IEC 61557-12 standard
- Power quality
  - THD and harmonics up to 63rd for voltage and current
  - K-factor
  - Crest Factor for voltage and current
  - Current and voltage unbalance
  - Direct, inverse and zero-sequence voltages and currents
  - EN50160 events (Uswl, Udip, Uint) and overcurrents
- Data logging
  - Recording of average electrical values
  - Recording and timestamping of min/max electrical values
- Metering
  - Total and partial active, reactive and apparant energies (+/- kWh, +/- kVarh, kVAh)
  - Load curves / demand profiles
- Alarm
  - Timestamped alarms with boolean combination
- Current inputs
  - Measurement of 3, 4 or 6 currents per current measurement module
  - Current inputs with quick connection and automatic recognition of the current sensors
  - Simultaneous management of several single-phase, two-phase and three-phase loads
  - Connection of solid-core, split-core and flexible sensors
  - Checking the connection, detecting the CT and auto-configuring the networks
  - Accuracy of the global measurement chain (DIRIS Digiware + sensors) = Class 0.5 performance according to IEC 61557-12
- Inputs/outputs
  - Analogue and digital inputs/outputs
- Communication
  - RS485 or Ethernet communication ports
  - Multiple communication protocols (Modbus RTU, Modbus TCP, BACnet IP, SNMP V1, V2, V3 & Traps)
  - Measurements available in the web server (WEBVIEW-M) embedded in the DIRIS Digiware M-70 gateway and DIRIS Digiware D-70 display
  - Time synchronisation done by the DIRIS Digiware M-50/M-70 gateway and DIRIS Digiware D-50/D-70 display
  - Auto-Discovery of slave modules from the DIRIS Digiware M gateway and DIRIS Digiware D display

5.1.4. Measured electrical parameters

	DIRIS Digiware				
	C-31	M-50	M-70	D-50	D-70
Function					
Basic system interface	•				
Multi-point display				•	•
Multifunction gateway		•	•	•	•
Power supply					
24 VDC	•	•	•	•	•
Communication					
Master RS485		•	•	•	•
Slave RS485	•	•	•	•	•
Digiware bus	•	•	•	•	•
Ethernet Modbus TCP		•	•	•	•
BACnet IP		•	•	•	•
SNMP v1, v2, v3 & Traps		•	•	•	•
WEBVIEW-M webserver			•		•
WEB-CONFIG webserver		•	•	•	•
Format					
Mounting	DIN rail	DIN rail	DIN rail	Panel mounted	Panel mounted
Dimensions	1 module	9 modules	9 modules	96 mm x 96 mm	96 mm x 96 mm
Reference	**48290101**	**48290219 48290221 (BLE)**	**48290220 48290222 (BLE)**	**48290204**	**48290203**

	DIRIS Digiware U		
	U-10	U-20	U-30
Multi-measurement			
U12, U23, U31, V1, V2, V3, Vn, F	•	•	•
U system, V system			•
Ph/N unbalance (Vnb, Vnba, Vdir, Vinv, Vhom)			•
Ph/Ph unbalance (Unb, Unba, Udir, Uinv)			•
Power quality			
THDv1, THDv2, THDv3, THDu12, THDu23, THDu31, THD Vsys, THD Usys		•	•
Individual harmonics U & V (up to 63rd)			•
Crest Factor			•
Voltage dips, swells and interruptions according to EN50160			•
Alarms			
Thresholds			•
Data logging			
Trends of average values			•
Format			
Width/Number of modules	18 mm / 1	18 mm / 1	18 mm / 1
Part number	**4829 0105**	**4829 0106**	**4829 0102**

	DIRIS Digiware I							
	I-30	I-31	I-33	I-35	I-43	I-45	I-60	I-61
Application	Metering		Monitoring	Analysis	Monitoring	Analysis	Metering	
Number of current inputs	3	3	3	3	4	4	6	6
Metering								
± kWh, ± kvarh, kVAh	•	•	•	•	•	•	•	•
Multi-tariff (max. 8)		•		•		•		•
Load curves		•		•		•		•
Multi-measurement								
I1, I2, I3, In, ΣP, ΣQ, ΣS, ΣPF	•	•	•	•	•	•	•	•
P, Q, S, PF per phase			•	•	•	•		
Predictive power				•		•		
Current unbalance (Inba, Idir, Iinv, Ihom, Iunb)				•		•		
Phi, cos Phi, tan Phi				•		•		
Quality								
THDi1, THDi2, THDi3, THDin, THD Isys			•	•	•	•		
Individual harmonics I (up to 63rd)				•		•		
Crest Factor				•		•		
Overcurrents				•		•		
Alarms								
Thresholds				•		•		
Inputs/outputs								
Number					2/2	2/2		
Data logging								
Trends of average values				•		•		
Format								
Width	18 mm	18 mm	18 mm	18 mm	27 mm	27 mm	36 mm	36 mm
Number of modules	1	1	1	1	1.5	1.5	2	2
Part number	**4829 0110**	**4829 0111**	**4829 0128**	**4829 0130**	**4829 0129**	**4829 0131**	**4829 0112**	**4829 0113**

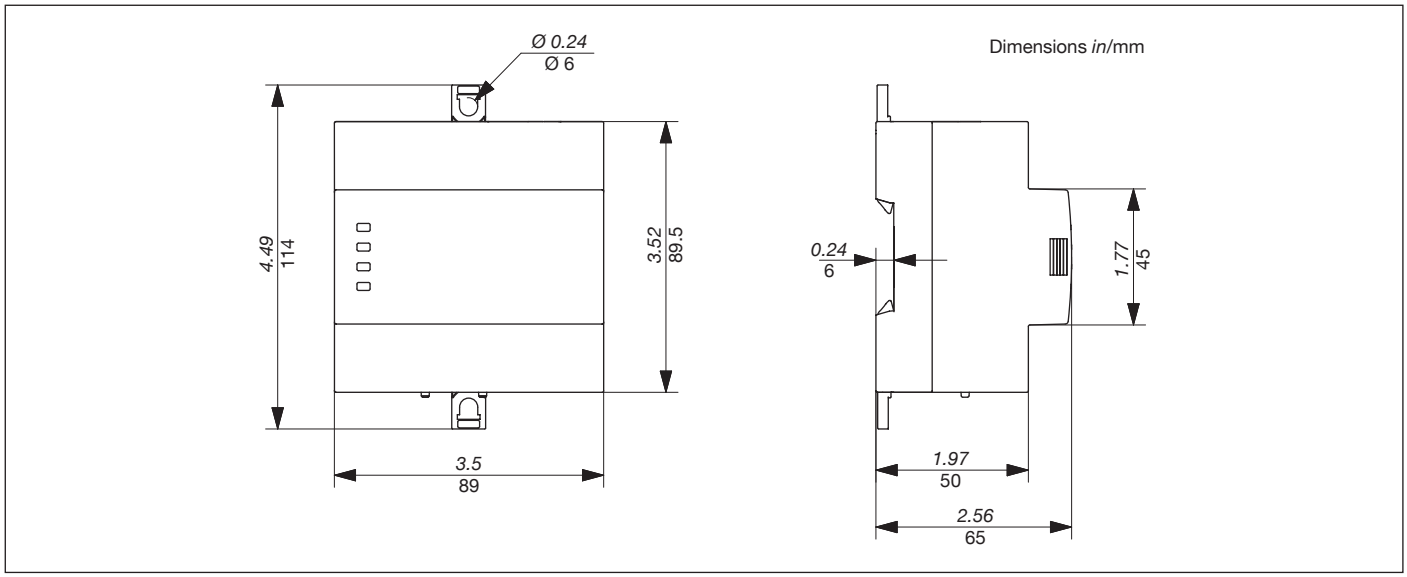
	DIRIS Digiware S		
	S-130	S-135	S-Datacenter
Application	Metering	Analysis	Monitoring
Number of current inputs	3	3	3
Basic current Ib / Maximum current Imax	10A / 63A	10A / 63A	10A / 63A
Load type accepted	1P+N 2P 2P+N 3P 3P+N	1P+N 2P 2P+N 3P 3P+N	1P+N
Metering			
± kWh, ± kvarh, kVAh	•	•	•
Multi-tariff (max 8)		•	
Load curves / demand profiles		•	•

	DIRIS Digiware S		
	S-130	**S-135**	**S-Datacenter**
Application	Metering	Analysis	Monitoring
Number of current inputs	3	3	3
Basic current Ib / Maximum current Imax	10A / 63A	10A / 63A	10A / 63A
Load type accepted	1P+N 2P 2P+N 3P 3P+N	1P+N 2P 2P+N 3P 3P+N	1P+N
Multi-measurement			
I1, I2, I3, In, ∑P, ∑Q, ∑S, ∑PF	•	•	•
P, Q, S, PF per phase		•	•
Predictive power		•	•
Current unbalance (Inba, Idir, Iinv, Ihom, Inb)		•	
Phi, cos Phi, tan Phi		•	•
Power Quality			
THDi1, THDi2, THDi3, THDin, THD Isys		•	•
Individual harmonics I (up to rank 63)		•	
Crest Factor I1, I2, I3		•	
Inrush		•	
Alarms			
Thresholds		•	•
Load levels			•
System alarms		•	•
Protection alarms		•	•
Protection counters		•	•
Boolean combination of alarms		•	•
Data logging			
Trends of average values		•	•
Advanced features			
Voltage detection	•	•	•
VirtualMonitor technology	•	•	•
AutoCorrect technology	•	•	•
Format			
Width	54 mm	54 mm	54 mm
Part number	**4829 0160**	**4829 0161**	**4829 0162**

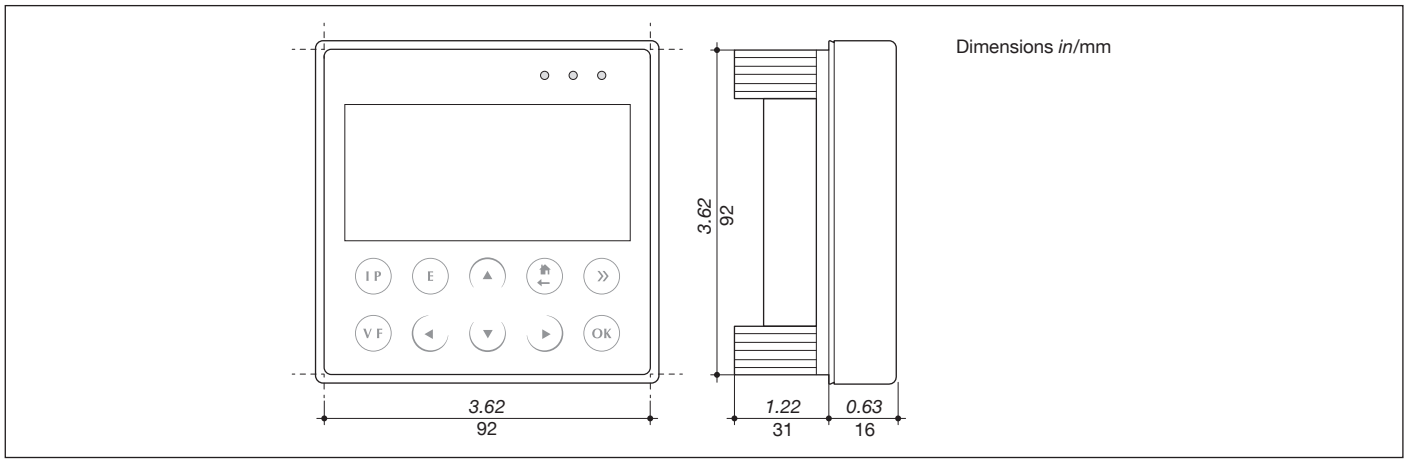
	DIRIS Digiware IO	
	IO-10	**IO-20**
Application	Metering / Monitoring / Analysis	
Number of digital inputs/outputs	4/2	-
Number of analogue inputs	-	2
Format		
Width	18 mm	18 mm
Number of modules	1	1
Part number	**4829 0140**	**4829 0145**

5.1.5. Dimensions

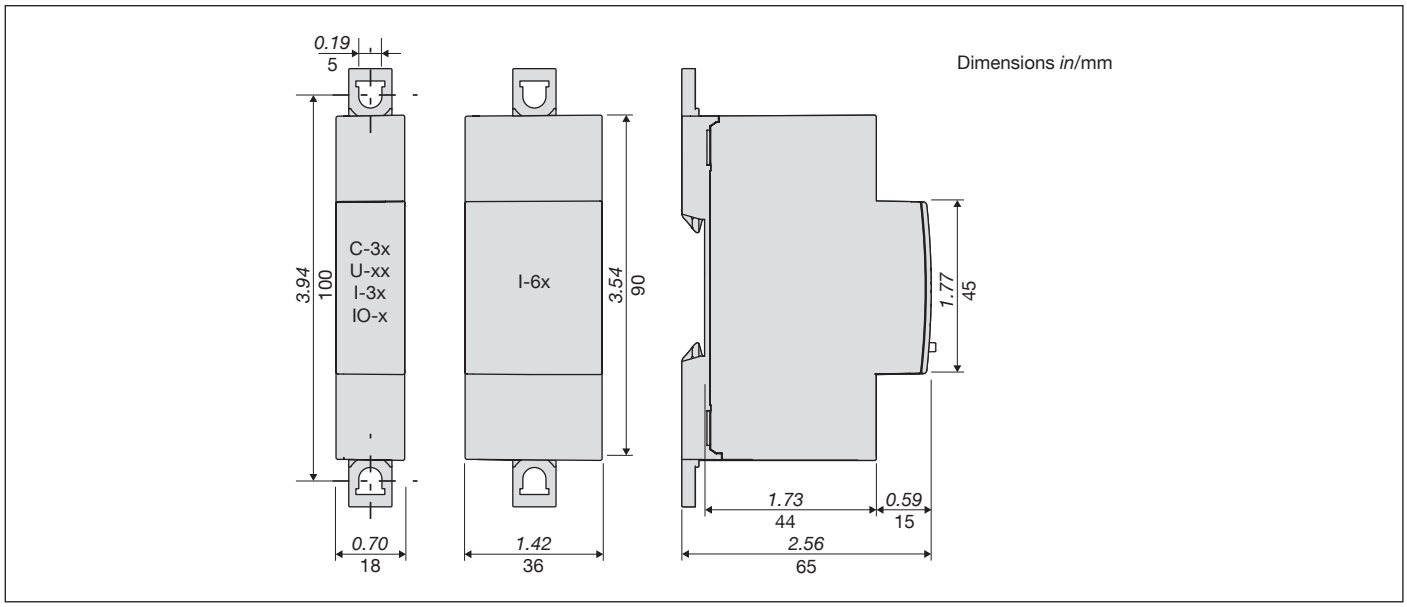
5.1.5.1. M-50 & M-70 gateways



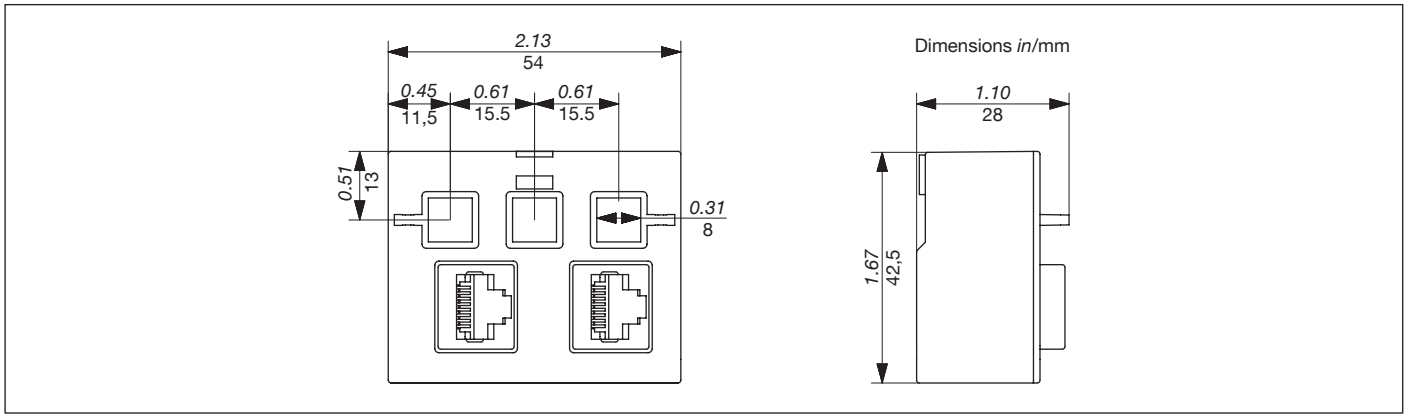
5.1.5.2. D-50 & D-70 displays



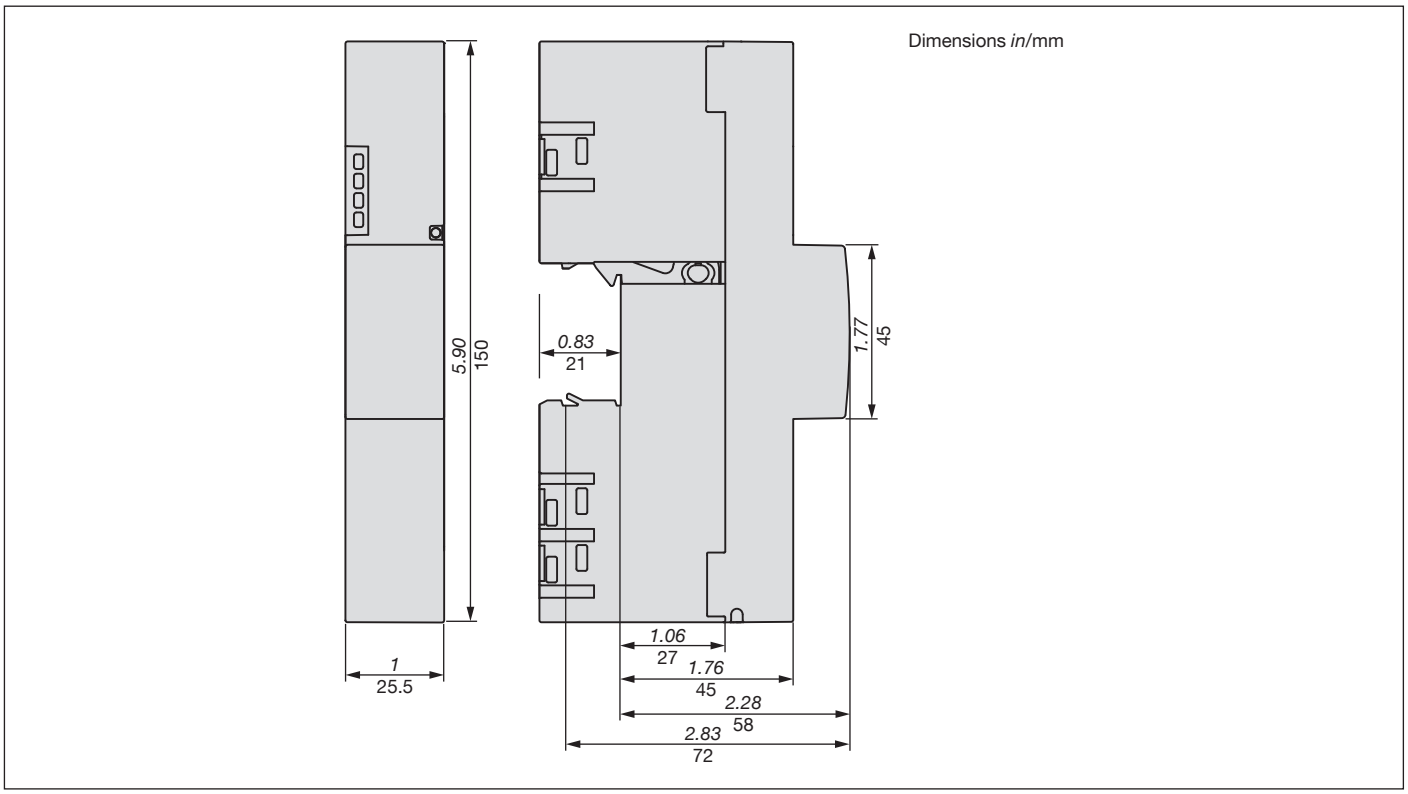
5.1.5.3. DIRIS Digiware C, U & I-3x, I-6x, IO-x



5.1.5.4. DIRIS Digiware S-xx

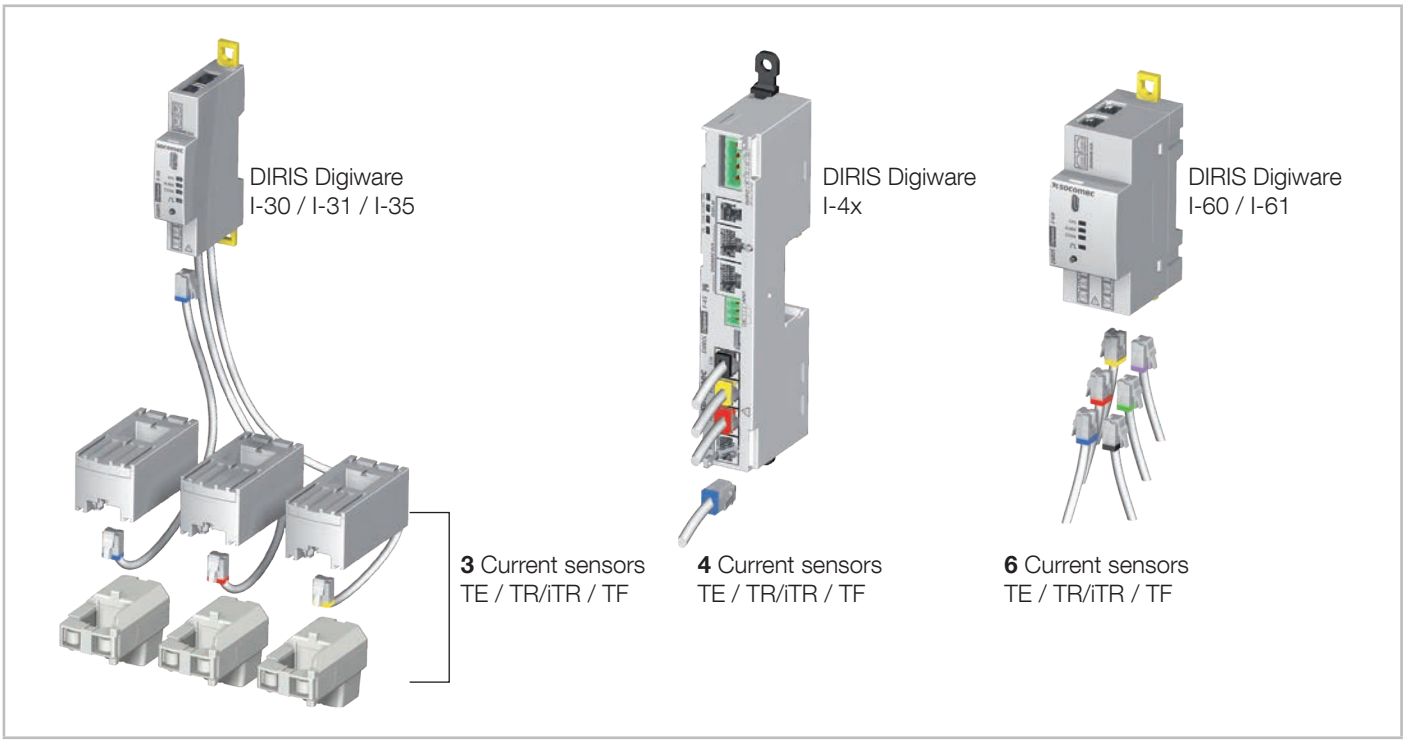


5.1.5.5. DIRIS Digiware I-4x



5.2. Presentation of the associated current sensors

Various types of current sensors are connected to DIRIS Digiware I modules: solid-core (TE), split-core (TR/iTR) or flexible (TF). The variety of these sensors make them suitable with any type of new, existing or high-current existing installation. They all use a specific link with the DIRIS Digiware I current measurement module. This link ensures rapid connection without any wiring error. DIRIS Digiware automatically recognises the type of current sensor that is connected and its rating.. In addition, combining them means the overall accuracy of DIRIS Digiware + Current sensor measurement chain can be guaranteed over a large measurement range.



For connecting the current sensors, use SOCOMEC cables or RJ12 straight cables, twisted pair, unshielded, 600 V -10°C / +70°C. It is recommended that all the current sensors be installed in the same direction.

Connection cables for current sensors:

RJ12 connection cables	Cable length (m)									
	0.1	0.2	0.3	0.5	1	2	3	5	10	50 m reel + 100 connectors*
Number of cables	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
1	-	-	-	-	-	-	4829 0606	4829 0602	4829 0603	4829 0601
3	4829 0580	4829 0581	4829 0582	4829 0595	4829 0583	4829 0584	-	-	-	-
4				4829 0596	4829 0588	4829 0589	-	-	-	-
6	4829 0590	4829 0591	4829 0592	4829 0597	4829 0593	4829 0594	-	-	-	-

* When producing cables, do not exceed a maximum length of 10 metres.

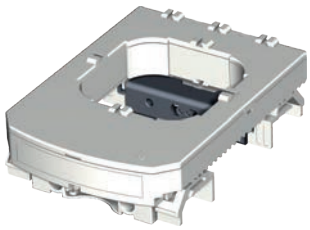
5.2.1. TE solid-core current sensors

The TE solid-core current sensors are used to set up measurement points in a new or existing installation. They are easy to integrate as they are compact and match the pitch of the circuit breakers. A wide range of accessories are also available for direct fitting on all type of cabling (cable, flexible or rigid busbar) or on a DIN rail support or plate.

Thanks to the specific link, they are recognised by DIRIS Digiware and a high level of overall accuracy for the measurement chain is guaranteed.

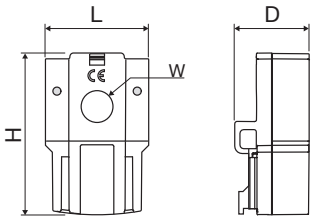
5.2.1.1. Range

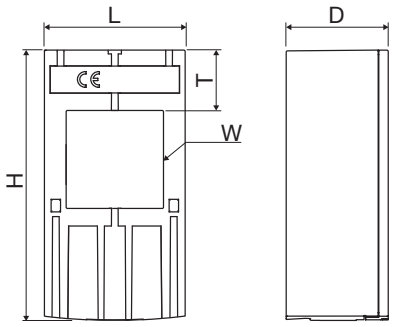
						
	TE-18	**TE-18**	**TE-25**	**TE-35**	**TE-45**	**TE-55**
Pitch	18 mm	18 mm	25 mm	35 mm	45 mm	55 mm
Nominal current range In	5 - 20 A	25 - 63 A	40 - 160 A	63 - 250 A	160 - 630 A	400 - 1000 A
Maximum I	24 A	75.6 A	192 A	300 A	756 A	1200 A
Part number	**4829 0500**	**4829 0501**	**4829 0502**	**4829 0503**	**4829 0504**	**4829 0505**

	
	TE-90
Pitch	90 mm
Nominal current range In	600 - 2000 A
Maximum I	2400 A
Part number	**4829 0506**

5.2.1.2. Dimensions

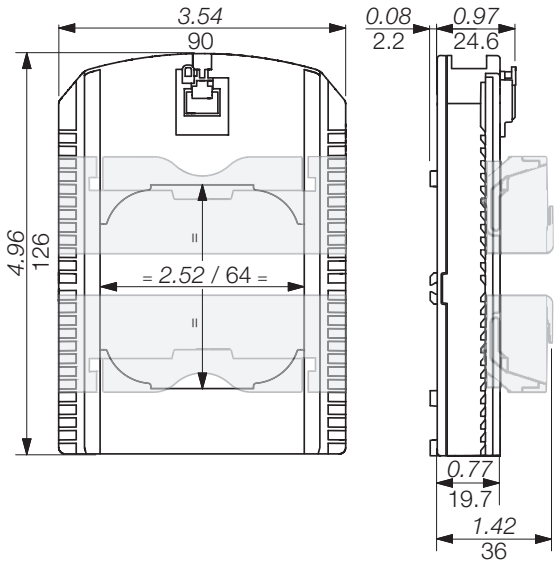
Dimensions *in*/mm





	TE-18	TE-25	TE-35	TE-45	TE-55
Pitch	*0.71* 18 (staggered assembly)	*0.98* 25	*1.37* 35	*1.77* 45	*2.16* 55
LxHxD	*1.10 x 0.79 x 1.77* 28 x 20 x 45	*0.98 x 1.28 x 2.56* 25 x 32.5 x 65	*1.37 x 1.28 x 2.79* 35 x 32.5 x 71	*1.77 x 1.28 x 3.38* 45 x 32.5 x 86	*2.16 x 1.28 x 3.93* 55 x 32.5 x 100
Aperture (W)	*Ø 0.33* Ø 8.4	*0.53 x 0.53* 13.5 x 13.5	*0.82 x 0.82* 21 x 21	*1.22 x 1.22* 31 x 31	*1.61 x 1.61* 41 x 41
(T)	-	*0.69* 17.5	*0.69* 17.5	*0.77* 19.5	*0.85* 21.5

TE-90



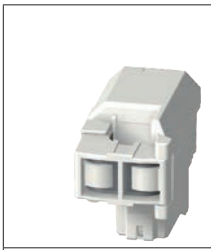
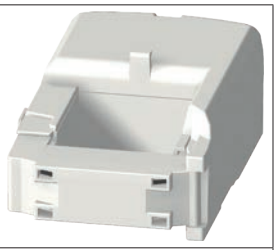
5.2.2. TR/iTR split-core current sensors

The TR/iTR split-core current sensors are used to set up measurement points in a new or existing installation without interfering with its cabling. Thanks to the specific link, they are recognised by DIRIS Digiware and the overall accuracy of the measurement chain is guaranteed.

