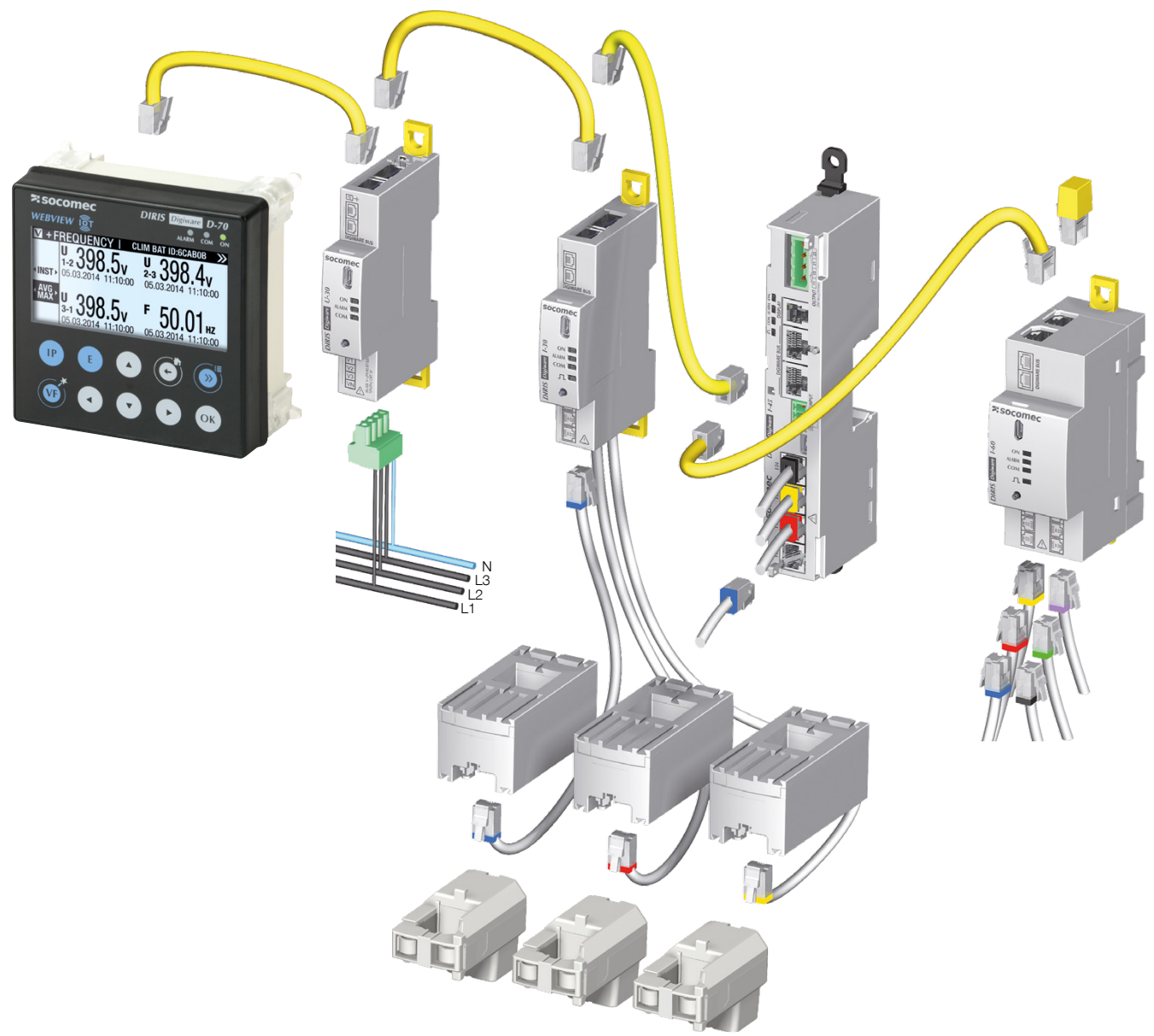


**INSTRUCTION
MANUAL**

DIRIS Digiware

Power Metering and Monitoring system
with associated current sensors



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1. DOCUMENTATION

All documentation relating to DIRIS Digiware and its associated sensors is available on the SOCOMEC website



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.

SOCOMEK 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 SOCOMEK 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 SOCOMEK.

	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 \pm 10%.
- The use of a SOCOMEK 230 VAC / 24 VDC power unit or a 24 VDC max 20 W class 2 power unit / SELV. 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 SOCOMEK 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. INTRODUCTION

4.1. DIRIS Digiware System

DIRIS Digiware is a measuring and monitoring system (PMD*) in a modular format. It is designed for monitoring and reporting electrical energy. DIRIS Digiware offers a range of functions for measuring voltage, current, power, energy and quality. It can be used to jointly analyse the single-phase and three-phase loads.

DIRIS Digiware is an innovative concept based on the centralisation of the voltage measurement and the distribution of the current measurement close to the loads. The voltage is measured by a dedicated DIRIS Digiware U module and the current by dedicated DIRIS Digiware I modules. The voltage and current measurements are interconnected by the Digiware Bus. On DIRIS Digiware I modules, three, four or six current inputs are available, depending on the model, enabling one or several loads to be monitored simultaneously. 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 software. The measurements can be accessed via the WEBVIEW web server integrating the monitoring function for electrical values (Power Monitoring version) and reporting function for energy data (Power & Energy Monitoring version). WEBVIEW is available on DIRIS G communication gateways and the DIRIS Digiware D-70 display. Consumption data can also be accessed in the N'VIEW energy management software.

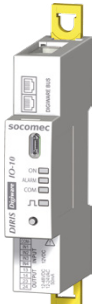

Thanks to its architecture, DIRIS Digiware can be easily integrated into an energy management system which requires a large number of loads to be monitored.

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

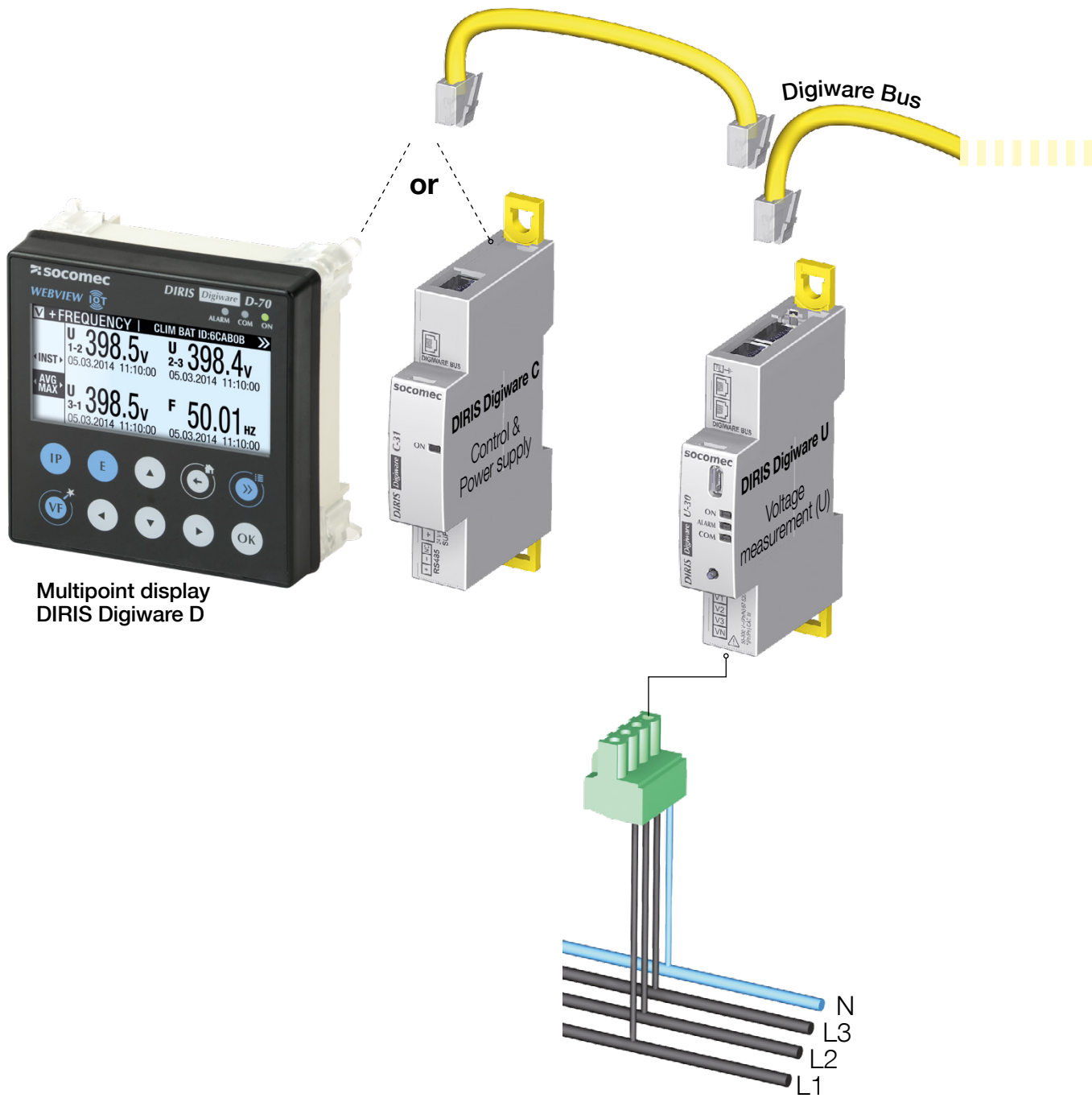
4.1.1. Range

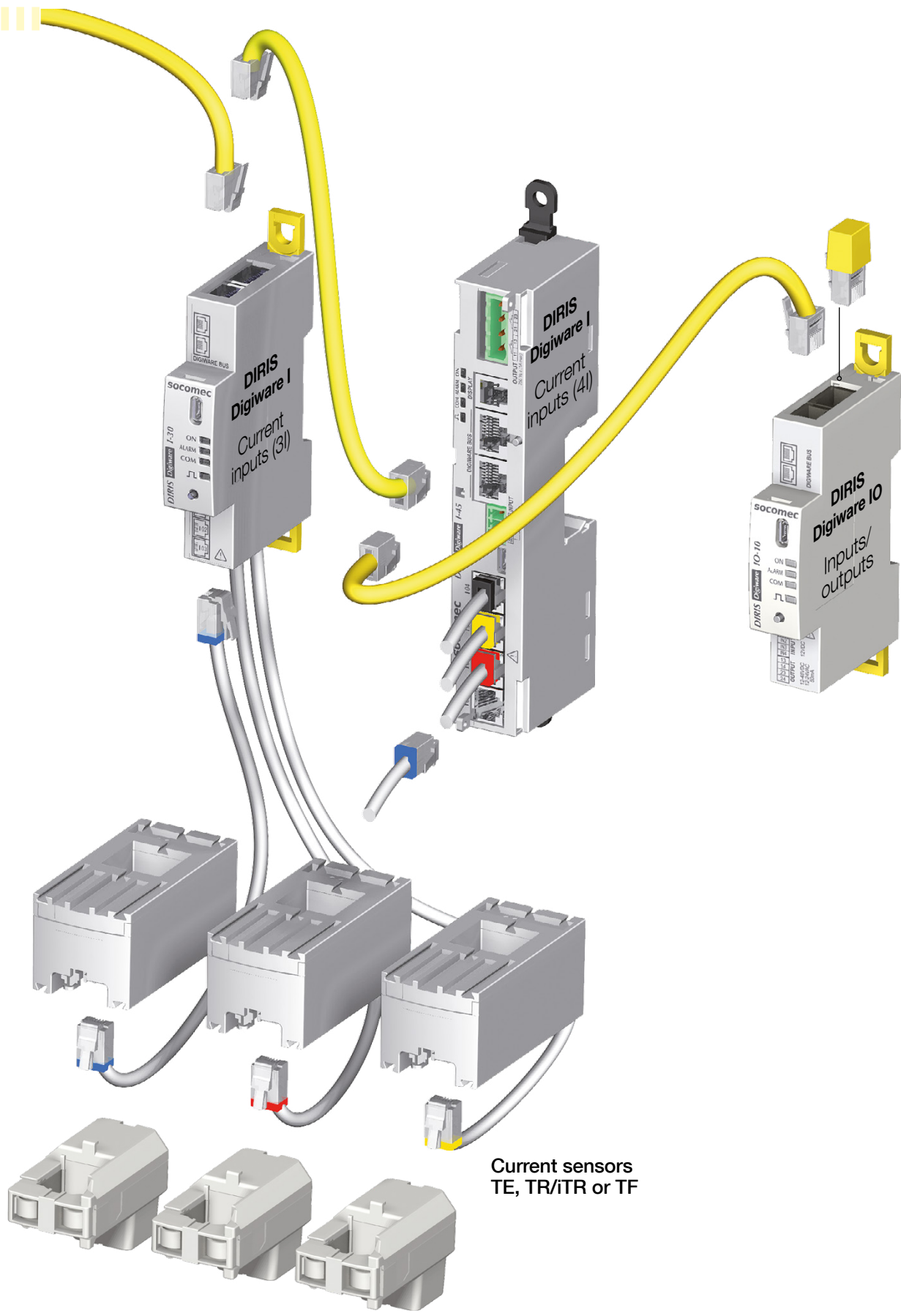
Control and power supply interface (24 VDC)	
	
<p>DIRIS Digiware D Multipoint display</p> <p>DIRIS Digiware D-40 Ref. 4829 0199</p> <p>DIRIS Digiware D-50 v2 Ref. 4829 0204</p> <p>DIRIS Digiware D-70 v2 Part no. 4829 0203</p>	<p>DIRIS Digiware C System interface*</p> <p>DIRIS Digiware C-31 Ref. 4829 0101</p> <p><i>* if there is no multipoint display</i></p> <p>Bus Repeater</p> <p>DIRIS Digiware C-32 Ref. 4829 0103</p>

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

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

4.1.2. Principle





Current sensors
TE, TR/ITR or TF

4.1.3. 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 global measurement chain (DIRIS Digiware + sensors) in terms of power and active energy up to class 0.5, according to the IEC 61557-12 standard.

- **Power quality**

- Direct, inverse and zero-sequence components for voltage and current
- THD and individual harmonics up to 63rd for voltage and current
- Crest Factor
- K-factor
- Current and voltage imbalance
- EN50160 events (Uswl, Udip, Uint) and current overloads

- **Data logging**

- Recording of average electrical values
- Recording and timestamping of min/max electrical values

- **Metering**

- Partial and total powers (active kW, reactive kvar, apparent kVA)
- Load curves

- **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 in terms of power and active energy according to IEC 61557-12

- **Inputs/outputs**

- Analogue and digital inputs/outputs

- **Communication**

- RS485 or Ethernet communication ports
- Association with DIRIS Digiware D multi-device remote display
- Measurements available in the web server (WEBVIEW) embedded in the DIRIS G gateway and the D-70 display
- Time synchronisation on the DIRIS G gateway or D-50/D-70 displays
- Auto-addressing from the DIRIS G or the DIRIS Digiware D-xx display.

4.1.4. Measured electrical parameters

	DIRIS Digiware			
	D-40	D-50 v2	D-70 v2	C-31
Function				
Centralisation of measurement points	•	•	•	•
High-resolution LCD display (configuration, selection and visualisation of circuits)	•	•	•	
Power supply				
24 VDC	•	•	•	•
Communication				
Slave RS485 modbus	•			•
Master RS485 modbus		•	•	
Digiware bus	•	•	•	•
Ethernet TCP Modbus		•	•	
BACnet IP		•	•	
SNMP v1, v2, v3		•	•	
WEBVIEW-M embedded web server			•	
Format				
Width/Number of modules	96x96 mm	96x96 mm	96x96 mm	18 mm / 1
Part number	4829 0199	4829 0204	4829 0203	4829 0101

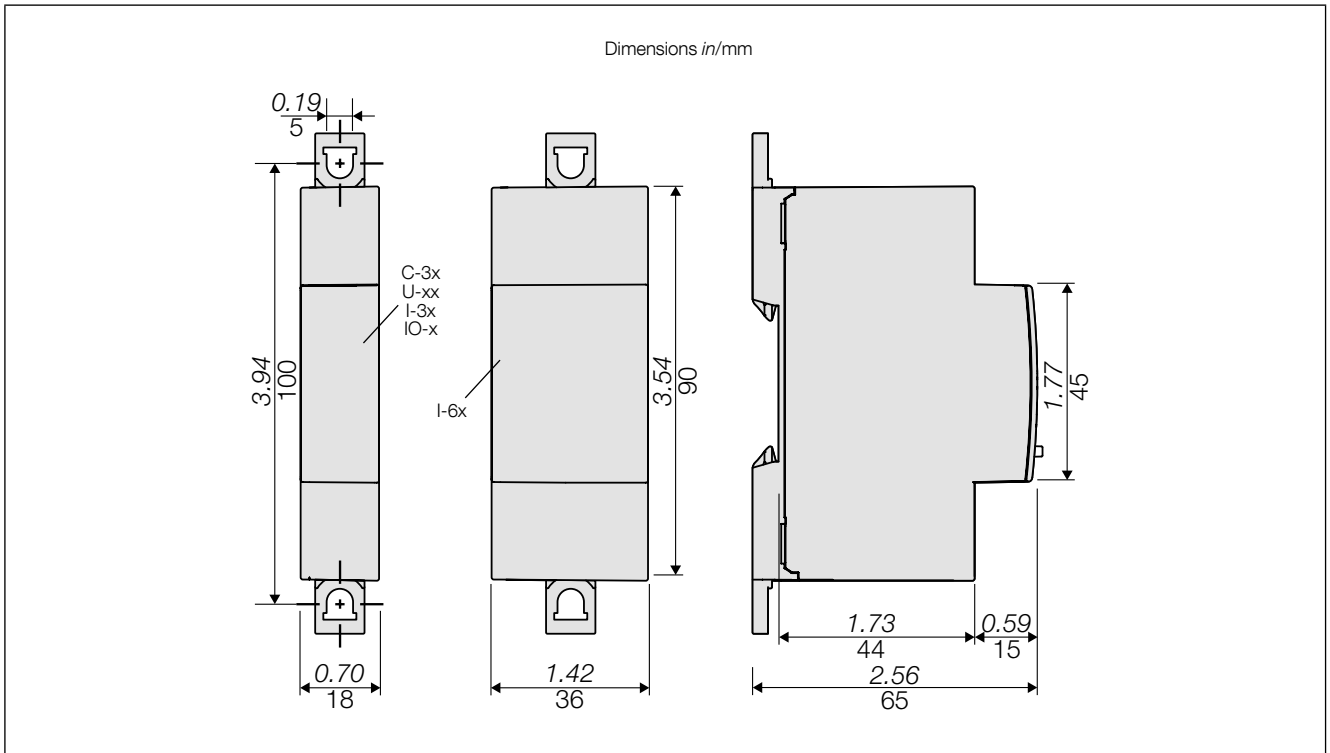
	DIRIS Digiware U		
	U-10	U-20	U-30
Multi-measurement			
U12, U23, U31, V1, V2, V3, Vn, F	•	•	•
U system, V system			•
Ph/N unbalance (Vnb, Vnba, Vdir, Vinv, Vhom)			•
Ph/Ph unbalance (Unb, Unba, Udir, Uinv)			•
Power quality			
THDv1, THDv2, THDv3, THDu12, THDu23, THDu31, THD Vsys, THD Usys		•	•
Individual harmonics U & V (up to 63rd)			•
Crest Factor			•
Voltage dips, swells and interruptions according to EN50160			•
Alarms			
Thresholds			•
Data logging			
Logs 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								
Logs 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

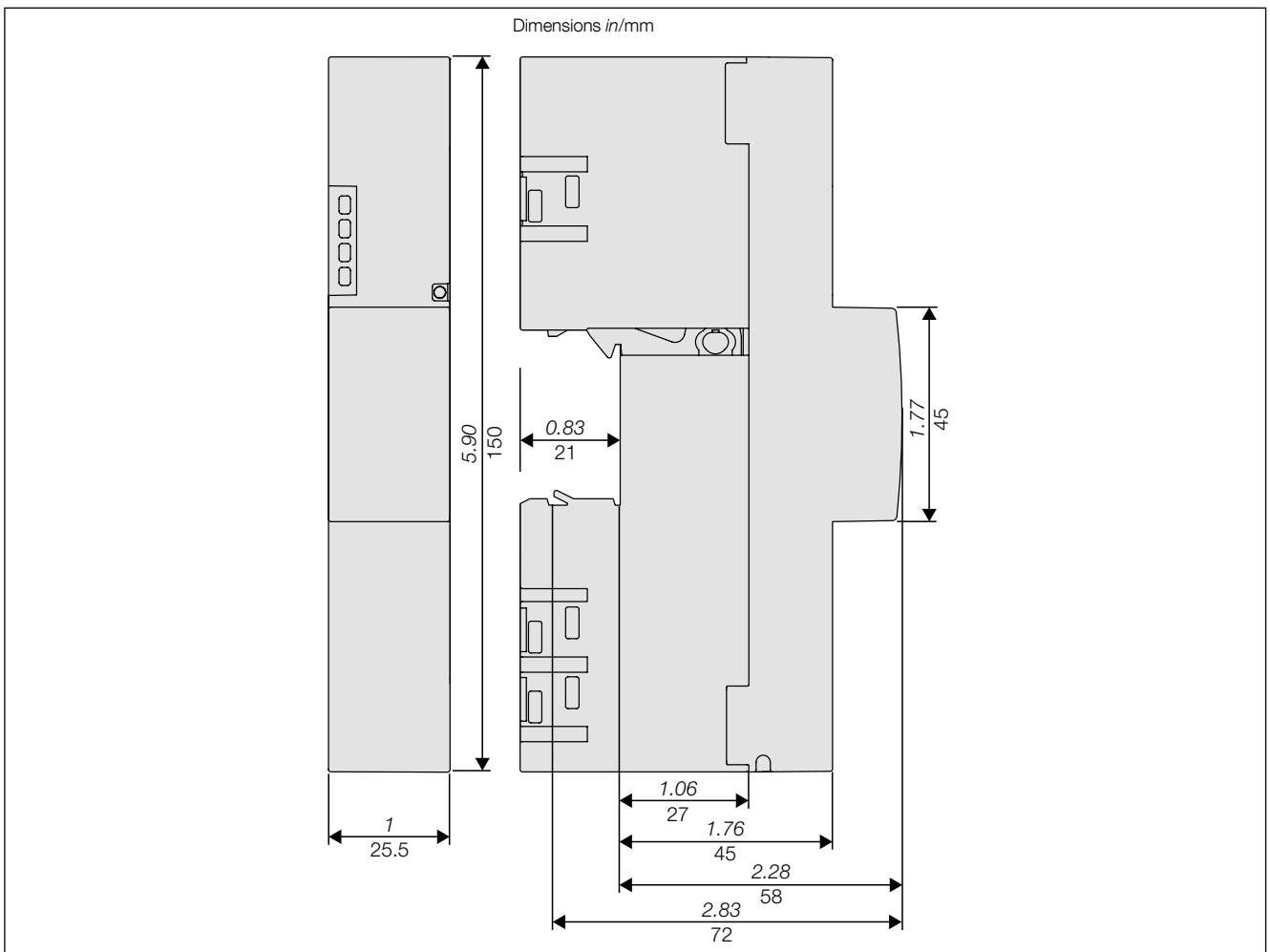
DIRIS Digiware IO		
	IO-10	IO-20
Application	Metering / Monitoring / Analysis	
Number of digital inputs/ outputs	4/2	-
Number of analogue inputs	-	2
Format		
Width	18 mm	18 mm
Number of modules	1	1
Part number	4829 0140	4829 0145