In addition, iTR sensors detect the presence of voltage in the cable passing through them.

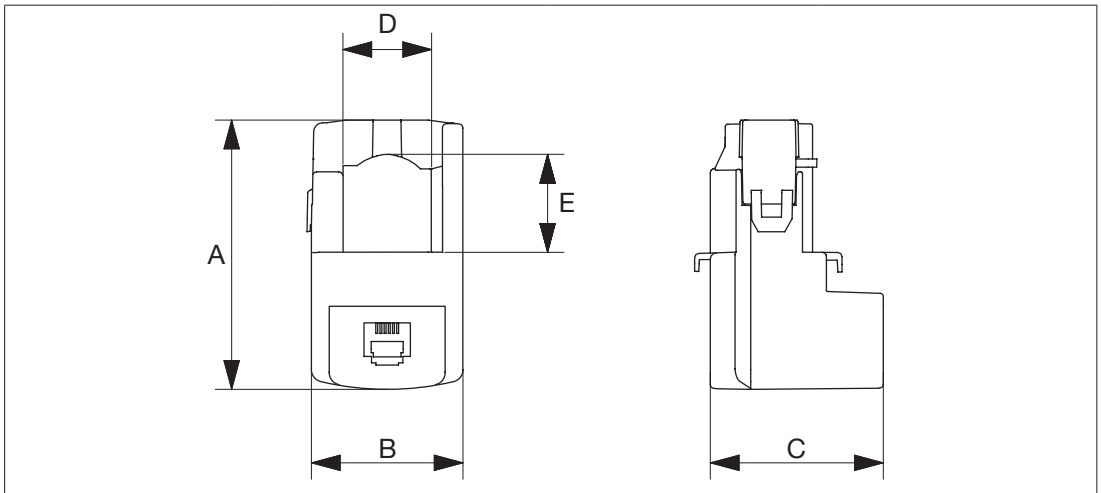
5.2.2.1. Range

Four models are available from 25A to 600A to analyse several types of loads.

				
	TR-10 / iTR-10	**TR-14 / iTR-14**	**TR-21 / iTR-21**	**TR-32 / iTR-32**
Cable passage diameter	Ø 10 mm	Ø 14 mm	Ø 21 mm	Ø 32 mm
Nominal current range In	25 - 63 A	40 - 160 A	63 - 250 A	160 - 600 A
Recommended cable section	6 mm² (iTR-10)	10 mm² (iTR-14)	50 mm² (iTR-21)	50 mm² (iTR-32)
Maximum I	75.6 A	192 A	300 A	720 A
Part number	4829 0555 / 4829 0655	4829 0556 / 4829 0656	4829 0557 / 4829 0657	4829 0558 / 4829 0658

5.2.2.2. Dimensions

Dimensions *in*/mm



	TR-10 / i TR-10	**TR-14 / i TR-14**	**TR-21 / iTR-21**	**TR-32 / iTR-32**
A	*1.74* 44	*2.63* 67	*2.56* 65	*3.38* 86
B	*1.02* 26	*1.14* 29	*1.45* 37	*2.08* 53
C	*1.10* 28	*1.10* 28	*1.69* 43	*1.85* 47
D	-	*0.55* 14	*0.82* 21	*1.26* 32
E	-	*0.59* 15	*0.90* 23	*1.30* 33
Diameter	*0.39* 10	*0.55* 14	*0.82* 21	*1.26* 32

5.2.3. TF flexible current sensors

The TF flexible current sensors use the Rogowski principle, covering a wide current range without saturation.

Their flexible design and easy opening system enables a quick installation inside electrical panels, making them particularly well suited for adding measuring points in existing electrical installations, especially when space is limited.

The secure lock technology prevents non voluntary openings of the Rogowski rope.

5.2.3.1. Range

Six models are available, covering a large current range up to 6000 A with openings of different shapes and sizes. They include a compact and self-supplied integrator, required to shape the current signal.

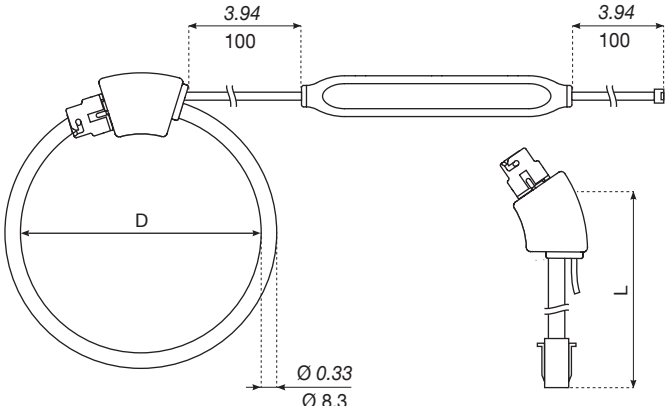
Due to the specific RJ12 connection, the TF current sensors can only be used with DIRIS Digiware I, DIRIS B and DIRIS A-40. Used in conjunction with these PMD equipped with RJ12 connectors, the overall accuracy of the measurement chain is guaranteed.

	TF-40	TF-80	TF-120	TF-200	TF-300	TF-600
Ø (mm)	40	80	120	200	300	600
I nom. (a.c.)	100 … 400A	150 … 600A	400 … 2000A	600 … 4000A	1600 … 6000A	1600 … 6000A
Part number	**4829 0573**	**4829 0574**	**4829 0575**	**4829 0576**	**4829 0577**	**4829 0578**

5.2.3.2. Dimensions

Dimensions *in*/mm

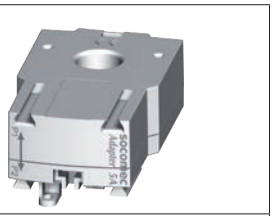
	TF-40	TF-80	TF-120	TF-200	TF-300	TF-600
Diameter D	*1.57* 40	*3.15* 80	*4.72* 120	*7.87* 200	*11.81* 300	*23.62* 600
Perimeter P	*4.96* 126	*9.88* 251	*14.84* 377	*24.72* 628	*37.09* 942	*74.21* 1885
Integrator	*8.04 x 0.75 x 0.6* 128 x 19 x 15					



5.2.4. Adaptor for 5A current transformers

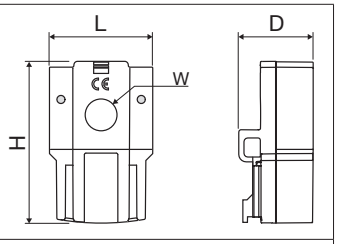
The adaptor enables the use of a standard sensor supplying a 1A or 5A current to the secondary sensor. When this kind of sensor is used, the overall accuracy of DIRIS Digiware + sensor is not guaranteed and will depend on the accuracy of the associated sensor (see standard "IEC 61557-12 annex D" for more information).
The max primary current is 10000 A for a 5A-secondary CT and 2000 A for a 1A-secondary CT.

5.2.4.1. Range

	
	5A adaptor
I nom.	5 A
I max.	6 A
Part number	4829 0599

5.2.4.2. Dimensions

Dimensions *in*/mm

	
	5A adapter
LxHxD	*1.10 x 0.79 x 1.77* 28 x 20 x 45
Aperture (W)	*Ø 0.33* Ø 8.4

6. INSTALLATION

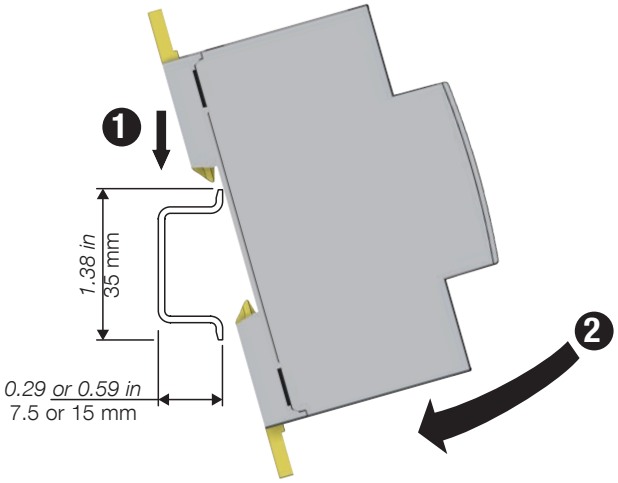
The following paragraphs describe the installation of DIRIS Digiware and its associated sensors.

6.1. Recommendations and safety

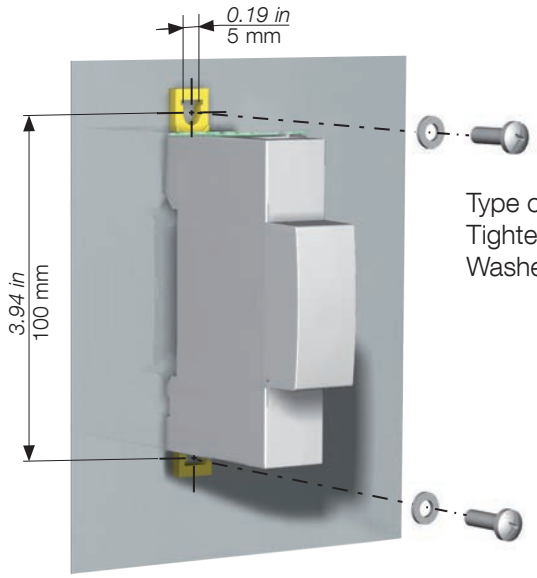
Refer to the safety instructions (section "2. Hazards and warnings", page 7).

6.2. DIRIS Digiware mounting

6.2.1. DIRIS Digiware C, U, I-3x, I-6x, IO-x - DIN rail-mounting



6.2.2. DIRIS Digiware C, U, I-3x, I-6x, IO-x - backplate-mounting

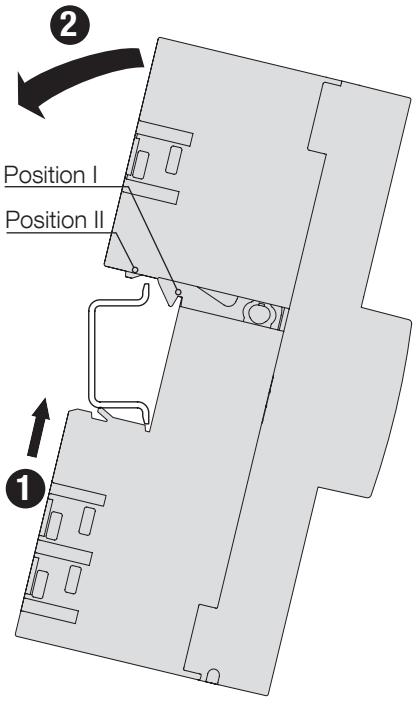


Type of screw: M4
Tightening torque: 0.5 Nm
Washer diameter *0.47 in* / 12 mm max.

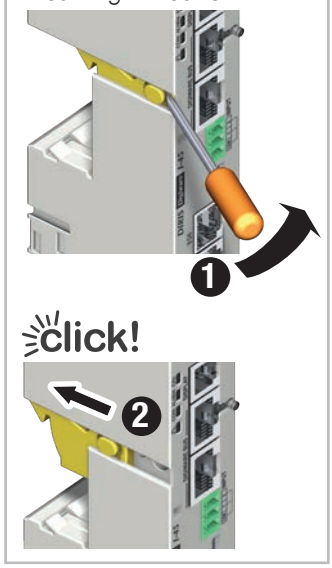
6.2.3. DIRIS Digiware I-4x - DIN rail mounting

DIRIS Digiware I-4x mounting

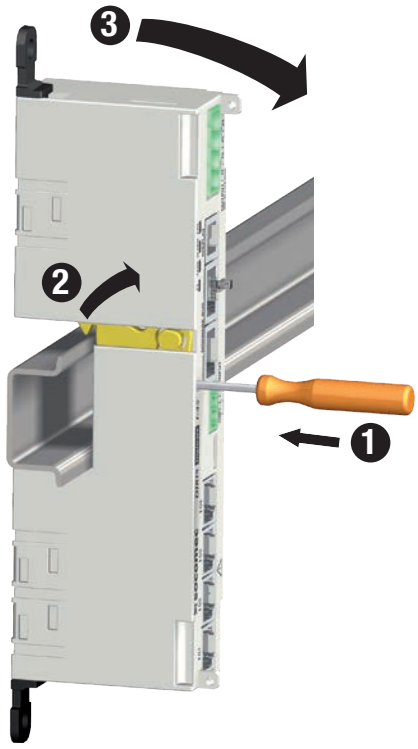
Two mounting positions are possible:
Position I (factory assembly): for 15mm rail.
Position II: for 7.5mm rail



Mounting in Position II

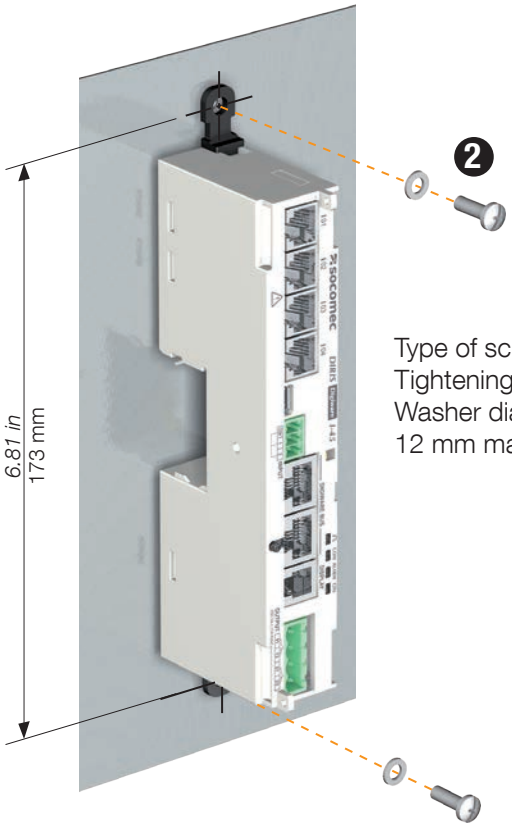


DIRIS Digiware I-4x dismounting



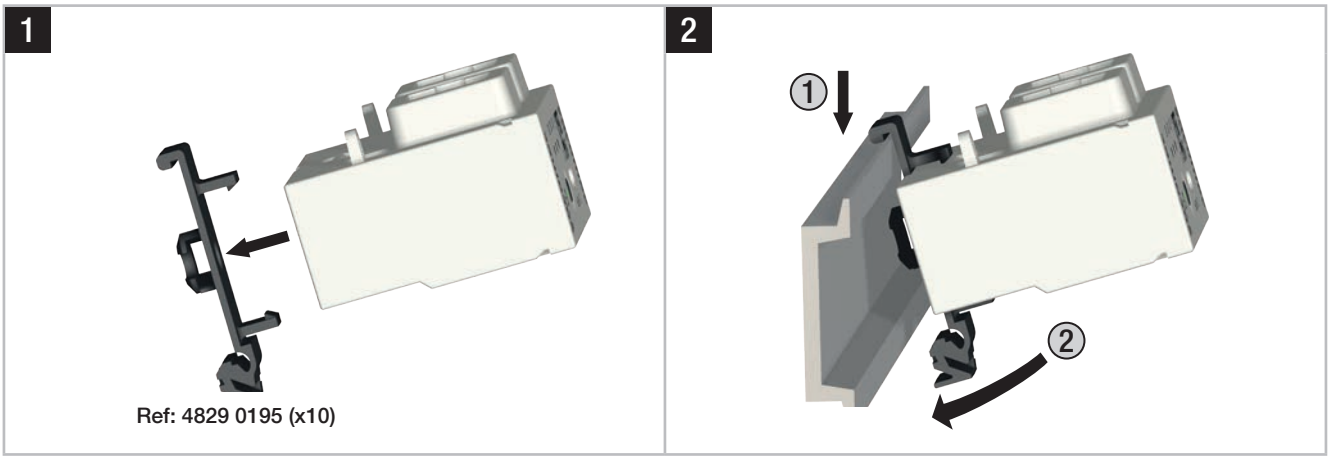
6.2.4. DIRIS Digiware I-4x - back-plate mounting

Mounting of the brackets on the top and bottom of the module.

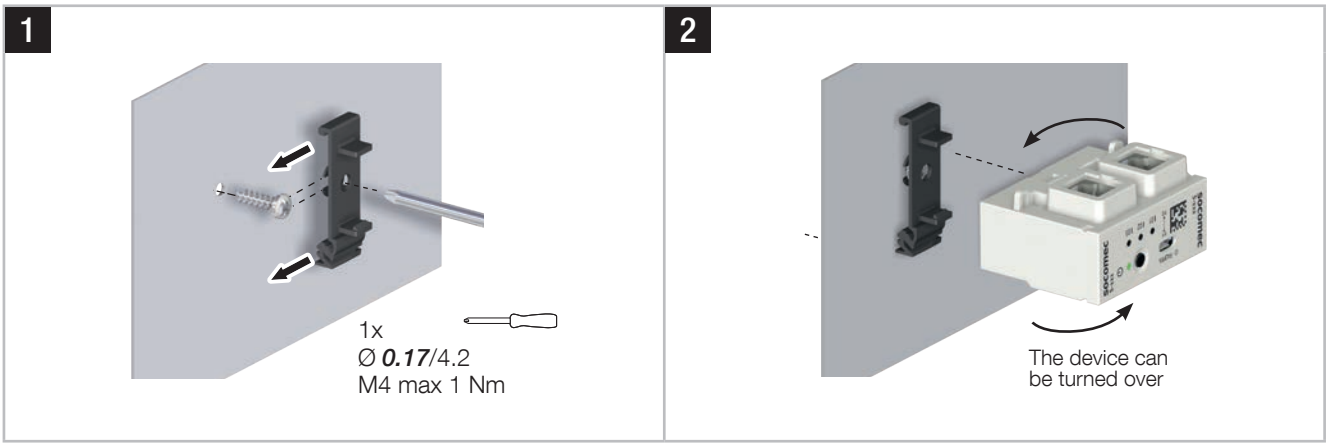


Type of screw: M4
Tightening torque: 0.5 Nm
Washer diameter *0.47 in* / 12 mm max.

6.2.5. DIRIS Digiware S – DIN rail mounting



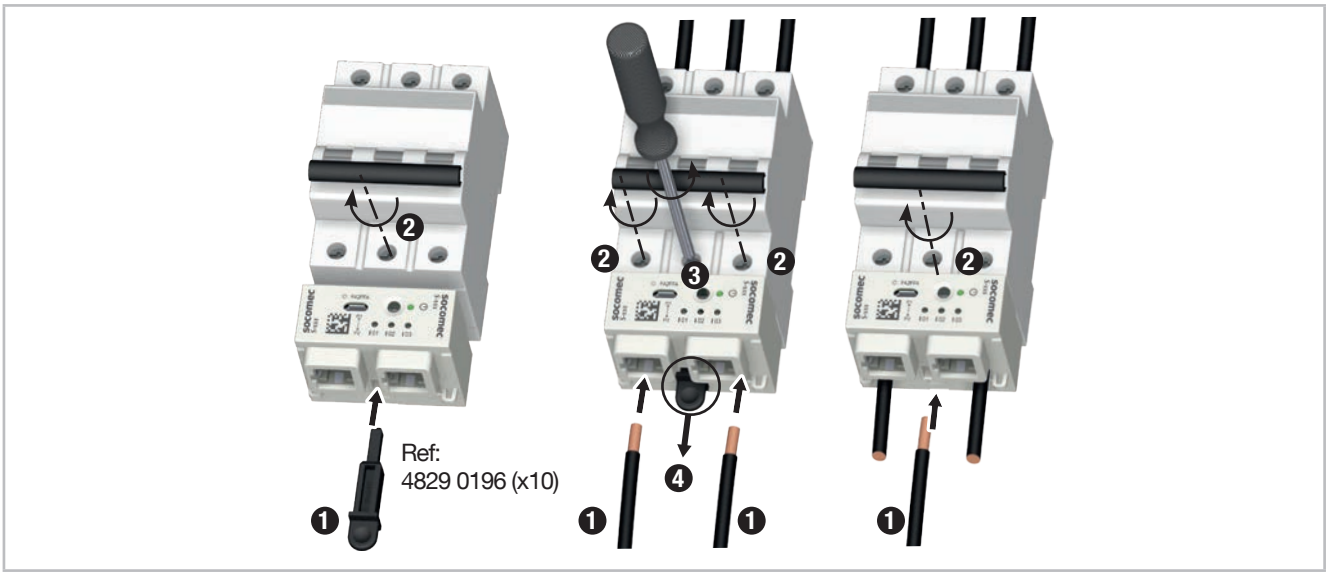
6.2.6. DIRIS Digiware S – Back plate mounting



6.2.7. DIRIS Digiware S holding

- Temporary MCB insert:

The DIRIS Digiware S module can be fixed and transported directly on top or under the protective device using a temporary insert tool:
Step 1: Insert the tool through one of the current inputs and into the corresponding breaker terminal.
Step 2: Tighten the associated screw(s).
Please refer to the operating instructions of the protective device for additional information related to its installation.



- Cable tie tethers:

The DIRIS Digiware S module has 2 tethers which can be used with tightening clamps:

The dimensions of the tightening clamp must not exceed 4 mm x 2 mm.

6.2.8. Accessories overview

	Part number	Description
	4829 0195	DIN-rail and back plate fixing tool (x10)
	48290196	Temporary MCB insert (x10)

6.3. Installing TE solid-core sensors

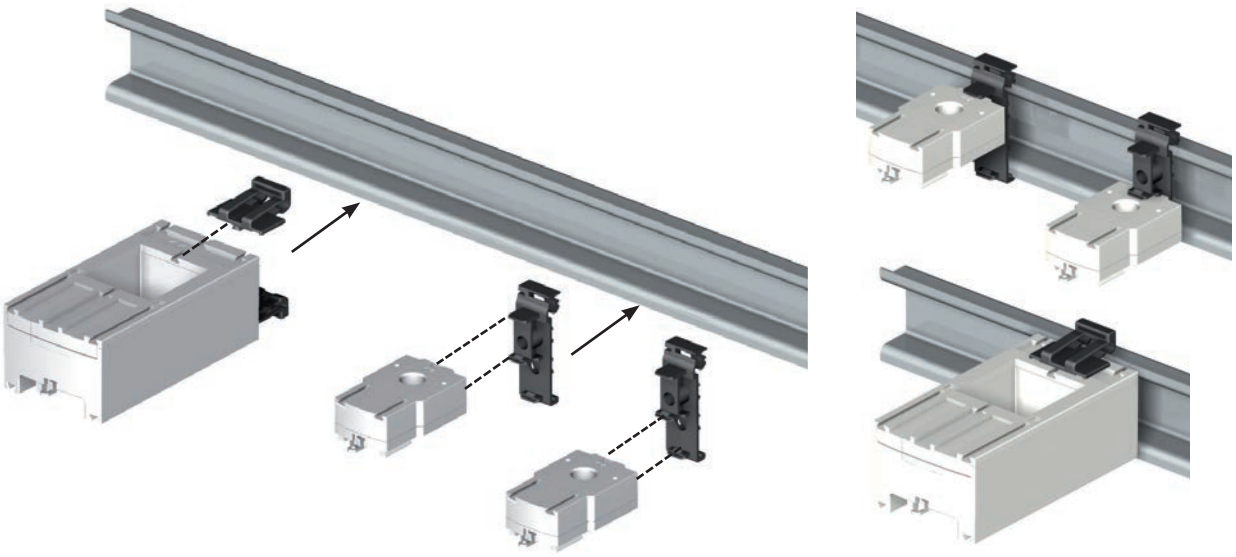
6.3.1. Mounting accessories

All mounting accessories supplied with the sensors are listed below:

						
Part number		**Pitch**	DIN rail and plate mounting	DIN rail mounting	Plate mounting	Busbar mounting
4829 0500 4829 0501	TE-18	18 mm	x1			
4829 0502	TE-25	25 mm		x2	x4	
4829 0503	TE-35	35 mm		x2	x4	x2
4829 0504	TE-45	45 mm		x2	x4	x2
4829 0505	TE-55	55 mm		x2	x4	x2
4829 0506	TE-90	90 mm	x2		x6	