4.1.5. Dimensions

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

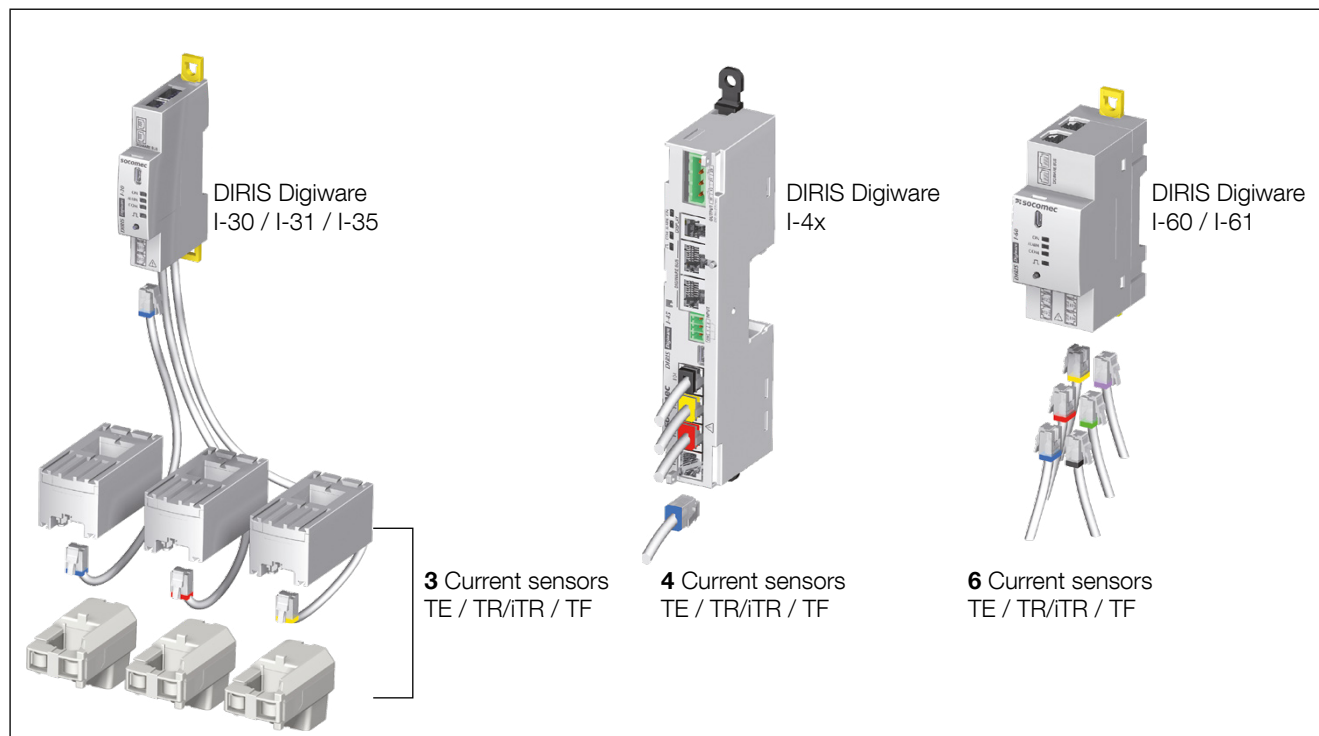


4.1.5.2. DIRIS Digiware I-4x



4.2. Presentation of the associated current sensors

Various types of current sensors are connected to DIRIS Digiware: 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 recognises the sensor size and type. 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 are 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	5	10	50 m reel + 100 connectors*
Number of cables	Part number	Part number	Part number	Part number	Part number	Part number	Part number	Part number	Part number
1	-	-	-	-	-	-	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	-	-	-




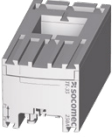
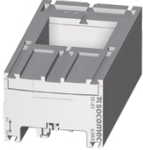
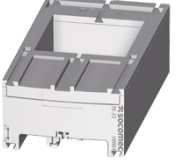
* When producing cables, do not exceed a maximum length of 10 metres.

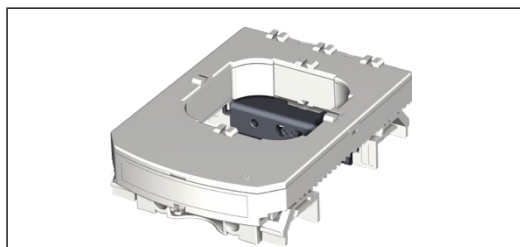
4.2.1. TE solid-core current sensors

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.

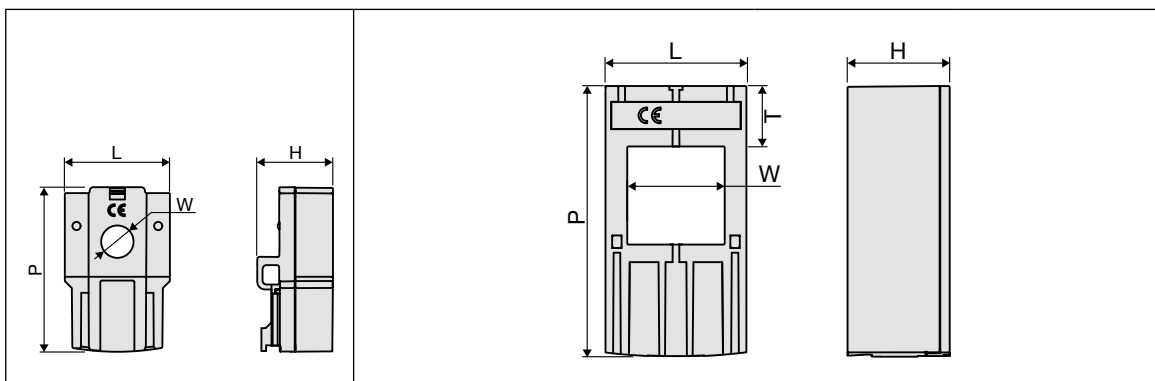
4.2.1.1. Range

						
	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

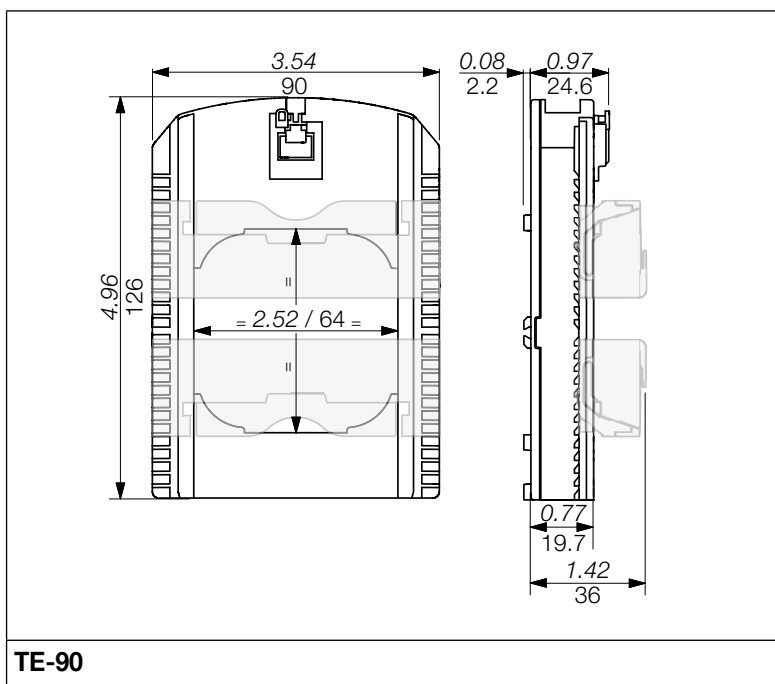


	TE-90
Pitch	90 mm
Nominal current range In	600 - 2000 A
Maximum I	2400 A
Part number	4829 0506

4.2.1.2. 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



Dimensions in/mm **TE-90**


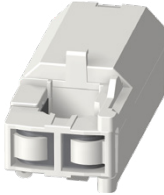
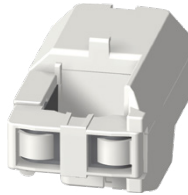
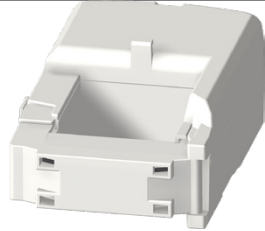
4.2.2. TR/iTR split-core current sensors

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.

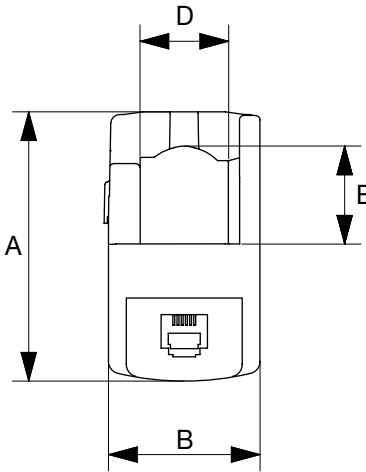
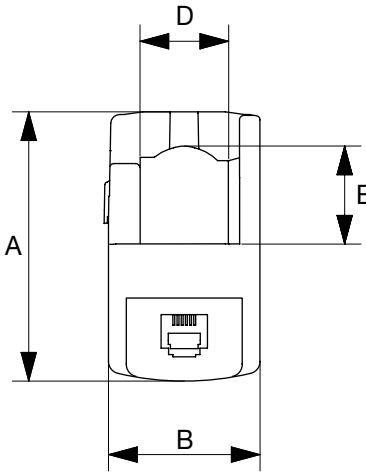
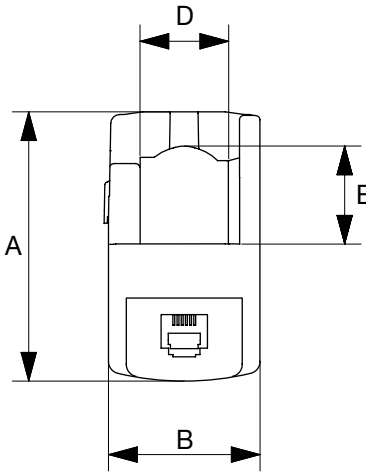
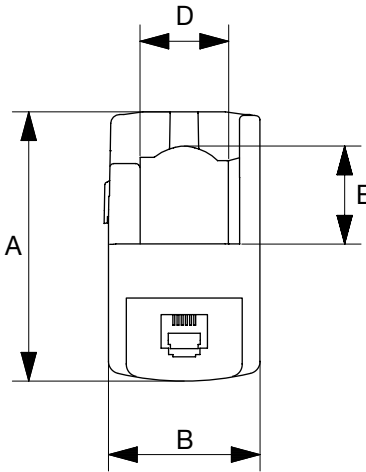
In addition, iTR sensors detect the presence of voltage in the cable passing through them.

4.2.2.1. 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
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

4.2.2.2. Dimensions

				
Dimensions in/mm	TR-10 / iTR-10	TR-14 / iTR-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

4.2.3. 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.

4.2.3.1. Range

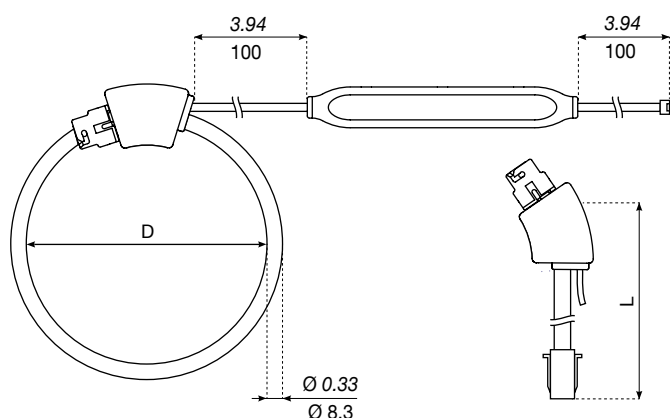
Six models are available, covering a large current range up to 6000 A with openings of different shapes and sizes. They include a compact and self-supplied integrator, required to shape the current signal.

	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

4.2.3.2. Dimensions

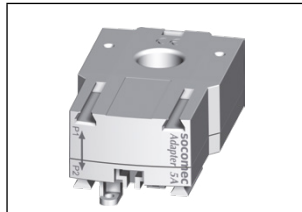
Dimensions in/mm	TF-40	TF-80	TF-120	TF-200	TF-300	TF-600
Diameter D	1.57 40	3.15 80	4.72 120	7.87 200	11.81 300	23.62 600
Perimeter P	4.96 126	9.88 251	14.84 377	24.72 628	37.09 942	74.21 1885
Integrator	8.04 x 0.75 x 0.6 128 x 19 x 15					



4.2.4. 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.

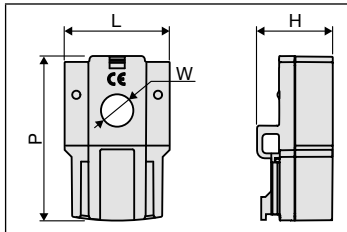
4.2.4.1. Range



5A adaptor

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

4.2.4.2. Dimensions



Dimensions in/mm

5A adaptor

LxHxD	1.10 x 0.79 x 1.77 28 x 20 x 45
Aperture (W)	∅ 0.33 ∅ 8.4

5. INSTALLATION

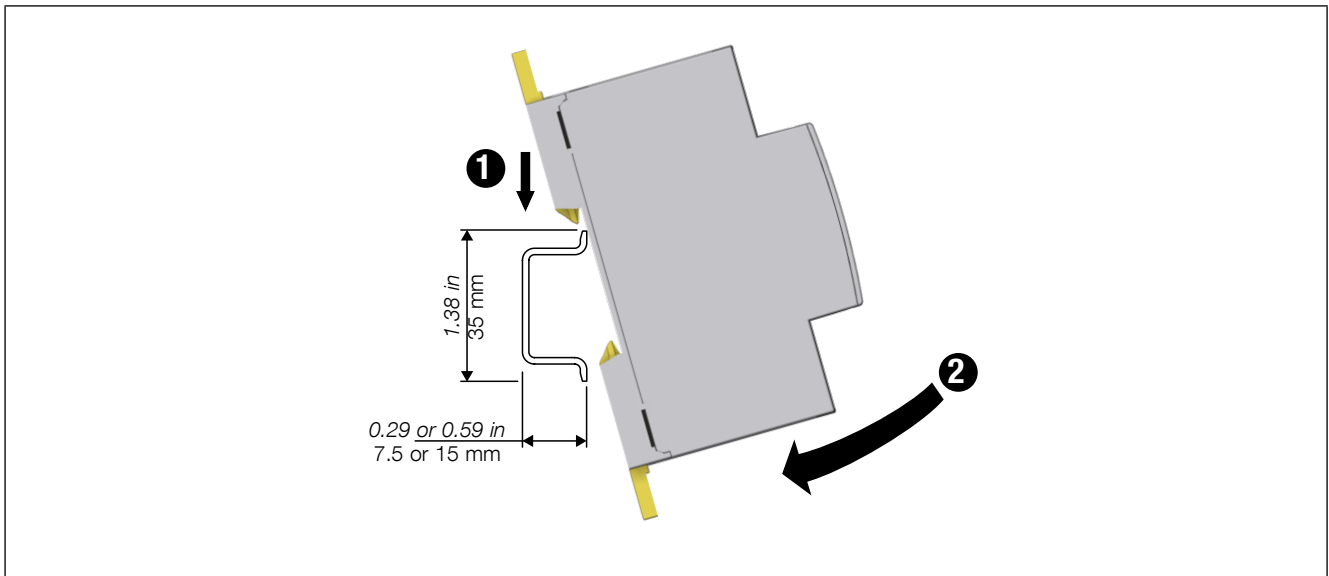
The following paragraphs describe the installation of DIRIS Digiware and its associated sensors.

5.1. Recommendations and safety

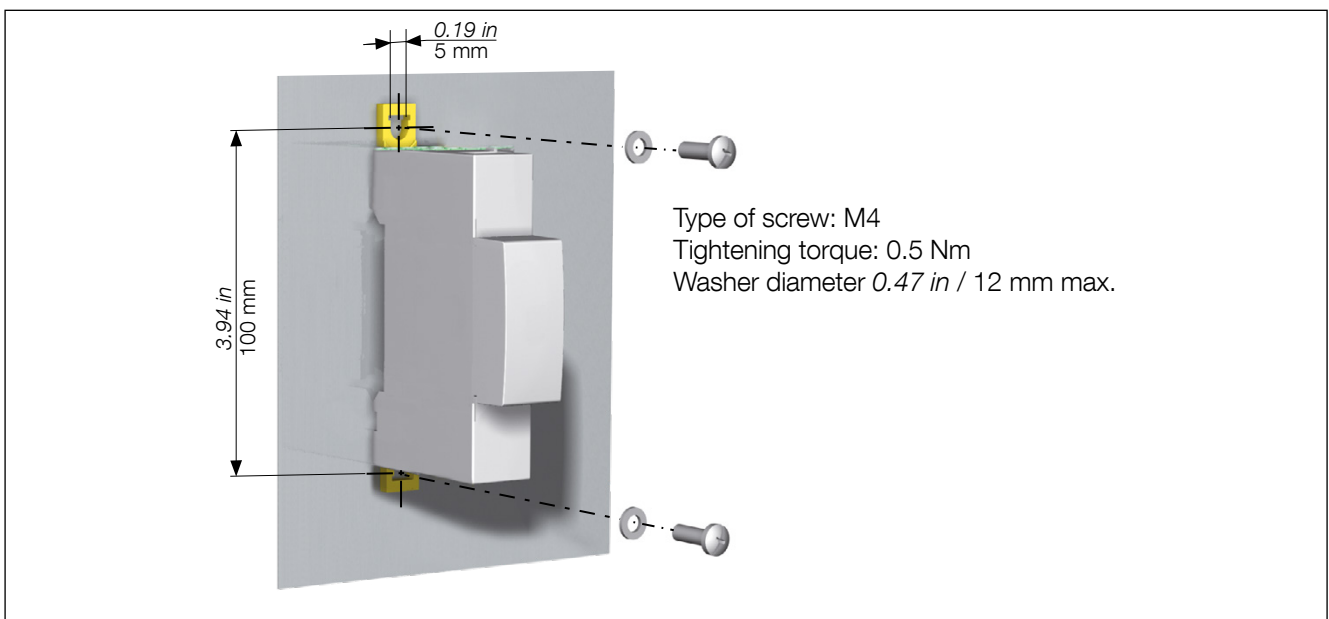
Refer to the safety instructions (section “2. Hazards and warnings”, page 5)

5.2. DIRIS Digiware mounting

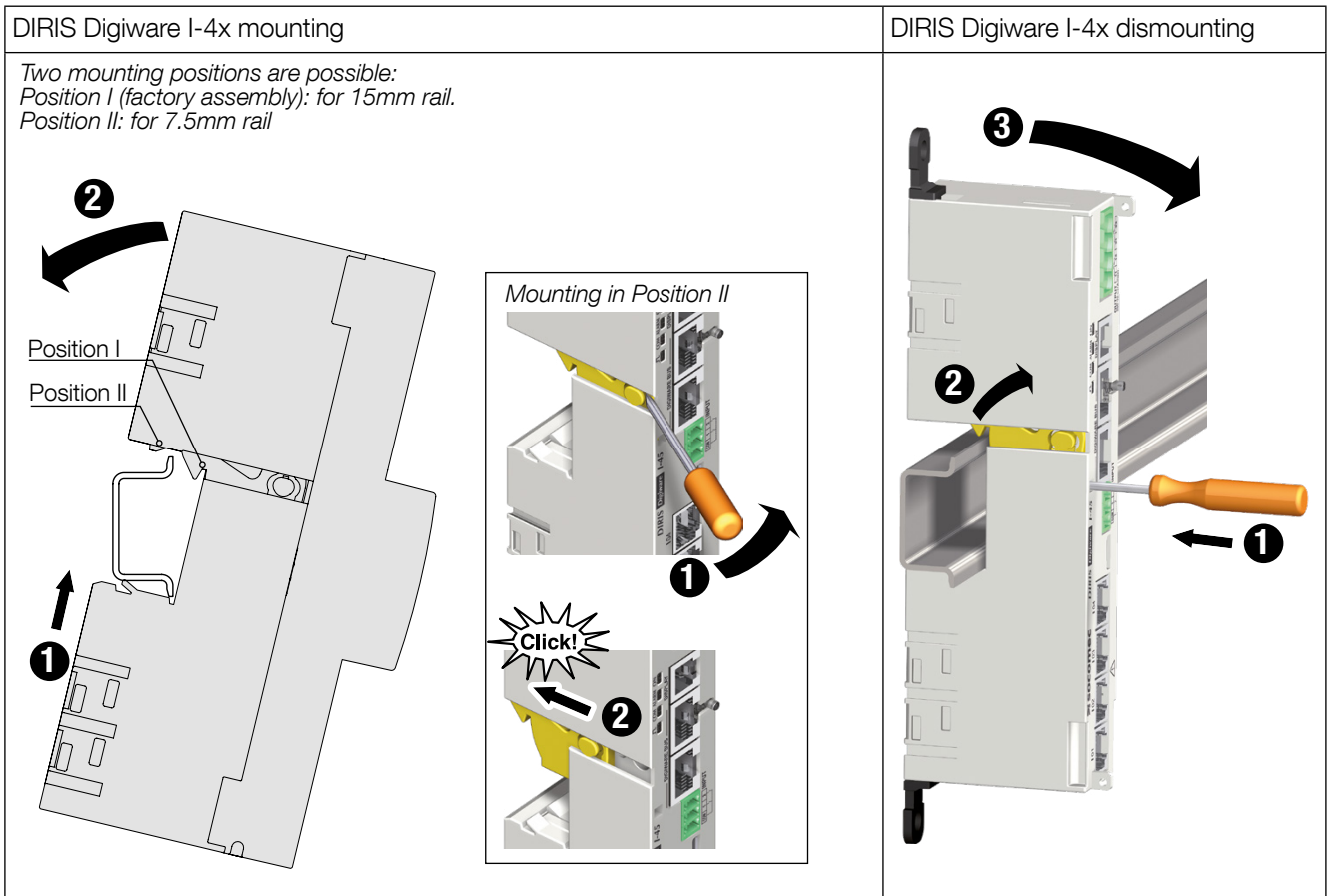
5.2.1. DIRIS Digiware C, U, I-3x, I-6x, IO-x - DIN rail-mounting



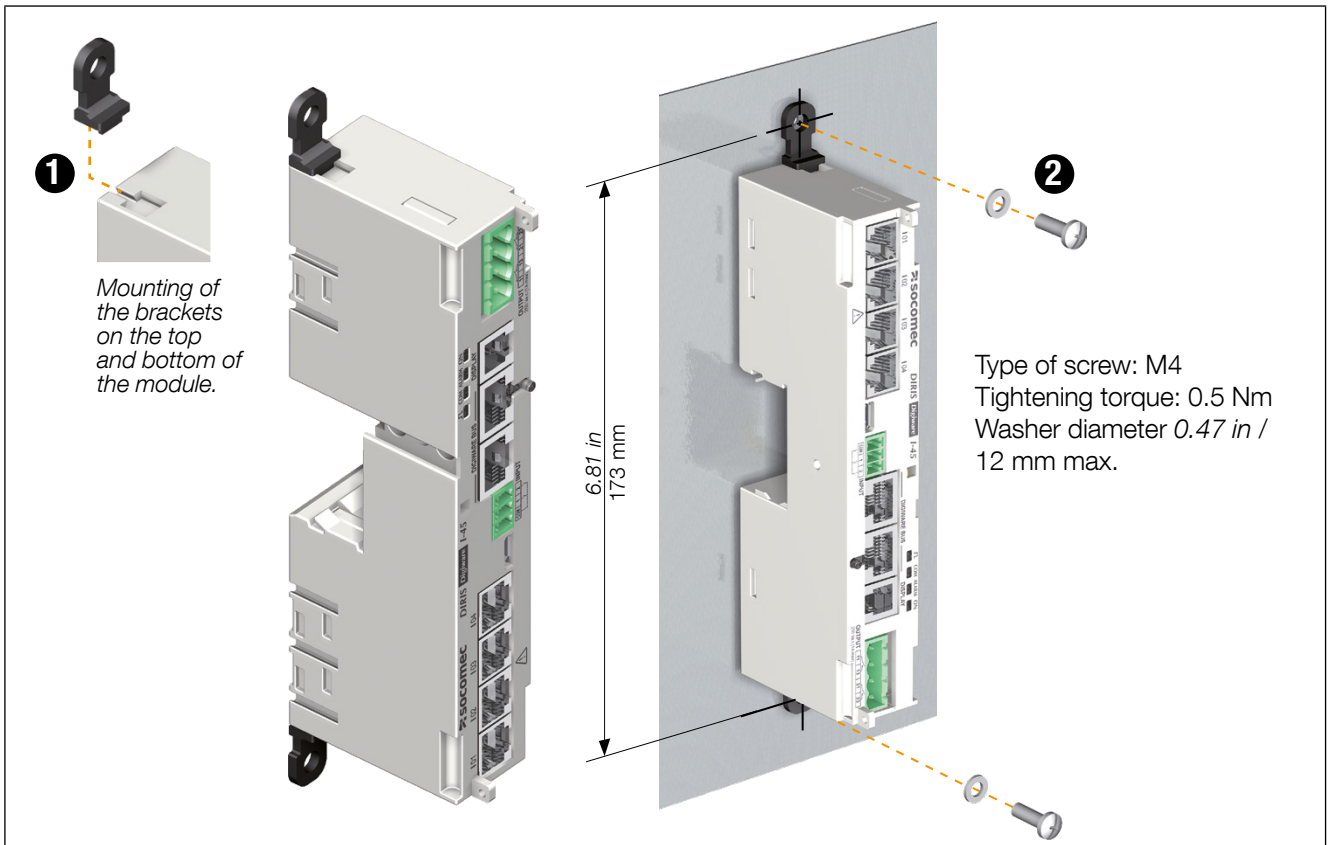
5.2.2. DIRIS Digiware C, U, I-3x, I-6x, IO-x - backplate-mounting



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



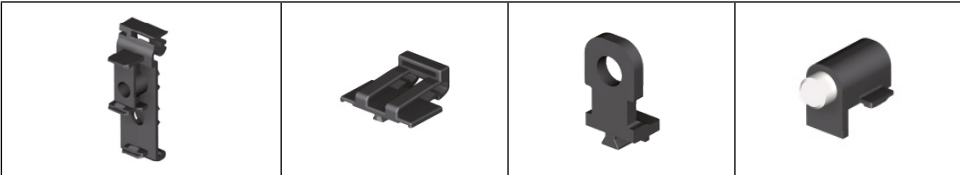
5.2.4. DIRIS Digiware I-4x - back-plate mounting



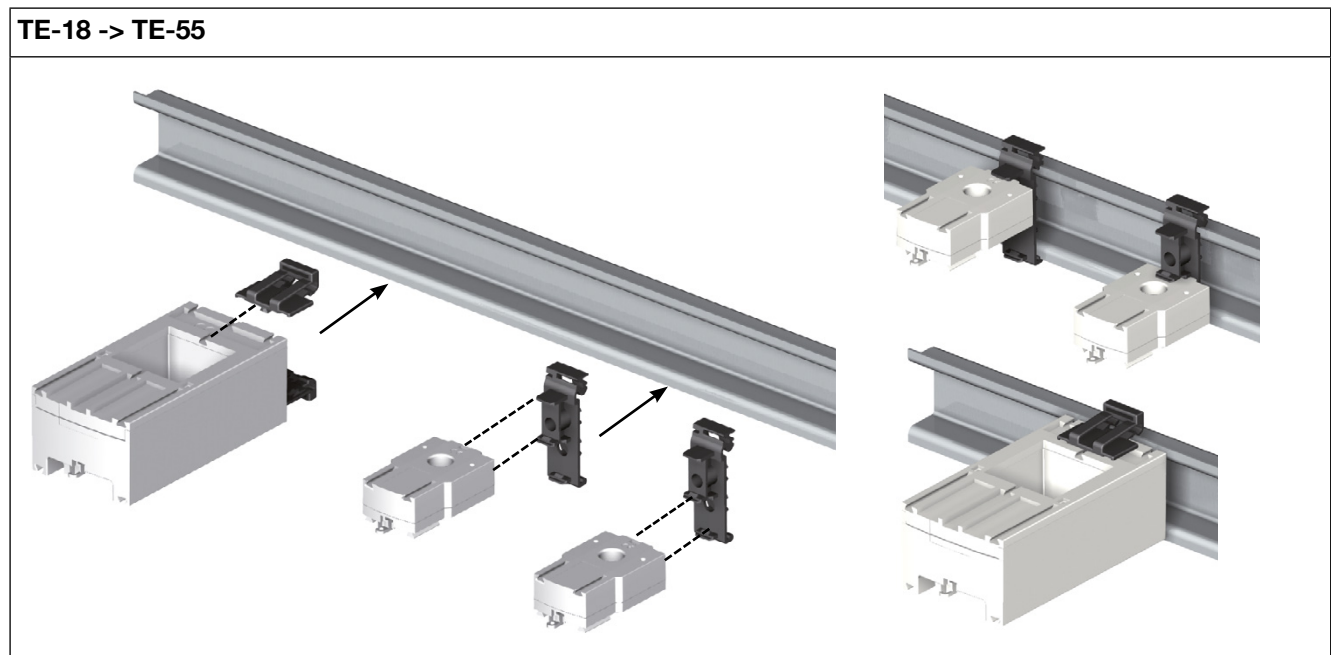
5.3. Installing TE solid-core sensors

5.3.1. Mounting accessories

All mounting accessories supplied with the sensors are listed below:

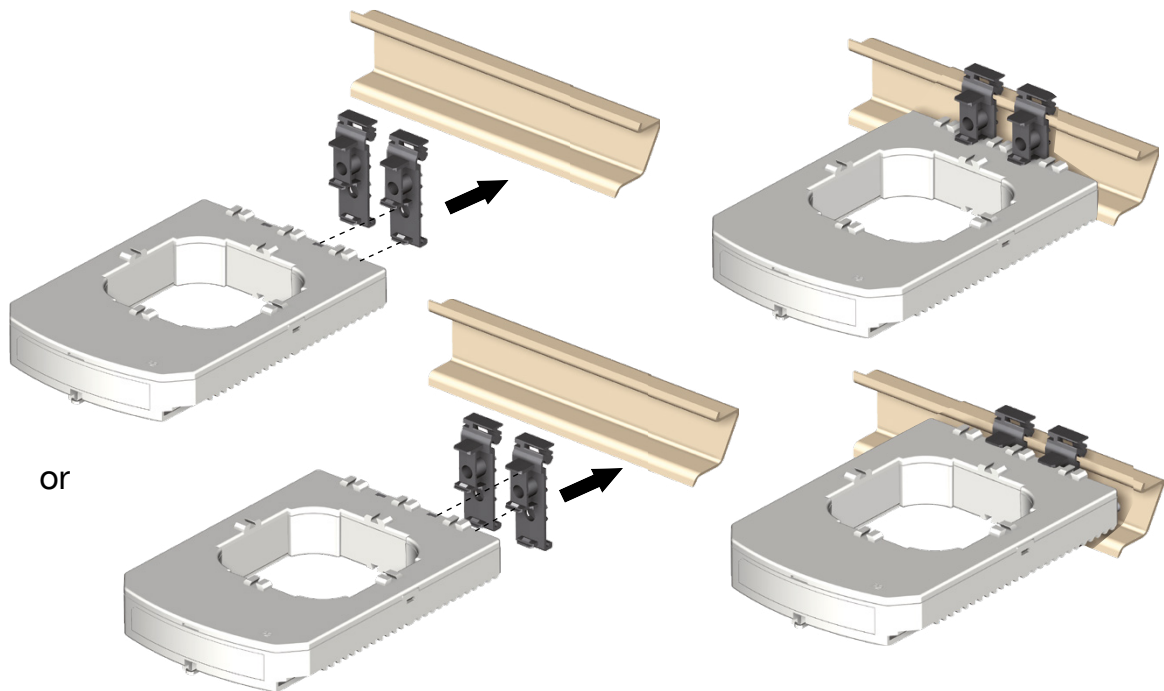
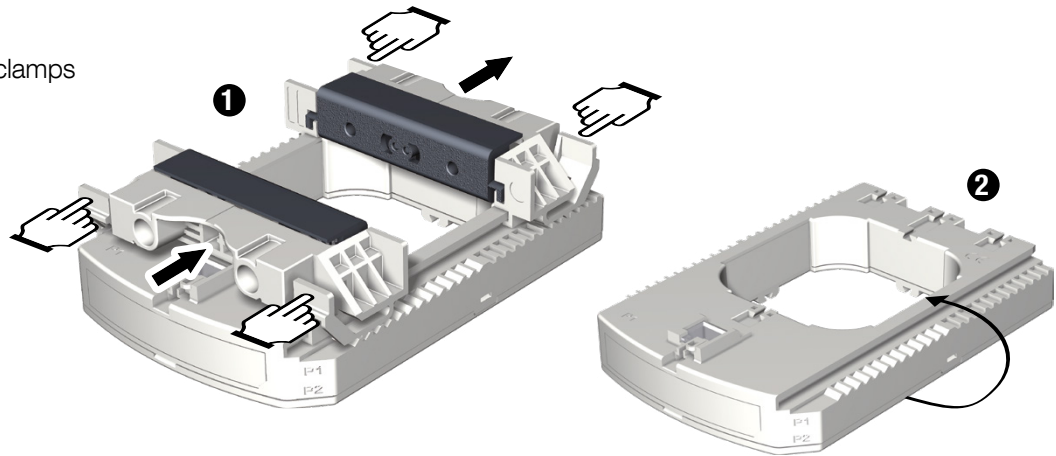
Part number	Pitch				
		DIN rail and plate mounting	DIN rail mounting	Plate mounting	Busbar mounting
4829 0500 4829 0501	TE-18 18 mm	x1			
4829 0502	TE-25 25 mm		x2	x4	
4829 0503	TE-35 35 mm		x2	x4	x2
4829 0504	TE-45 45 mm		x2	x4	x2
4829 0505	TE-55 55 mm		x2	x4	x2
4829 0506	TE-90 90 mm	x2		x6	

5.3.2. DIN rail mounting



TE-90

Removing the clamps

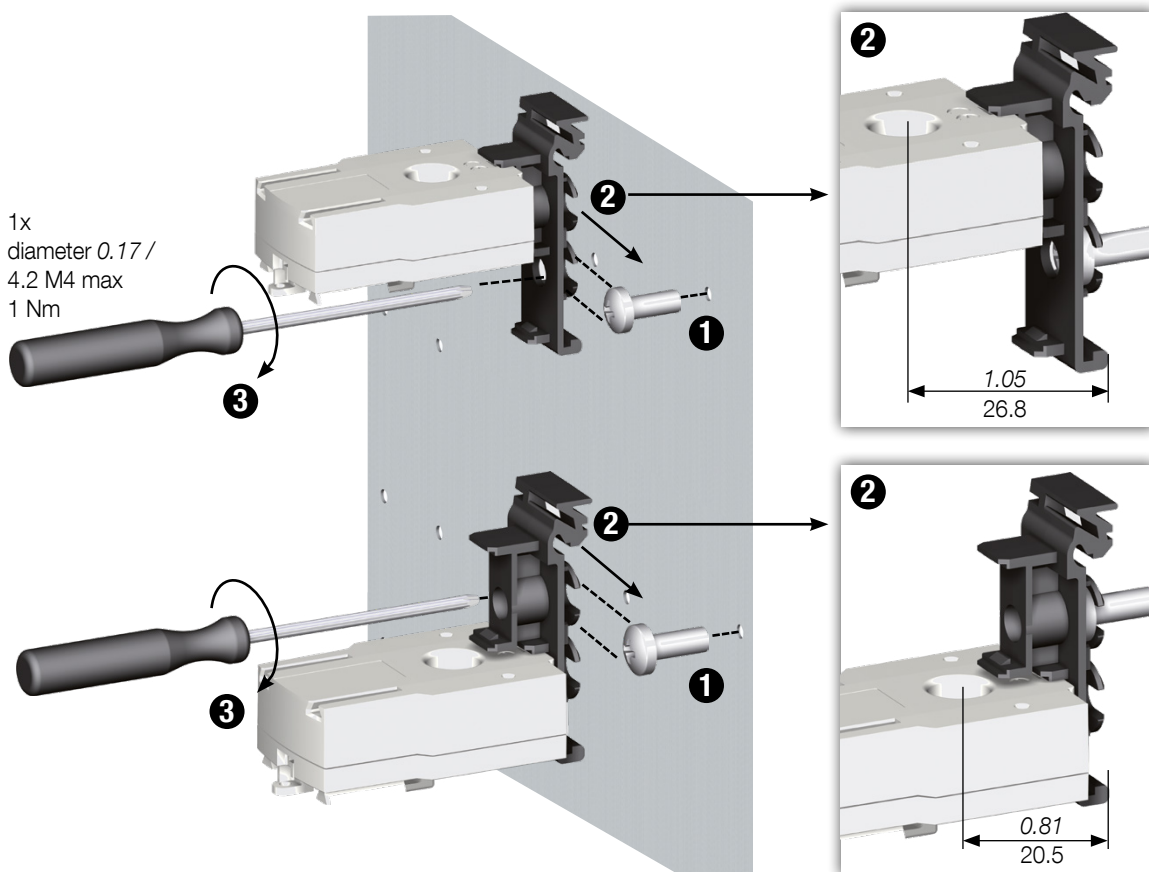


NB: It is possible to fix the TE-90 sensor to a DIN rail to make it easier to install. This is a temporary installation. Remove the clamps to install the TE-90 sensors on the DIN rail.

5.3.3. Back-plate mounting

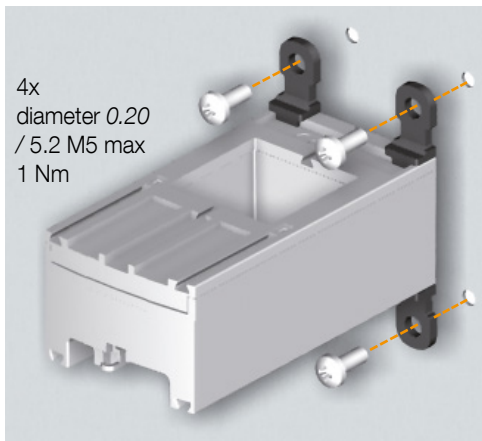
TE-18

1x
diameter 0.17 /
4.2 M4 max
1 Nm



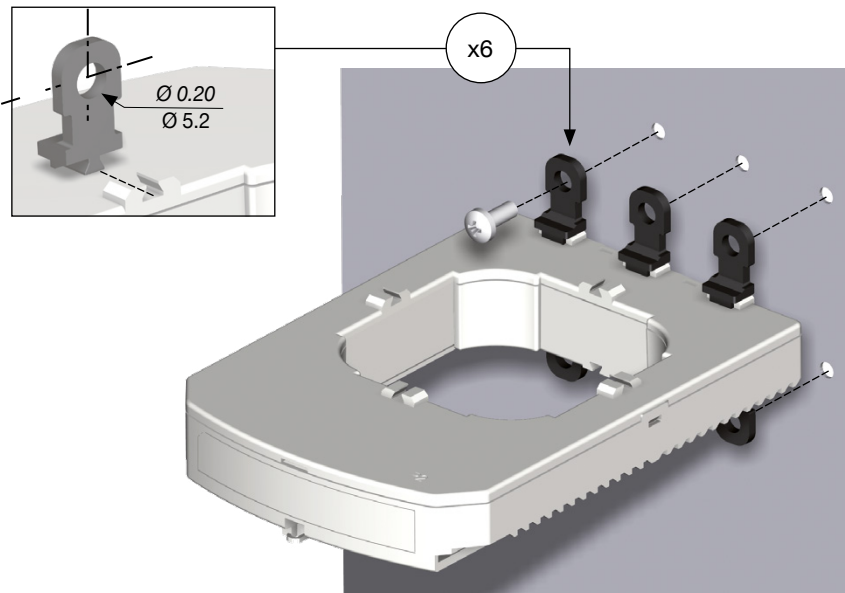
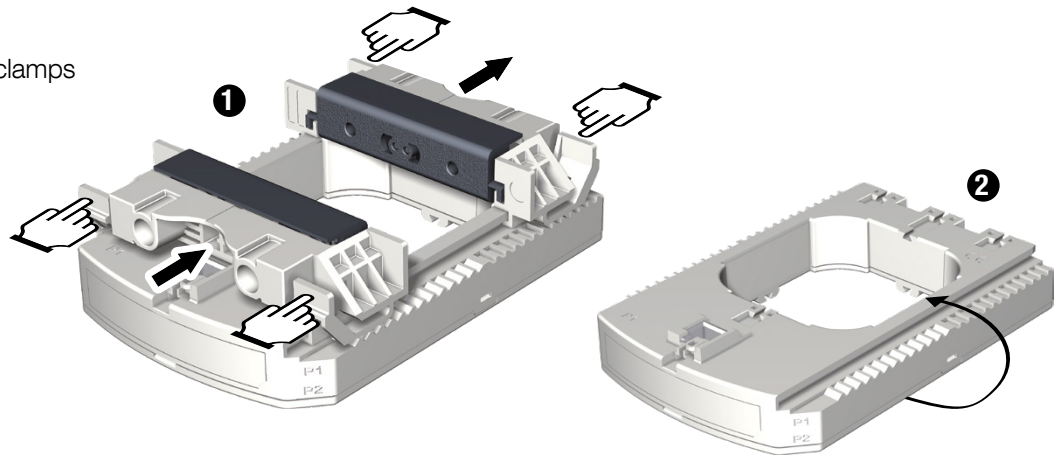
TE-25 -> TE-55

4x
diameter 0.20
/ 5.2 M5 max
1 Nm



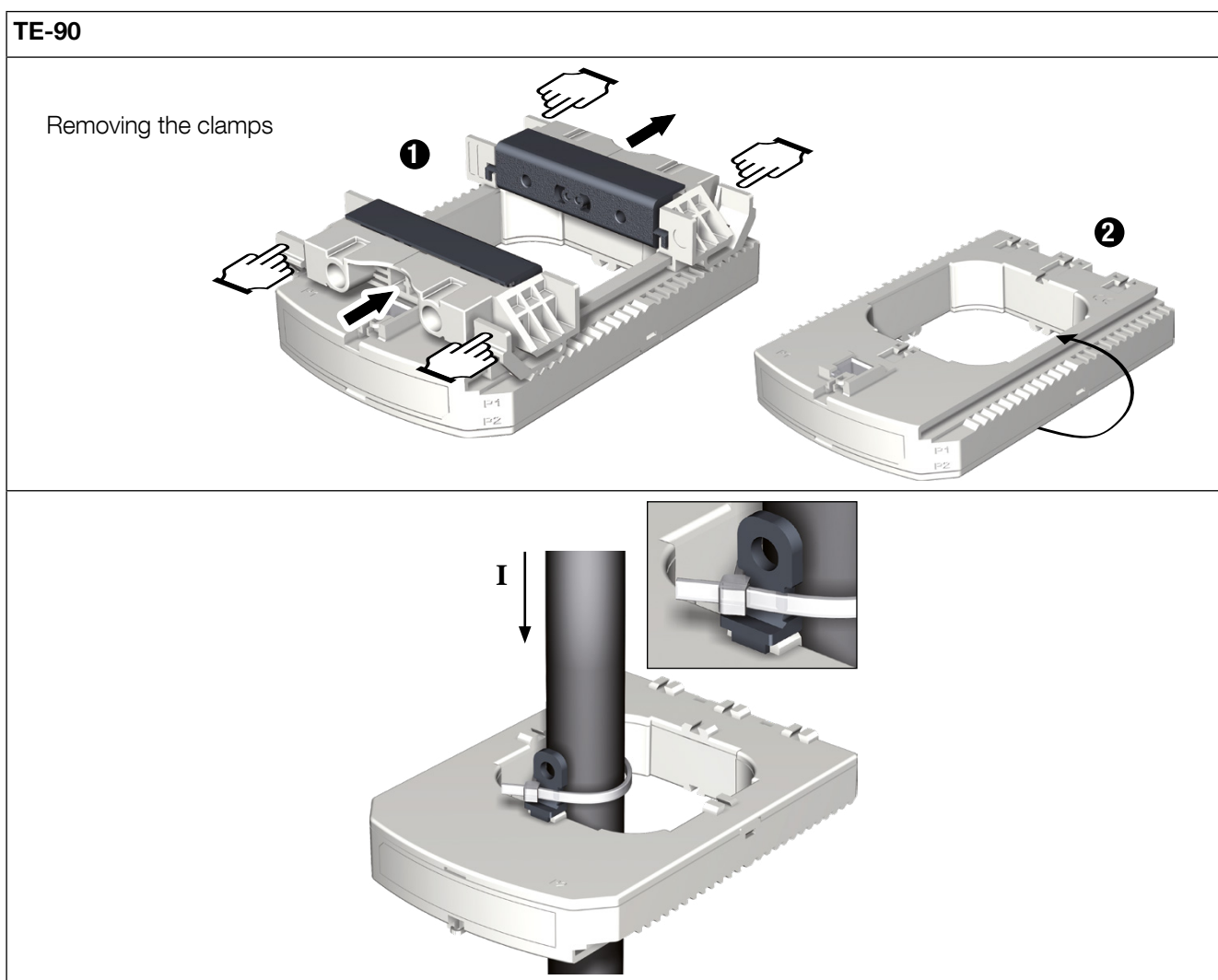
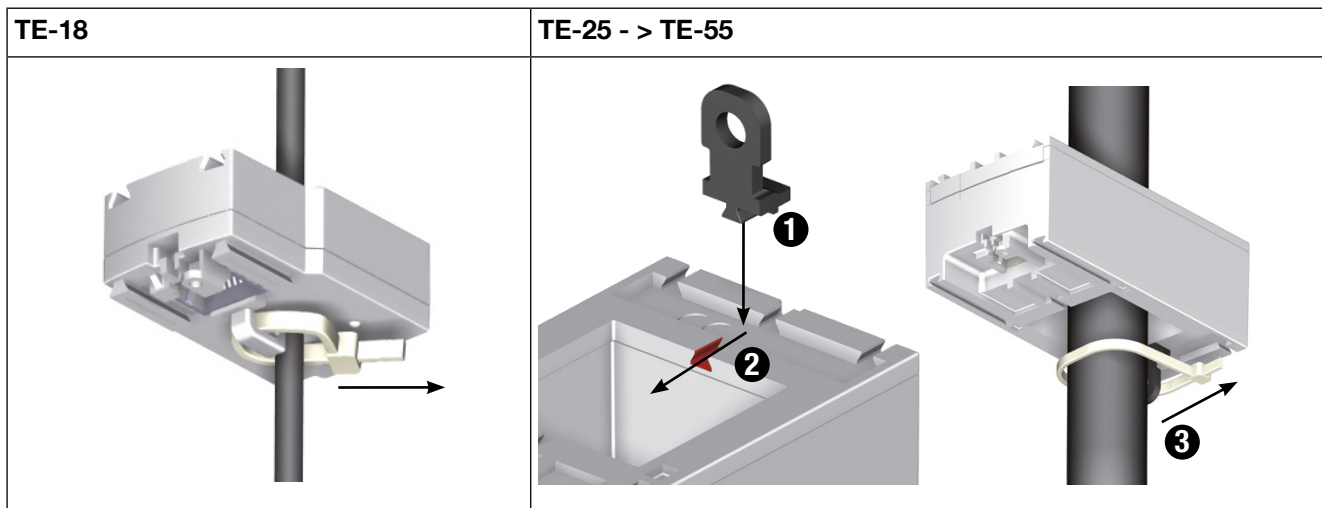
TE-90

Removing the clamps




NB: Remove the clamps to install the TE-90 sensors on the back- plate.