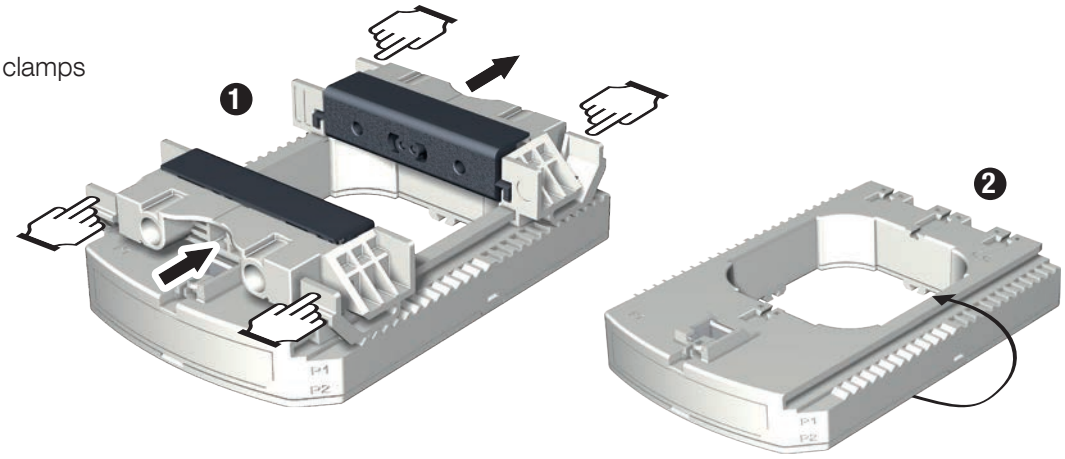
6.3.2. DIN rail mounting

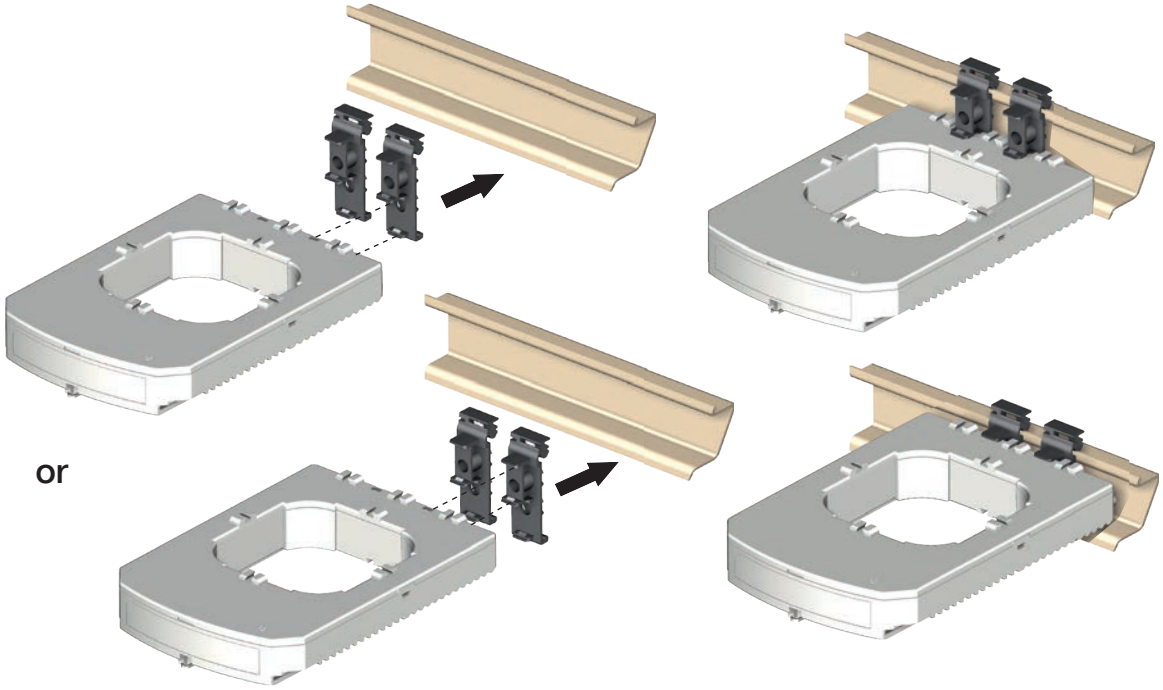
TE-18 -> TE-55



TE-90

Removing the clamps

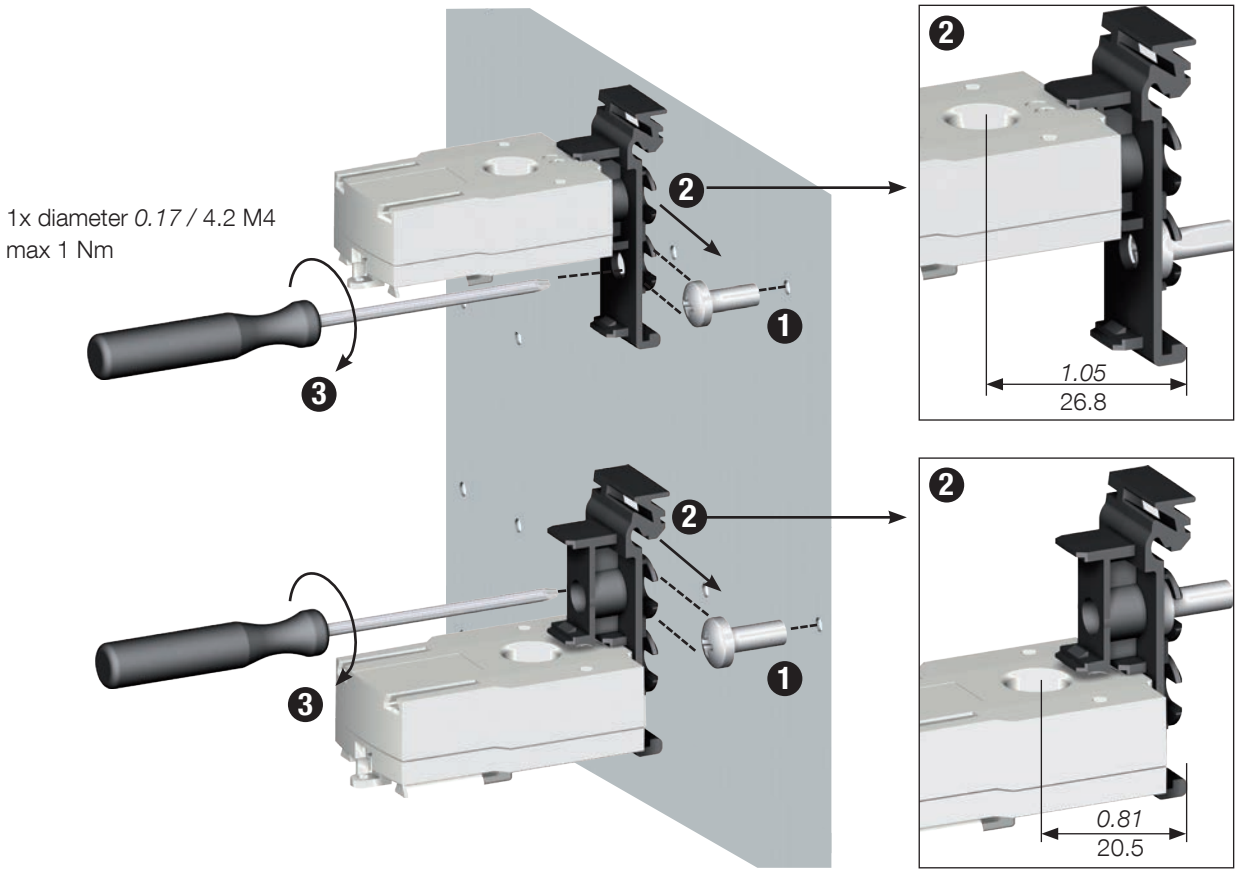




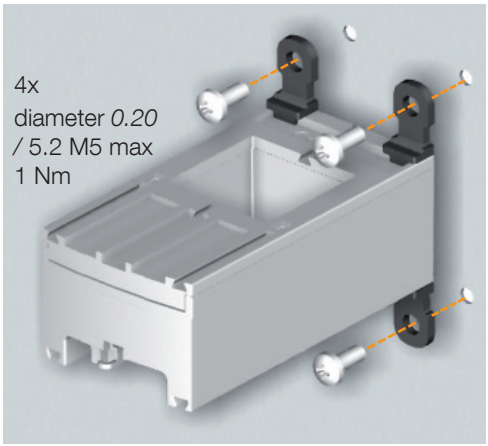
Note: it is possible to fix the TE-90 sensor to a DIN rail to make it easier to install.
This is a temporary installation. Remove the clamps to install the TE-90 sensors on the DIN rail.

6.3.3. Back-plate mounting

TE-18

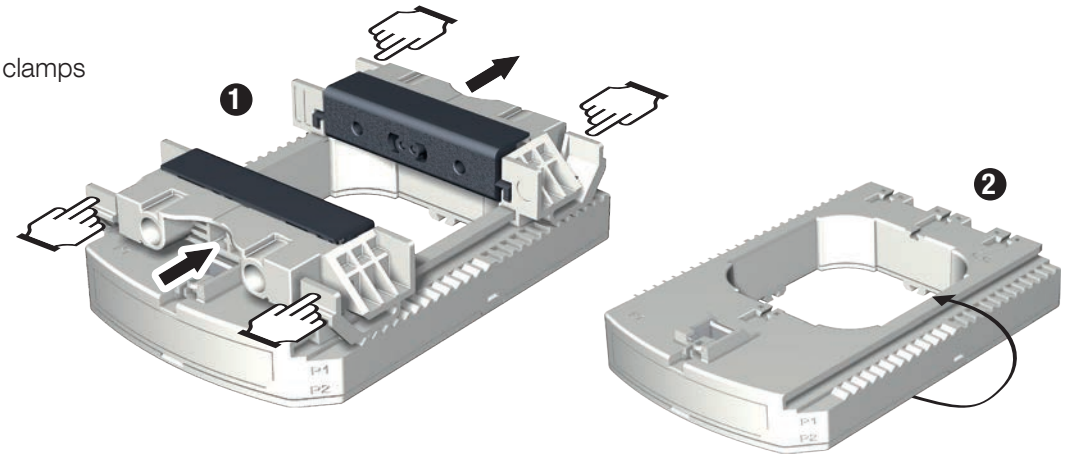


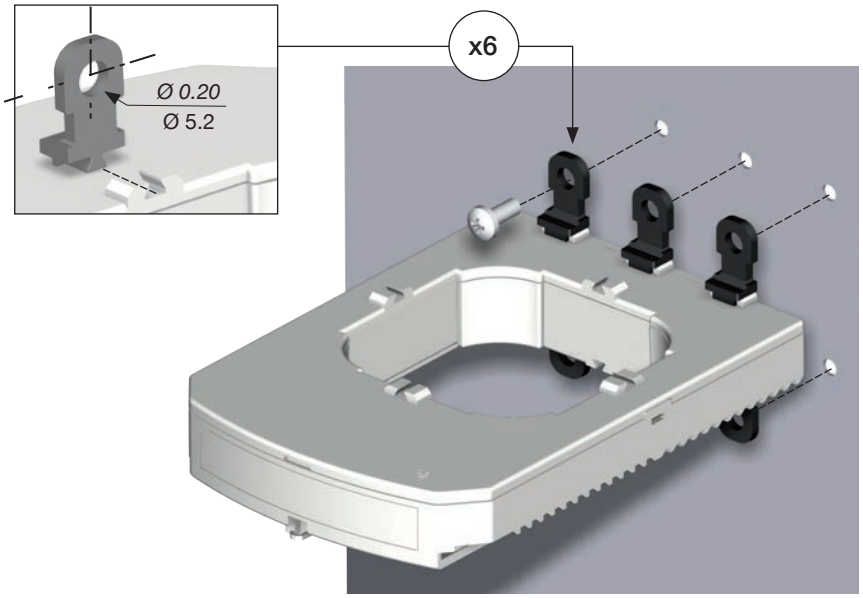
TE-25 - > TE-55



TE-90

Removing the clamps

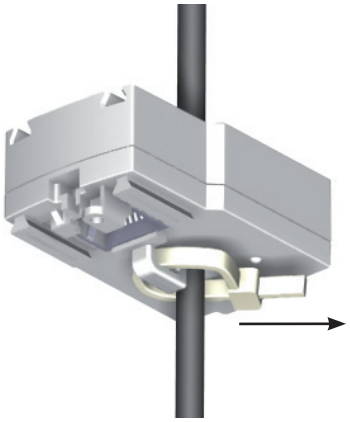




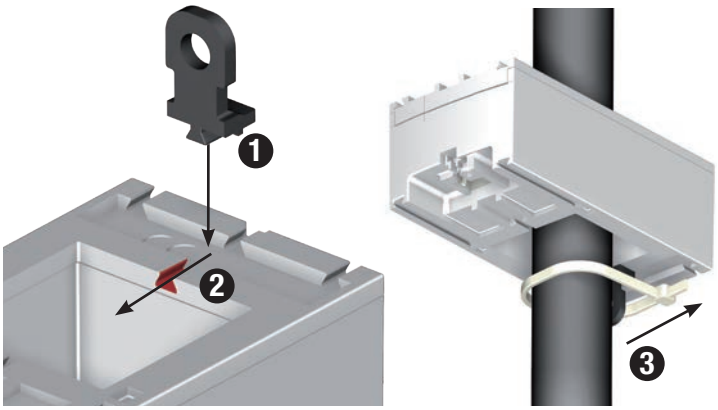
Note: remove the clamps to install the TE-90 sensors on the back-plate.

6.3.4. Installing on a cable with clamping collar

TE-18

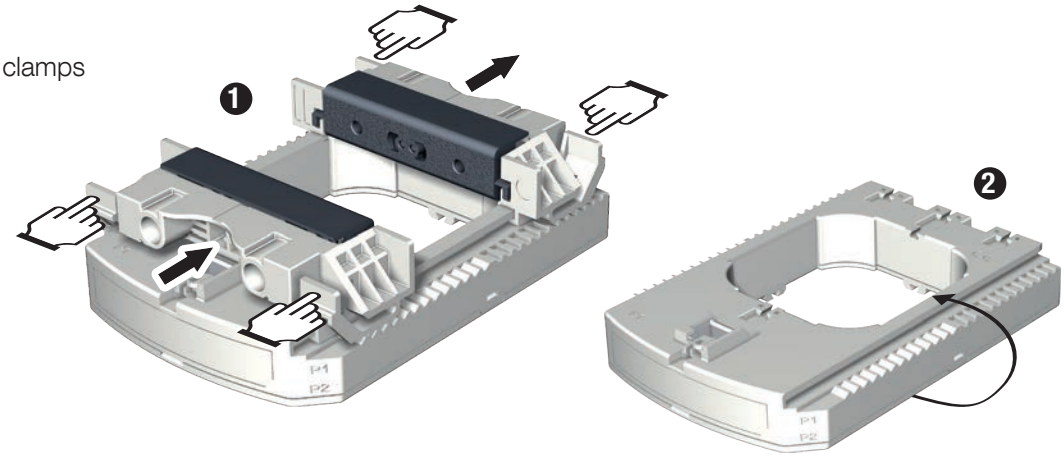


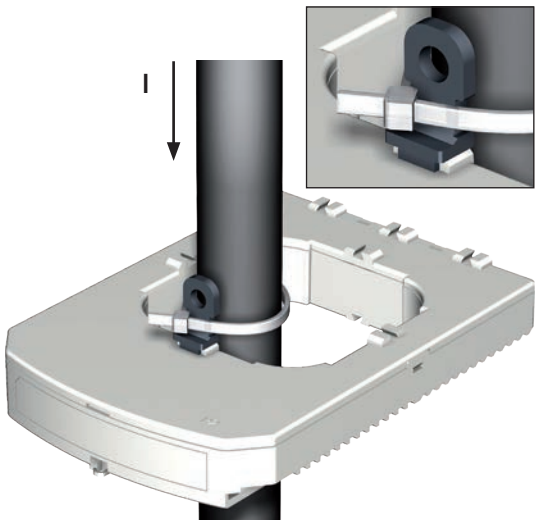
TE-25 - > TE-55



TE-90

Removing the clamps



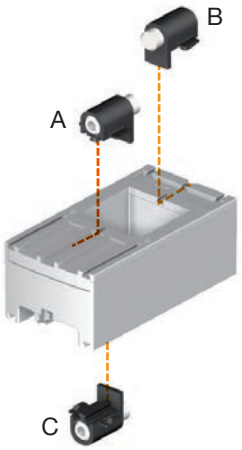


Note: remove the clamps to install the TE-90 sensors on a cable with clamping collar.

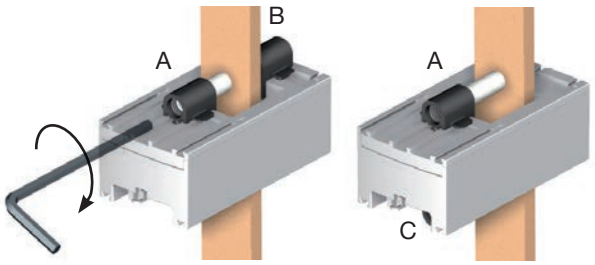
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

6.3.5. Bar mounting

TE-35 - > TE-55

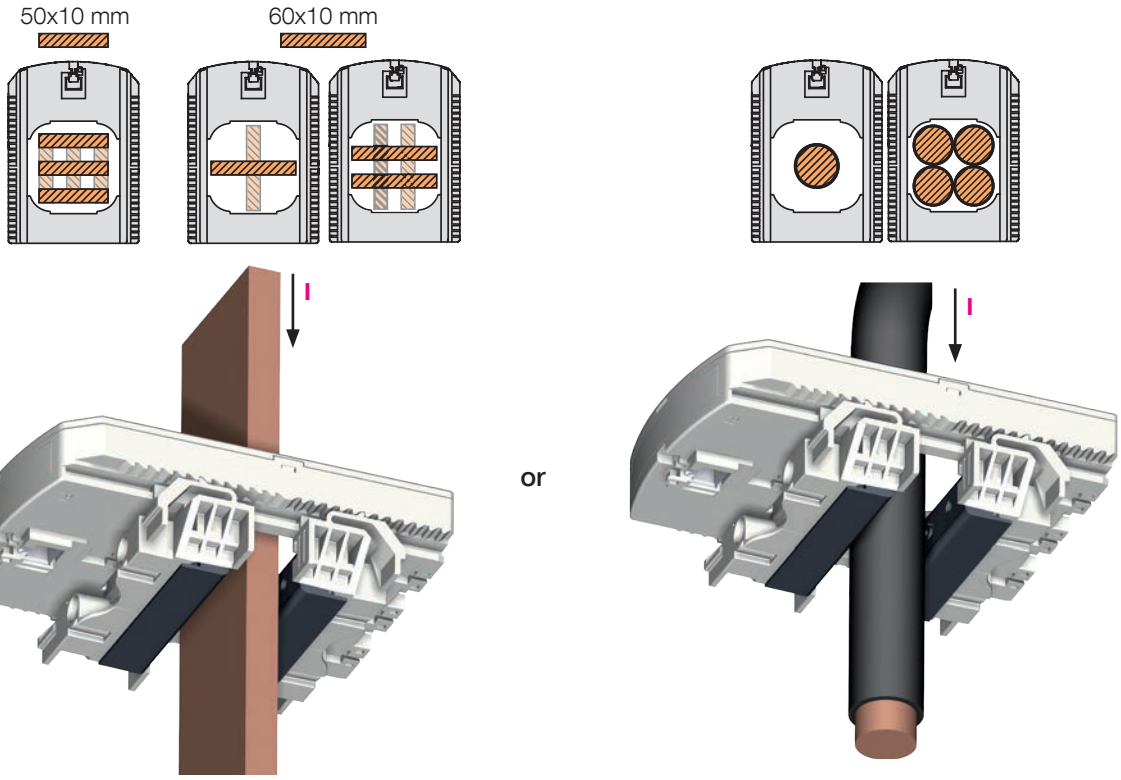


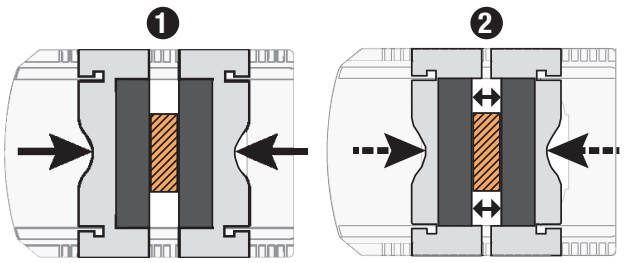
Installation options:
A+B, A+C



0.4 Nm, 4mm key

TE-90

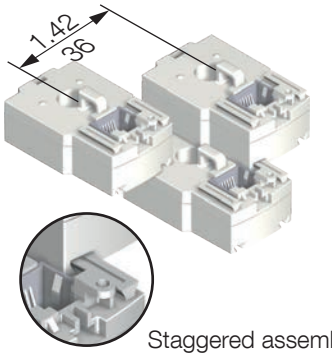
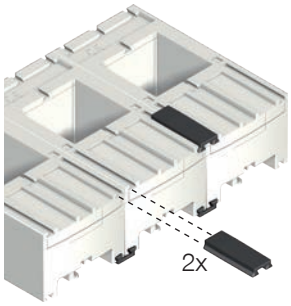
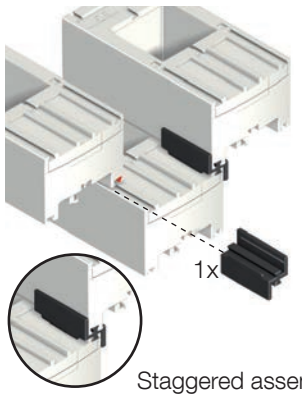




Tighten the jaws on both sides of the cable by applying pressure.
The jaws must be perpendicular to the holding notches.

Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

6.3.6. Sensors assembly

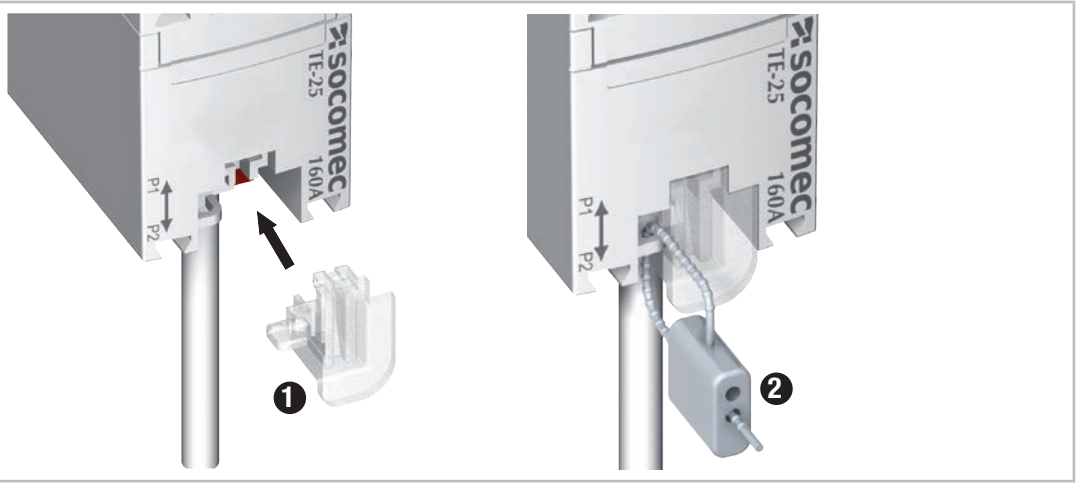
TE-18	TE-25 - > TE-55	TE-35 - > TE-55
 Staggered assembly	 Linear assembly	 Staggered assembly

Mounting accessories for sensor combination:

		
Part number	Linear assembly	Staggered assembly
4829 0598	x30	

These accessories must be ordered separately.

6.3.7. Sealing accessories for sensors

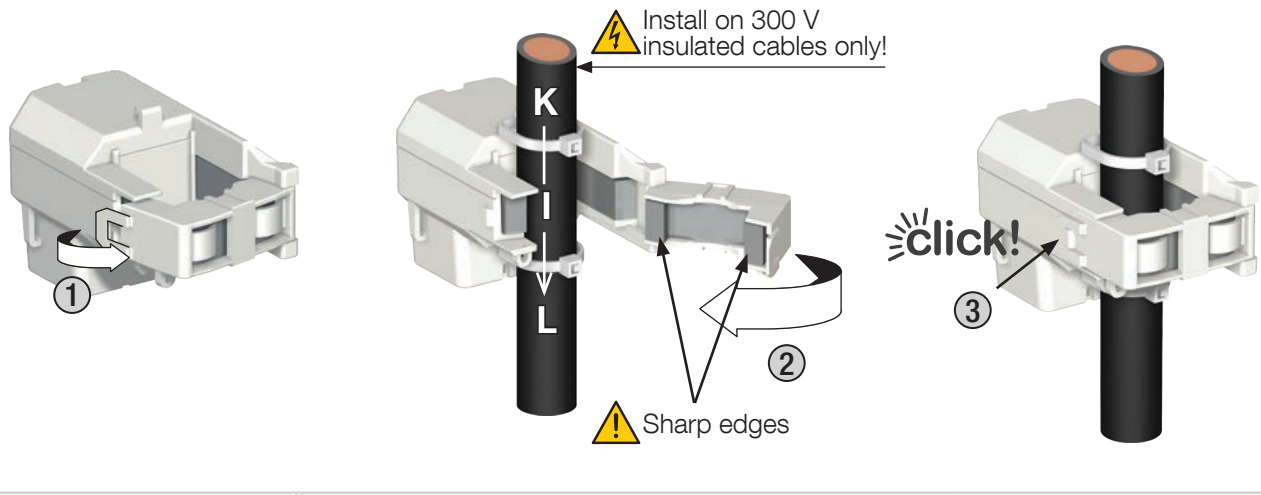


Part number	Sealing case for terminal
4829 0600	x20

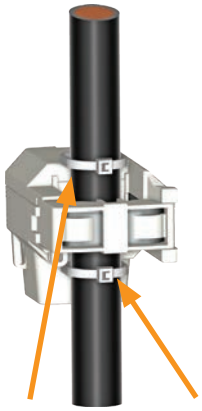
These accessories must be ordered separately.

6.4. Installing TR/iTR split-core sensors

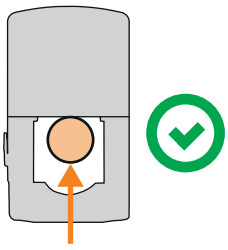
6.4.1. Cable mounting



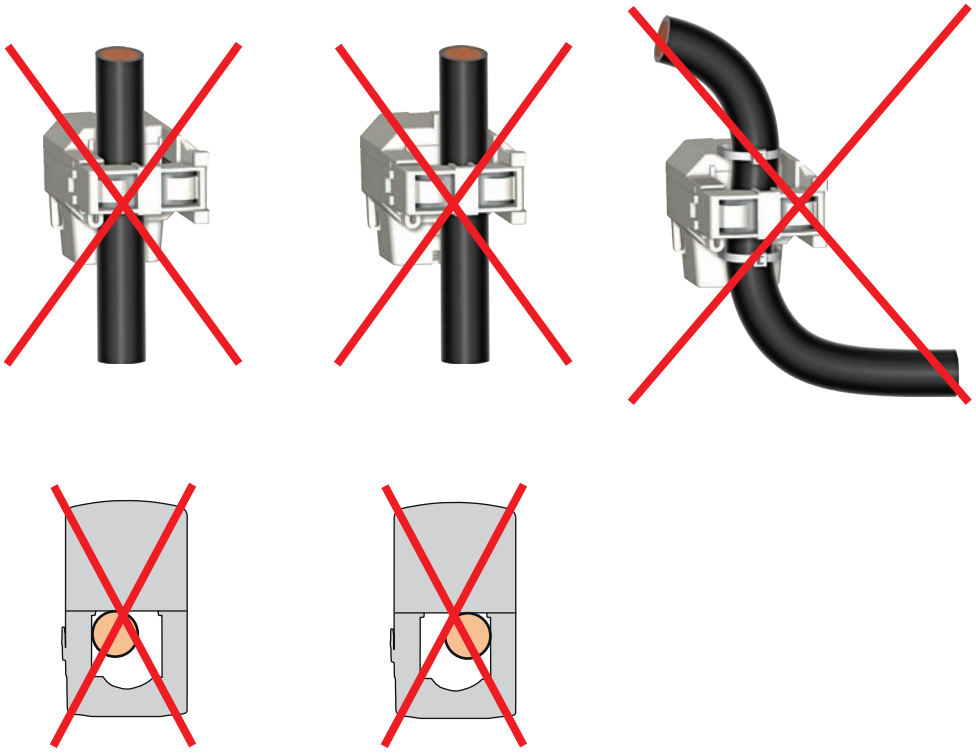
Recommended installation:



Use cable ties to push the conductor against the base of the aperture



Not recommended

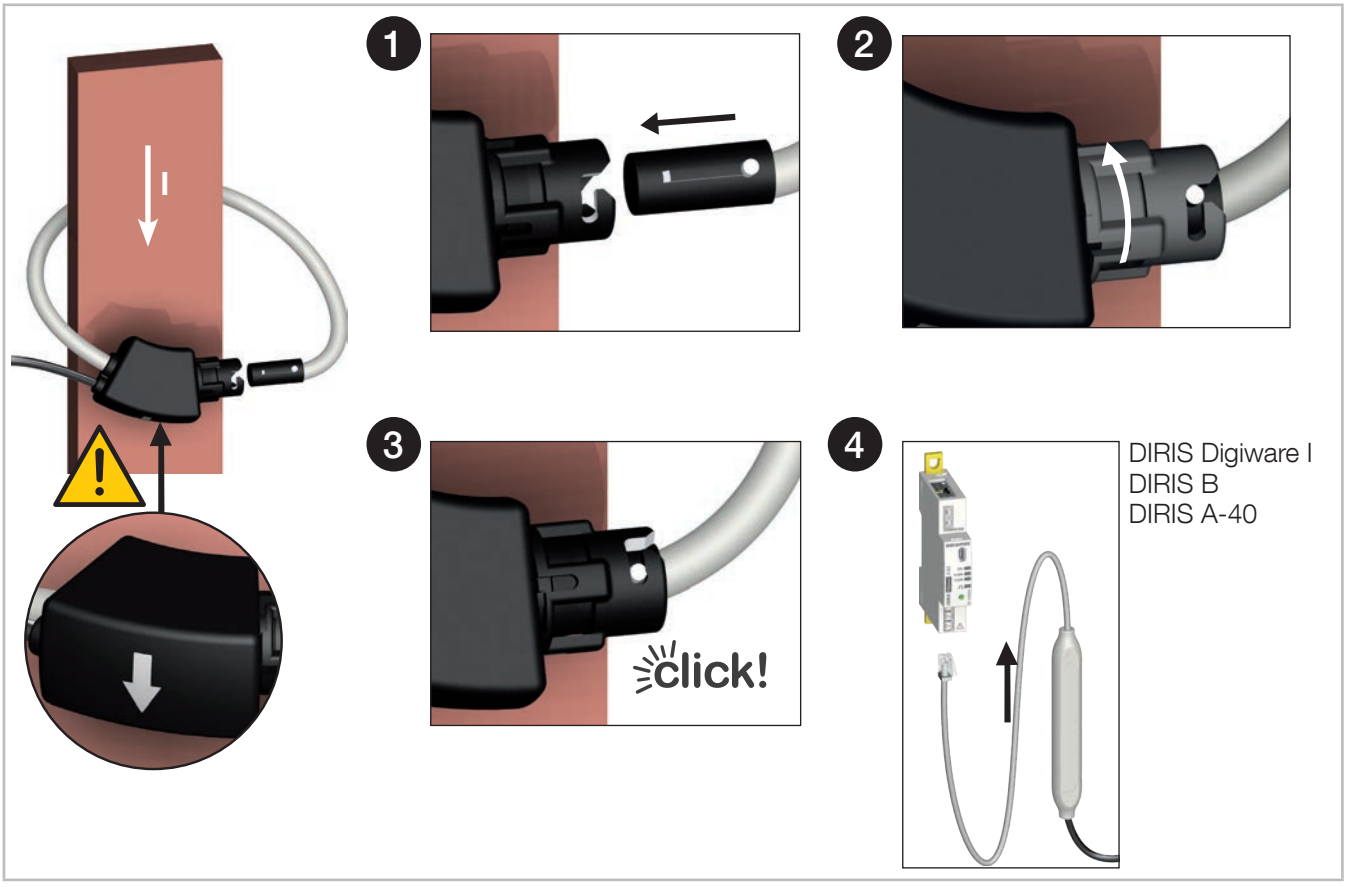


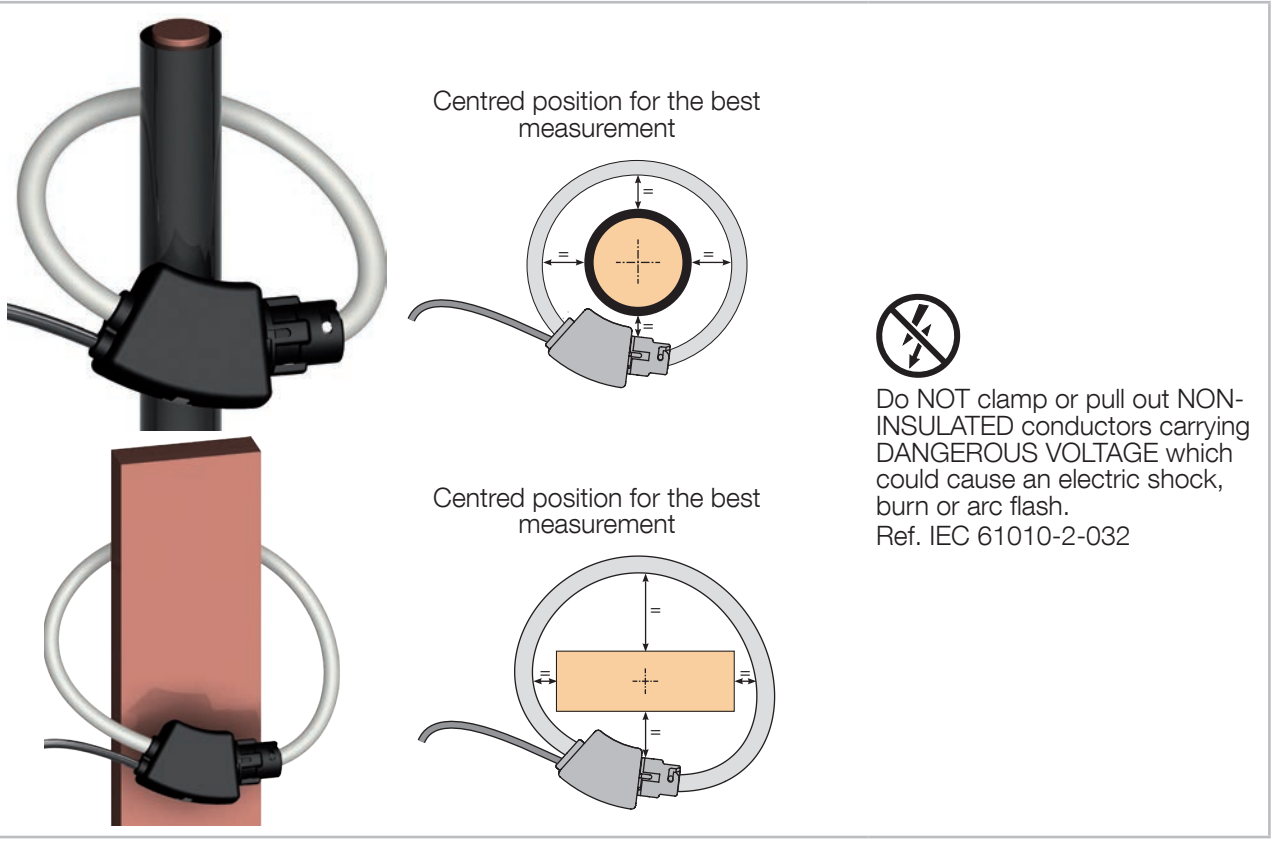
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032.