5.3.4. Installing on a cable with clamping collar

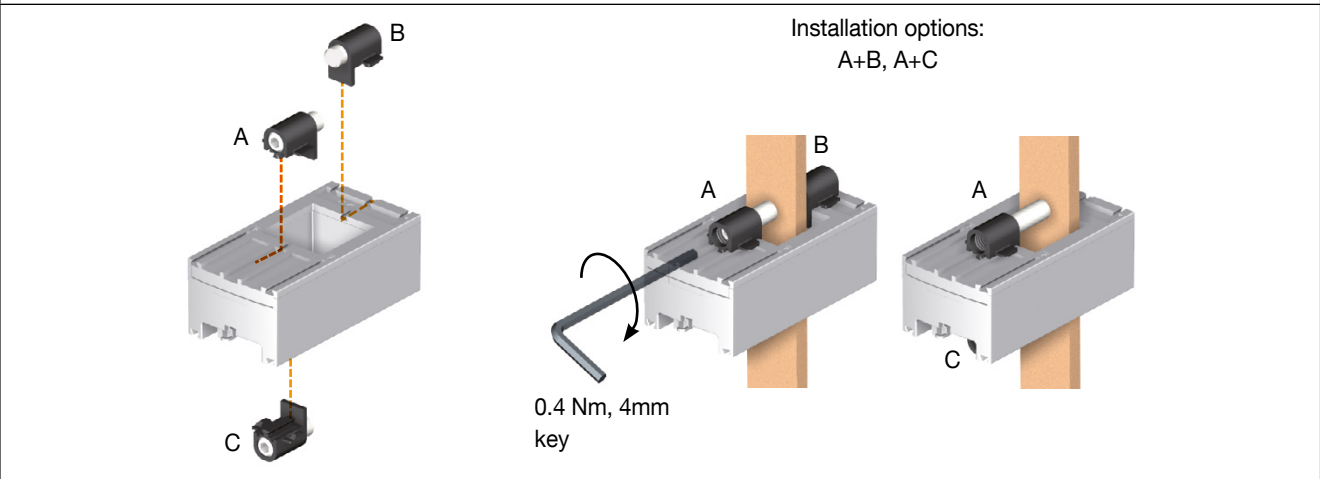


NB: Remove the clamps to install the TE-90 sensors on a cable with clamping collar.

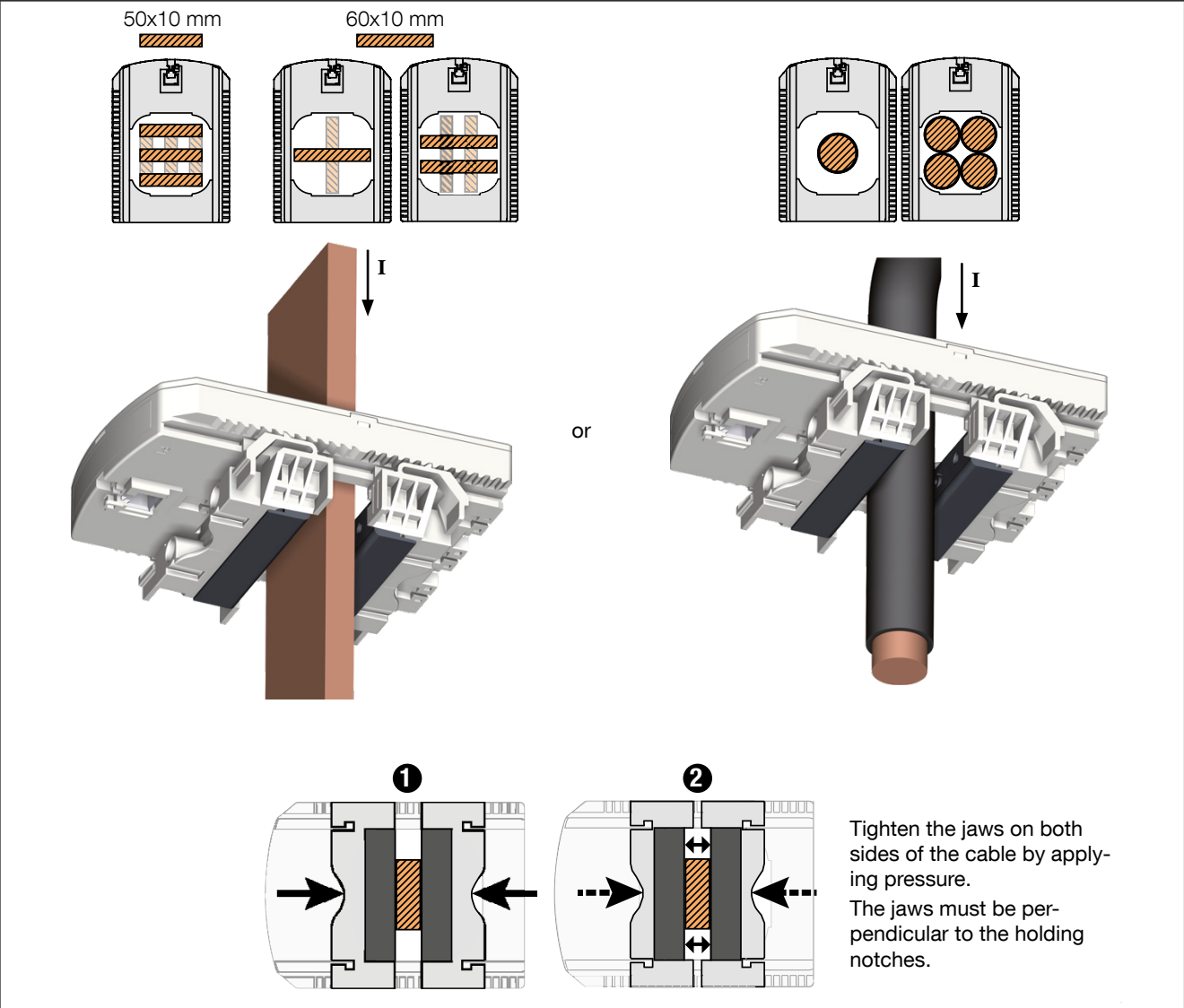
	<p>Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032</p>
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5.3.5. Bar mounting

TE-35 -> TE-55

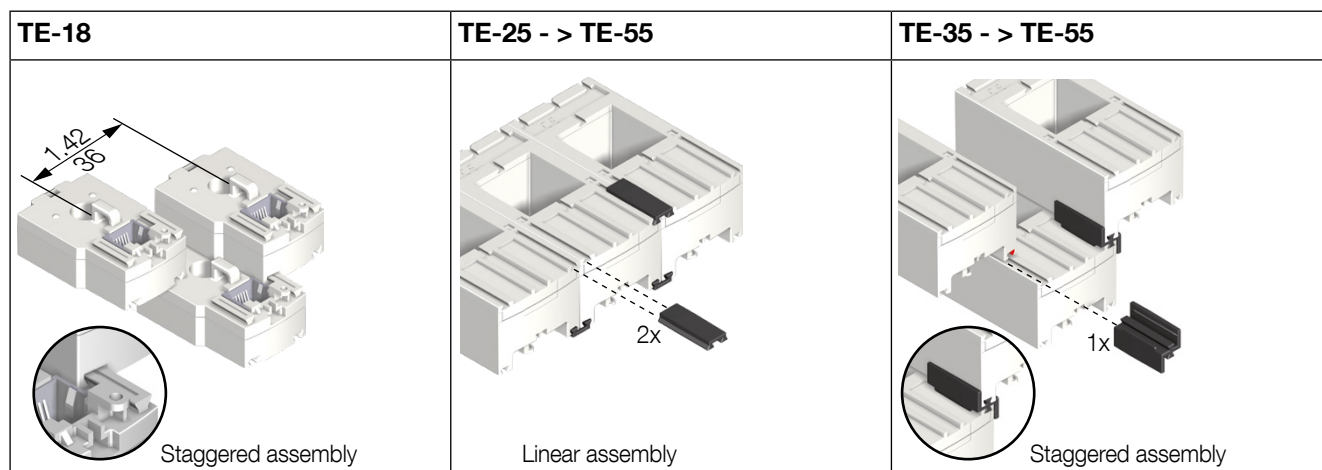


TE-90

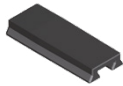
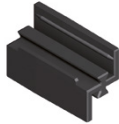


Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

5.3.6. Sensors assembly

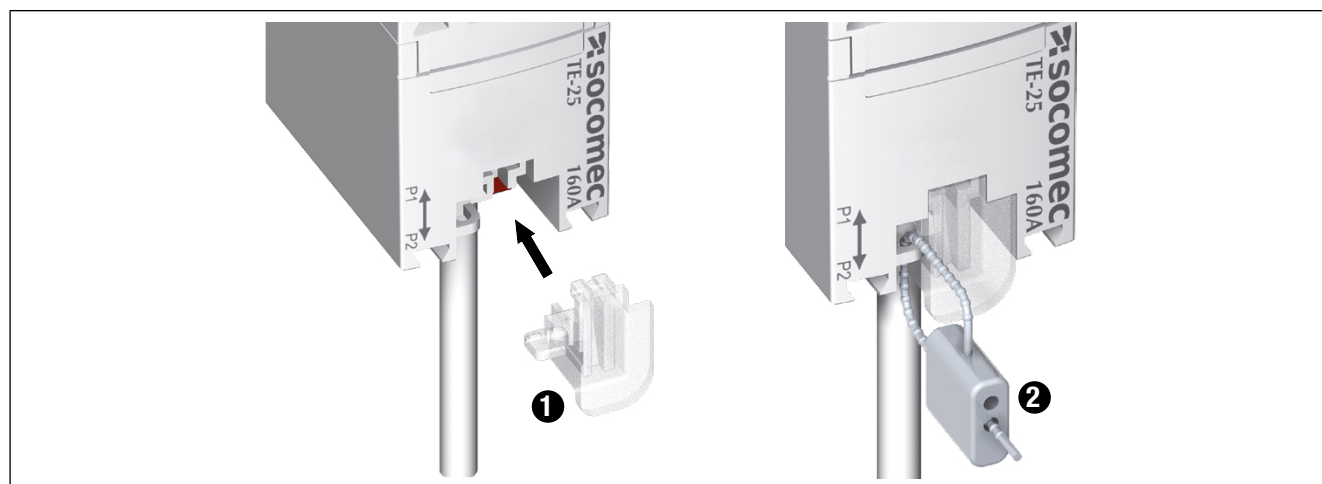


Mounting accessories for sensor combination:

		
Part number	Linear assembly	Staggered assembly
4829 0598	x30	

These accessories must be ordered separately.

5.3.7. Sealing accessories for sensors

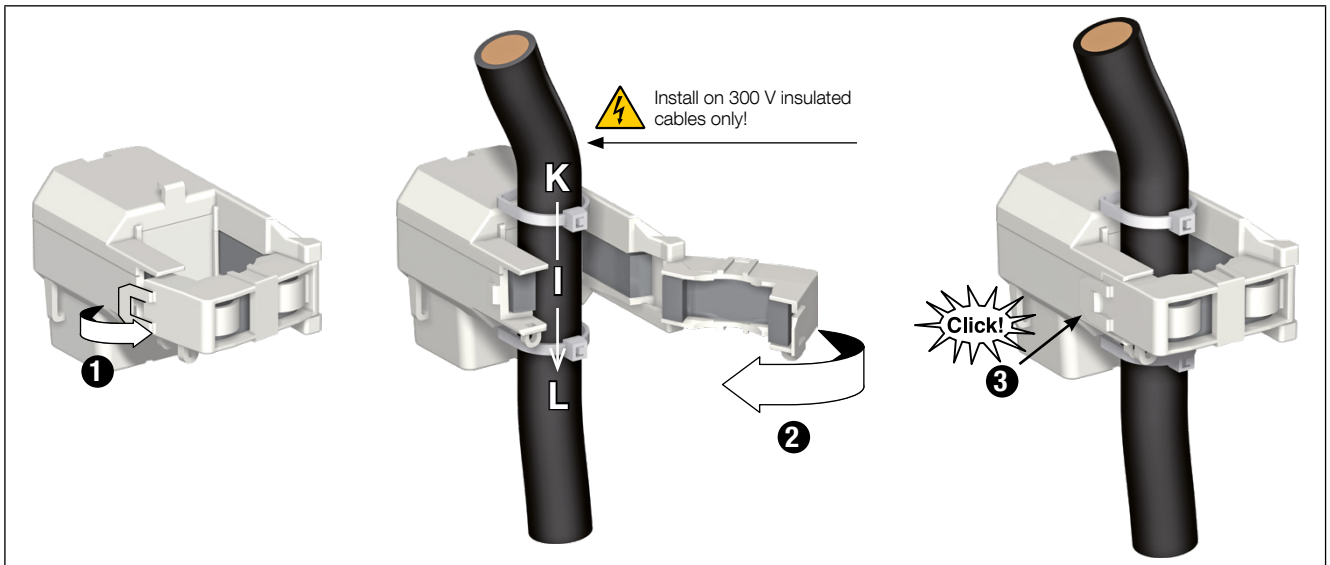


Part number	Sealing case for terminal
4829 0600	x20

These accessories must be ordered separately.

5.4. Installing TR/iTR split-core sensors

5.4.1. Cable mounting



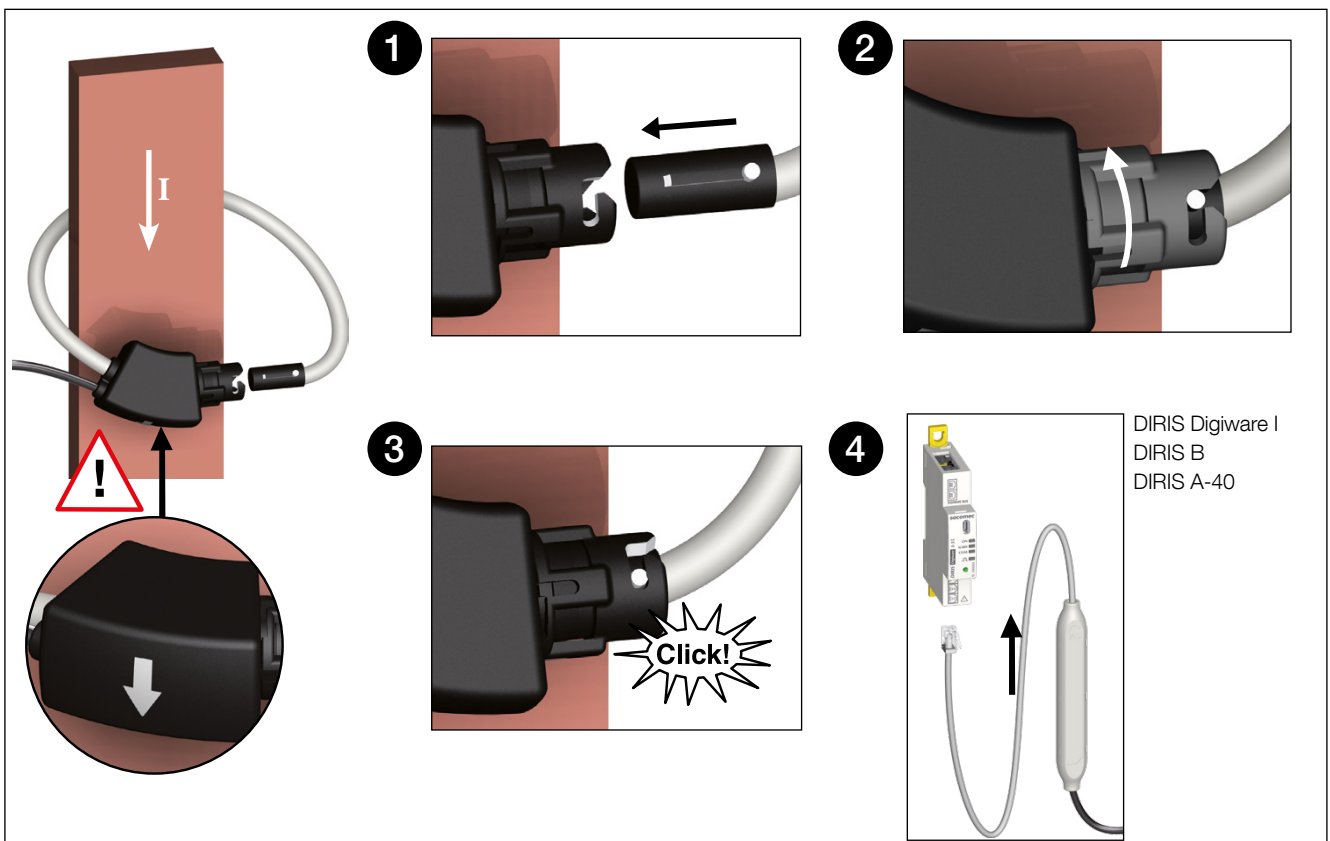
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

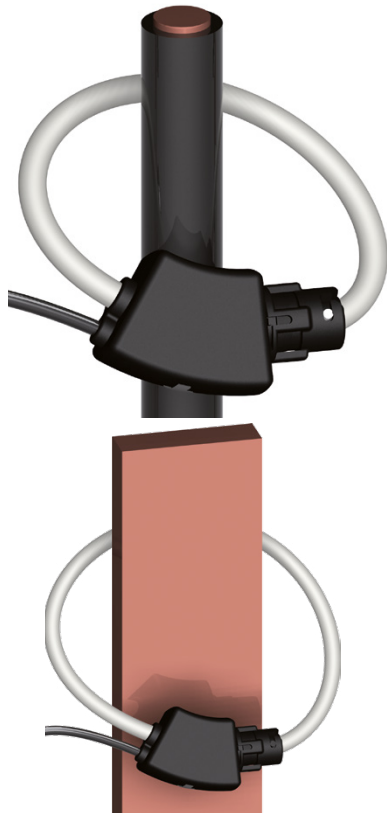


Before closing the TR/iTR sensor, check that the air gap is clean (no contamination or corrosion)

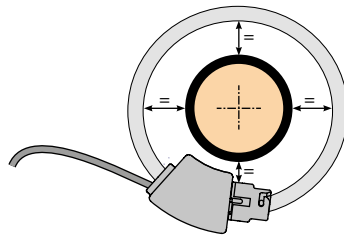
5.5. Installing TF Flexible current sensors

5.5.1. Bar or cable mounting

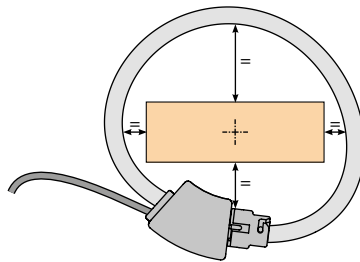




Centred position for the best measurement



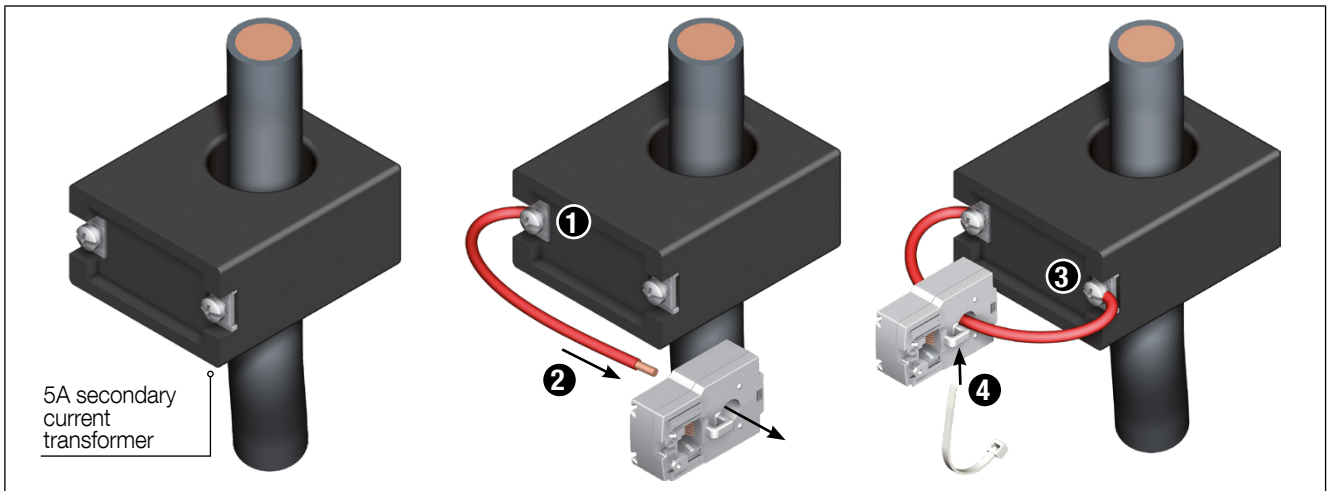
Centred position for the best measurement