Before closing the TR /iTR sensor, check that the air gap is clean (no contamination or corrosion).

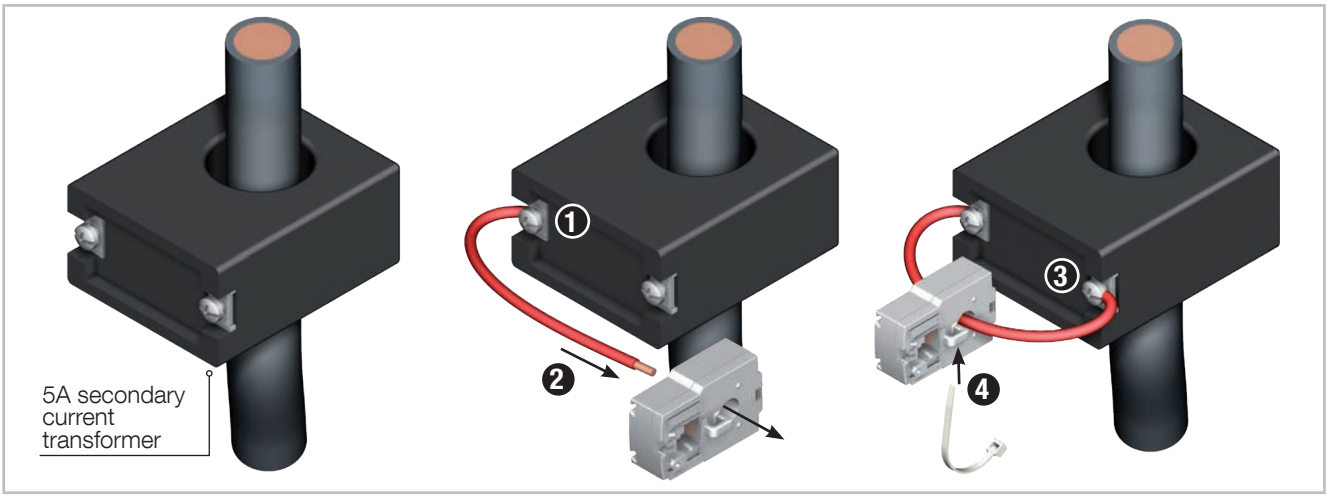
6.5. Installing TF Flexible current sensors

6.5.1. Bar or cable mounting





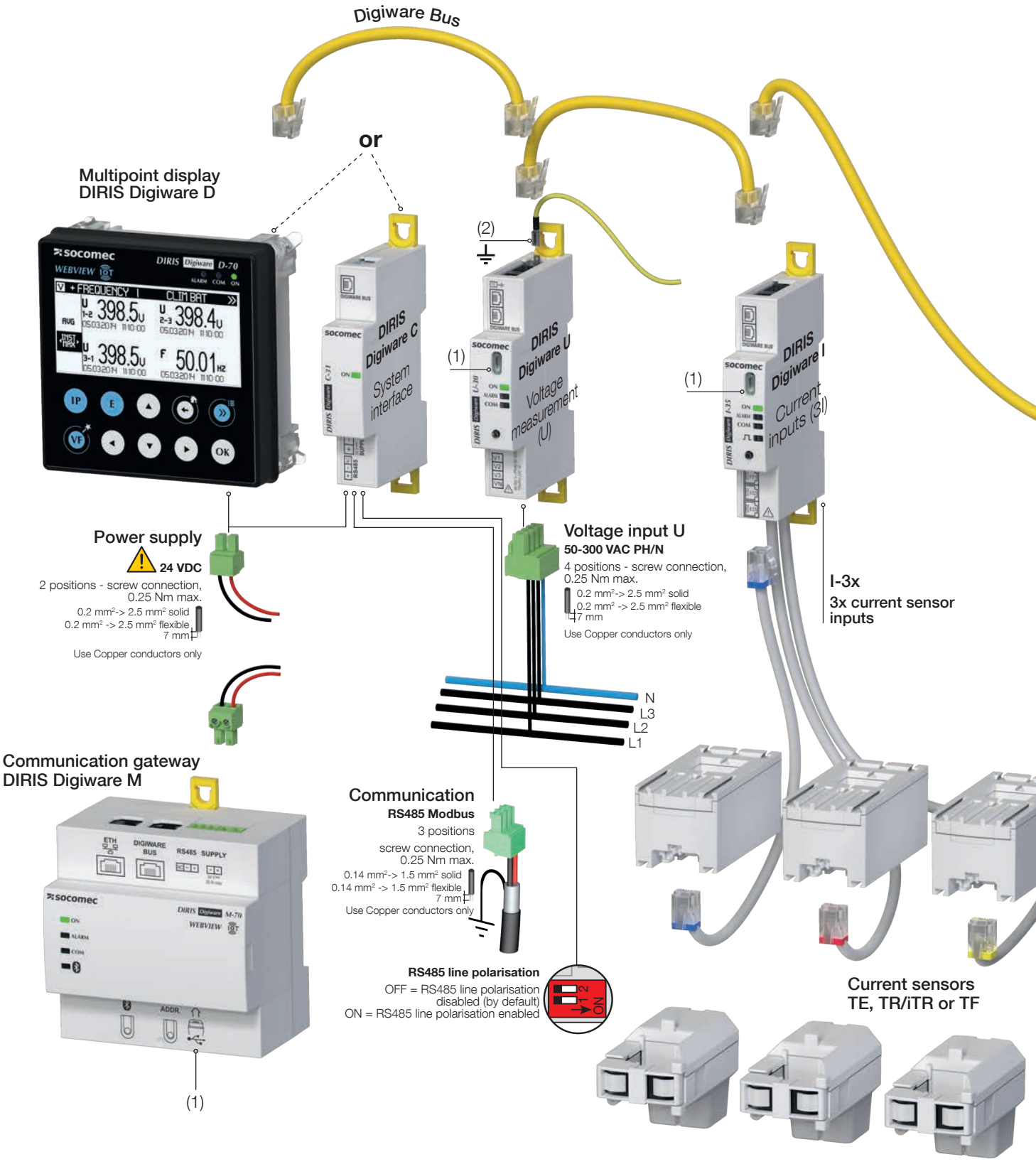
6.6. Installing the 5A adapter



Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032.

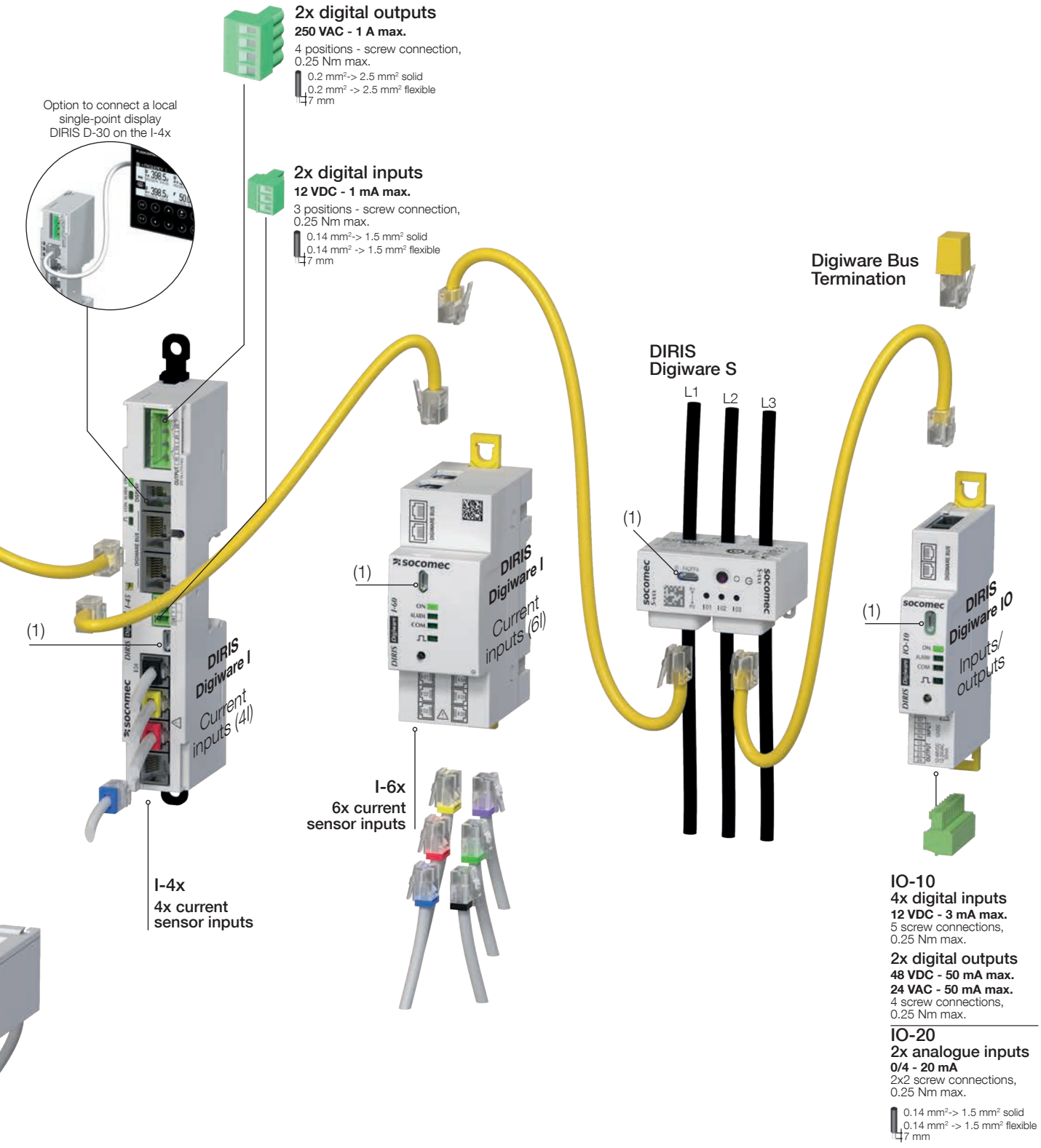
7. CONNECTION

7.1. DIRIS Digiware connection



Only use a SOCOMEC Digiware bus cable (UTP RJ45 straight, twisted pair, unshielded, AWG24, 600V CAT V (-10 ... +70°C). When wiring, make sure you separate the low voltage (LV) section and the very low voltage (SELV) section to prevent any risk of electric shock.

Do not pull on the RJ45 cable more than 20N.

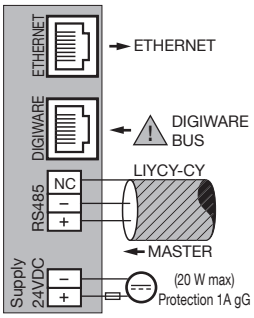


(1) Micro USB - type B
(2) Do not forget to connect earth to the DIRIS Digiware U module

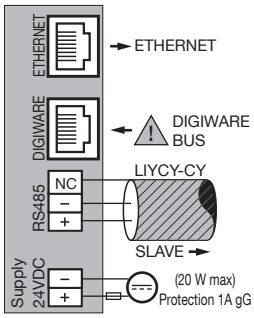
Description of the terminals

DIRIS Digiware D-50/D-70 display and M-50/M-70 gateway

• RS485 master mode



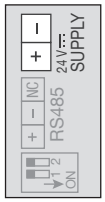
• RS485 slave mode



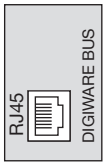
(*) The use of a 1A / 24 VDC fuse protection is recommended if the 24 VDC power supply is not provided by Socomec.
For North America, the use of recognized fuses is mandatory.

DIRIS Digiware C-31

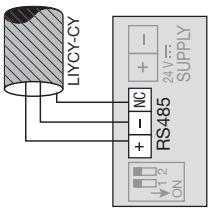
Power supply



Digiware BUS



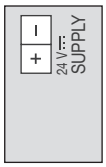
Communication



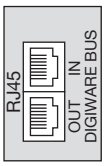
Line polarisation

DIRIS Digiware C-32

Power supply

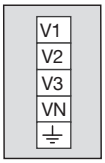


Digiware BUS

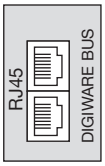


DIRIS Digiware U

Voltage measurement

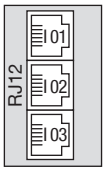


Digiware BUS

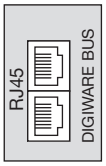


DIRIS Digiware I-3x

Current measurement(**)

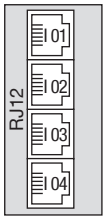


Digiware BUS

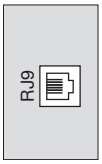


DIRIS Digiware I-4x

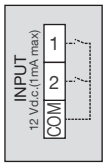
Current measurement(**)



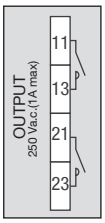
RJ9 for DIRIS D-30
(Self-powered and data)



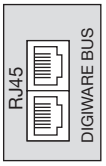
Inputs



Outputs

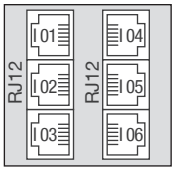


Digiware BUS

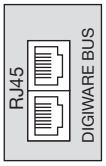


DIRIS Digiware I-6x

Current measurement(**)

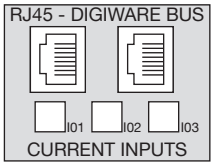


Digiware BUS



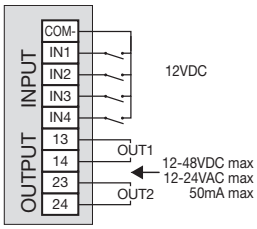
(**) Always connect input I01 first.

DIRIS Digiware S

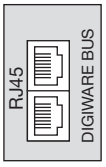


DIRIS Digiware IO-10

Inputs/outputs

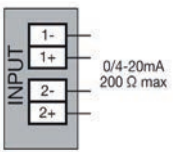


Digiware BUS

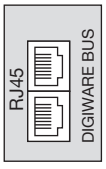


DIRIS Digiware IO-20

Inputs

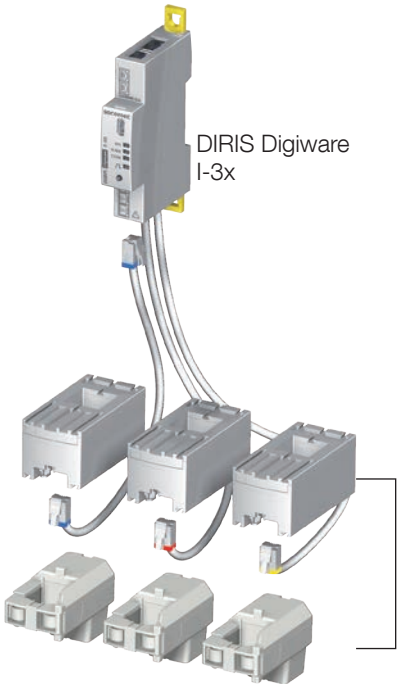


Digiware BUS



7.2. Connecting the current sensors

7.2.1. Connection concept



DIRIS Digiware I-3x

3 Current sensors
TE / TR/iTR / TF

DIRIS Digiware I-4x

4 Current sensors
TE / TR/iTR / TF

DIRIS Digiware I-6x

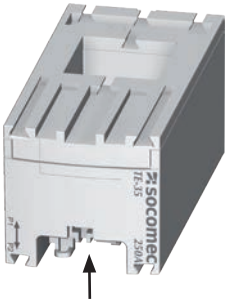
6 Current sensors
TE / TR/iTR / TF

- For connecting the current sensors, only use a SOCOMEC RJ12 cables (UTP unshielded, twisted pair, straight, AWG24, 600V, CATV, -10 ... +70°C).
- Always connect input I01 first.
- It is recommended thaat all current sensors be installed in the same direction.

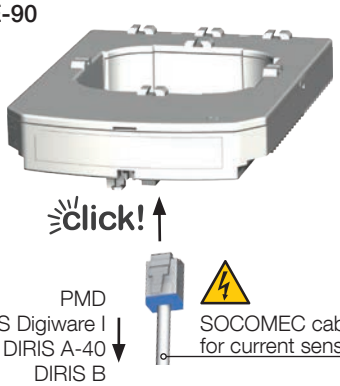
7.2.2. Details on the RJ12 connections for each current sensor

TE

TE-18 to TE-55



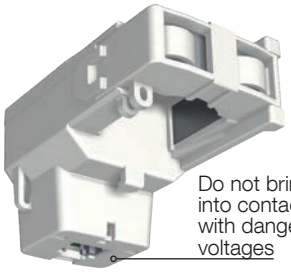
TE-90



PMD
DIRIS Digiware I
DIRIS A-40
DIRIS B

SOCOMEC cable
for current sensors

TR/iTR



Do not bring into contact with dangerous voltages

PMD
DIRIS Digiware I
DIRIS A-40
DIRIS B

SOCOMEC cable
for current sensors

TF

SOCOMEC
cable for current
sensors

PMD
DIRIS Digiware I
DIRIS A-40
DIRIS B

7.3. Connecting to the electrical network and loads

DIRIS Digiware can be used on single-phase, two-phase or three-phase networks.

Each DIRIS Digiware I and S current measurement module can simultaneously measure several loads, for example a three-phase load and a single-phase load. This approach allows great flexibility in terms of where it is fitted in the installation.

The loads are measured using several types of current sensors (solid-core, split-core, flexible) selected depending on the new, existing or high-current installations. The link between each DIRIS Digiware I current measurement module and its associated sensors is made using specific cables. With this connection you can quickly and easily install the units without any risk of cabling error and in complete safety. The connected sensors are automatically detected.

In addition, DIRIS Digiware can identify the majority of load types to be measured: single-phase, three-phase with or without neutral using 1, 2, 3 or 4 sensors for balanced or unbalanced loads.

The overall accuracy of the measurement chain (DIRIS Digiware + sensors) is guaranteed. To guarantee this accuracy, SOCOMEC current sensor connection cables or equivalent must be used.

7.3.1. Configurable loads based on the network type

The following table summarises the loads which can be configured based on the installation's network type

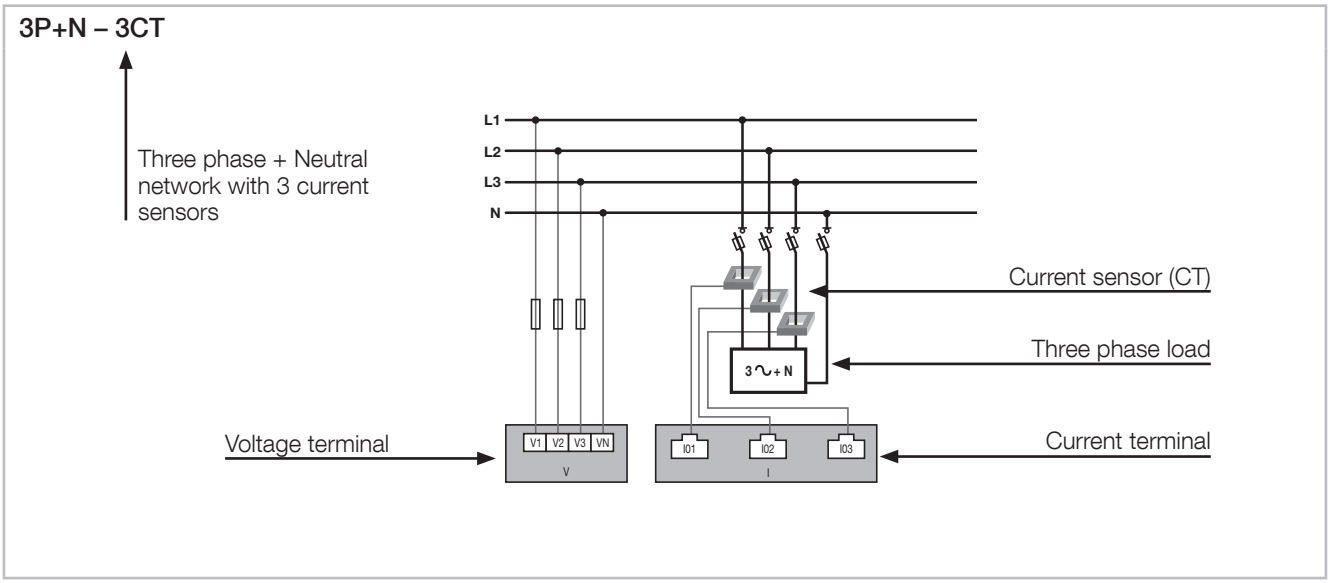
Network type	Configurable load
1P+N	1P+N – 1CT
2P	2P – 1CT
2P+N	2P+N – 2CT / 2P – 1CT / 1P+N – 1CT
3P*	3P – 3CT / 3P – 2CT / 3P – 1CT / 2P - 1CT
3P+N	3P+N – 4CT / 3P+N – 3CT / 3P+N – 1CT / 3P – 3CT / 3P – 2CT / 3P – 1CT / 2P - 1CT / 2P+N - 1CT / 1P+N – 1CT

(*) Note: Single-phase loads cannot exist on a 3P network.

7.3.2. Description of the main network and load combinations

7.3.2.1. DIRIS Digiware I-3x

Legend:



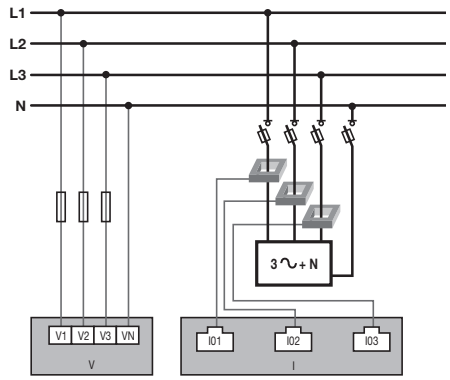
CT
Current sensor

Balanced load

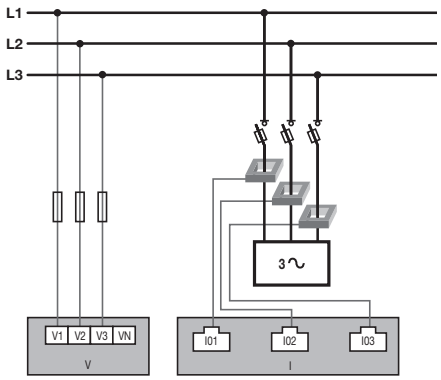
Unbalanced load

Each current input is individual; see below for some connection examples:

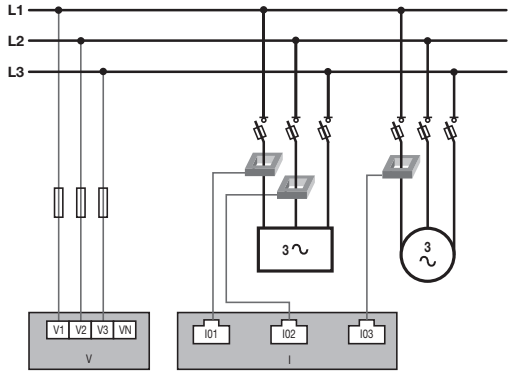
Three-phase + Neutral
3P+N - 3CT (1 three-phase load + calculated Neutral)



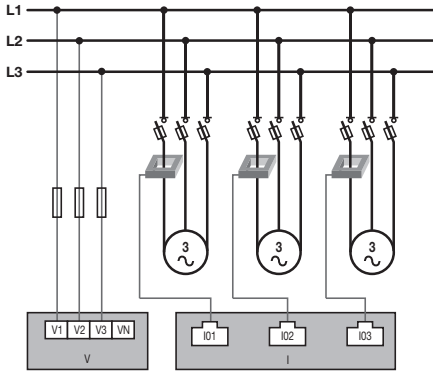
Three-phase
3P – 3CT (1 three-phase load)



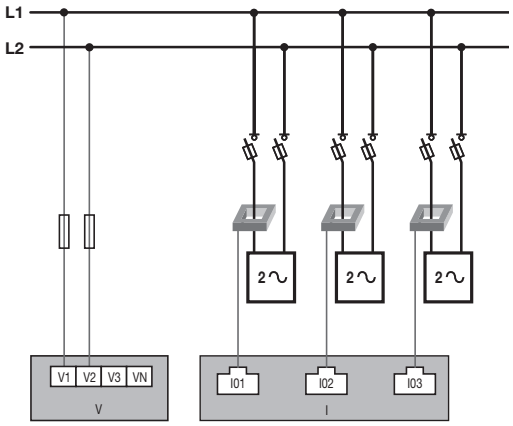
Three-phase
3P – 2CT & 3P – 1CT
(1 three-phase load and 1 three-phase balanced load)



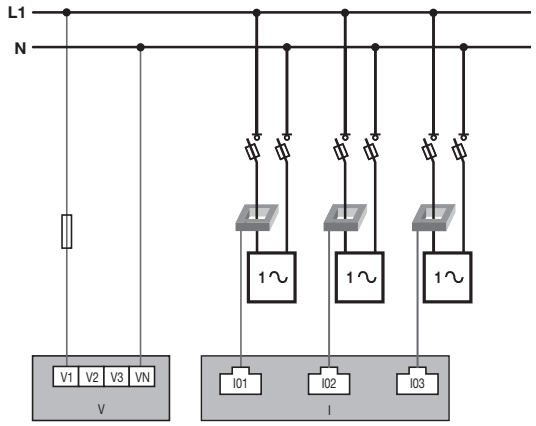
Three-phase
3P – 1CT (x3)
(3 three-phase balanced loads)



Two-phase
2P – 1CT (x3)
(3 two-phase loads)

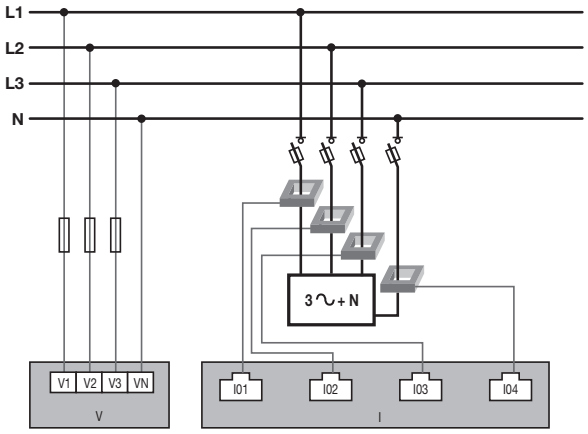


Single-phase
1P+N – 1CT (x3)
(3 single-phase loads)

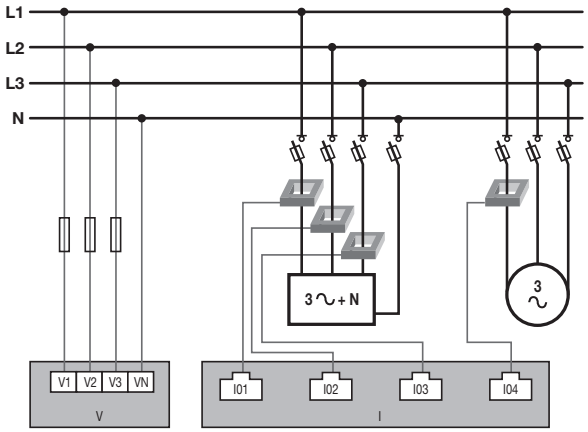


Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC Listed fuses for UL application.

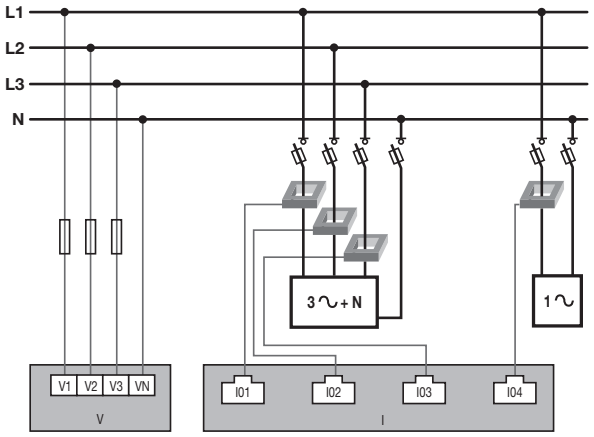
Three-phase + Neutral
3P+N – 4CT
(1 three-phase load + measured Neutral)



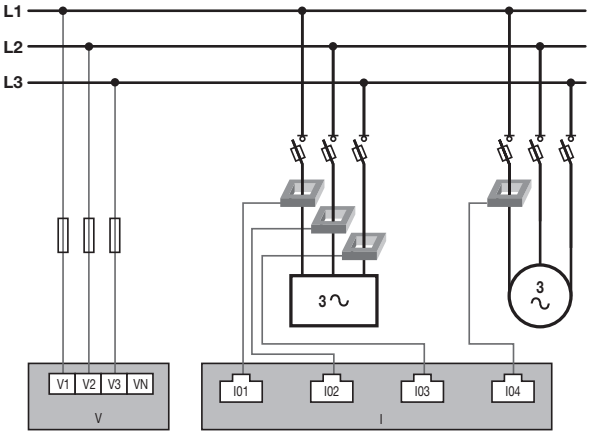
Three-phase + Neutral
3P+N – 3CT & 3P – 1CT
(1 three-phase load + calculated Neutral + 1 three-phase balanced load)



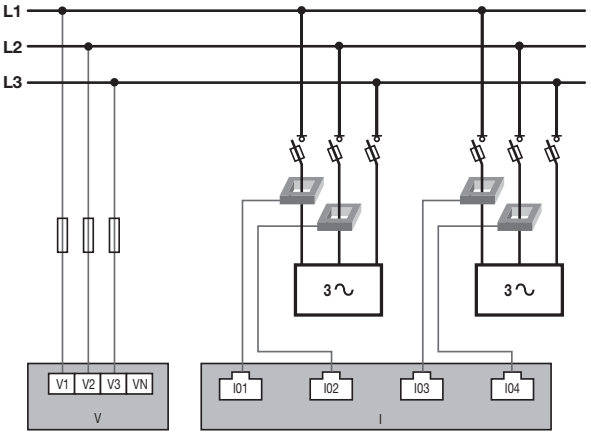
Three-phase + Neutral 3P+N – 3CT & 1P+N – 1CT
(1 three-phase load + calculated Neutral + 1 single-phase load)



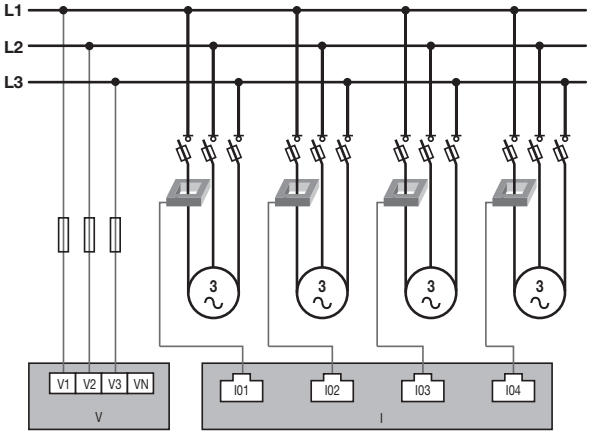
Three-phase 3P – 3CT & 3P – 1CT
(1 three-phase load and 1 three-phase balanced load)



Three-phase 3P – 2CT (x2)
(2 three-phase loads)

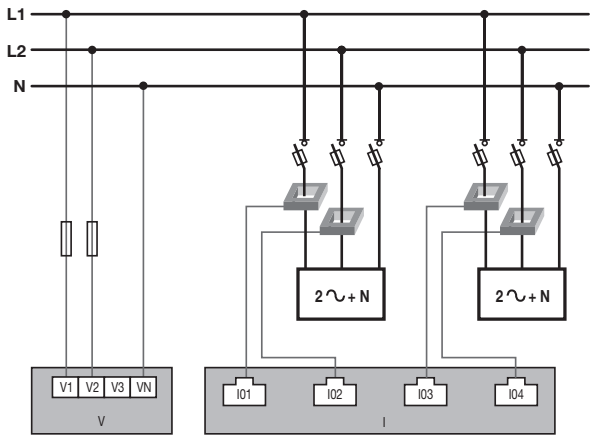


Three-phase 3P – 1CT (x4)
(4 three-phase balanced loads)

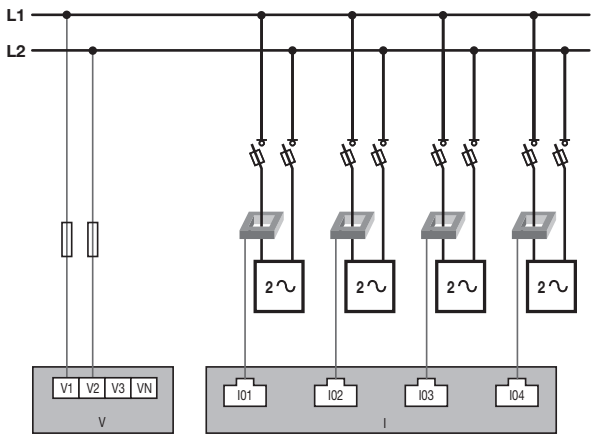


Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC Listed fuses for UL application.

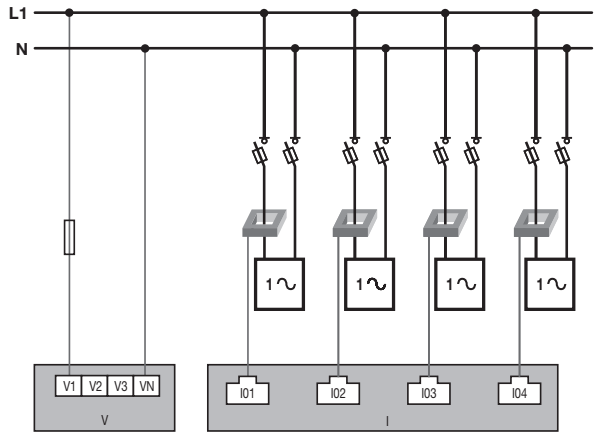
Two-phase + Neutral 2P+N – 2CT (x2)
(2 two-phase loads)



Two-phase2P – 1CT (x4)
(4 two-phase loads)



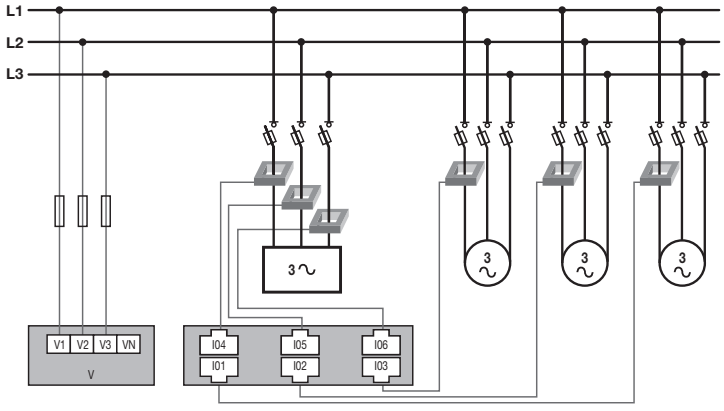
Single-phase1P+N – 1CT (x4)
(4 single-phase loads)



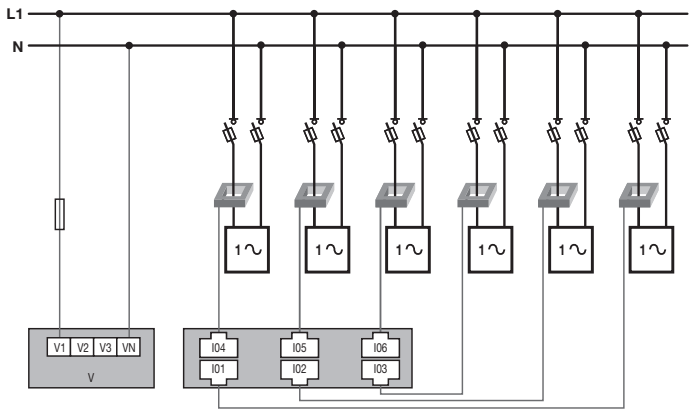
Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC Listed fuses for UL application.

7.3.2.3. DIRIS Digiware I-6x

Three-phase
3P – 3CT + 3P – 1CT (x3)
(1 three-phase load and 3 three-phase balanced load)



Single-phase 1P+N – 1CT (x6)
(6 single-phase loads)

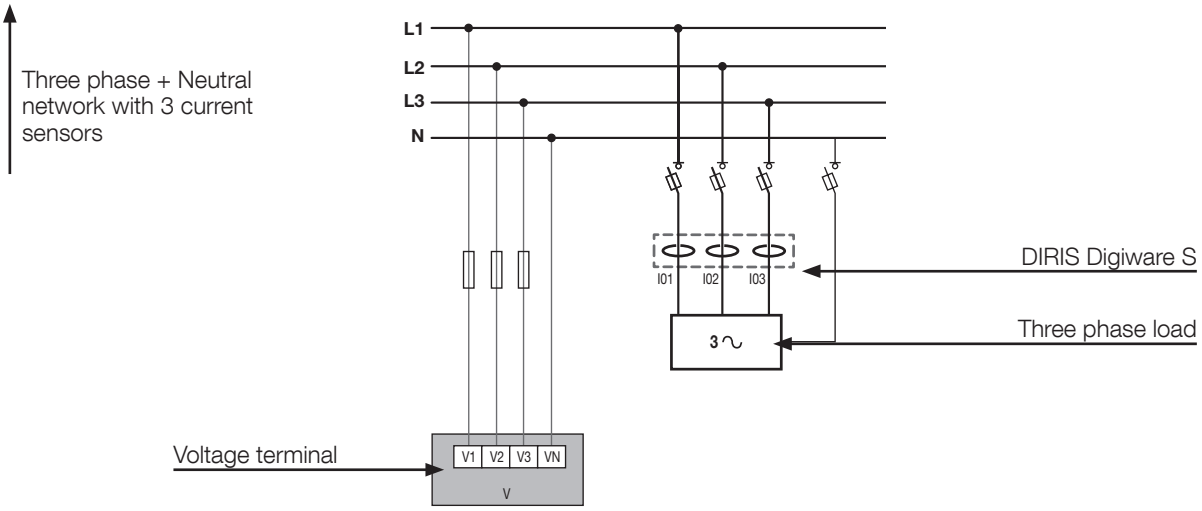


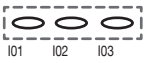
0.5 A gG / BS 88 2A gG / 0.5 A class CC fuse
If self-supplied, a fuse should be added to the neutral.

Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC Listed fuses for UL application.

7.3.2.4. DIRIS Digiware S-xx

3P+N – 3CT



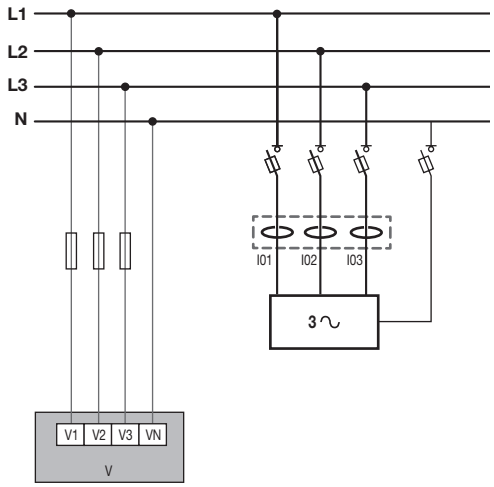


DIRIS Digiware S
current inputs
I01, I02, I03

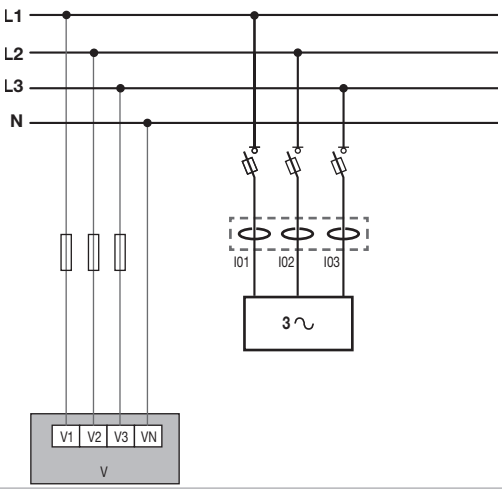
Three phase load

Below are some connection examples of the DIRIS Digiware S module:

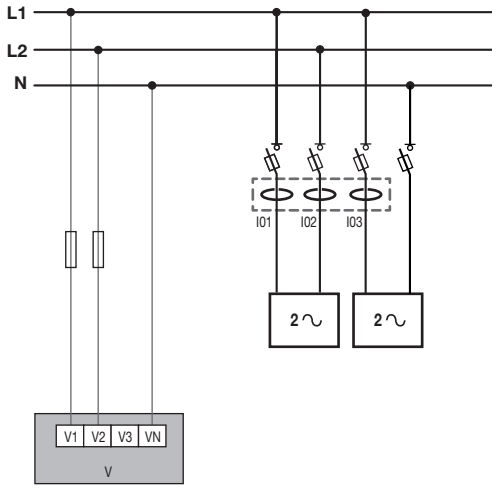
3P+N - 3CT



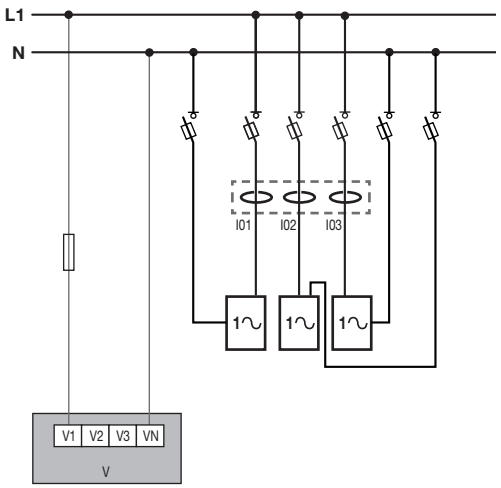
3P - 3CT



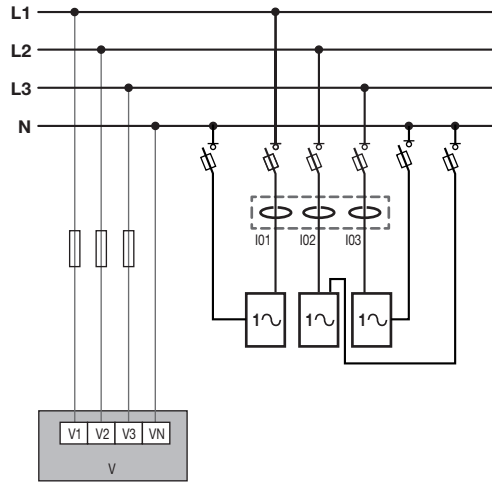
2P+N-2CT & 2P+N-1CT



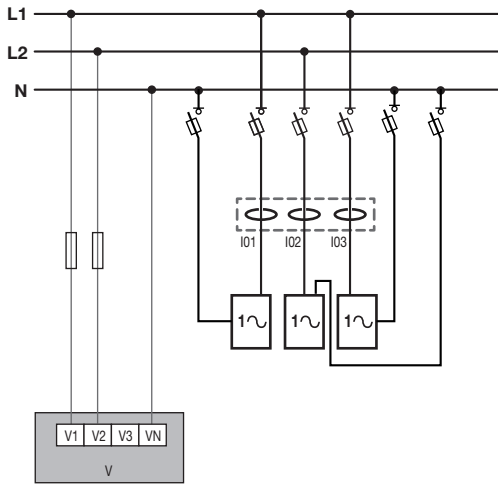
1P+N - 1CT (3x)



3P+N - 1 CT (x3)



2P+N - 1CT (x3)



Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC Listed fuses for UL application.

Notes relating to connections:

The **Easy Config System** software can also be used to select numerous other configuration variants for the types of loads and associated network voltages.

3P – 2CT: this connection reduces the accuracy of the phases, the current for which is worked out by vector calculation, by 0.5%.

3P – 1CT: this connection requires a three-phase network that is perfectly balanced.

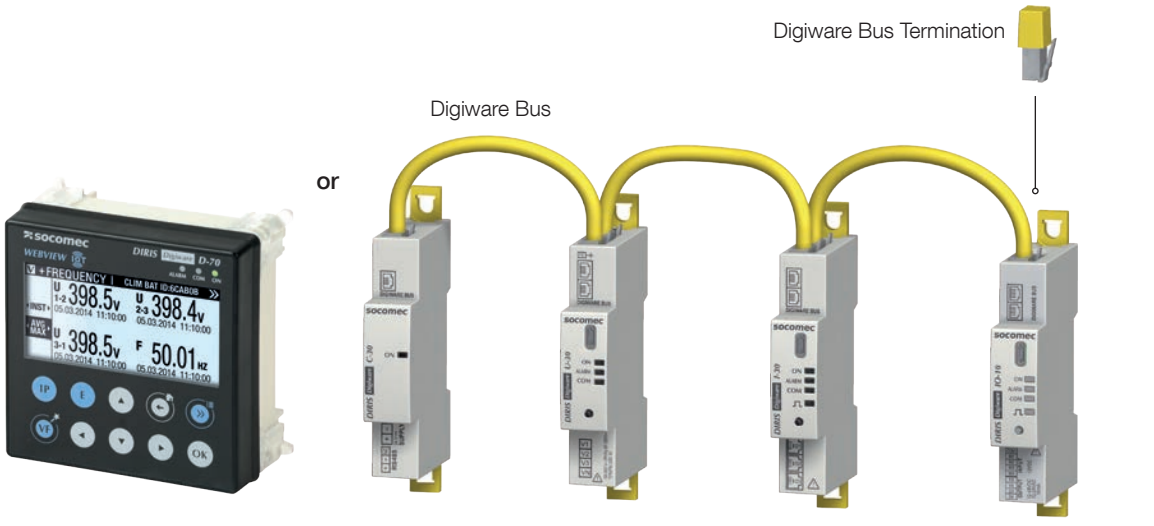
7.3.3. Connection of the functional earth

It is recommended that the functional earth be connected to guarantee optimum measurement accuracy and better emissivity/immunity for the electromagnetic compatibility (class B in conducted emission).

In order to use the VirtualMonitor and AutoCorrect technologies, Earth must be connected to the DIRIS Digiware U module.

8. DIGIWARE BUS

8.1. Principle



DIRIS Digiware is a system comprising the following elements:

- One DIRIS Digiware D remote display or one DIRIS Digiware M gateway or one DIRIS Digiware C-31 system interface module.
- One DIRIS Digiware U voltage measurement module.
- One or several DIRIS Digiware I or S current measurement modules.
- One or several DIRIS Digiware IO input/output modules.
- A Digiware bus termination (ref. 4829 0180) positioned on the last module. It is provided with the DIRIS Digiware D display, the DIRIS Digiware M gateway, and the DIRIS Digiware C-31 system interface module.

8.1.1. Digiware Bus connection cables

Length (m)	Quantity	Reference
0.06	1	4829 0189
0.1	1	4829 0181
0.2	1	4829 0188
0.5	1	4829 0182
1	1	4829 0183
2	1	4829 0184
3	1	4829 0190
5	1	4829 0186
10	1	4829 0187
50 m reel + 100 connectors		4829 0185

Use the shortest possible length of cable to optimise the electromagnetic emissions.

The total maximum length must not exceed 100 metres.

Use only SOCOMEC RJ45 cables for the Digiware bus.

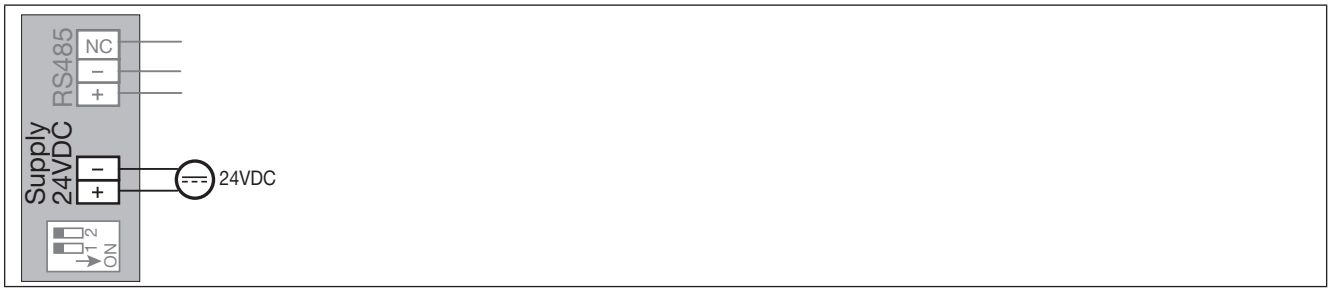
8.1.2. Digiware Bus Termination

	Quantity	Part number
	1	4829 0180

A DIRIS Digiware bus termination is supplied with each DIRIS Digiware D display, with each DIRIS Digiware M gateway and with each DIRIS Digiware C system interface module.

8.2. Sizing of the power supply

DIRIS Digiware units are supplied by a single 24VDC power supply via the DIRIS Digiware C-31 system interface module.



A P15 24VDC power supply is available in a 15 W version (part no. 4829 0120).

Specifications:

- 230 VAC / 24 VDC - 0.63 A - 15 W
- Modular format
- Dimensions (H x W): 90 x 36 mm

8.2.1. Equipment consumption

Device	Power supplied (W)	Power consumed (W)
Power supply		
P15 230 V / 24 V P30 230 V / 24 V	15 20	
RJ45 cables		
50 metre package		1.5
System interface		
DIRIS Digiware M-50 / M-70 / D-50 / D-70		2.5
DIRIS Digiware C-31		0.8
Module voltage		
DIRIS Digiware U-xx		0.72
Module current		
DIRIS Digiware I-3x		0.52
DIRIS Digiware I-4x		1.125
DIRIS Digiware I-6x		0.7
DIRIS Digiware IO-10		0.5
DIRIS Digiware IO-20		0.5
DIRIS Digiware S-xx		0.35
Repeater		
DIRIS Digiware C-32		1.5
Single-point display		
DIRIS D-30		2

8.2.2. Calculation rules for the max. number of devices on the Digiware BUS

The total power consumed by the equipment connected to the Digiware BUS must not exceed the power from the 24 VDC supply.
Power supply must not exceed 20 W.

Size with P15 power supply (ref: 4829 0120) delivering 15 W
For example, it is possible to use

- 1 DIRIS Digiware D-50 (2.5 W) display
- 1 DIRIS Digiware U-xx (0.72 W) voltage module
- 50 metres of cable (1.5 W)

and

- 19 DIRIS Digiware I-3x current modules (19 x 0.52 = 9.88 W)

⇨ **Total power = 14.6 W**

or

- 9 DIRIS Digiware I-4x current modules (9 x 1.125 = 10.125 W)

⇨ **Total power = 14.845 W**.

Size with a 24 VDC power supply delivering a maximum of 20 W
For example, it is possible to use

- 1 DIRIS Digiware D-50 (2.5 W) display
- 1 DIRIS Digiware U-xx voltage module (0.72 W)
- 50 metres of cable (1.5 W)

and

- 29 DIRIS Digiware current modules I-3x (29 x 0.52 = 15.08 W)

⇨ **Total power = 19.30 W**

or

- 13 DIRIS Digiware current modules I-4x (13 x 1.125 = 14.625)

⇨ **Total power = 19.345 W**.

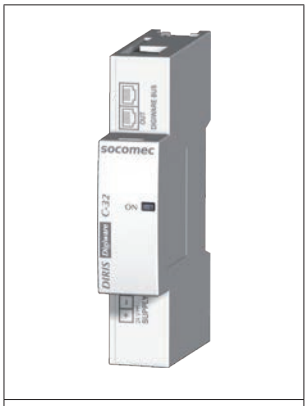
For applications using female/female RJ45 connectors to interconnect several enclosures (e.g Busway with tap-off boxes), the additional power loss of each connector must be take into account in the overall calculation.

Socomec has estimated (but this can vary from one connector to another) that the power loss of an RJ45 female/female connector averages 0.1 W and represents an additional 3.33m of RJ45 cable length within the Digiware bus.

8.2.3. Digiware bus repeater

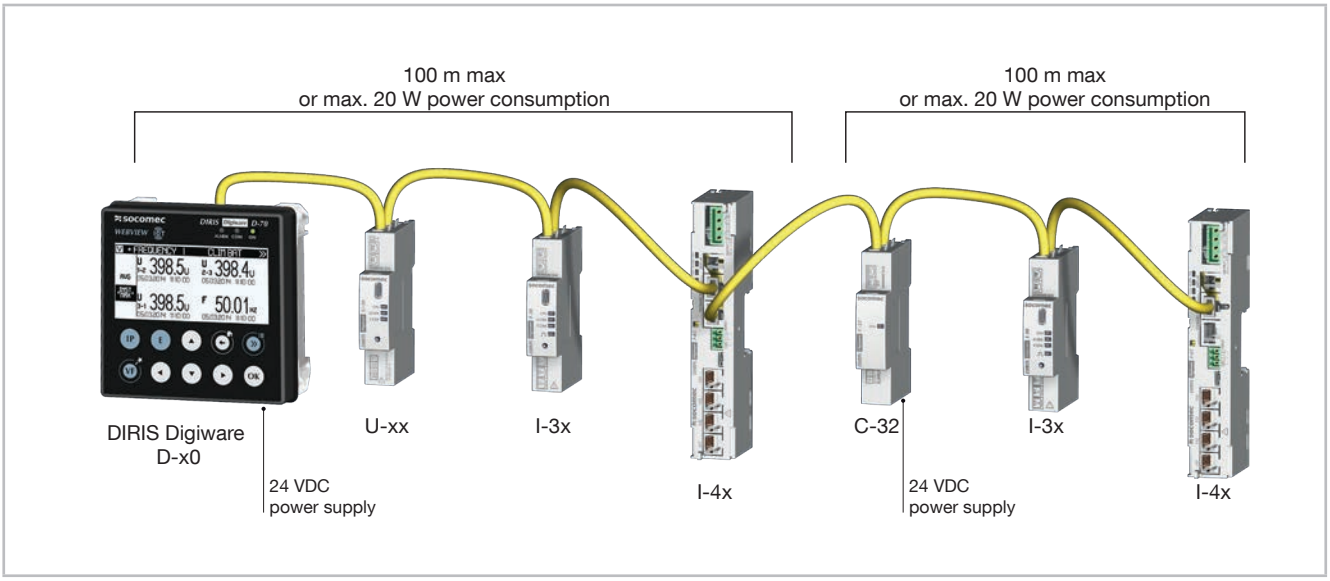
Whenever the power consumption is higher than 20 W or the distance is greater than 100 m, a DIRIS Digiware C-32 repeater is required.