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


5.6. Installing the 5A adapter



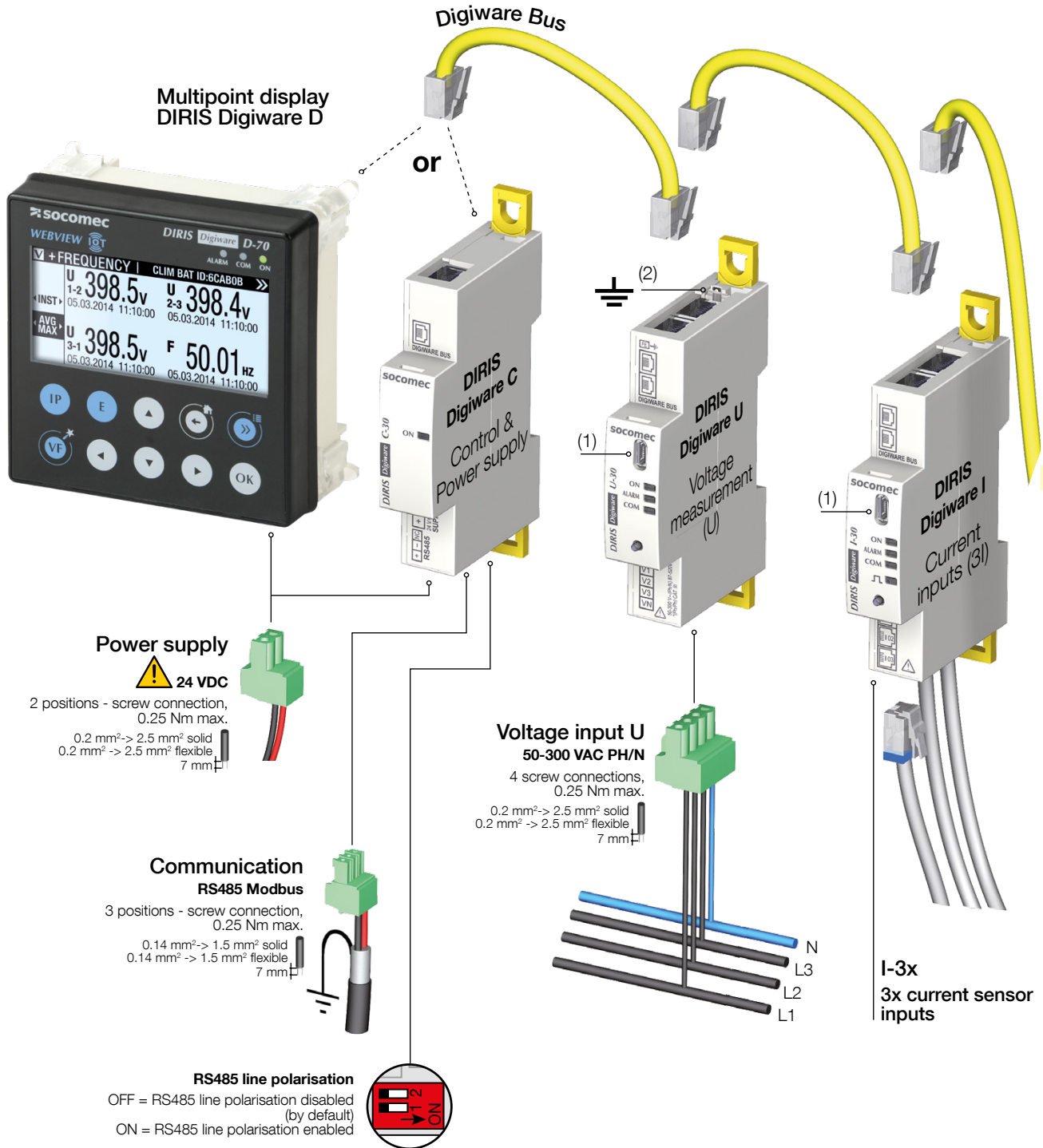
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

6. CONNECTION

6.1. DIRIS Digiware connection

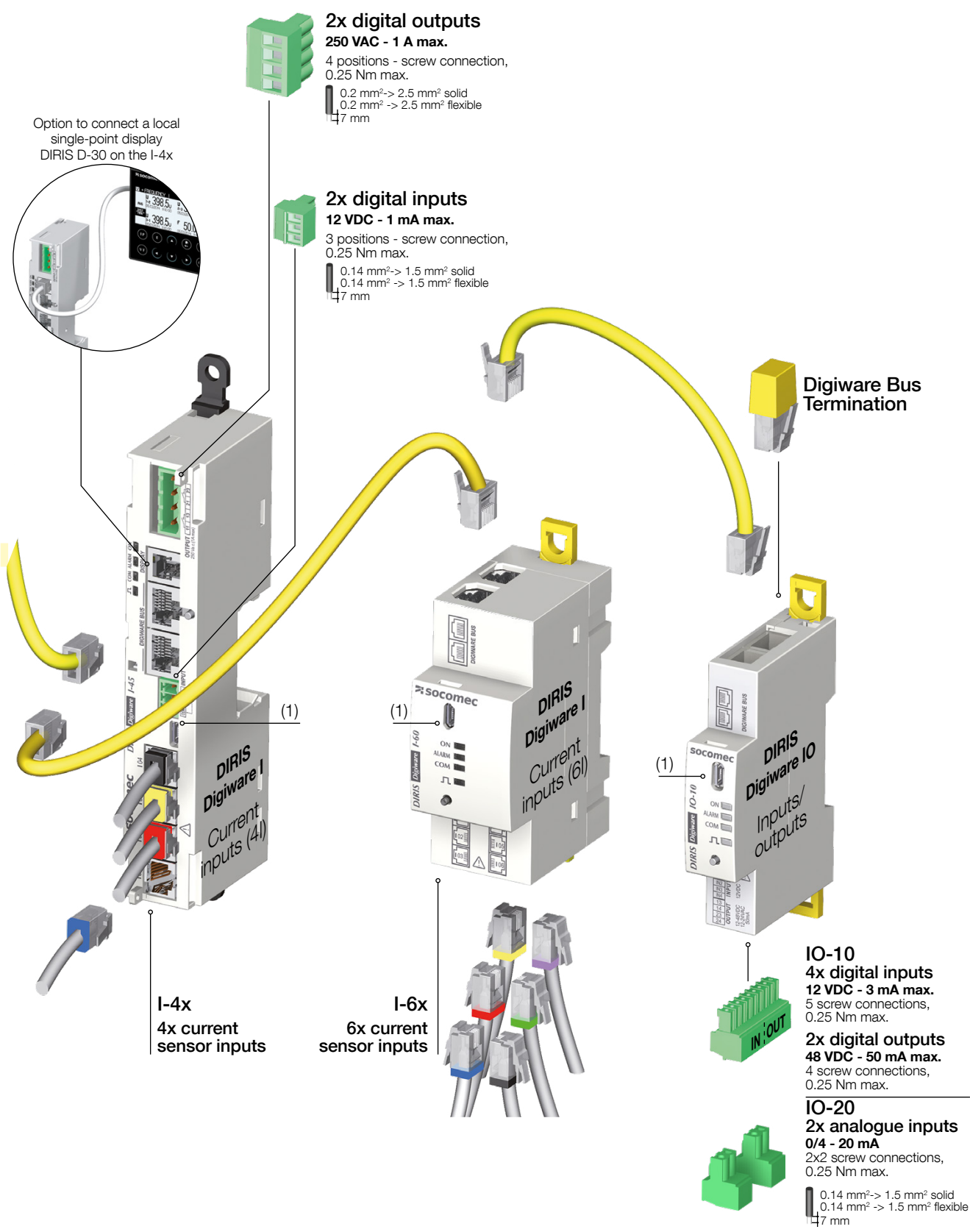


Only use a SOCOMEC Digiware bus cable (UTP RJ45 straight, twisted pair, unshielded, AWG24, 600V CAT V -10 ... +70°C).
When wiring, make sure you separate the low voltage (LV) section and the very low voltage (SELV) section to prevent any risk of electric shock.



(1) Micro USB - type B

(2) Earth must not be used in a neutral IT system



Option to connect a local single-point display DIRIS D-30 on the I-4x

2x digital outputs
250 VAC - 1 A max.
 4 positions - screw connection, 0.25 Nm max.
 0.2 mm²-> 2.5 mm² solid
 0.2 mm² -> 2.5 mm² flexible
 7 mm

2x digital inputs
12 VDC - 1 mA max.
 3 positions - screw connection, 0.25 Nm max.
 0.14 mm²-> 1.5 mm² solid
 0.14 mm² -> 1.5 mm² flexible
 7 mm

Digiware Bus Termination

I-4x
 4x current sensor inputs

I-6x
 6x current sensor inputs

IO-10
 4x digital inputs
12 VDC - 3 mA max.
 5 screw connections, 0.25 Nm max.

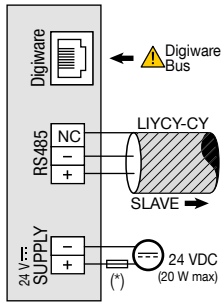
2x digital outputs
48 VDC - 50 mA max.
 4 screw connections, 0.25 Nm max.

IO-20
 2x analogue inputs
0/4 - 20 mA
 2x2 screw connections, 0.25 Nm max.

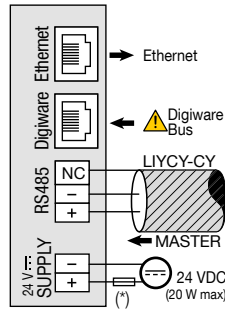
0.14 mm²-> 1.5 mm² solid
 0.14 mm² -> 1.5 mm² flexible
 7 mm

Description of the terminals

DIRIS Digiware D-40

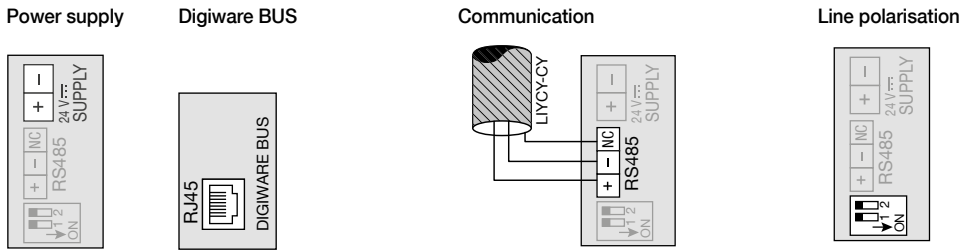


DIRIS Digiware D-50 / D-70

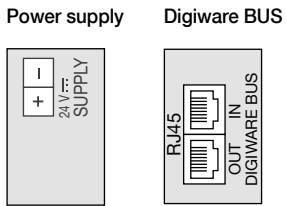


(*) 1 A gG/Am fuse if using a non-SOCOME C supply

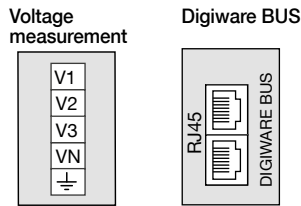
DIRIS Digiware C-31



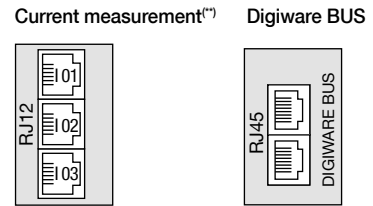
DIRIS Digiware C-32



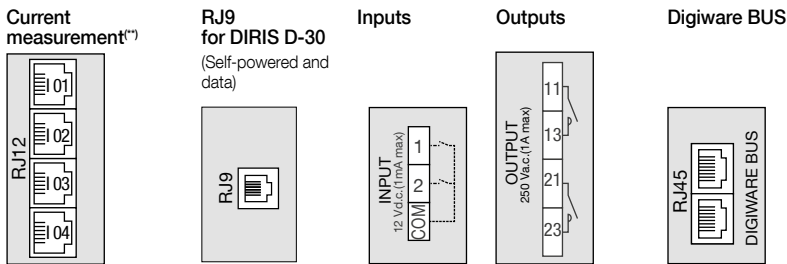
DIRIS Digiware U



DIRIS Digiware I-3x

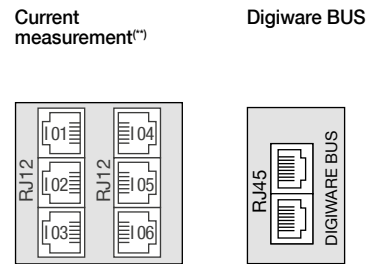


DIRIS Digiware I-4x

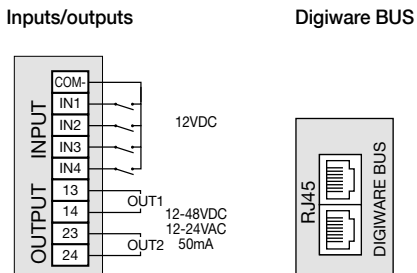


(**) Always connect input I01 first.

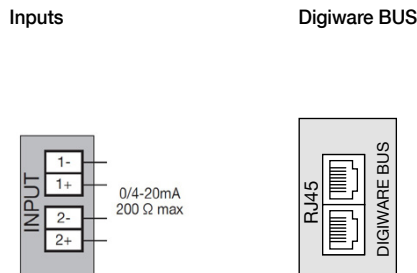
DIRIS Digiware I-6x



DIRIS Digiware IO-10

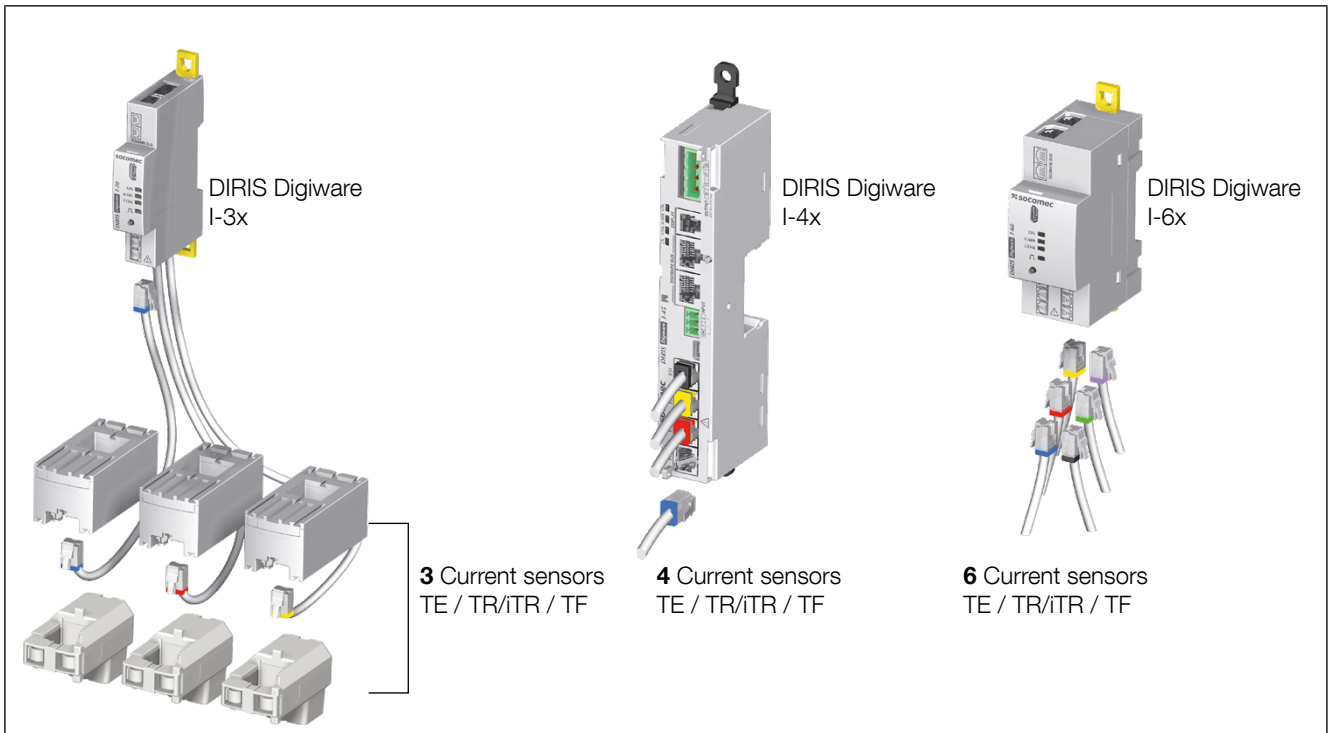


DIRIS Digiware IO-20



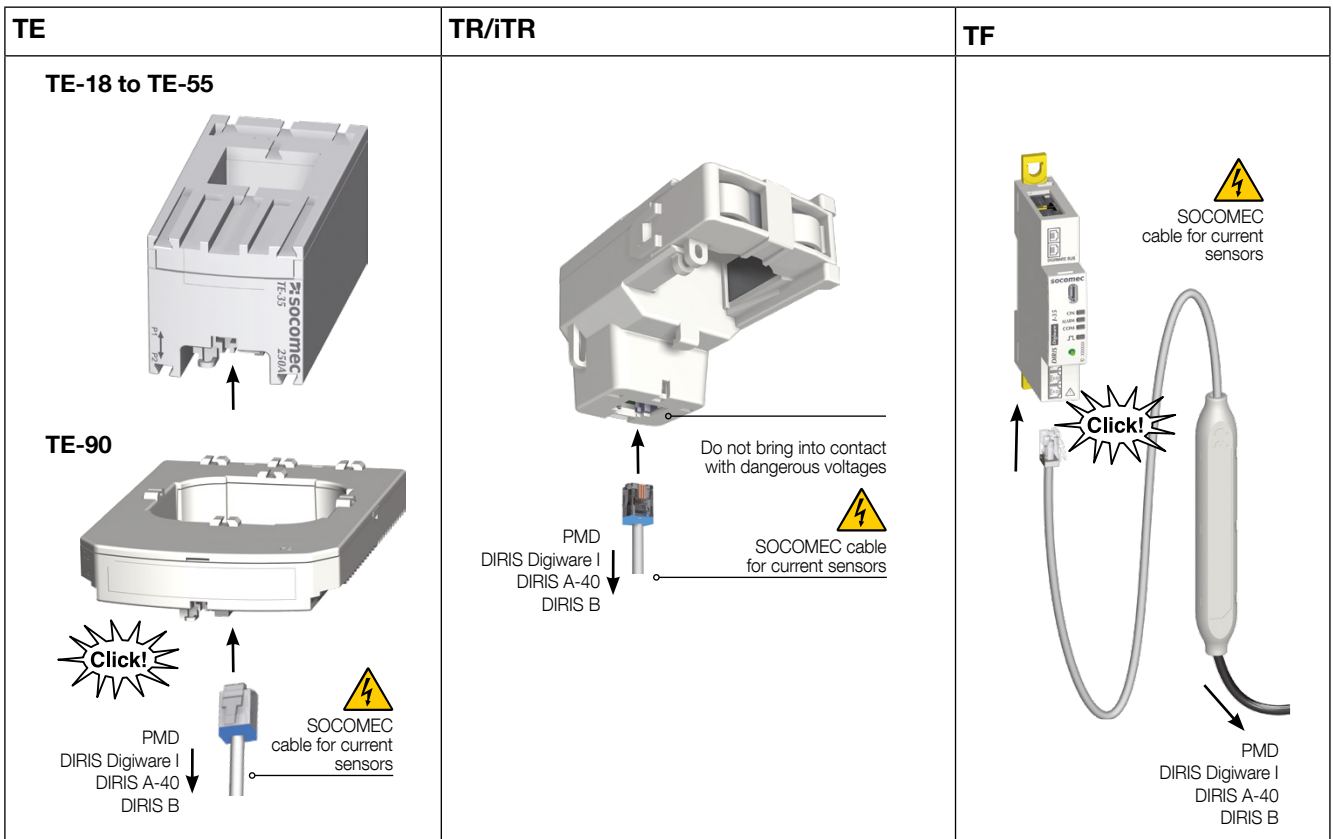
6.2. Connecting the current sensors

6.2.1. Connection concept



- 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 are installed in the same direction.
- Always connect input I01 first.

6.2.2. Details on the RJ12 connections for each current sensor



6.3. 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 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.