In a DIRIS Digiware system, a maximum of 2 repeaters may be used.



	DIRIS Digiware C-32 repeater
Reference	4829 0103

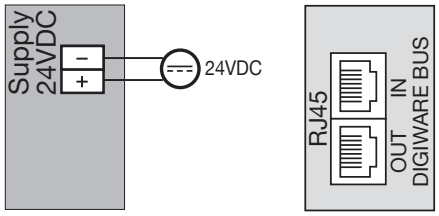
Configuration example:



The DIRIS Digiware U voltage module must be located upstream of the repeater.

The repeater has a 24VDC power supply.

DIRIS Digiware C-32

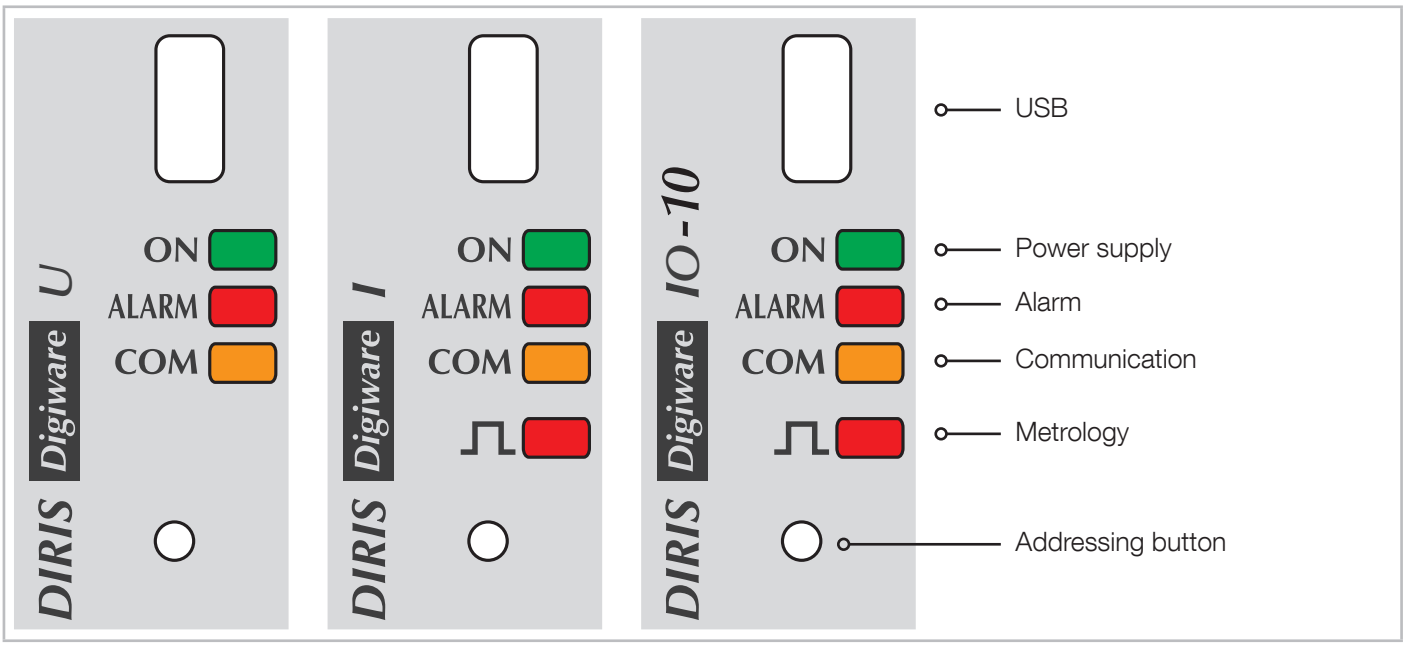


9. STATUS AND LEDS

9.1. DIRIS Digiware U / I / IO / S LEDs

Several LEDs are present on the DIRIS Digiware modules to identify their status at any time.

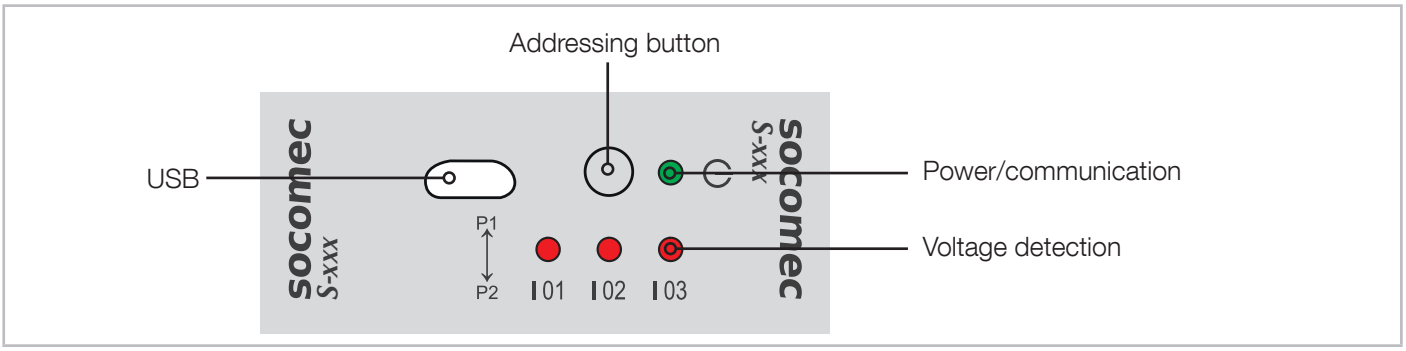
9.1.1. DIRIS Digiware U / I / IO



LED state	Fixed	Blinking	Pulse
ON	Product operating normally	10 seconds - on request via a Modbus control to identify the device (remote screen, etc.)	1 second during power-on
ALARM	Presence of a measurement alarm or logical alarm (do not have priority over system alarms)	• DIRIS Digiware U: Network phase rotation system alarm is active (*) • DIRIS Digiware I: At least one system alarm is active: - Disconnection of a current sensor - Incorrect V/I association (possible wiring error) - Incorrect CT primary	1 second during power-on
COM	Addressing conflict during Auto-Discovery process	Address OK	1 second during power-on and when a communication frame is received is processed
⎍	Not available	I - xx: not available IO-10: Corresponds to the change of state in all of the inputs (IN1, IN2, IN3, IN4) configured in logical mode	I - xx: Corresponds to the metrological pulse weight IO-10: The metrological pulse weight of input 1 (IN1) configured in pulse meter mode

(*) Network rotation alarm possibly indicating a configuration error

9.1.2. DIRIS Digiware S



Main LED	Fixed	Blinking
Green	Product operating normally	When a communication frame is received is processed and During 10 seconds, if an identification command is initiated from the Easy Config System software
Red	Indicates the presence of a measurement alarm (does not have priority over system alarms)	Indicates the presence of a system alarm (**)
Orange	Address conflict during Auto-Discovery process	Not available

I01, I02 & I03 LEDs (***)	Fixed	Pulse
Red	Indicates that no voltage is detected on a phase.	Corresponds to the metrological pulse weight (1Wh by default)

(**) System alarms for the DIRIS Digiware S module can be a bad V/I association indicating a possible wiring error.

(***) By default, I01, I02, I03 LEDs are configured in voltage detection mode.
Settings can be changed to metrological LED mode from the Easy Config System configuration software.

The voltage detection feature is an indication of the presence or the absence of voltage on one of the phases. It should only be used as an indication, and must not replace the use of a voltage tester.
In addition, the nominal voltage must be correctly configured in the DIRIS Digiware U module

10. AUTO-DISCOVERY PROCESS

Once the system is fully wired and powered on, you must launch the auto-discovery process.

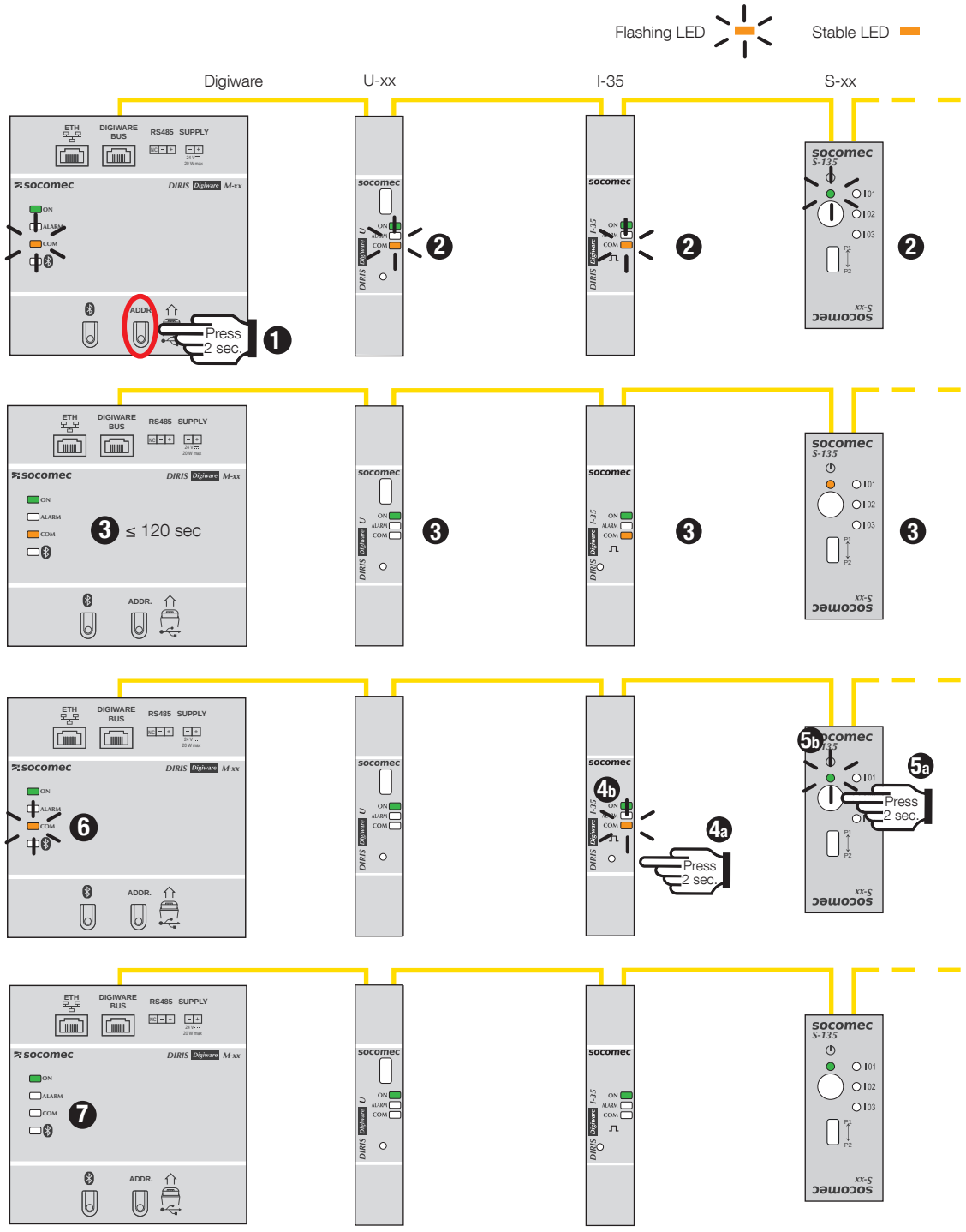
The auto-discovery process scans all slave devices connected on the Digiware and RS485 bus of the display/gateway and assigns them with a unique Modbus address.

Two auto-discovery modes can be used:

- FAST (default mode): this mode will only detect DIRIS Digiware modules on the Digiware bus and RS485 bus, DIRIS B and DIRIS A-40 on the RS485 bus.
- FULL: this mode will also detect other Socomec PMDs (DIRIS A) and meters (COUNTIS E) connected on the RS485 bus.

You can launch the auto-discovery using the push button of the DIRIS Digiware M-50/M-70 gateway, using the DIRIS Digiware D-50/D-70 display, or from the Easy Config System software.

10.1. Auto-discovery from the DIRIS Digiware M gateway



1. Start the auto-discovery of all devices connected to the Digiware or RS485 buses, by pressing the “ADDR.” button under the M-50/M-70 for 2 seconds.
2. “COM” LEDs of all devices will start blinking synchronously during the process. If com LEDs are not blinking, there could be a configuration issue (inconsistent baud rate between the M-xx gateway and slave devices).
3. After approximately 1 minute, the COM LED of the M-xx gateway as well as I-xx/S-xx/IO-xx modules are lit and stable. This is perfectly normal; it simply indicates that address conflicts have been detected since multiple devices have the same Modbus address (same factory default settings).

4a/5a. Press the front button on each slave device that has a fixed COM LED, for 2 seconds to resolve address conflicts.

4b/5b. COM LEDs of the modules start blinking again.

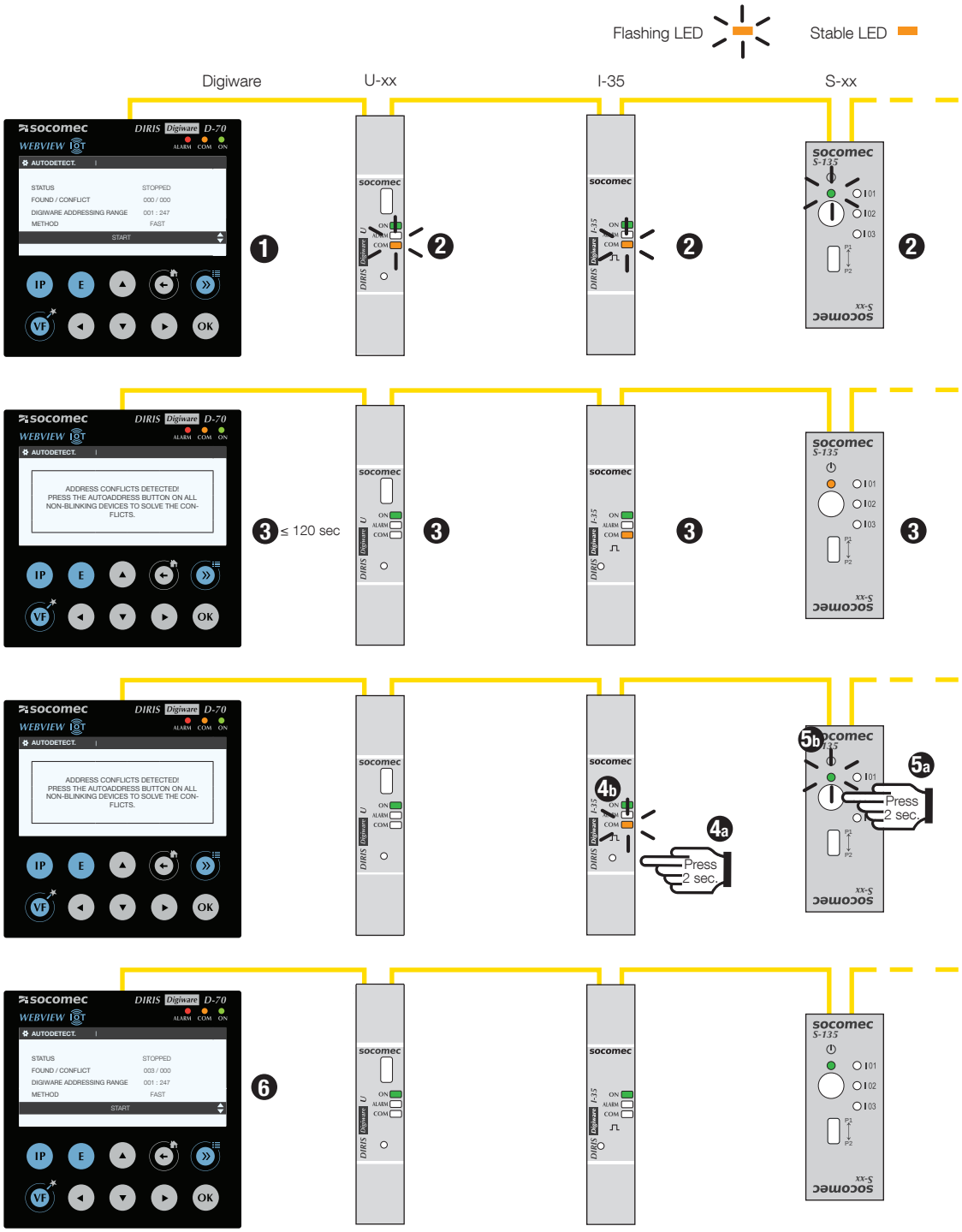
6. COM LED of the M-xx gateway starts blinking again, and slave devices can now communicate with the M-xx gateway.
7. The auto-discovery process is finished, the COM LEDs blink when communication is on-going between the M-xx gateway and downstream modules.

Notes:

- The Easy Config System software must be used if you wish to change the auto-discovery process mode to FULL.
- The order used when pressing the push buttons on the modules also determines the order for the Modbus addressing of those modules.
- The auto-discovery process can also be launched from the Easy Config System software where you can choose an automatic resolution of conflicts, instead of having to press the front button on the modules.

If you would like to assign specific Modbus addresses to the devices connected to the M-50/M-70 gateway, launch the auto-discovery from the Easy Config System software, and change the Modbus addresses of slave devices directly from the dashboard of the M-50/M-70 gateway (see 13.2).

10.2. Auto-discovery from the DIRIS Digiware D display



1. Go to PARAMETERS, then AUTODETECT SERIAL DEVICES (password is 100 or 0100). Click on START, then OK to start the auto-discovery process.
2. “COM” LEDs of all devices will start blinking synchronously during the process. If com LEDs are not blinking, there could be a configuration issue (inconsistent baud rate between D-xx display and slave device etc.).
3. After approximately 1 minute, a pop-up message on the D-xx display indicates that address conflicts have been detected, and the COM LED of slave devices in conflict are lit and stable. This is perfectly normal; it simply indicates that address conflicts have been detected since multiple devices have the same Modbus address (same factory default settings).

4a/5a. Press the front button on each slave device that has a fixed COM LED, for 2 seconds.

4b/5b. COM LEDs of the modules start blinking again.

6. The auto-discovery process is finished, the D-xx display shows the number of discovered devices (3 in our example). The COM LEDs blink when communication is on-going between the D-xx display and downstream modules.

Notes:

- The order used when pressing the push buttons on the modules also determines the order for the Modbus addressing of those modules.
- Before launching the auto-discovery process, you can change the method to resolve address conflicts and set it to AUTOMATIC. In this case, steps 3-5 are avoided

If you would like to assign specific Modbus addresses to the devices connected to the D-50/D-70 display, launch the auto-discovery from the Easy Config System software, and change the Modbus addresses of slave devices directly from the dashboard of the D-50/D-70 display (see 13.2).

11. COMMUNICATION

11.1. General information

The DIRIS Digiware system communicates via RS485 or Ethernet from the DIRIS Digiware M-50/M-70 gateway or D-50/D-70 display, both acting as the unique point of access to measurements.

The M-50/M-70 and D-50/D-70 can communicate via multiple communication protocols: Modbus RTU, Modbus TCP, BACnet IP, SNMP v1, v2, v3.

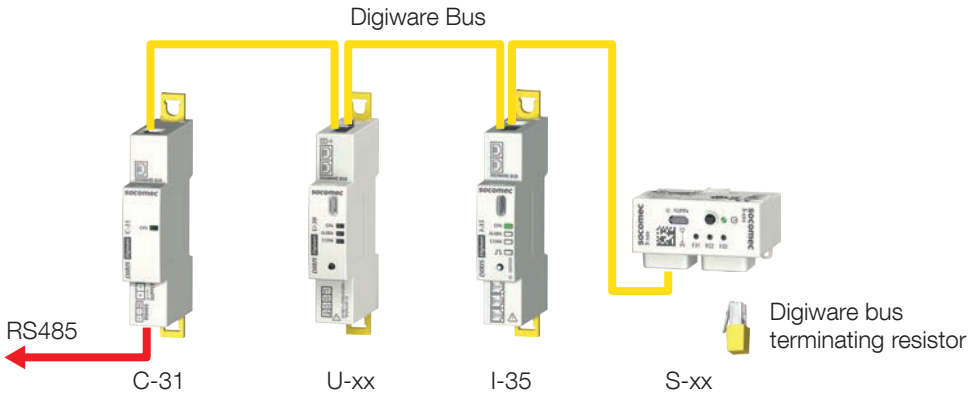
Maximum 32 devices can be visualised on the D-50/D-70 display or on WEBVIEW-M, the webserver embedded in the M-70 gateway and D-70 display.

11.2. RS485 communication

The DIRIS Digiware C-31 module, DIRIS Digiware D-50/D-70/M-50/M-70 can communicate over RS485 (2- or 3-wire) using the Modbus RTU protocol.

The Modbus protocol requires a dialogue with a master/slave structure. The mode of communication is the RTU (Remote Terminal Unit). In a standard setup, an RS485 link enables the interconnection of 32 RS485 devices to a PC (with DIRIS Digiware C-31 or DIRIS Digiware D-50/D-70 counting as one device), or a PLC over a distance of 1,200 metres.

Example of architecture using a C-31 module* :



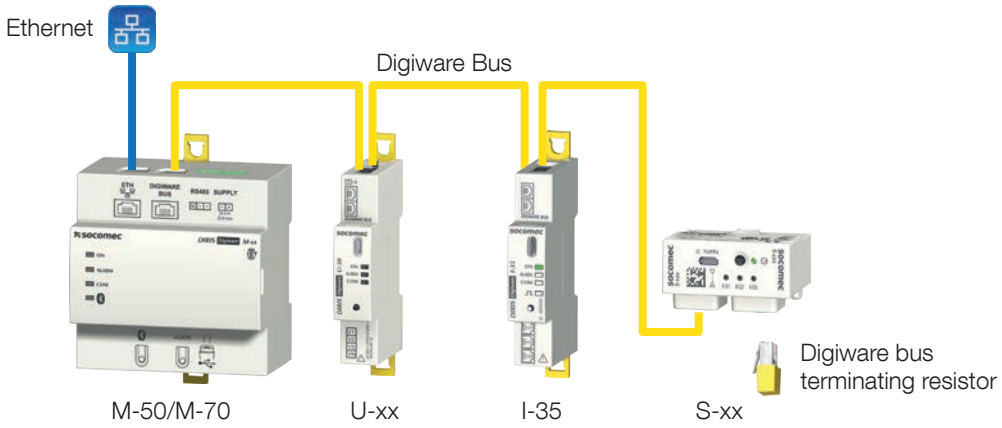
* RS485 communication is also possible with M-50/M-70 gateways and D-50/D-70 displays

The following rules must be observed:
- A 120 Ω resistor must be added at the start of the RS485 link
- A 120 Ω resistor must be added at the end of the RS485 link
- A terminating resistor must be added at the end of the Digiware bus.

11.3. Ethernet communication

The DIRIS Digiware M-50/M-70 gateway and DIRIS Digiware D-50/D-70 display can communicate over Ethernet using multiple communication protocols (Modbus TCP, BACnet IP, SNMP v1, v2, v3 & Traps).

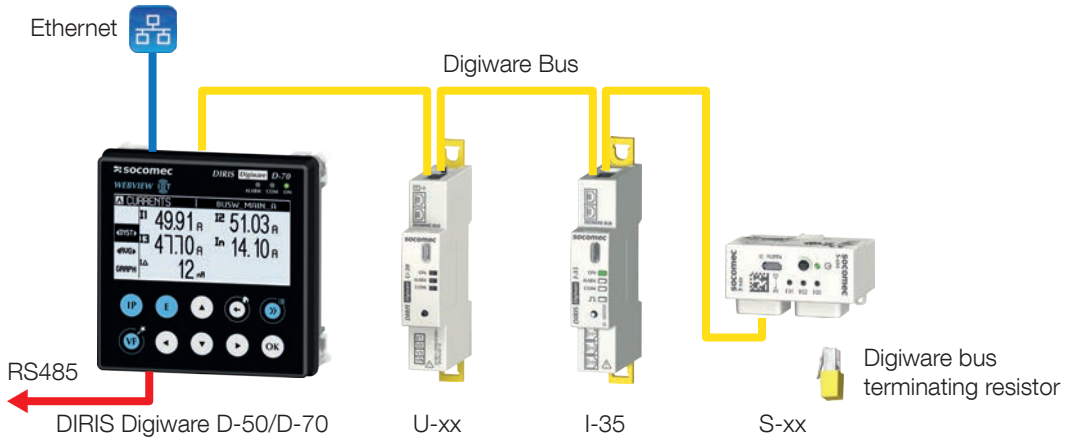
Example of architecture using an M-50/M-70 gateway:



11.4. Ethernet and RS485 communication

In the event that the system needs to communicate to a second PLC via RS485, you can configure M-50/M-70 gateways and D-50/D-70 displays as RS485 slave to communicate via the RS485 bus in addition to the Ethernet bus.

Example of architecture using a D-50 or D-70 display:



The following rules must be observed:
- A 120 Ω resistor must be added at the start of the RS485 link
- A 120 Ω resistor must be added at the end of the RS485 link
- An end of line resistor must be added at the end of the Digiware bus.

11.5. Communication tables

The communication tables and associated explanations can be found on the documentations page for DIRIS Digiware on the SOCOMEC website: www.socomec.com/operating-instructions_en.html

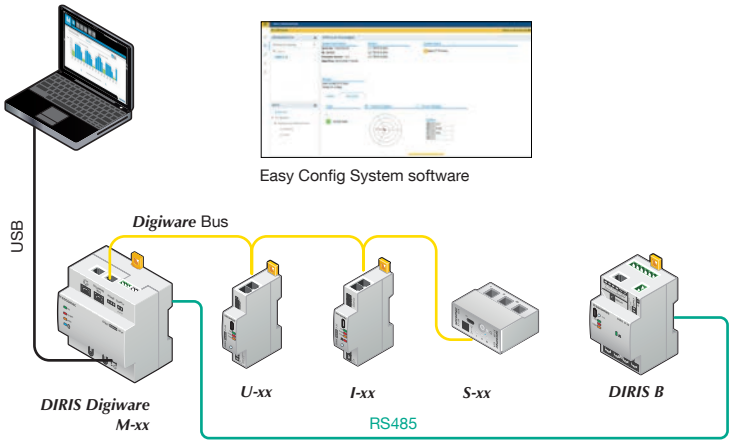
12. CONFIGURATION

Configuration can be carried out using the Easy Config System configuration software or directly from the DIRIS Digiware D-xx remote display.
The Easy Config System software is used to configure the DIRIS Digiware system directly via Ethernet or USB. Easy Config System must be installed before using the USB connection.

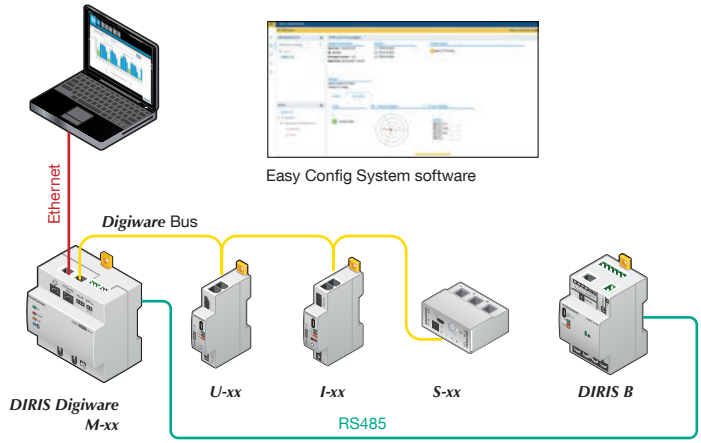
Before configuring the DIRIS Digiware system, please make sure it operates using the latest available firmware versions. The latest firmware versions are available on the Socomec website.

12.1. Connection modes

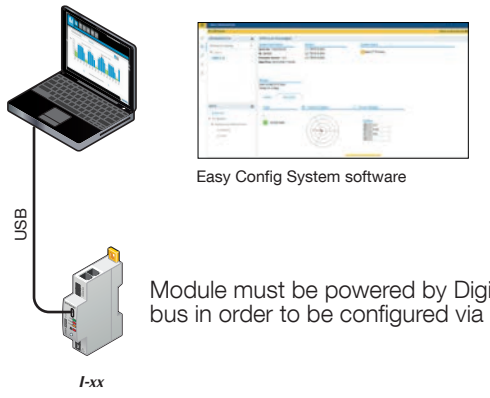
> USB through M-xx gateway or D-xx display



> Ethernet through M-xx gateway or D-xx display

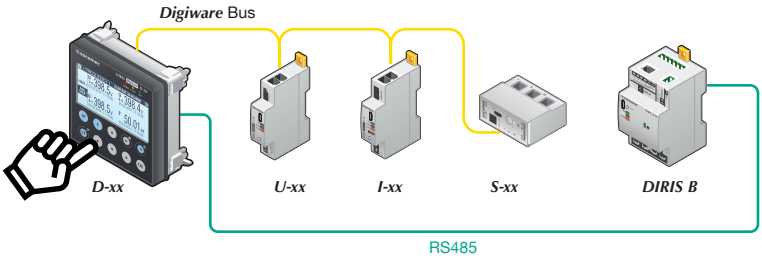


> Direct USB to U-xx/I-xx/S-xx modules



Module must be powered by Digiware bus in order to be configured via USB

> Manual via D-xx display



Connect the power supply before configuring the products.

12.2. Configuration via Easy Config System

Easy Config System is the software used to configure the DIRIS Digiware system easily and quickly.

It can be downloaded at the following link: https://www.socomec.com/easy-config-system_en.html

The DIRIS Digiware system should be configured in the following sequence:

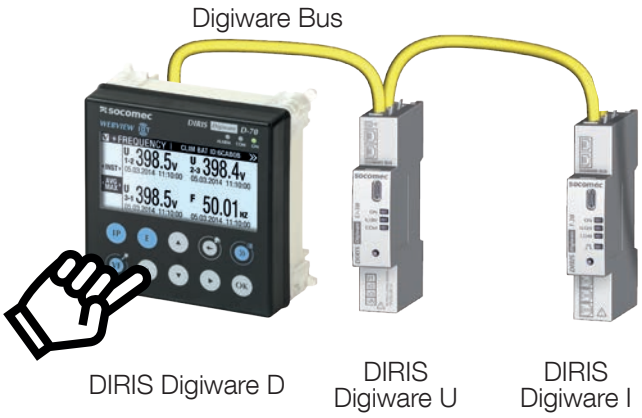
- Configuration of the DIRIS Digiware D display / M gateway
- Configuration of the DIRIS Digiware U voltage module
- Configuration of DIRIS Digiware I /S modules and IO-10/IO-20 modules

Refer to the Easy Config System instruction manual for more details on the full configuration procedure.

12.3. Configuration from the DIRIS Digiware D remote display

12.3.1. Connection mode

Configuration from the remote display



The main settings of the DIRIS Digiware system (U, S, I, IO) can be configured from the DIRIS Digiware D-xx display directly.

Refer to the manual for the DIRIS Digiware D display for more details.

13. ALARMS

Several types of alarms are available with the DIRIS Digiware system.
The alarm type depends on the type of module, as detailed in the table below:

Module Type / Alarm type	U-10	U-20	U-30	S-130	I-30	I-60	I-31	I-61	I-33	I-43	S-135	I-35	I-45	IO-10	IO-20
System alarms	X	X	X	X	X	X	X	X	X	X	X	X	X		
Measurement alarms			X								X	X	X	X	X
Protection alarms*				X	X	X	X	X	X	X	X	X	X		
Protection counter alarms*											X	X	X	o	
Logical alarms										X			X	X	
Combination alarms			X								X	X	X	X	X
EN 50160 alarms			X												
Overcurrent alarm											X	X	X		

x = available
o = partially available
(*) Protection and Protection Counter alarms are only available with DIRIS Digiware S and when iTR current sensors are used with DIRIS Digiware I modules.

Active alarms and logs of timestamped finished alarms can be accessed from WEBVIEW and from the DIRIS Digiware D-xx display.

13.1. System alarms

System alarms are activated upon detection of a commissioning error.

Voltage/current association

A “V/I association” alarm is activated upon detection of a wrong association between the current inputs of the DIRIS Digiware I or S current module and the voltage inputs on the DIRIS Digiware U module:

- If TE/TR/TF current sensors are used, this feature requires a certain load level: 0.6 < PF < 1 and I > 2% In
- If iTR current sensors or DIRIS Digiware S modules are used, the V/I association alarm also works off-load

Incorrect phase rotation (three-phase system only)

A “Phase rotation” alarm is activated upon detection of an incorrect direction of phase rotation (for example 3-2-1 instead of 1-2-3).

CT disconnected

A “CT disconnected” alarm is activated upon disconnection of a current sensor from the DIRIS Digiware I module.

Incorrect CT primary

An “Incorrect CT primary” alarm is activated if the detected current sensor rating is different from the one configured in the DIRIS Digiware I module.

Acknowledgement

System alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware IO-10 and I-4x modules)

Output report

System alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.2. Measurement alarms

Measurement alarms are activated when a threshold is exceeded for the instantaneous or average values measured by the DIRIS Digiware module: current, voltage, frequency, power, energies, power factor, Cos phi, THD, K-factor, Crest factor, unbalance and analogue input values.

For each measurement alarm:

- A high and a low threshold must be configured
- A hysteresis can be configured
- A time delay can be configured at the start and the end of the alarm

You can choose to activate the alarm if the configured threshold is exceeded on all phases simultaneously (Phase 1 and Phase 2 and Phase 3) or at least on one phase (Phase 1 or Phase 2 or Phase 3).

Acknowledgement

Measurement alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware IO-10 and I-4x modules)

Output report

Measurement alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.3. Protection alarms

Protection alarms alert you in case of an event on a protective device. They can be configured in case of:

- an opening of the protective device.
- a trip of the protective device (only available for circuit breakers)
- a defect of the protective device (for multi-phase protective devices only, when one pole is in a different position from the other poles).

Make sure you have configured the protective device type used in the “Protection” menu of Easy Config System in order to use the Protection alarms.

Acknowledgement

Protection alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware IO-10 and I-4x modules)

Output report

Protection alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.4. Protection counter alarms

Alarms on protection counters can be configured thanks to the VirtualMonitor technology (available with DIRIS Digiware S-135 module and with DIRIS Digiware I-35/I-45 modules connected to iTR current sensors):

- Total operation counter
- Low-load operation counter
- On-load operation counter
- Overload operation counter
- Total Trip Counter (this feature is also available using the inputs of the DIRIS Digiware IO-10)

Refer to the VirtualMonitor paragraph (section 14 of this instruction manual) for more information on protection counters.

Acknowledgement

Protection counter alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware IO-10 and I-4x modules)

Output report

Protection counter alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.5. Logical alarms

Logical alarms are activated upon the change of status of a digital input.

Acknowledgement

Logical alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as IO-10, I-4x etc.)

Output report

Logical alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.6. Combination alarms

Combination alarms consist of Boolean combinations (OR, AND) of multiple existing alarms.

Acknowledgement

Combination alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware IO-10 and I-4x modules)

Output report

Combination alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

13.7. EN50160 alarms

EN50160 alarms are activated upon on power quality events: voltage dips (Udip), voltage swells (Uswl) and voltage interruptions (Uint).

Acknowledgement

EN50160 alarms can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)

Output report

EN50160 alarms can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm

13.8. Overcurrent alarm

An “Overcurrent” alarm is activated if an overcurrent is detected. The thresholds can be configured in the “Overcurrent Event” menu.

Acknowledgement

The overcurrent alarm can be acknowledged either:

- Automatically
- Via communication (from WEBVIEW, DIRIS Digiware D display or Modbus command)
- Via a digital input (for devices with digital inputs, such as DIRIS Digiware I-4x)

Output report

The overcurrent alarm can be linked to a digital output for alarm reporting purposes.

Delay

A time delay can be configured at the start and the end of the alarm.

14. VIRTUALMONITOR TECHNOLOGY: MONITORING OF PROTECTIVE DEVICES

The VirtualMonitor technology is only available with DIRIS Digiware I modules when connected to iTR split-core current sensors, and natively embedded in DIRIS Digiware S modules.

The technology offers an advanced real-time monitoring of protective devices without using auxiliary contacts:

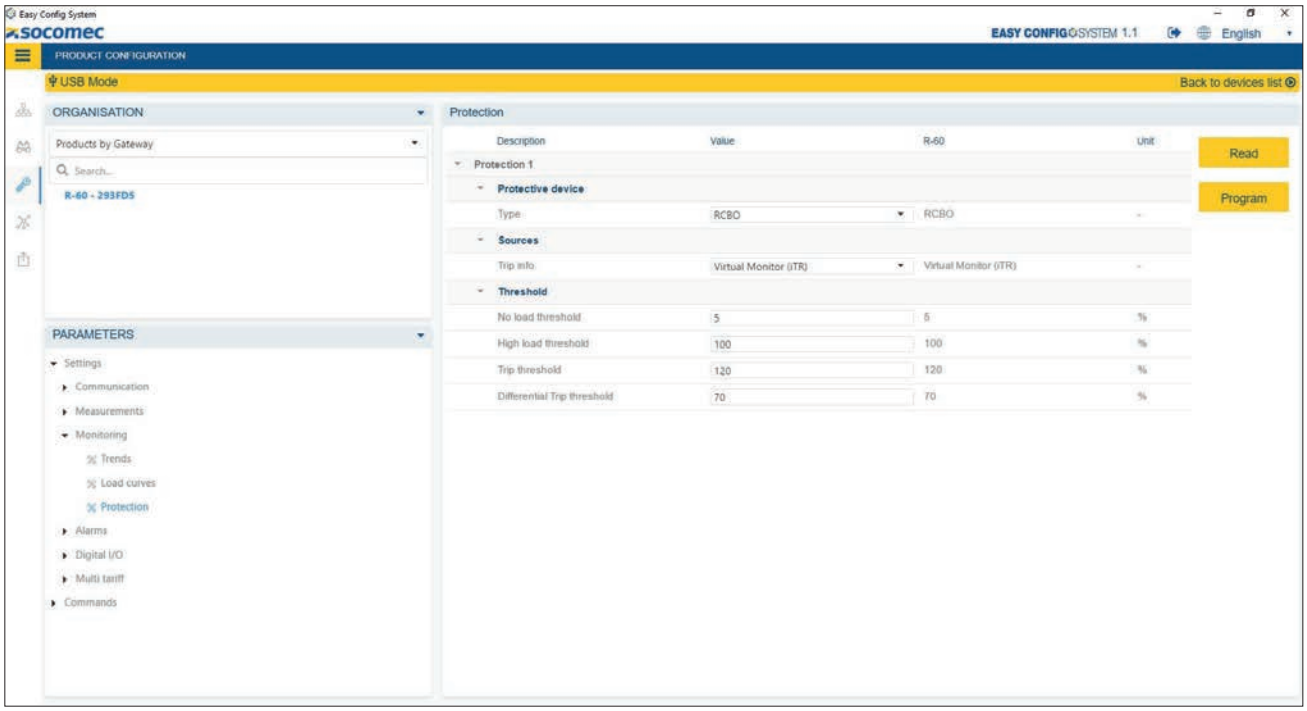
- Position (open/closed)
- Trip information
- Operation counters and trip counters
- Alarms:
  - On the opening or the trip of protective devices
  - On the defect of protective devices

The protective device can be:

- a circuit breaker
- a switch
- a fusible switch
- a fuse

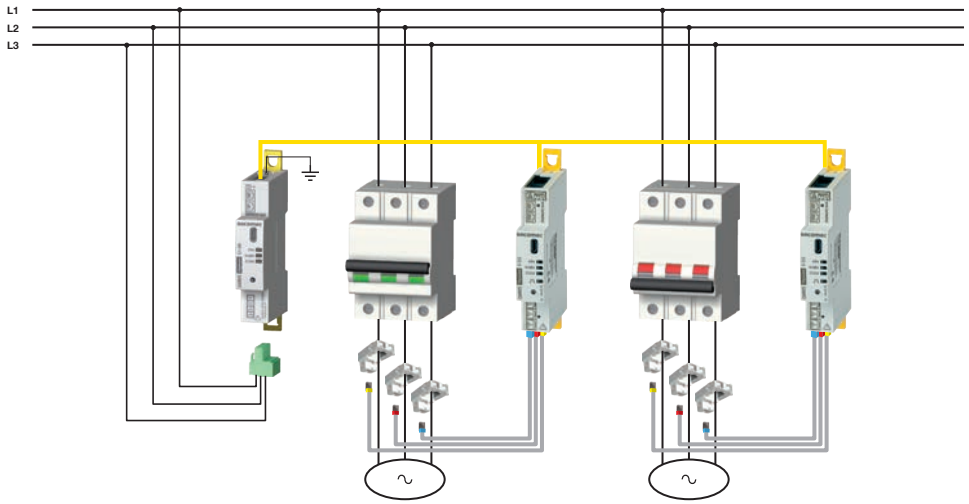
Visualisation is available from the DIRIS Digiware D-50/D-70 displays and WEBVIEW, embedded in the DIRIS Digiware M-70/D-70 and DATALOG H80/H81.

You must configure the type of protective device from the Easy Config System software in the “Protection” menu for the VirtualMonitor function to be used:



VirtualMonitor can only be used if the DIRIS Digiware U module is connected upstream of the protective device, and the current sensor downstream. This is illustrated in the architectures below:

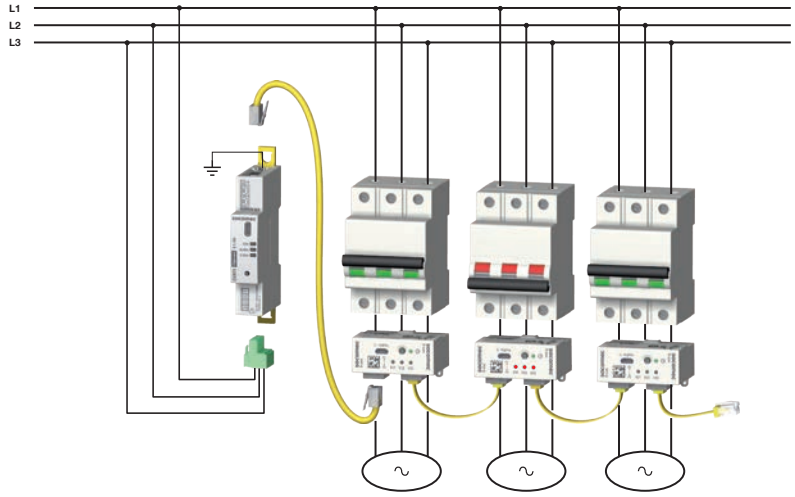
Architecture 1: with DIRIS Digiware I module and iTR sensors



Thanks to its voltage detection capability, the iTR sensors connected to DIRIS Digiware I modules can monitor the position of the protective device. An example corresponding to the above illustration is given in the table below:

	MCB 1	MCB 2
Voltage on U module ?	Yes, 230 V L-N measured for instance	
Voltage detected by iTR ?	Yes	No
Position of MCB	Closed	Open

Architecture 2: with DIRIS Digiware S



Thanks to its voltage detection capability, the DIRIS Digiware S module can detect the position of the protective device. An example corresponding to the above illustration is given in the table below:

Voltage measured on U module ?	Yes, 230V L-N		
Voltage detected on S modules ?	Yes	No, 0V	Yes
Position of protective device	Closed	Open	Closed

When a circuit breaker is used, the VirtualMonitor technology also enables to detect and count trips. A trip is detected if the 2 following conditions are met:

- the sensor records an opening of the protective device
- the sensor records an overcurrent ≥ 120% In(*)

(*) It is important to configure the nominal current correctly in the "Loads" configuration menu for the VirtualMonitor technology to work.

Several protection counters are also accessible thanks to the VirtualMonitor technology:

Protection counter type	Description
Total operation counter	Number of times the protective device was opened
Low-load operation counter	Number of times the protective device was opened when load current was ≤ 5% Inom
On-load operation counter	Number of times the protective device was opened when load current was [5% Inom – 100% Inom)
Overload operation counter	Number of times the protective device was opened when load current was ≥ 100% Inom
Trip Counter	Number of times the protective device has tripped (only available if the protective device is a breaker)

The VirtualMonitor technology allows to detect several successive openings of a protective device if the interval between 2 openings is greater than or equal to 200 ms.

Make sure Earth is connected on the DIRIS Digiware U module to use the VirtualMonitor technology.

For the voltage detection (hence the VirtualMonitor technology) to work properly when using iTR current sensors, make sure the section of live conductors are above the minimal sections given in the table below:

iTR Type	iTR-10	iTR-14	iTR-21	iTR-32
Min cable section (mm²)	6	10	50	50

15. AUTOCORRECT TECHNOLOGY: AUTOMATIC DETECTION OF WIRING ERRORS AND SOFTWARE CORRECTION

The AutoCorrect technology enables the detection and software correction of wiring errors such as the connection of a current sensor on the wrong phase.

If the DIRIS Digiware I or S module detects an incorrect voltage/current association between the voltage module and the current module, a system alarm will be triggered on the DIRIS Digiware I/S module and on the DIRIS Digiware M gateway or DIRIS Digiware D display.

15.1. Identifying the wiring error from the DIRIS Digiware D-50/D-70 display

- Go to PARAMETERS --> DEVICE ACTIONS
- Select a DIRIS Digiware S module or a DIRIS Digiware I module connected to iTR current sensors
- Choose a load
- Click on “AUTOCORRECT”

The AutoCorrect menu enables a live diagnostic of the system’s wiring. It indicates what is detected by the sensor thanks to the embedded voltage detection feature and what should be corrected.

If the wiring is correct, the following table will be displayed for a three-phase load:

AUTOCORRECT | PC 1-2-3 >>

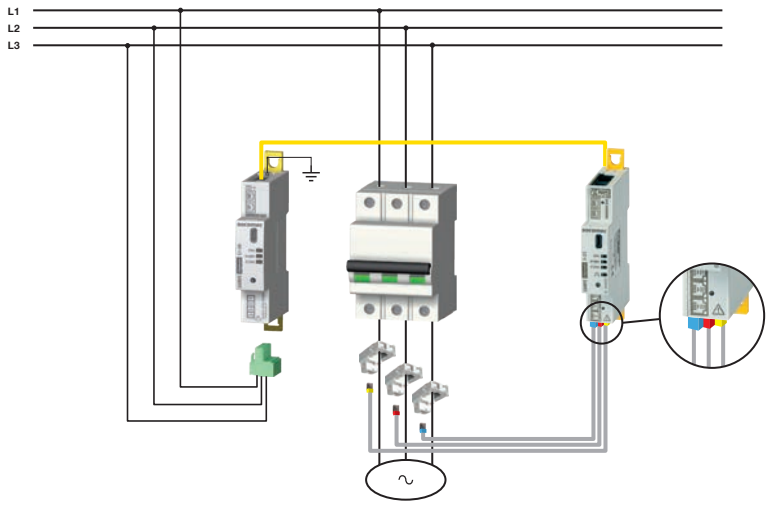
		INPUT	WAY	V	P
✓	P1	I01	+/DIRECT	V1	+
✓	P2	I02	+/DIRECT	V2	+
✓	P3	I03	+/DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

The table indicates that the load power P1 will be correctly calculated by associating current from the sensor associated to input I01 with voltage V1 from the DIRIS Digiware U-xx module and if the CT way is DIRECT (p1 --> p2). The resulting Power is positive (import/consumption).

Ex.1: DIRIS Digiware I module and iTR current sensors, with phase inversion of current sensors 1 and 3.

Let’s consider a phase inversion between current sensors 1 and 3, as showed in the following picture:



The AUTOCORRECT menu will display the following diagnostic table:

AUTOCORRECT | **PC 1-2-3** >>

		INPUT	WAY	V	P
✗	P1	I03	+/DIRECT	V1	+
✓	P2	I02	+/DIRECT	V2	+
✗	P3	I01	+/DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

The table indicates that the load power P1 will be correctly calculated by associating current from the iTR connected to input I03 with voltage V1 from the DIRIS Digiware U-xx module.
This is not the case as per the cross marks on lines P1 and P3 and the gray cells that indicate the errors are on the INPUT I03 and I01.

- Press “OK” to launch AUTOCORRECT:

AUTOCORRECT | **PC 1-2-3**

✗
✓
✗

AUTOCORRECT: SOFTWARE CORRECTION
MANUAL: PHYSICAL WIRING CORRECTION

◄ AUTOCORRECT ►

Choose the power sign – “POSITIVE” for Power import (consumption) or “NEGATIVE” for Power export (generation), and press “OK”:

AUTOCORRECT | **PC 1-2-3**

✗
✓
✗

CHOOSE POWER SIGN

◄ POSITIVE ►

- Now the wiring has been corrected in the software and power values are correctly calculated:

AUTOCORRECT | **PC 1-2-3** >>

		INPUT	WAY	V	P
✓	P1	I03	+/DIRECT	V1	+
✓	P2	I02	+/DIRECT	V2	+
✓	P3	I01	+/DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

Ex.2: Incorrect CT orientation on phase 1

If there is an incorrect CT orientation on phase 1, it will be detected by the current module, a cross mark will appear on the first line of the diagnostic table and the cell “WAY” will be gray:

AUTOCORRECT | PC 1-2-3 >>

		INPUT	WAY	V	P
✗	P1	I01	-/INV	V1	-
✓	P2	I02	+/DIRECT	V2	+
✓	P3	I03	+/DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

The table shows the error and indicates that the correct power P1 will be calculated using a reverse CT way for the current sensor connected to the I01 input.

- Press “OK” to launch AUTOCORRECT, and choose a positive power sign. The error mark is cleared and the cell WAY is no longer gray:

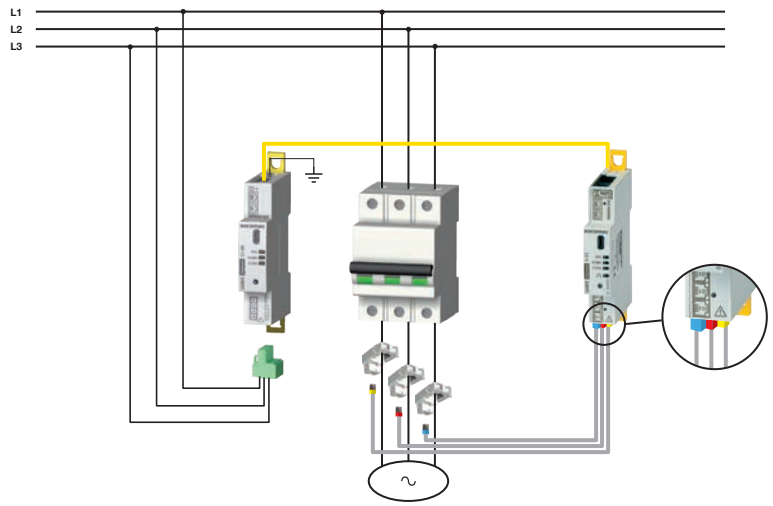
AUTOCORRECT | PC 1-2-3 >>

		INPUT	WAY	V	P
✓	P1	I01	-/INV	V1	+
✓	P2	I02	+/DIRECT	V2	+
✓	P3	I03	+/DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

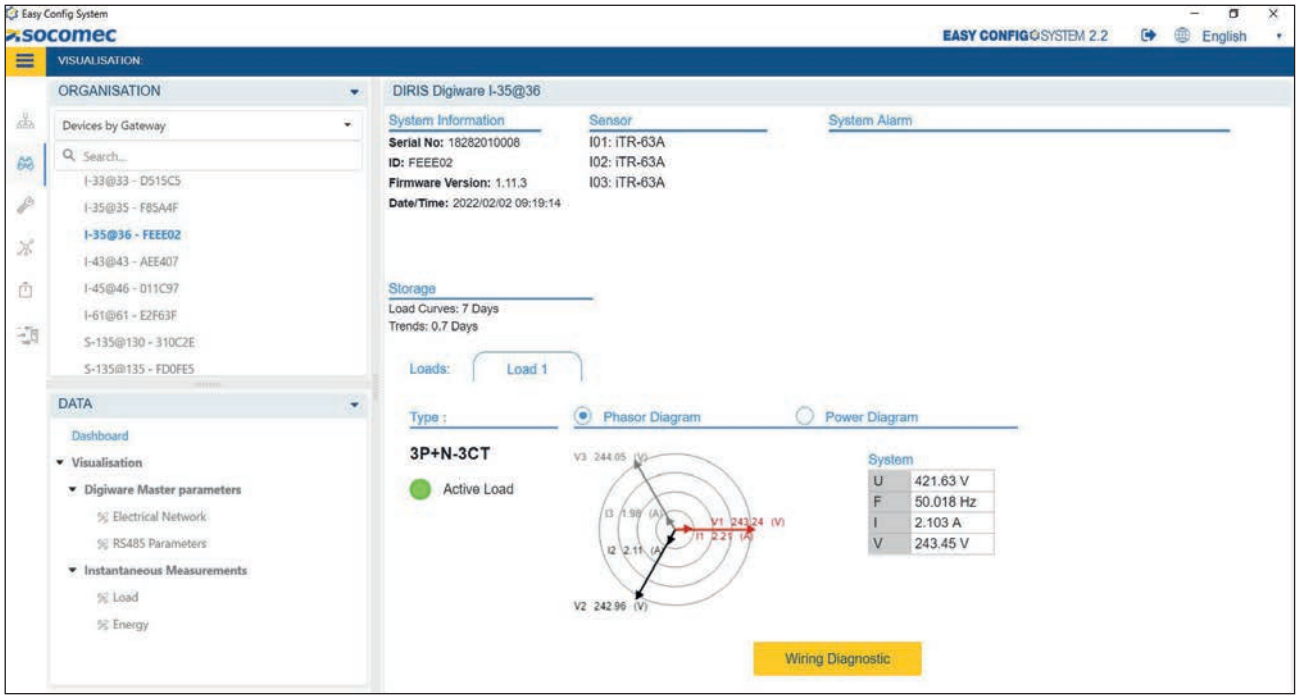
15.2. Identifying the wiring error from the Easy Config System software

Let's use the previous phase inversion example as per the following picture:



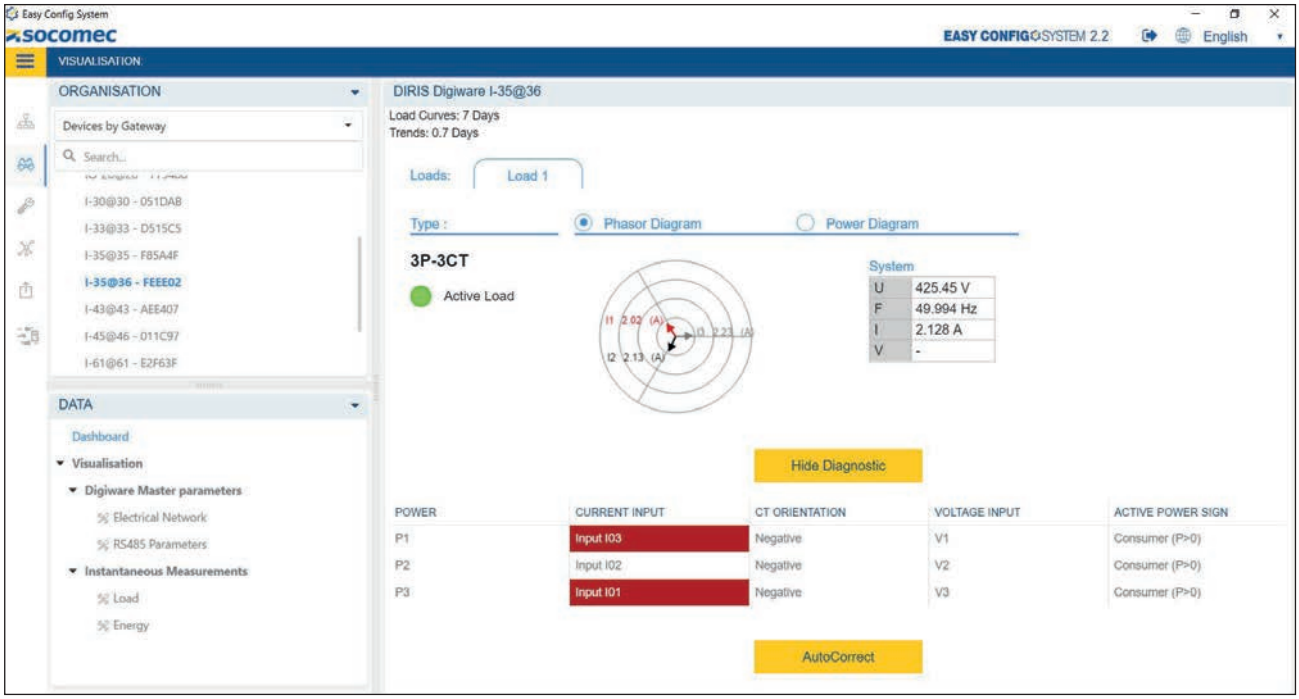
Connect to the DIRIS Digiware in Easy Config System.