6.3.1. Configurable loads based on the network type

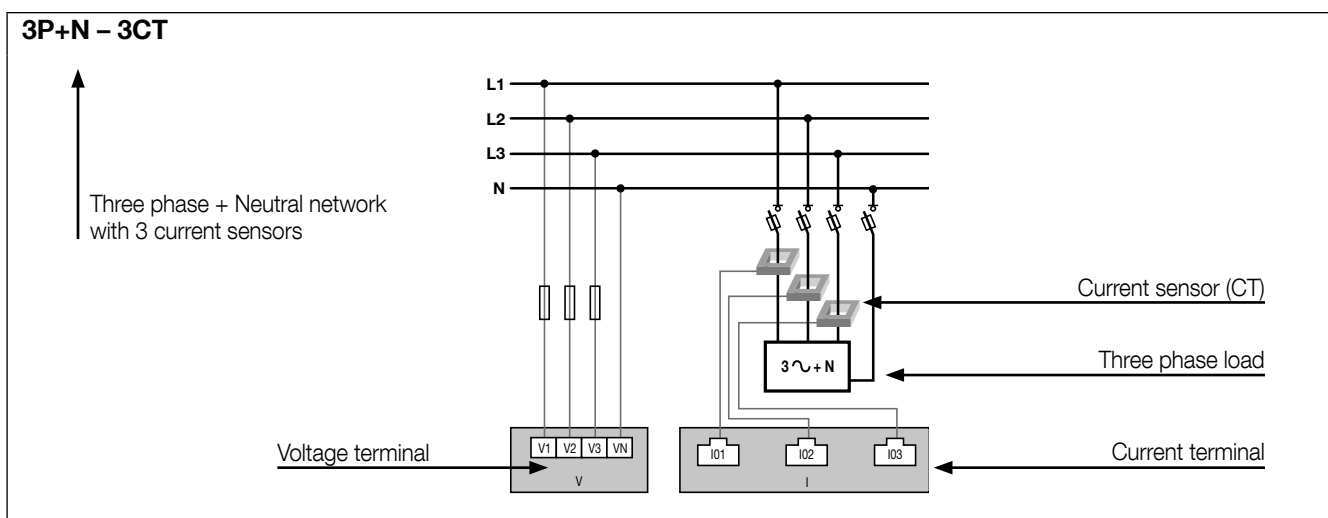
The following table summarises the loads which can be configured based on the installation's network type

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
3P+N	3P+N – 4CT / 3P+N – 3CT / 3P+N – 1CT / 3P – 3CT / 3P – 2CT / 3P – 1CT / 1P+N – 1CT

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

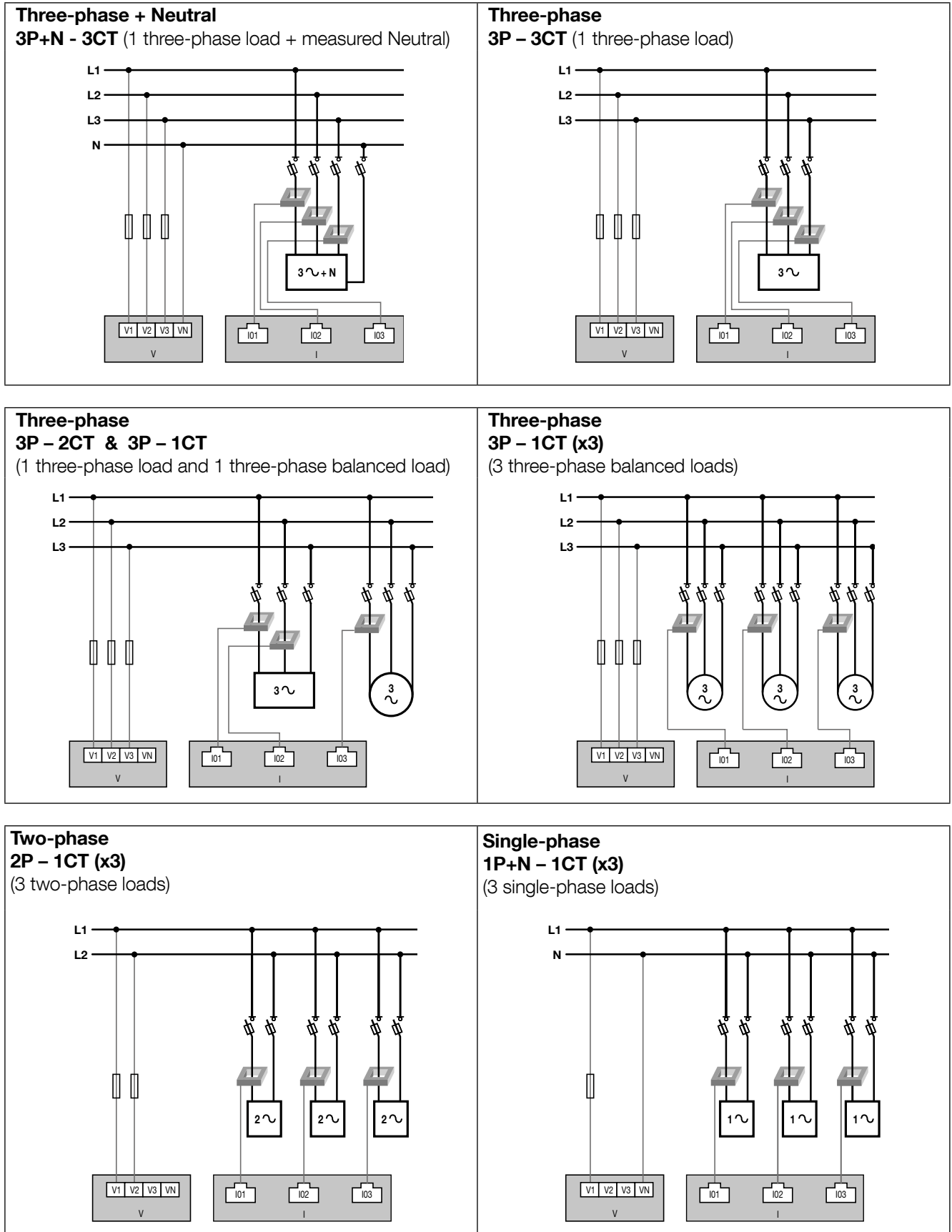
6.3.2. Description of the main network and load combinations


Legend:

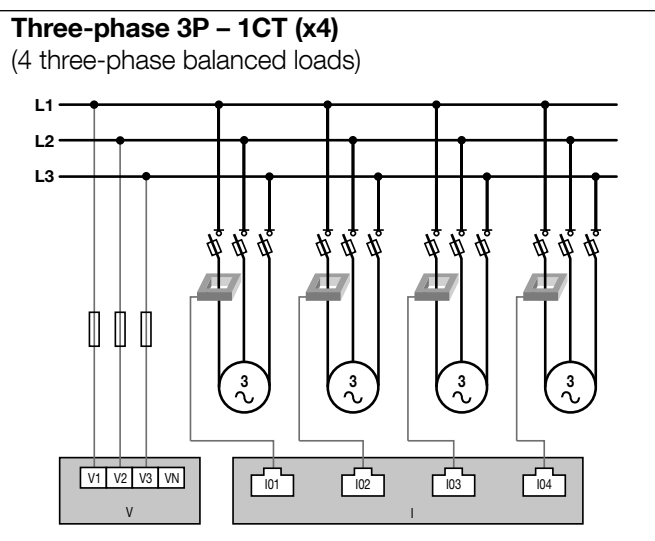
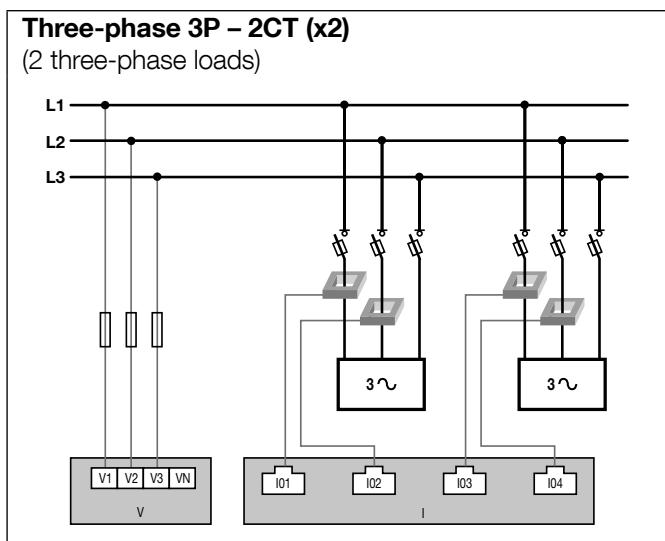
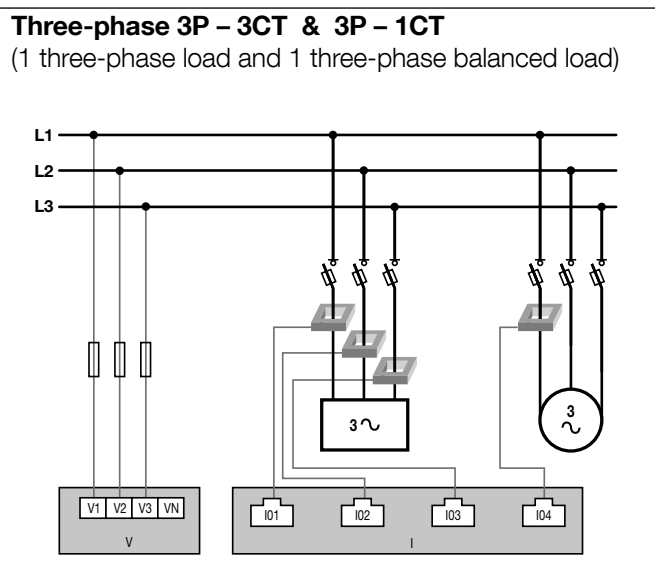
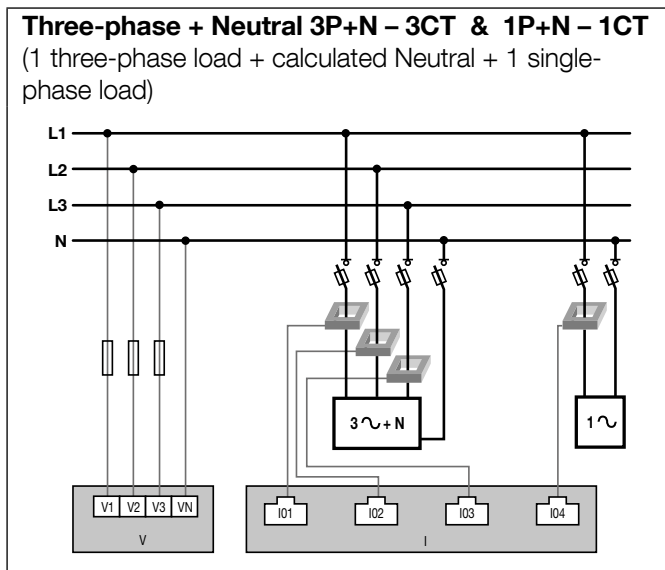
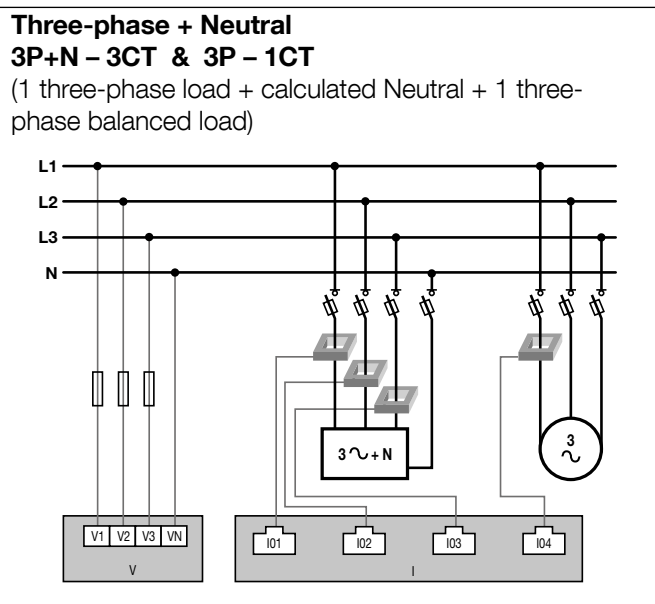
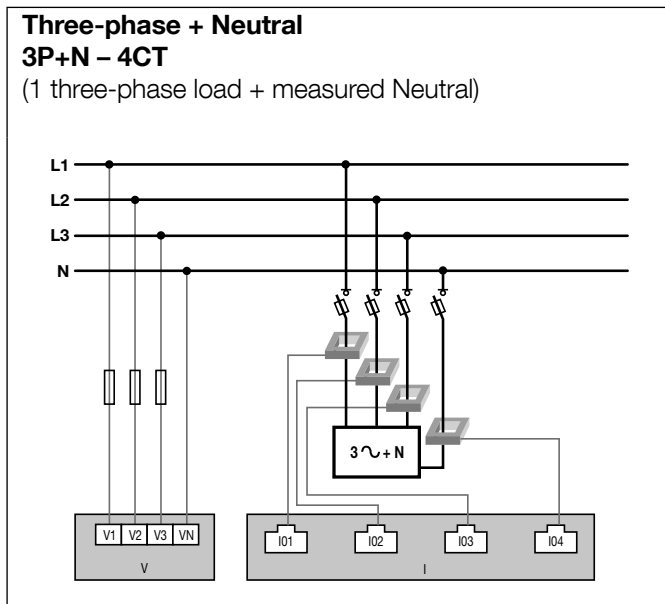


Each current input is individual; see below for some connection examples:

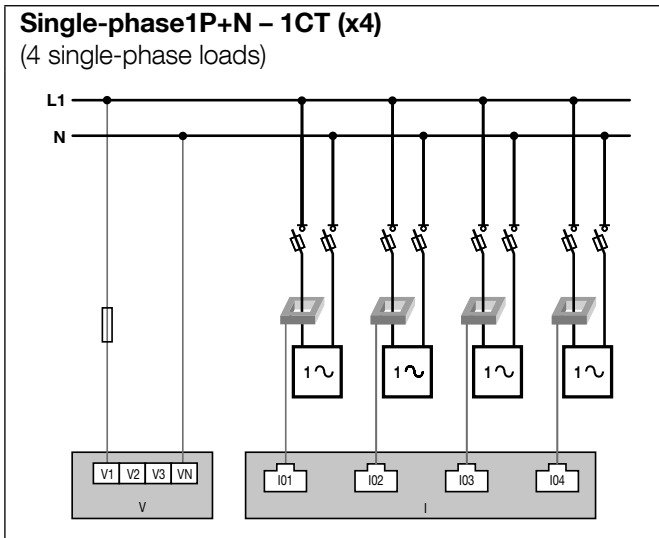
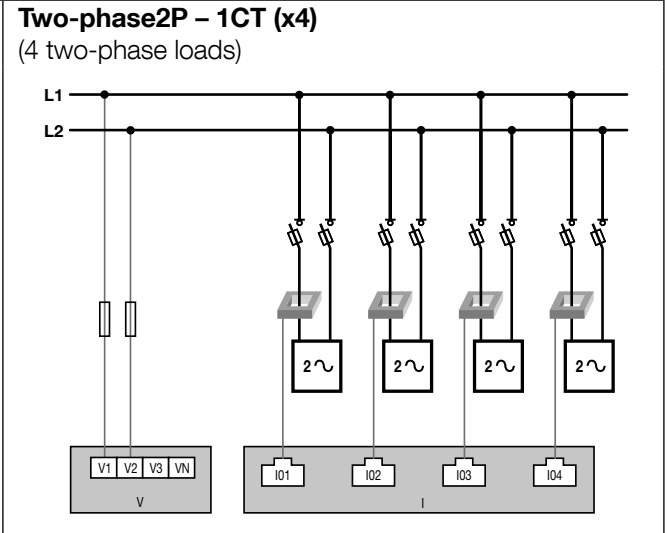
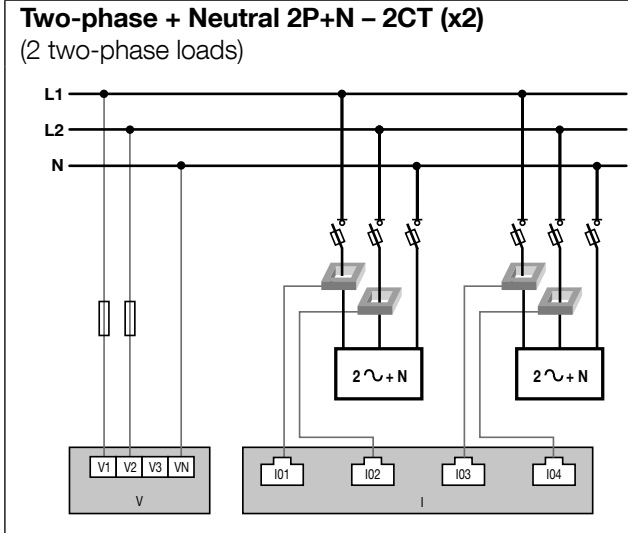
6.3.2.1. DIRIS Digiware I-3x




 Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

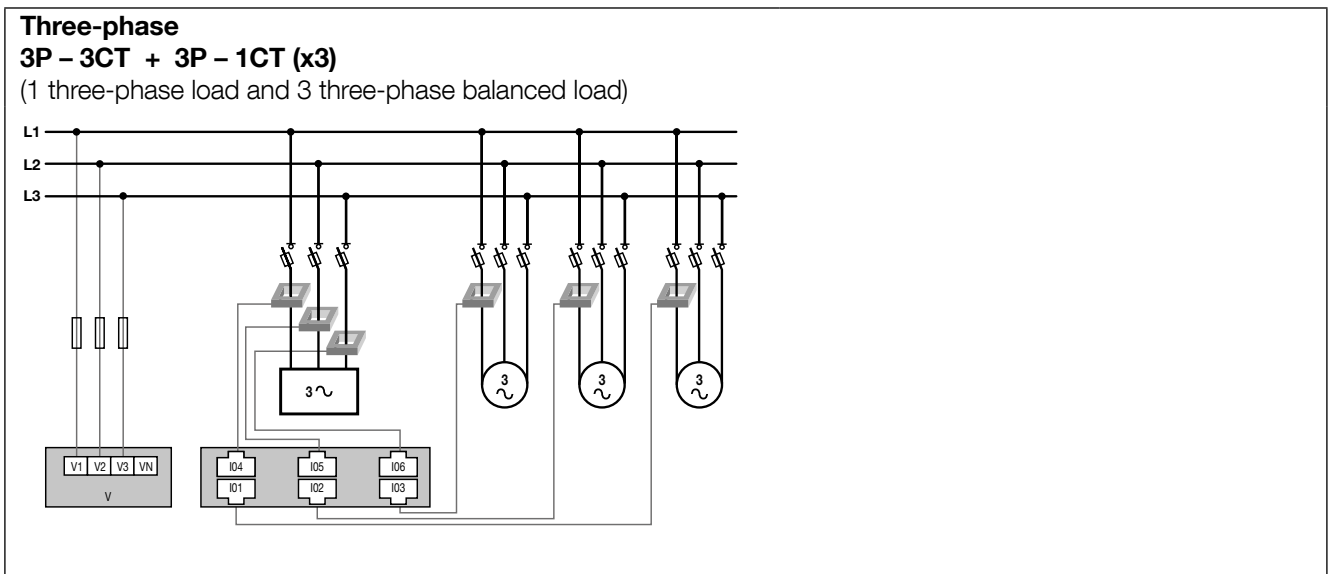


Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC



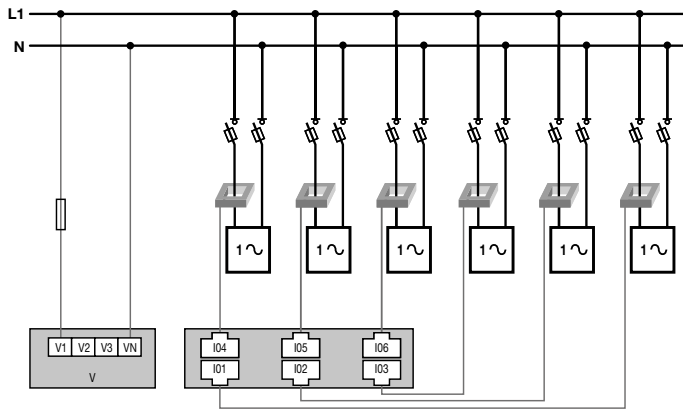
 Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

6.3.2.3. DIRIS Digiware I-6x




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

Notes relating to connections:

The **Easy Config** 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%.

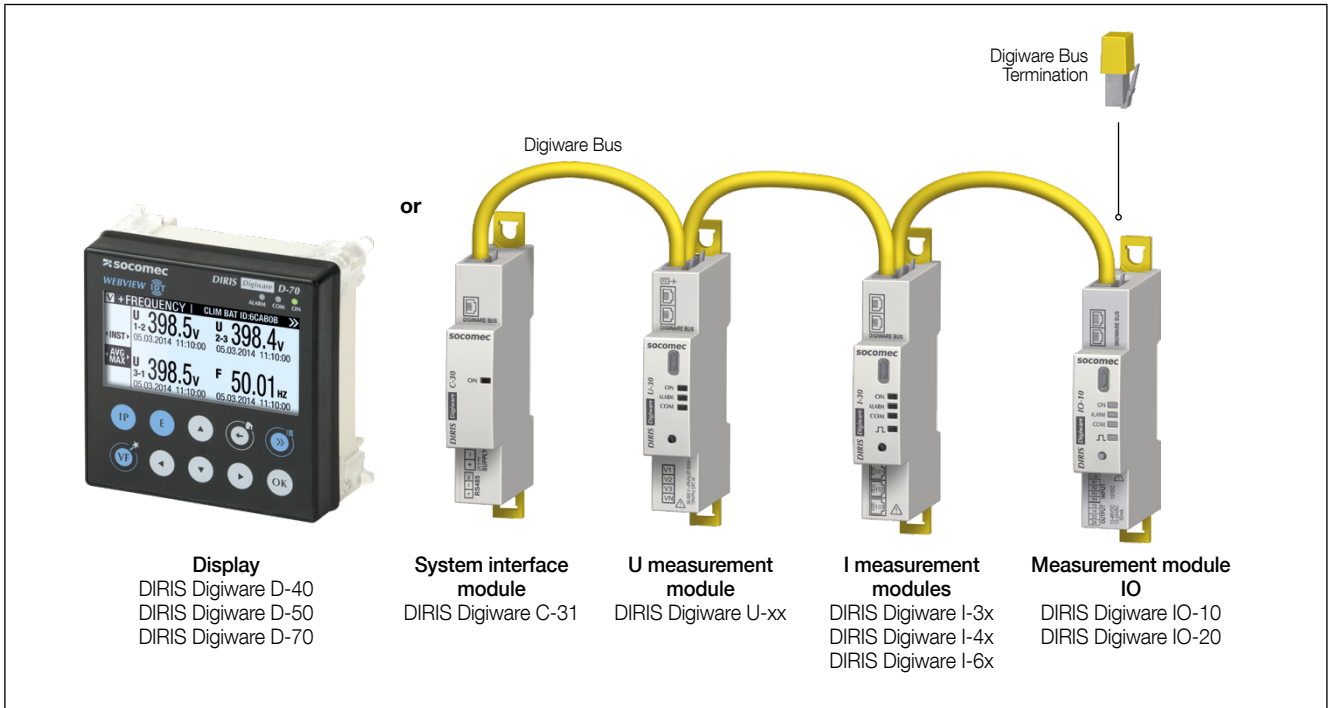
3P – 1CT: this connection requires a three-phase network that is perfectly balanced.

6.3.3. Connection of the functional earth

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

7. DIGIWARE BUS

7.1. Principle



DIRIS Digiware is a system comprising the following elements:

- One DIRIS Digiware D remote display or one DIRIS Digiware C-31 system interface module
- One DIRIS Digiware U voltage measurement module
- One or several DIRIS Digiware I 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 and the DIRIS Digiware C-31 system interface module.

7.1.1. Digiware Bus connection cables


Length (m)	Quantity	Part number
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
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 max. length must not exceed 100 metres.

	Use only SOCOMEC cables for the Digiware bus.
--	---

7.1.2. Digiware Bus Termination

	Quantity	Part number
	1	4829 0180

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

7.2. Sizing of the power supply

DIRIS Digiware units are supplied by a single 24VDC power point 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

7.2.1. Equipment consumption

Device	Power supplied (W)	Power consumed (W)
Power supply		
P15 230 V / 24 V	15	

Cables		
50 metre package		1.5

System interface		
DIRIS Digiware D-40		2
DIRIS Digiware 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

7.2.2. 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-40 (2 W) display
- 1 DIRIS Digiware U-xx (0.72 W) voltage module
- 50 metres of cable (1.5 W)

and

- 20 DIRIS Digiware current modules I-3x ($20 \times 0.52 = 10.4$ W)
⇒ **Total power = 14.62 W**

or

- 9 DIRIS Digiware current modules I-4x ($9 \times 1.125 = 10.125$ W)
⇒ **Total power = 14.345 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-40 (2 W) display
- 1 DIRIS Digiware U-xx (0.72 W) voltage module
- 50 metres of cable (1.5 W)

and

- 30 DIRIS Digiware current modules I-3x ($30 \times 0.52 = 15.6$ W)
⇒ **Total power = 19.82 W**

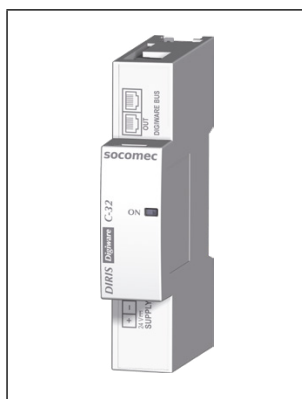
or

- 14 DIRIS Digiware current modules I-4x ($14 \times 1.125 = 15.72$)
⇒ **Total power = 19.97 W.**

7.2.3. 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.

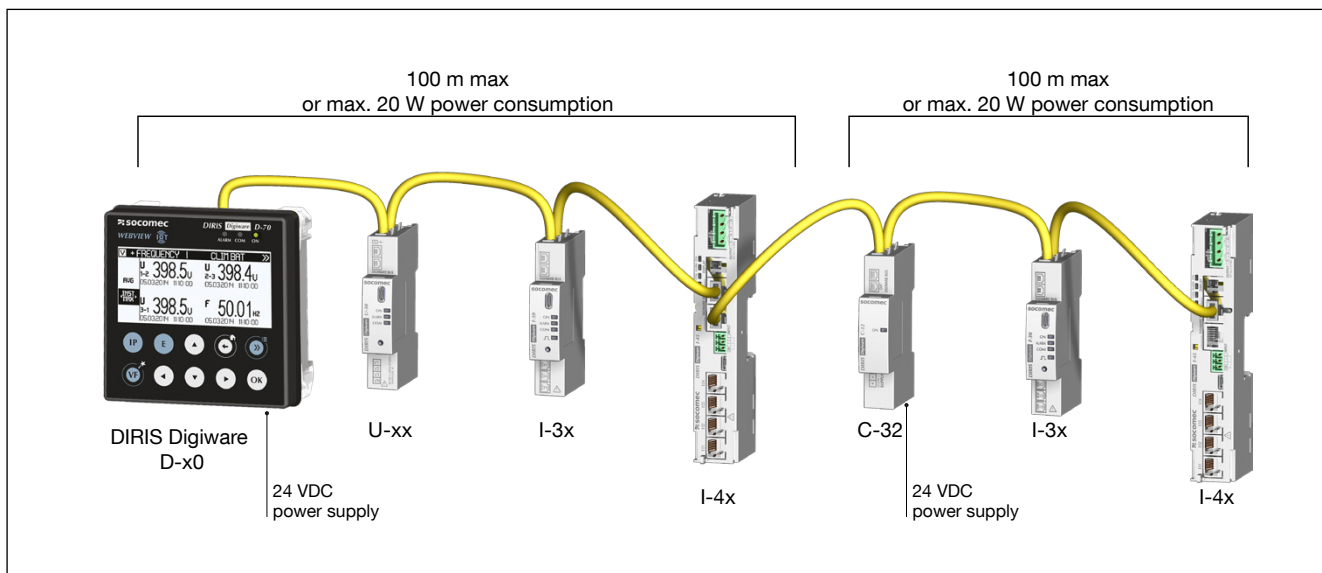
In a DIRIS Digiware system, a maximum of 2 repeaters may be used.



**DIRIS Digiware C-32
repeater**

Part number	4829 0103
--------------------	-----------

Configuration example:



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

The repeater has a 24VDC power supply.

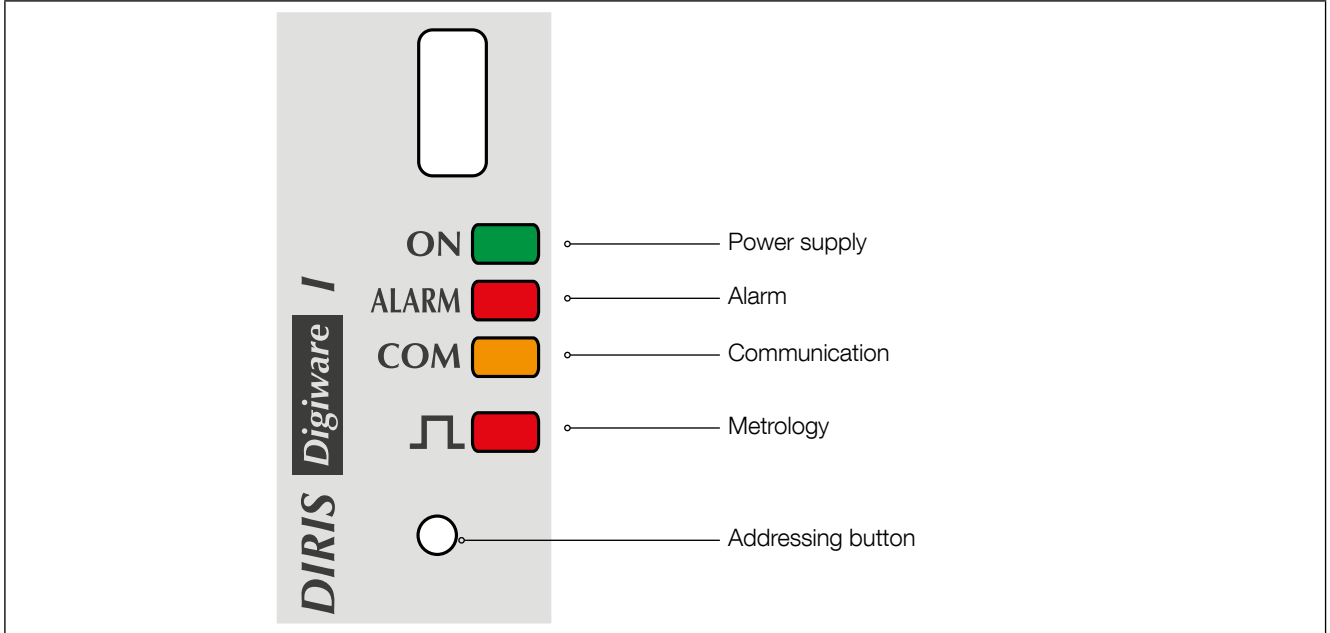


8. STATUS AND AUTO-ADDRESSING LEDS

8.1. Status LEDs

These LEDs can be used to find out the status of the device at any time.

The addressing button is used to automatically assign a Modbus address from the gateway.

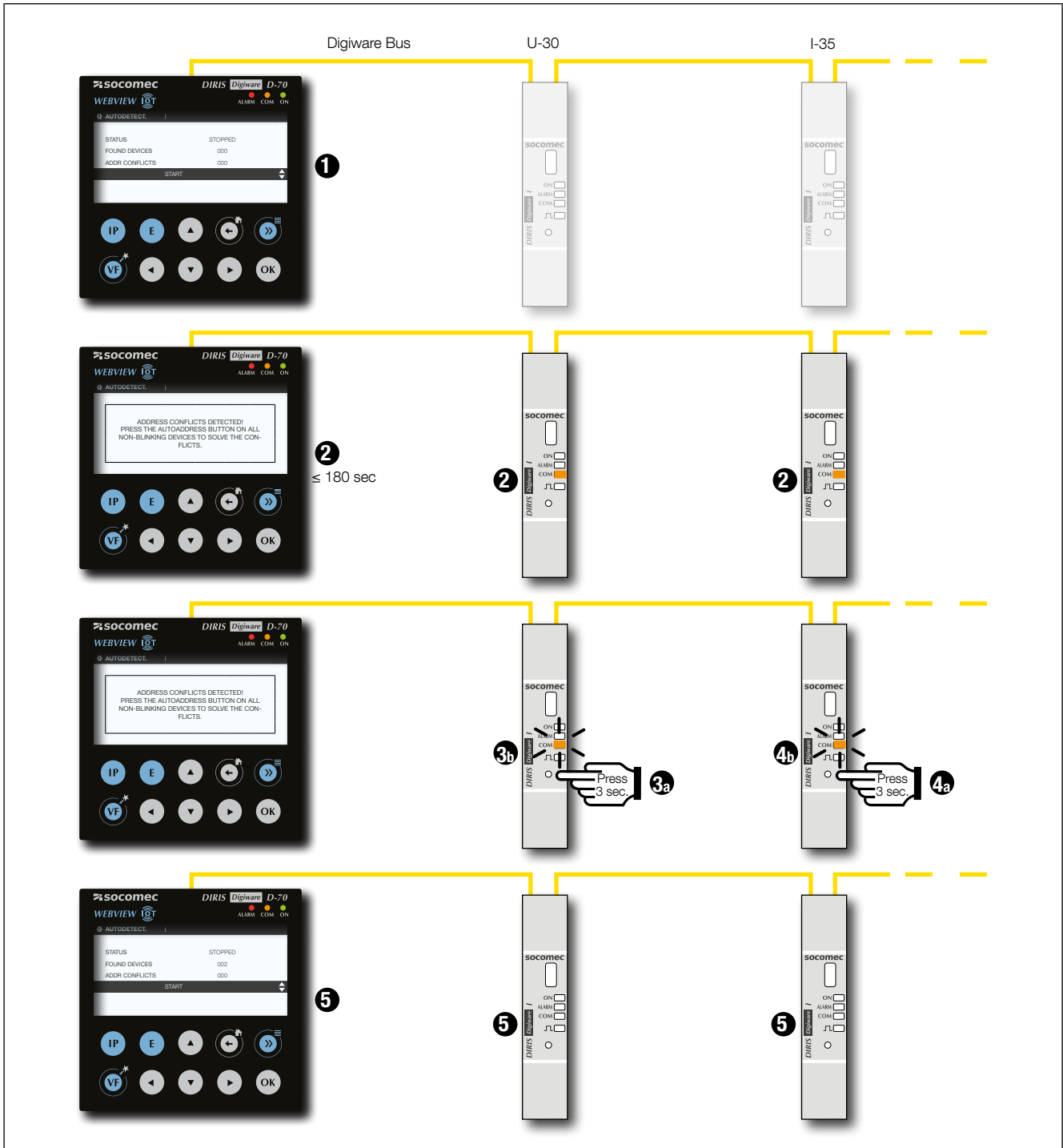


LED state	Fixed	Blinking	Pulse
ON	In operation	10 seconds - on request via a Modbus control to identify the device (remote screen, etc.)	1 second during power-on
ALARM	An alarm (logical/analogue, etc.) is active (does not take priority if there is a system alarm at the same time)	At least one system 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 problem.	Address OK	1 second during power-on and when a frame 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 counter mode

8.2. Auto-addressing

From DIRIS G gateways and DIRIS Digiware D-xx displays, an auto detection and auto addressing can be launched to detect all downstream devices and to automatically assign a Modbus address to each device. This mode is only compatible with DIRIS B and DIRIS Digiware PMDs. The addresses will need to be allocated manually on the other PMD (DIRIS A) and meters (COUNTIS).

Example with a DIRIS Digiware D-xx display:



The DIRIS Digiware U, DIRIS Digiware I, DIRIS Digiware S and DIRIS Digiware IO modules benefit from the auto addressing mode.

The auto addressing can be launched from the DIRIS Digiware D-40 / D-50 / D-70 remote displays or from the DIRIS G communication gateway.

Note 1: from the Easy Config software, Modbus addresses can be chosen and manually assigned to downstream devices.

Note 2: During the auto-addressing process, the RS485 line is reserved for allocating addresses and no other exchange of data is possible at this time.

9. COMMUNICATION

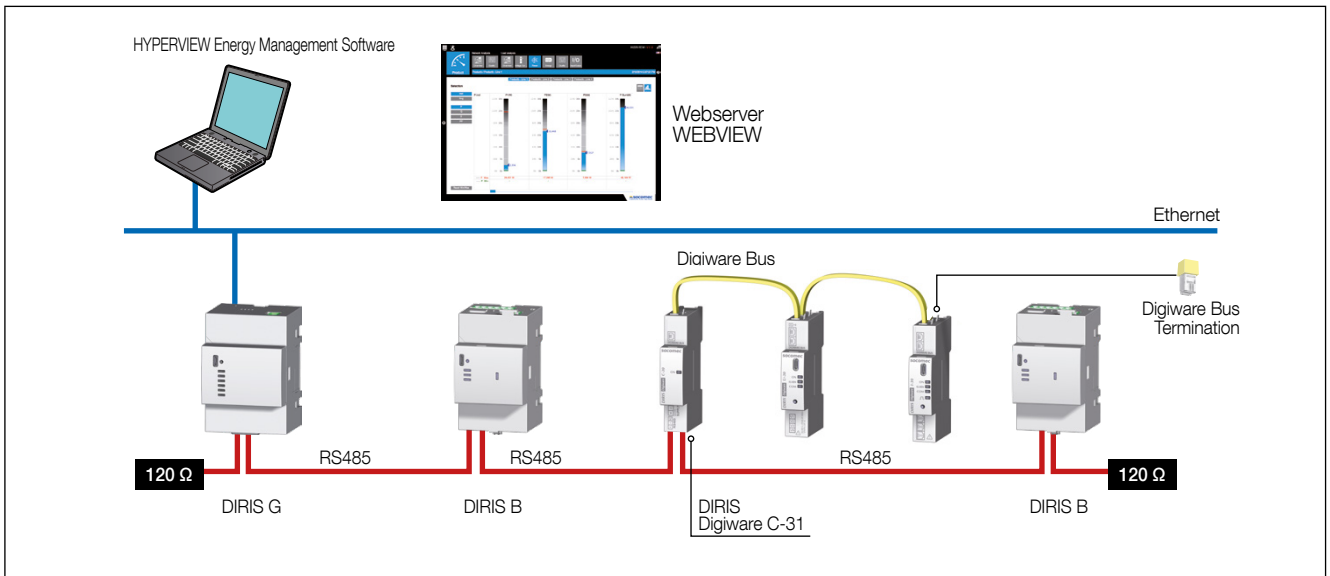
9.1. General information

DIRIS Digiware communicates via RS485 using the Modbus protocol. RS485 communication is available at a single point either on the DIRIS Digiware D display or on the DIRIS Digiware C-31 system interface module. It is done via an RS485 serial link (2- or 3-wire) in accordance with the Modbus RTU protocol.

With the RS485 link, DIRIS Digiware can be directly connected to a PC, a PLC or to the G-30 and G-50 gateways (see the corresponding manual for more details) to exploit the data.

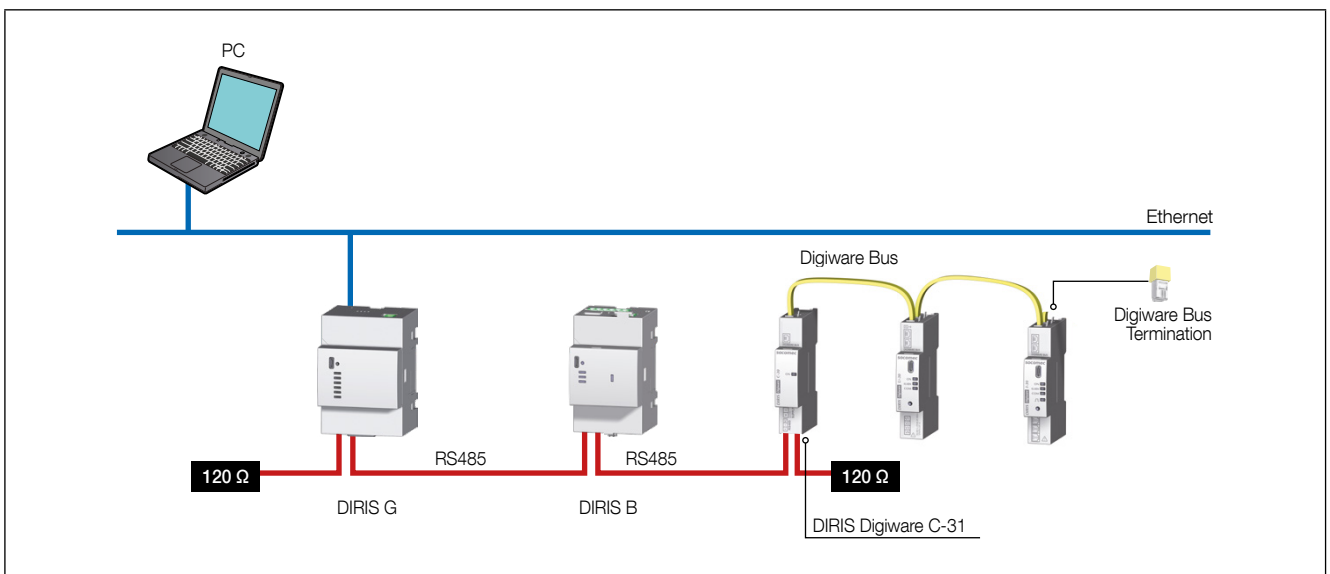
The Modbus protocol requires a dialogue with a master/slave structure. The mode of communication is the RTU (Remote Terminal Unit). In a standard setup, an RS485 link enables the interconnection of 32 RS485 devices to a PC (with DIRIS Digiware C-31 counting as one device), a PLC or the gateway over a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

Example of architecture in combination with the DIRIS G gateway:



9.2. RS485 and Bus DIRIS Digiware rules

A certain number of rules must be respected when DIRIS Digiware is connected using RS485. These rules are set out in the paragraphs below.



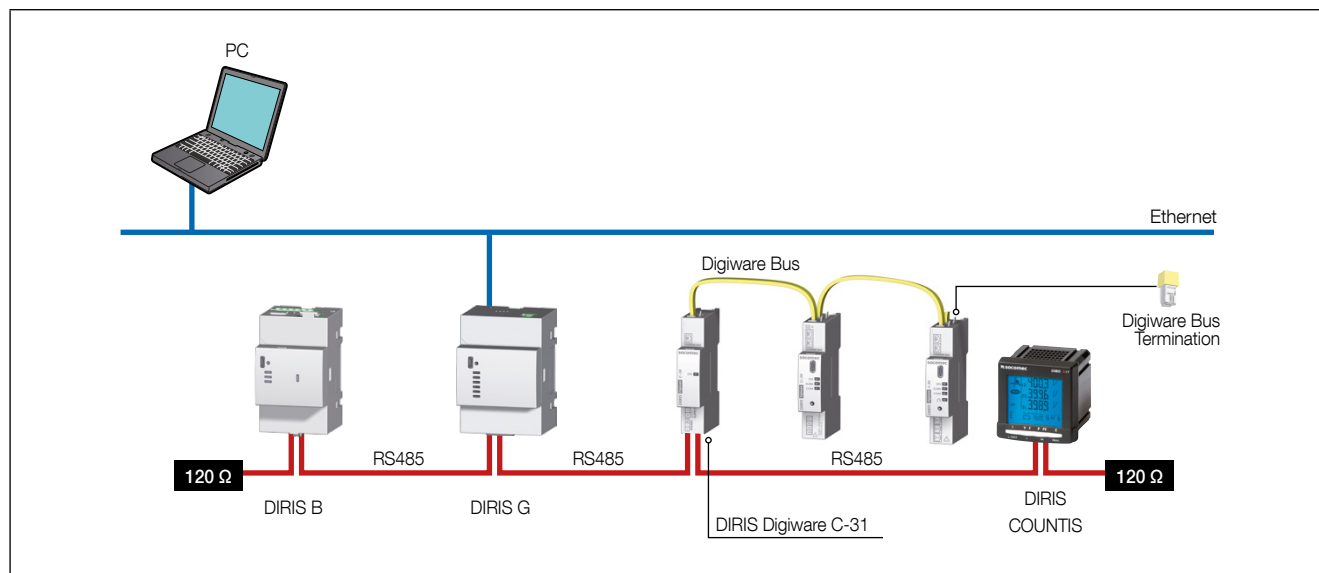
9.2.1. Connection with the DIRIS Digiware C-31 system interface module

In an RS485 link, the DIRIS Digiware C-31 system interface module may be placed anywhere in the RS485 link.

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 termination must be added at the end of the Digiware bus.

Connection example:



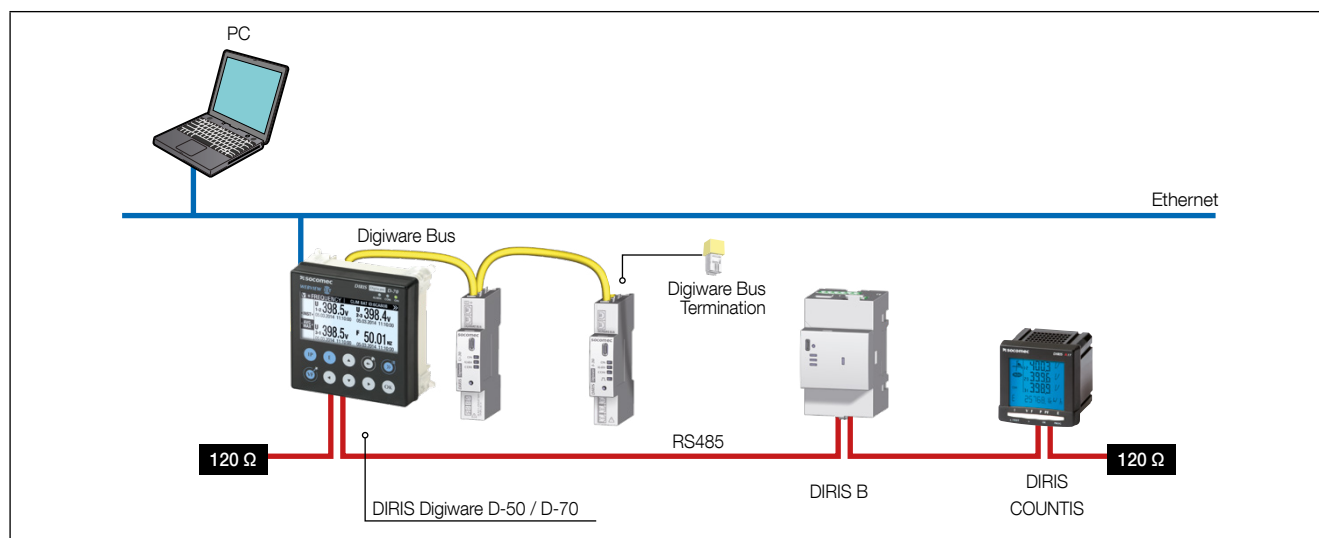
9.2.2. Connection with the DIRIS Digiware D-50/D-70 remote display

In an RS485 link, a DIRIS Digiware D-50/D-70 remote display is a master device of the RS485 bus and links to the DIRIS Digiware bus. It is used like an Ethernet gateway.

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 termination must be added at the end of the Digiware bus.

Connection example:



You can show 32 devices on DIRIS Digiware D-50/D-70 display.

Other connections are possible with the DIRIS Digiware D remote display; refer to its manual for more details.

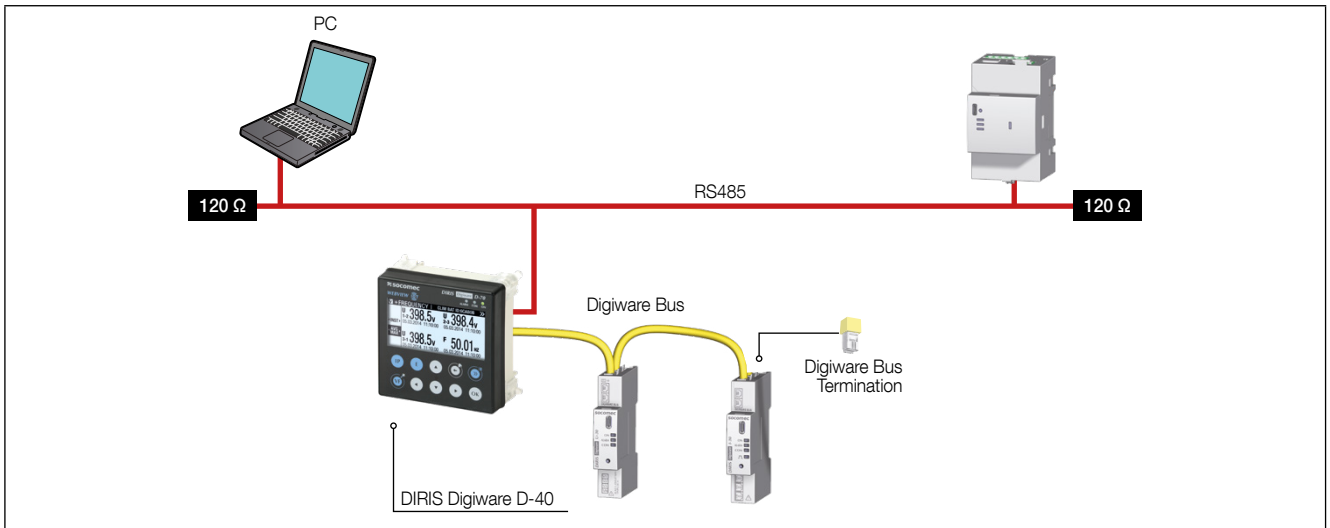
9.2.3. Connection with the DIRIS Digiware D-40 remote display

In an RS485 link, a DIRIS Digiware D-40 remote display is a slave device of the RS485 bus and links to the DIRIS Digiware bus.