- In the visualisation menu, select the DIRIS Digiware I module and click on "Dashboard". A Fresnel phase diagram is available and shows if phase voltages and phase currents are in phase or out of phase:

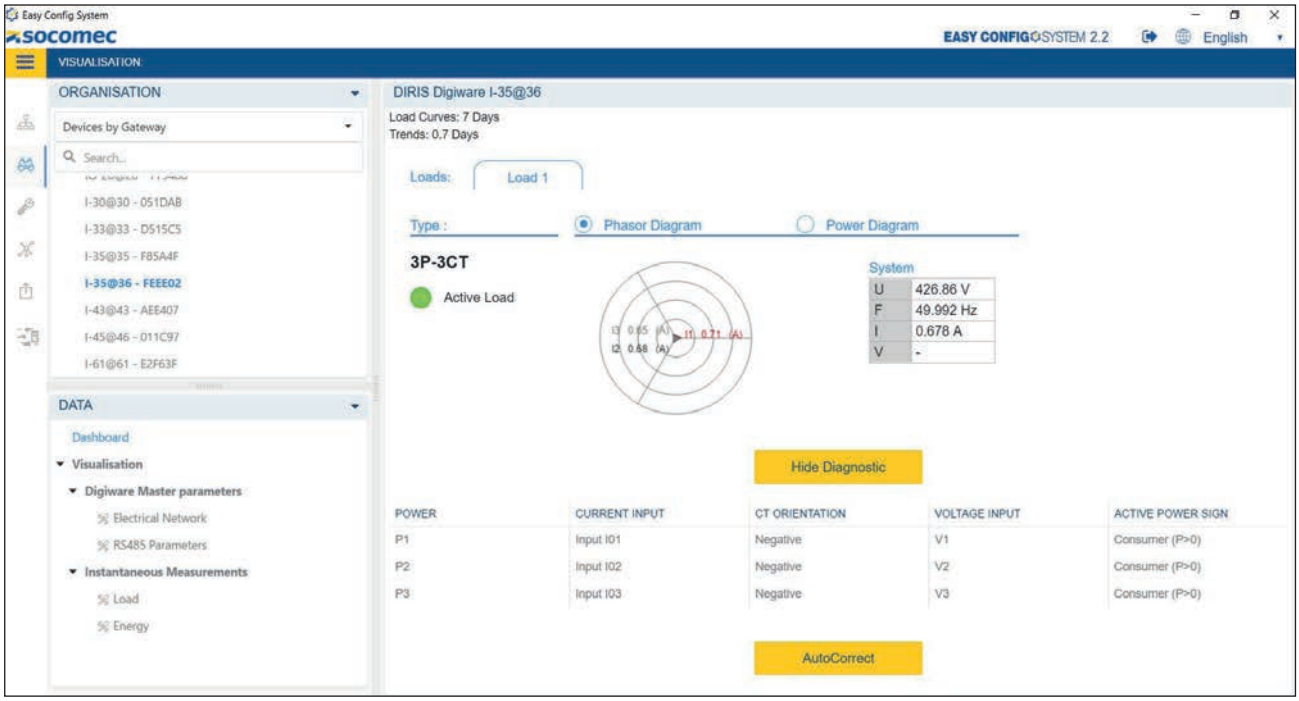


You can click on "Wiring Diagnostic" (only available with DIRIS Digiware S and with DIRIS Digiware I connected to iTR current sensors) to display a dignostic table showing the voltage/current associations detected by the iTR sensors.
If inconsistencies are detected, cells will be highlighted in red and an automatic software correction is possible by clicking on "AutoCorrect".

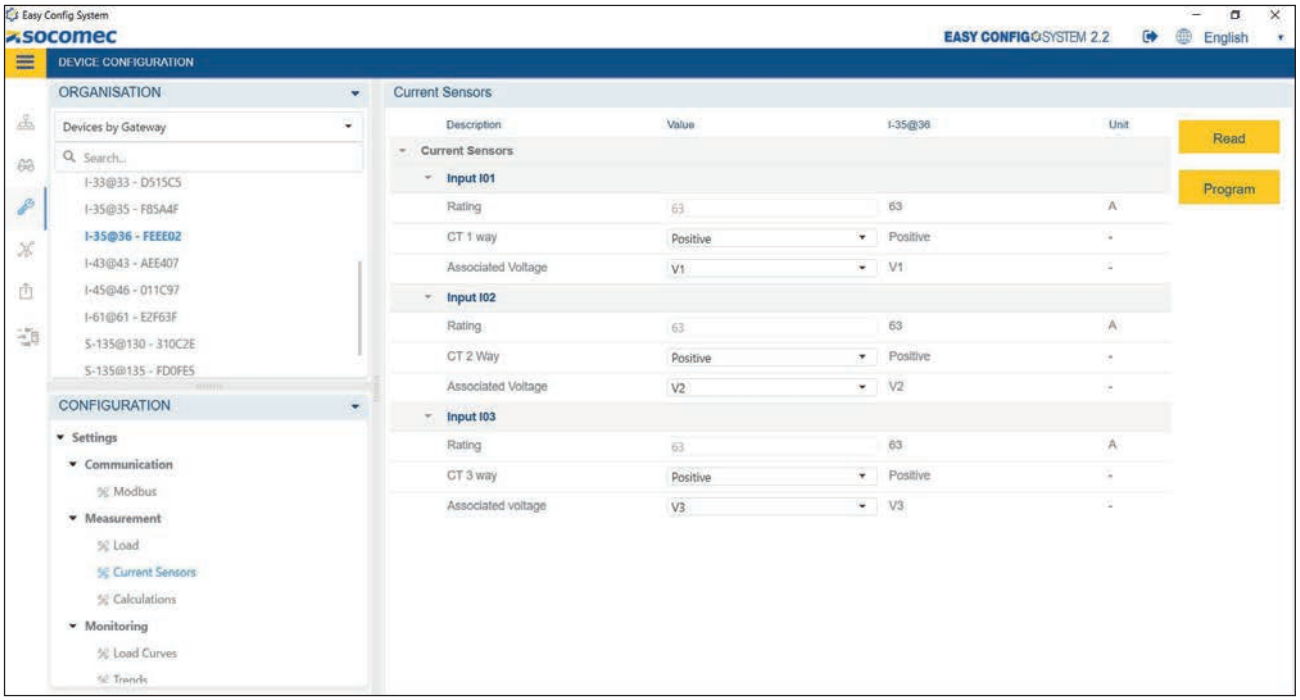
The example below indicates that the load power P1 will be correctly calculated by associating current from the iTR connected to input I03 with voltage V1 from the DIRIS Digiware U-xx module. This is not the case as per the red cells showing the error is on inputs I03 and I01.



After clicking on "AutoCorrect" the association errors are corrected and there are no more red cells in the diagnostic table:



You can also correct the wrong voltage/current association manually in the "Current Sensors" menu:



Make sure Earth is connected on the DIRIS Digiware U module to use the AutoCorrect technology.

For the voltage detection (hence the AutoCorrect technology) to work properly, make sure the section of live conductors are above the minimal sections given in the table below:

iTR Type	iTR-10	iTR-14	iTR-21	iTR-32
Min cable section (mm^2)	6	10	50	50

16. TECHNICAL CHARACTERISTICS

16.1. DIRIS Digiware C, U, I, S and IO technical characteristics

16.1.1. Mechanical characteristics

Casing type	DIN-rail mounting module and base
Casing protection index	IP20
Front panel protection index	IP40 on the nose in modular assembly
Weight of DIRIS Digiware C-3x / U-xx / S-xx / I-3x / I-4x / I-6x / IO-xx	65 g / 64 g / 54 g / 63 g / 133 g / 83 g / 63 g

16.1.2. Electrical characteristics

DIRIS Digiware C-31	
Input voltage	24 VDC ± 20 % - 20 W max - SELV, class 2 power supply unit according to UL1310
Connection	Removable screw terminal block, 2 positions, stranded or solid 0.2 - 2.5 mm² cable. Use Copper Conductors Only.
Link with DIRIS Digiware U voltage module	The DIRIS Digiware U voltage module is linked to the DIRIS Digiware C-31 by a Digiware Bus
P15 power supply	Features: 230 VAC / 24 VDC - 0.63 A - 15 W Modular format - Dimensions (H x L): 90 x 36 mm

16.1.3. Measuring characteristics

Measurement accuracy	
Accuracy	According to IEC 61557-12 PMD DD classification in association with dedicated sensors (TE, TR/iTR, TF)
Measuring energy and power	
Active energy and active power accuracy	• For DIRIS Digiware I modules and sensors: - Class 0.2 DIRIS Digiware I module alone - Class 0.5 system accuracy with TE, iTR or TF sensors - Class 1 system accuracy with TR sensors • For DIRIS Digiware S modules: - Class 0.5 for active energy - Class 1 for active power
Accuracy of reactive energy	Class 2 system accuracy
Power factor measurement	
Accuracy	• For DIRIS Digiware I modules and sensors: - Class 0.5 system accuracy with TE, iTR or TF sensors - Class 1 system accuracy with TR sensors • Class 1 for DIRIS Digiware S modules
Voltage measurement - DIRIS Digiware U	
Characteristics of the network measured	50-300 VAC (Ph/N) - 87-520 VAC (Ph/Ph) - CAT III
Frequency range	45 - 65 Hz
Frequency accuracy	Class 0.02
Network type	Single-phase/ Two-phase / Two-phase with neutral / Three-phase / Three-phase with neutral
Measurement by voltage transformer	Primary: 400,000 VAC Secondary: 60, 100, 110, 173, 190 VAC
Input consumption	≤ 0.1 VA
Permanent overload	300 VAC Ph/N

Rated impulse voltage	IEC 60947-1 V. IMP: 6.4 kV
Accuracy of voltage measurement	Class 0.2
Connection	Removable screw terminal block, 4 positions, stranded or solid 0.2 - 2.5 mm² cable. Use Copper Conductors Only.
Current measurement - DIRIS Digiware S	
Number of current inputs	3
Accuracy of current measurement	Class 0.5
Basic current Ib	10 A
Maximum current Imax	63 A
Current measurement - DIRIS Digiware I	
Number of current inputs	I-3x: 3 / I-4x: 4 / I-6x: 6
Associated current sensors	Solid-core TE, split-core TR/iTR, flexible TF current sensors
Accuracy of current measurement	Class 0.2 DIRIS Digiware I module alone Class 0.5 with TE, iTR or TF sensors Class 1 with TR sensors
Connection	Specific Socomec cable with RJ12 connectors
Inputs - DIRIS Digiware I-4x	
Number of inputs	2
Type / Power supply	Non-insulated input, internal polarisation 12 VDC max., 1mA
Input functions	Logical status, position, trip, pulse meter
Connection	Removable screw terminal block, stranded or solid 0.14 - 1.5 mm² cable (max. length 1000 m)
Outputs - DIRIS Digiware I-4x	
Number of outputs	2
Relay type	230 V ±15% - 1 A 30 VDC - 3 A
Function	Alarm report (measurement alarm, protection alarm etc.) Remote status control
Connection	Removable screw terminal block, stranded or solid 0.2 to 2.5 mm² cable - Fuse or circuit-breaker protection 1A
Digital inputs/outputs- DIRIS Digiware IO-10	
Number of inputs	4
Type / Power supply	Insulated input, internal polarisation 12 VDC max., 3 mA - SELV
Input functions	Logical status Position and trip of protective device Pulse meter Tariff change Synch. signal for load curves
Connection	Removable screw terminal block, 9 positions - 5 dedicated to inputs, stranded or solid 0.14 - 1.5 mm² cable. Use Copper Conductors Only.
Number of outputs	2
Type	Insulated output - SELV Maximum applicable voltage 12 - 48 VDC 12 - 24 VAC 50 mA
Output functions	Alarm report (measurement alarm, protection alarm etc.) Remote status control
Connection	Removable screw terminal block, 9 positions - 4 dedicated to outputs, stranded or solid 0.14 - 1.5 mm² cable. Use Copper Conductors Only.

Analogue inputs - DIRIS Digiware IO-20	
Number of inputs	2
Type / Power supply	0/4-20mA, 200 Ω max - SELV
Accuracy	0.5% full scale
Function	Connection of analogue sensors (pressure, humidity, temperature...) with linear or quadratic interpolation
Connection	Removable screw terminal block, 2x2 positions, stranded or solid 0.14 - 1.5 mm² cable. Use Copper Conductors Only.

16.1.4. Communication characteristics

Digiware BUS	
Function	Connection between DIRIS Digiware modules
Cable type	Specific SOCOMEC cable with RJ45 connections
RS485	
Connection type	2 - 3 half duplex wires
Protocol	Modbus RTU
Baudrate	9600 to 500 000 bauds
Function	Configuration and reading of centralised data on the DIRIS Digiware U and all of the DIRIS Digiware I linked by the Digiware bus
Location	Single-point on DIRIS Digiware C-31
Connection	Removable screw terminal block, 3 positions, stranded or solid 0.14 - 1.5 mm² cable. Use Copper Conductors Only.
USB	
Protocol	Modbus RTU over USB
Function	Firmware upgrade and configuration of DIRIS Digiware U / S / I / IO modules
Location	On each DIRIS Digiware U / S / I / IO module
Connection	Type B micro USB connector

16.1.5. Environmental characteristics

Ambient operating temperature	-10 … +70°C (+55 °C for DIRIS Digiware S) (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature	-25 … +70°C (IEC 60068-2-1/IEC 60068-2-2)
Operating humidity	25°C / 97% RH & 55°C / 93% RH (IEC 60068-2-30)
Operating altitude	< 2000 m
Vibration	0.35 mm, 25 Hz, 20 min/axe (IEC 61557-12)
Impact resistance	Front panel: 1J (5J for DIRIS Digiware S) - casing: 1J (IEC 61010-1 Ed 3.0)
PEP ecopassport - ISO 14025	DIRIS Digiware U: SOCO-2014-05-v1-fr, SOCO-2014-05-v1-en DIRIS Digiware S: SOCO-00006-V01.01-FR; SOCO-00006-V01.01-EN DIRIS Digiware I: SOCO-2014-06-v1-fr, SOCO-2014-06-v1-en DIRIS Digiware IO :SOCO-00001-V01.01-fr, SOCO-00001-V01.01-en

16.1.6. Electromagnetic characteristics

Immunity to electrostatic discharges (ESD)	IEC 61000-4-2 LEVEL III
Immunity to radiated radio-frequency electromagnetic fields	IEC 61000-4-3 LEVEL III
Immunity to electrical fast transients/bursts	IEC 61000-4-4 LEVEL III
Immunity to surges	IEC 61000-4-5 LEVEL III
Immunity to conducted disturbances induced by radio-frequency fields	IEC 61000-4-6 LEVEL III
Immunity to power frequency magnetic fields	IEC 61000-4-8 400A/m
Radiated emissions	CISPR11 Group1 - CLASS B

16.1.7. Standards and safety

Device	IEC 61557-12, power metering and monitoring device (PMD)
CE	Compliant with Low Voltage Directive: 2014/35/EU of February 26th 2014 (IEC EN61010-1 & IEC EN61010-2-030). Compliant with Electromagnetic Compatibility Directive: 2014/30/EU of February 26th 2014 (IEC EN 61326-1).
Insulation	Installation category III (300VAC Ph/N), degree of pollution 2
UL	UL 61010-1 & 61010-2-030 compliant UL installation: The DIRIS Digiware system must be enclosed in an NRTL certified electrical/fire enclosure, listed Industrial Control Panel Equipment, or similar equipment.

16.1.8. Service life

MTTF (mean time to failure)	> 100 years

16.2. TE, TR/iTR and TF sensor technical characteristics

16.2.1. General characteristics

TE - solid-core sensor TE-18 to TE-55						
Model	TE-18	TE-18	TE-25	TE-35	TE-45	TE-55
Nominal current range In (A)	5 - 20	25 - 63	40 - 160	63 - 250	160 - 630	400 - 1000
Max. current (A)	24	75.6	192	300	756	1200
Weight (g)	24	24	69	89	140	187
Max. voltage (AC)	300 V					600 V
Rated withstand voltage	3 kV					3.6 kV / 1min
Frequency	50/60 Hz					
Intermittent overload	10x In in 1 second					
Measurement category	CAT III					
Protection degree	IP30 / IK06					
Operating temperature	-10 … +70°C					
Storage temperature	-25 … +85°C					
Relative humidity	95% RH without condensation					
Altitude	< 2,000 m					
PEP ecopassport - ISO 14025	TE sensors: SOCO-2014-03-v1-fr, SOCO-2014-03-v1-en					
UL	UL 61010					
Connection	SOCOMEC RJ12 cables: UTP, unshielded, twisted pair, straight, AWG24, 600V, CATV, -10 ... +70°C					

TE - solid-core sensor TE-90	
Model	TE-90
Nominal current range In (A)	600 - 2000 A(1)
Max. current	2400 A
Weight	163g (118g without clamps)
Max. voltage (AC)	600 V
Rated withstand voltage	3.6 kV AC 1 min
Frequency	50/60 Hz
Intermittent overload	40x In in 0.5 sec
Measurement category	CAT III
Protection degree	IP30 / IK06
Operating temperature	-10 … +70°C
Storage temperature	-25 … +85°C
Relative humidity	95% RH without condensation
Altitude	< 2,000 m
Connection	SOCOMEC RJ12 cables: UTP, unshielded, twisted pair, straight, AWG24, 600V, CATV, -10 ... +70°C.
(1) 5A CT adaptor (max primary current is 10 000 A for 5A CT).	

TR/iTR - Split-core sensor				
Model	TR-10 / iTR-10	TR-14 / iTR-14	TR-21 / iTR-21	TR-32 / iTR-32
Nominal current range In (A)	26 - 63	40 - 160	63 - 250	160 - 600
Max. current (A)	75.6	192	300	720
Weight (g)	74	117	211	311
Max. voltage (AC)	300 V			
Rated withstand voltage	3 kV			
Frequency	50/60 Hz			
Intermittent overload	10x In in 1 second			
Measurement category	CAT III			
Protection degree	IP20 / IK06			
Operating temperature	-10 … +55°C			
Storage temperature	-25 … +85°C			
Relative humidity	95% RH without condensation			
Altitude	< 2,000 m			
PEP ecopassport - ISO 14025	TR sensors: SOCO-2014-04-v1-fr, SOCO-2014-04-v1-en			
UL	UL 61010 conformity			
Connection	SOCOMEC RJ12 cables: UTP, unshielded, twisted pair, straight, AWG24, 600V, CATV, -10 ... +70°C			

TF - Flexible current sensor						
Model	TF-40	TF-80	TF-120	TF-200	TF-300	TF-600
Weight (g)	90	130	142	164	193	274
Nominal current range In (A)	100 … 400	150 … 600	400 … 2000	600 … 4000	1600 … 6000	1600 … 6000
Max. voltage (AC)	600 V					
Measurement category	CAT III					
Frequency	50/60 Hz					
Power ratings (d.c.)	3.3V / max. 10mAC (exclusively from specified PMD)					
Accuracy	Performance class for power and energy: 0.5 in combination with DIRIS Digiware I, according to IEC 61557-12					
Intermittent overload	10x In for 1 second					
Rated withstand voltage	3.6 kV					
Protection degree	IP30 / IK07					
Operating temperature	-10 … +70°C					
Storage temperature	-25 … +85°C					
Relative humidity	95%					
Pollution degree	2					
Altitude	< 2,000 m					
Connection	SOCOMEC RJ12 cables: UTP, unshielded, twisted pair, straight, AWG24, 600V, CATV, -10 ... +70°C					

16.2.2. Electromagnetic compatibility and insulation levels

TF flexible sensors	Test standard	Test level	Performance criteria
Immunity to electrostatic discharge (ESD)	IEC 61000-4-2	6kV contact – LEVEL III 8kV air – LEVEL III	B
Immunity to radiated, radio-frequency, electromagnetic field	IEC 61000-4-3	80MHz – 1GHz: 10V/m – LEVEL III 1.4GHz – 2GHz: 3V/m - LEVEL II 2.0GHz – 2.7GHz: 1V/m – LEVEL I	A
Immunity to electrical fast transients/bursts	IEC 61000-4-4	4kV on power supply port and 2kV on input/ output signal.	B
Immunity to surges	IEC 61000-4-5	4kV Common mode, 2kV differential mode – LEVEL IV	B
Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6	LEVEL III	A
Immunity to power frequency magnetic fields	IEC 61000-4-8	LEVEL V	A
Radiated Emission	EN 55022	30 to 230Mhz : 30dBuV/m 230 to 1000Mhz : 37dBuV/m	B

TE/TR/iTR sensors	Test standard	Test level	Performance criteria
Immunity to electrostatic discharge (ESD)	IEC 61000-4-2	III	A
Immunity to radiated, radio-frequency, electromagnetic fields	IEC 61000-4-3	III	A
Immunity to electrical fast transients/bursts	IEC 61000-4-4	III	A
Immunity to surges	IEC 61000-4-5	Line to line : III Line to ground : IV	A
Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6	III	A
Immunity to power frequency magnetic fields	IEC 61000-4-8	IV	A
Radiated Emission	CISPR11	-	Class B

16.3. DIRIS D-30 - technical characteristics

16.3.1. Mechanical characteristics

Type of screen	Capacitive touch-screen technology, 10 keys
Screen resolution	350 x 160 pixels
Front panel protection index	IP65
Weight	D-30: 160 g

16.3.2. DIRIS D-30 communication characteristics

Type of screen	Local single-point screen for DIRIS Digiware I-4x
RJ9	Self-powered and data
USB	Upgrade and configuration via type B micro USB connector

16.4. DIRIS Digiware D-50/D-70 & M-50/M-70 characteristics

16.4.1. Mechanical characteristics

Display type (D-50/D-70)	Capacitive touchscreen technology, 10 keys, 4 LEDs
Display resolution (D-50/D-70)	350 x 160 pixels
Front panel protection index (D-50/D-70)	IP65*
Material and flammability class of housing (D-50/D-70)	Polycarbonate UL94-V0
Weight	210 g (M-50/M-70) 210 g (D-50/D-70)

* Front face only. The use of a silicone seal may be required to ensure sufficient sealing of the junction between D-50/D-70 display and panel door.

16.4.2. Electrical characteristics

Power supplies	
Power supply	24 VDC ±10% - Class 2 power supply unit according to UL1310
Power consumption	2.5 VA

16.4.3. Communication characteristics

Type of display	Multipoint remote display
Ethernet RJ45 10/100 Mbs	Gateway function: - Modbus TCP, BACnet IP, SNMP v1, v2, v3 & Traps - Embedded web server WEBVIEW-M (M-70/D-70 only)
SNTP protocol	Synchronises the date/time of the M-50/M-70 or D-50/D-70 with an SNTP server. The M-50/M-70 or D-50/D-70 then synchronises the connected devices.
SMTP(S) protocol	Sends email notifications in case of alarms.
FTP(S) protocol	Automatically exports data via standard or secure FTP server (energy index, load curves, measurement logs)
RJ45 Digiware	Control and power supply interface function
RS485 2-3 wires	RS485 2-3 wire master or slave communication function
USB	Firmware upgrade and configuration via type B micro USB connector

16.4.4. Environmental characteristics

Standard model	
Operating temperature	-10 ... +55°C (IEC 60068-2-1 / IEC 60068-2-2)
Storage temperature	-40 ... +70°C (IEC 60068-2-1 / IEC 60068-2-2)
Humidity	+23°C/97% RH & +55°C/93% RH (IEC 60068-2-30)
Installation category, Degree of pollution	Device powered by SELV, 2

17. PERFORMANCE CLASSES

17.1. DIRIS Digiware I

Performance classes are given in compliance with IEC 61557-12

Classification of DIRIS Digiware	DD in combination with dedicated sensors (TE, TR/iTR, TF)
Temperature	K55
Overall operating performance class for active power or active energy	0.5 in combination with TE, iTR or TF solid-core sensors 1 in combination with TR split-core sensors

Symbol	Description	Overall operating performance class DIRIS Digiware I + dedicated sensors* (TE, TR/ iTR, TF) in compliance with IEC 61557-12	Measurement range
Pa	Total active power	0.2 DIRIS Digiware only 0.5 with TE, iTR or TF sensors 1 with TR sensors	10% … 120% In 2% … 120% In 2% … 120% In
Q_A, Q_V	Total reactive power (arithmetic, vectorial)	2 with TR sensors 1 with TE, iTR or TF sensors	5% … 120% In
S_A, S_V	Total apparent power (arithmetic, vectorial)	0.5 with TE, iTR or TF sensors 1 with TR sensors	10% … 120% In
Ea	Total active energy	0.2 DIRIS Digiware only 0.5 with TE, iTR or TF sensors 1 with TR sensors	10% … 120% In 2% … 120% In 2% … 120% In
Er_A, Er_V	Total reactive energy (arithmetic, vectorial)	2 with TE, TR/iTR or TF sensors	5% … 120% In
Eap_A, Eap_V	Total apparent energy (arithmetic, vectorial)	0.5 with TE, iTR or TF sensors 1 with TR sensors	10% … 120% In
f	Frequency	0.02	45 - 65 Hz
I, IN	Phase current, measured neutral current	0.2 DIRIS Digiware only 0.5 with TE, iTR or TF sensors 1 with TR sensors	5% … 120% In 10% … 120% In 10% … 120% In
INc	Calculated neutral current	1 with TE, iTR or TF sensors 2 with TR sensors	10% … 120% In
U	Voltage (Lp-Lg or Lp-N)	0.2	50 - 300 VAC Ph/N
PF_A, PF_V	Power factor (arithmetic, vectorial)	0.5 with TE, iTR or TF sensors 1 with TR sensors	0.5 lagging to 0.8 leading
Pst, Plt	Flicker (short-term, long-term)	-	-
Udip	Voltage dip (Lp-Lg or Lp-N)	0.5	-
Uswl	Voltage swell (Lp-Lg or Lp-N)	0.5	-
Uint	Voltage interruption (Lp-Lg or Lp-N)	0.2	-
Unba	Voltage amplitude unbalance (Lp-N)	0.5	-
Unb	Voltage phase and amplitude unbalance (Lp-Lg or Lp-N)	0.2	-
THDu, THD-Ru	Total harmonic distortion rate of the voltage (relative to the fundamental, relative to the RMS value)	1	Orders 1 to 63
Uh	Voltage harmonics	1	-
THDi, THD-Ri	Total harmonic distortion rate of the current (relative to the fundamental, relative to the RMS value)	1 with sensors TE, TR/iTR or TF	Orders 1 to 63
Ih	Current harmonics	1 with sensors TE, TR/iTR or TF	-
Msv	Centralised remote control signals	-	-

*With SOCOMEC RJ12 and RJ45 connection cables.

17.2. DIRIS Digiware S

Performance classes are given in compliance with IEC 61557-12

Classification of DIRIS Digiware	DD
Temperature	K55
Overall operating performance class	0.5 for active energy 1 for active power

Symbol	Description	Overall operating performance class DIRIS Digiware S with integrated current sensors in compliance with IEC 61557-12	Measurement range
Pa	Total active power	1	5% Ib ... Imax
Q_A, Q_V	Total reactive power (arithmetic, vectorial)	1	5% Ib ... Imax
S_A, S_V	Total apparent power (arithmetic, vectorial)	1	5% Ib ... Imax
Ea	Total active energy	0.5	2% Ib ... Imax
Er_A, Er_V	Total reactive energy (arithmetic, vectorial)	1	5% Ib ... Imax
Eap_A, Eap_V	Total apparent energy (arithmetic, vectorial)	2 according to IEC 61557-12 1 according to IEC 62053-24	5% Ib ... Imax
f	Frequency	0.02	45 - 65 Hz
I	Phase current	0.5	20% Ib ... Imax
INc	Calculated neutral current	1	20% Ib ... Imax
U	Voltage (Lp-Lg or Lp-N)	0.2	50 - 300 VAC Ph/N
PF_A, PF_V	Power factor (arithmetic, vectorial)	1	0.5 lagging to 0.8 leading
Pst, Plt	Flicker (short-term, long-term)	-	-
Udip	Voltage dip (Lp-Lg or Lp-N)	0.5	-
Uswl	Voltage swell (Lp-Lg or Lp-N)	0.5	-
Uint	Voltage interruption (Lp-Lg or Lp-N)	0.2	-
Unba	Voltage amplitude unbalance (Lp-N)	0.5	-
Unb	Voltage phase and amplitude unbalance (Lp-Lg or Lp-N)	0.2	-
THDu, THD-Ru	Total harmonic distortion rate of the voltage (relative to the fundamental, relative to the RMS value)	1	Rank 1 to 63
Uh	Voltage harmonics	1	-
THDi, THD-Ri	Total harmonic distortion rate of the current (relative to the fundamental, relative to the RMS value)	1	Rank 1 to 63
Ih	Current harmonics	1	-
Msv	Centralised remote control signals	-	-

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