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 termination must be added at the end of the Digiware bus.

Connection example:



You can show 32 devices on the DIRIS Digiware D-40 display.

9.3. Communication tables

The communication tables and associated explanations can be found on the documentations page for DIRIS Digiware on the SOCOMEC website.

The communication tables are sent via JBUS (Modbus).

10. CONFIGURATION

Configuration can be carried out using the Easy Config configuration software or directly from the remote display. The Easy Config software is used to configure DIRIS Digiware directly via RS485 or USB. Easy Config must be installed before using the USB connection.

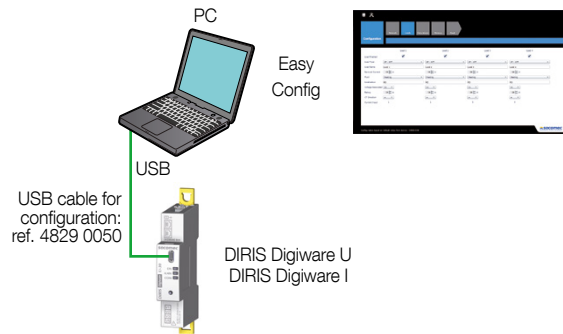
If DIRIS Digiware is combined with a DIRIS Digiware D-x display or DIRIS G gateway, the configuration can be done directly from the display or the gateway via USB or Ethernet (G-30/G-50/D-50/D-70).

To set the parameters from the remote display, refer to the manual for the display.

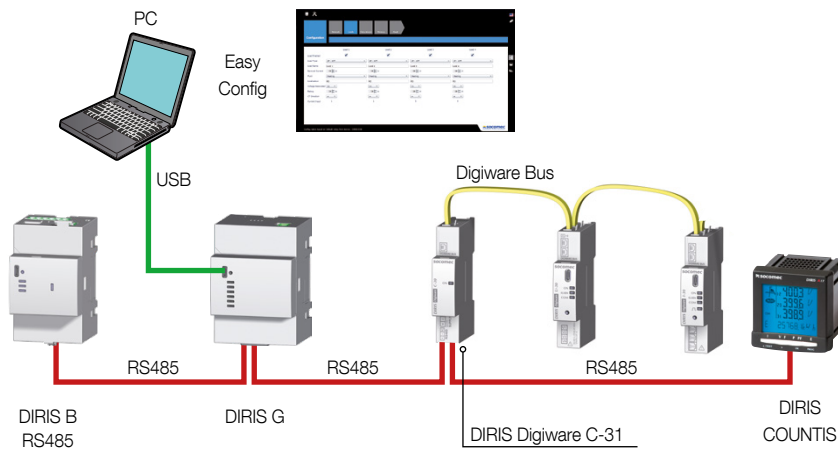
10.1. Configuration using Easy Config

10.1.1. Connection modes

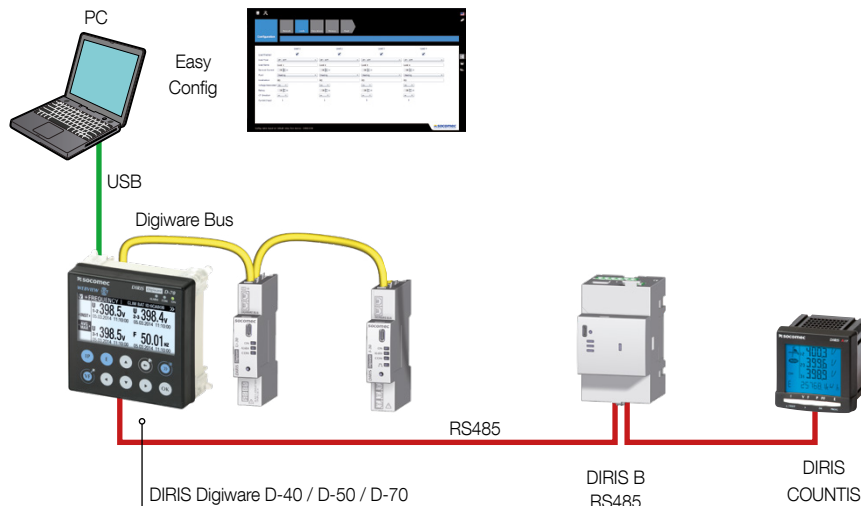
Configuration using Easy Config directly (USB)



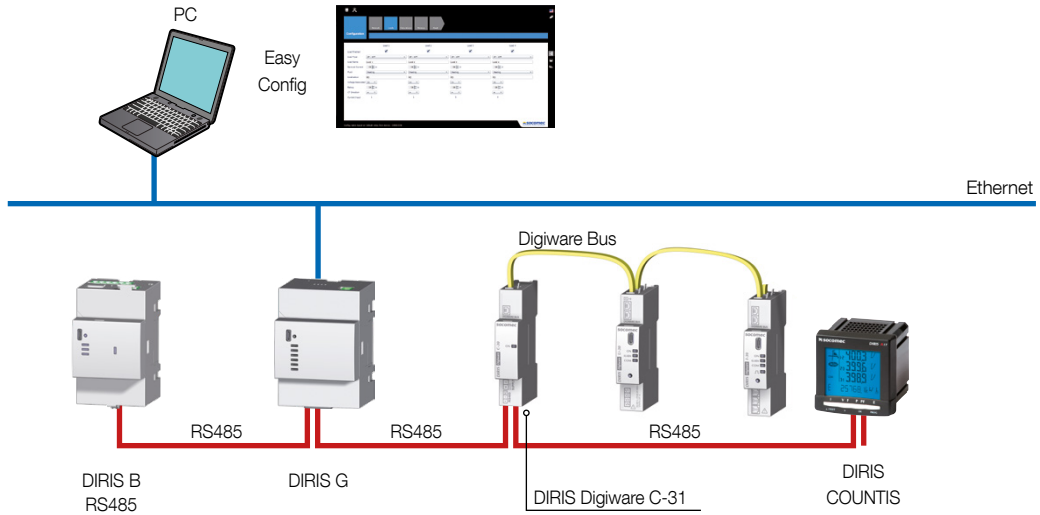
Configuration using Easy Config via a DIRIS G gateway (USB)



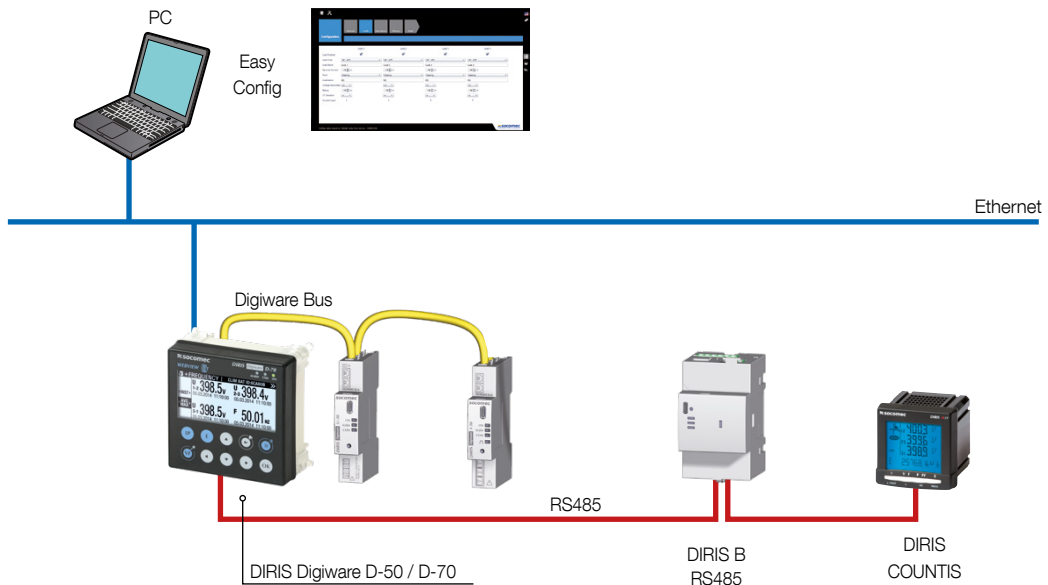
Configuration using Easy Config via a DIRIS Digiware D (USB)



Configuration using Easy Config via a DIRIS G gateway (Ethernet)



Configuration using Easy Config via a DIRIS Digiware D-50/D-70 display (Ethernet)



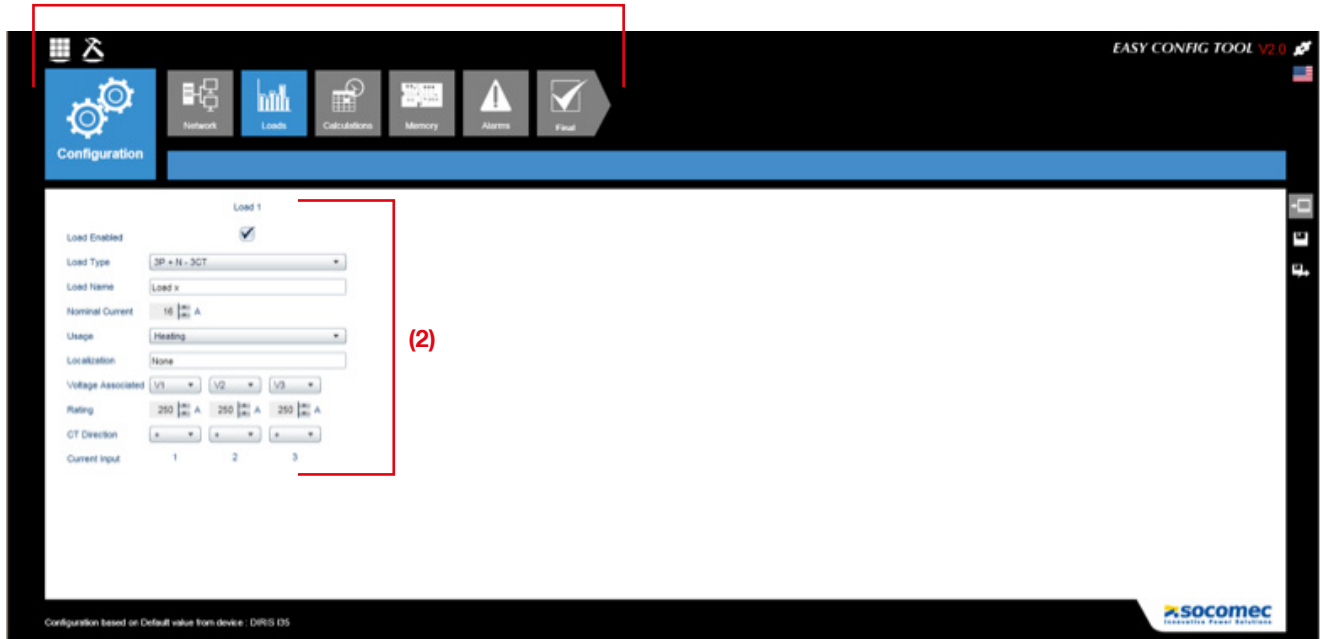
These devices must be connected to the power supply before you configure them.
For the Digiware bus and 120-ohm termination resistors, see section “Communication”, page 49.

10.1.2. Using Easy Config

Easy Config is the configuration software used to set device parameters easily and quickly. Parameters are set in successive steps:

Network → Loads → Measurement method → Values to be stored → Alarms → End of configuration

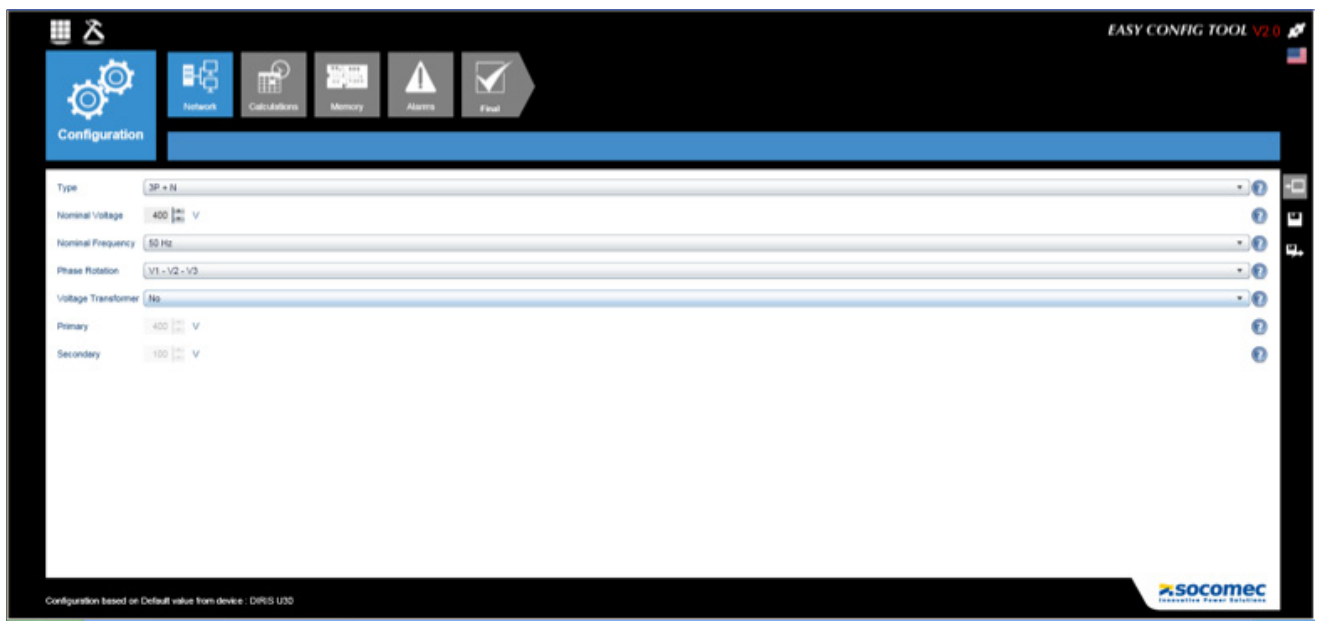
(1)



For each setting selected (1) a customised screen appears, depending on the connected device (2).

Network configuration

In the electrical network configuration menu, the user selects the type of network (three-phase, single-phase, etc.), the nominal voltage, the network frequency, the direction of phase rotation and whether or not a voltage transformer is used.



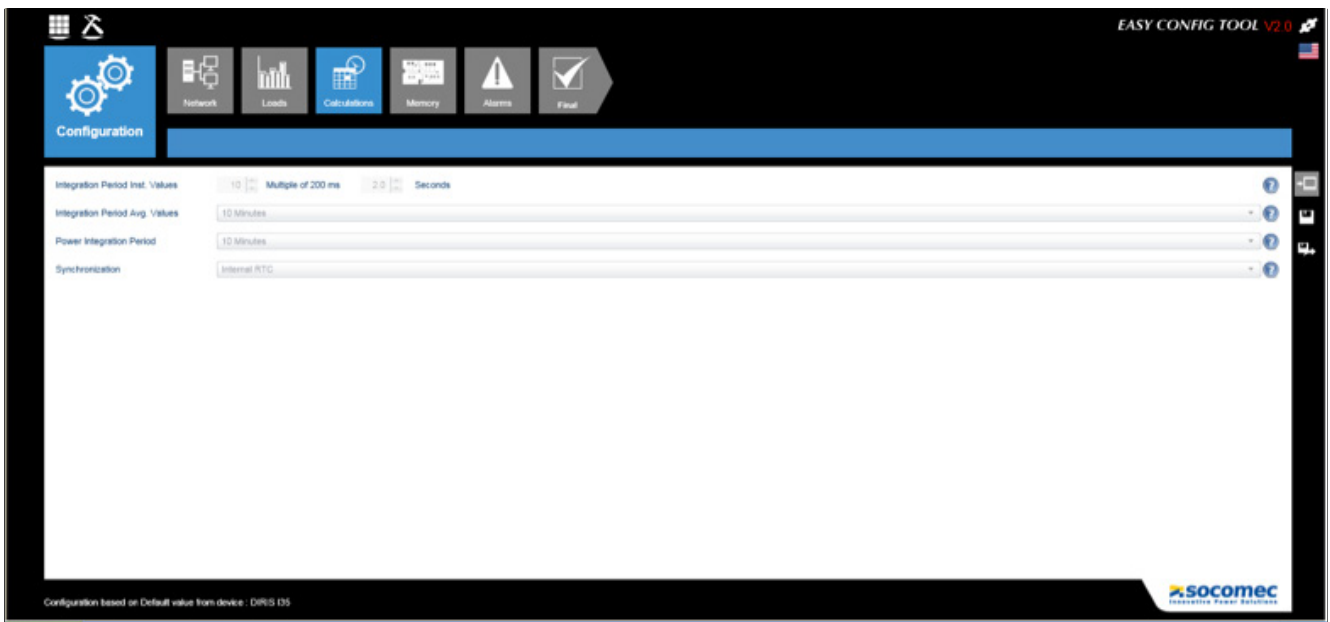
Configuring the loads

The number and type of loads can be accessed in the load configuration menu. The user can also define its nominal current, the name of the load, its usage and its location within the electrical installation.



Calculation method

The calculation methods for the various electrical parameters and the integration time are defined in this screen.



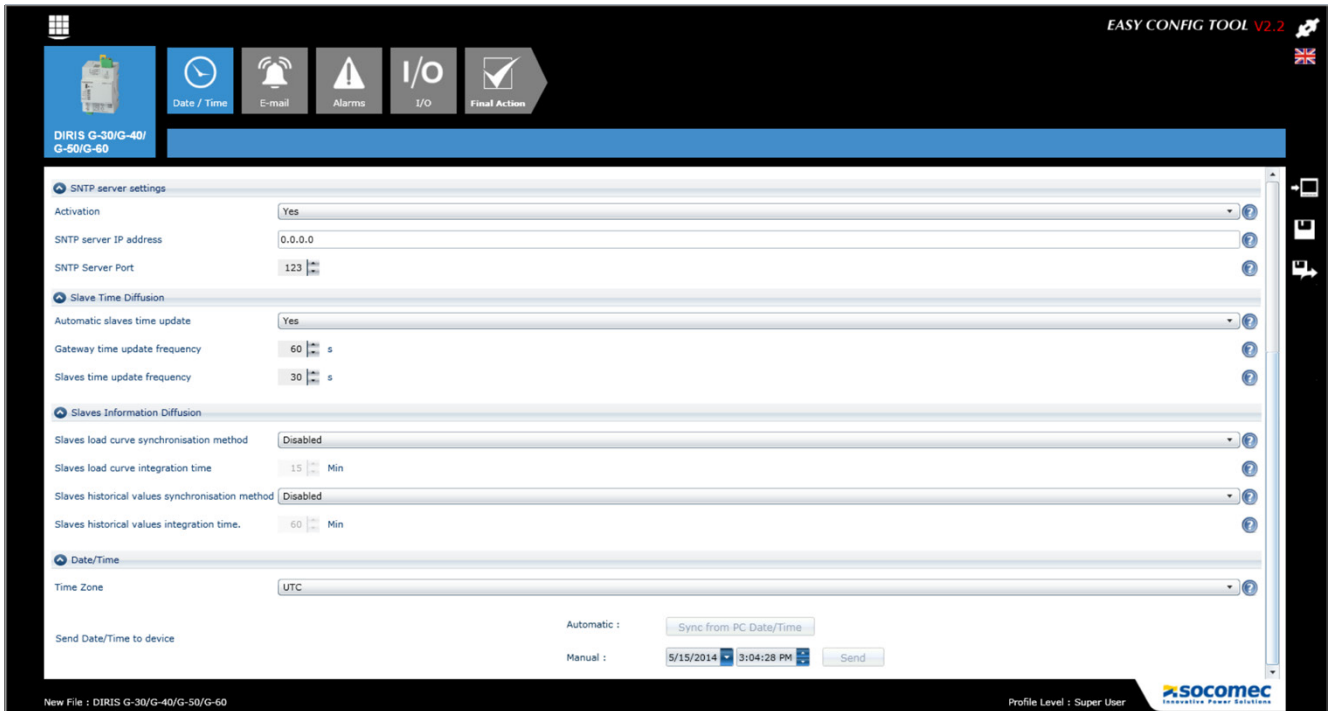
Alarms


The type of alarm and the configuration is performed via Easy Config, see section "11. ALARMS", page 57 for more details.

10.1.3. Synchronising devices

In order for all connected devices to be set at the same time, their time can be synchronized with an NTP server (DIRIS G, DIRIS Digiware D-50/D-70) or manually (DIRIS G, DIRIS Digiware D-40/D-50/D-70).

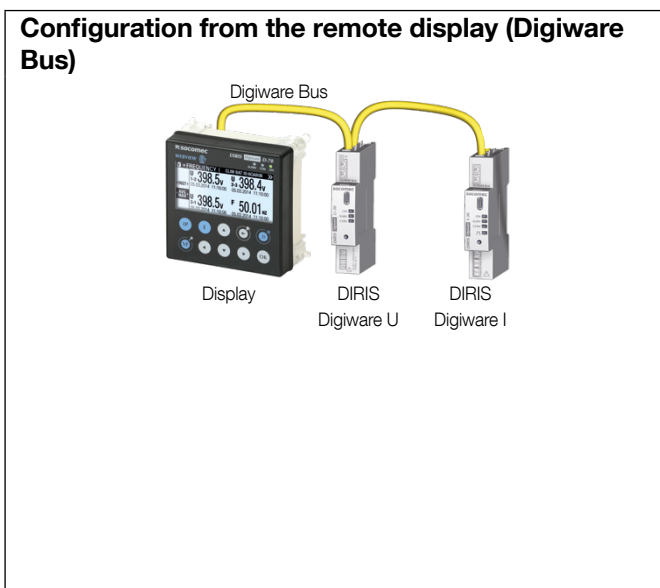
The screen below shows how to set the time from the DIRIS G gateway. The time setting is done from an SNTP server or manually. The time may be sent on connected devices automatically based on a configurable update schedule.



 Do not use the synchronisation function on a single-point DIRIS D-30 screen as part of a multi-device configuration.

10.2. Configuration from the DIRIS Digiware D remote display

10.2.1. Connection mode



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

11. ALARMS

The threshold alarms are only available with DIRIS Digiware U-30, I-35, I-45 and IO-20.

The alarms on digital inputs with change of output status are only available with DIRIS Digiware I-45 and DIRIS Digiware IO-10.

11.1. Alarms upon events

Alarms can be generated when a threshold is exceeded for the electrical measurements, consumption, variations in level or change in input status. Also, combinations can be made on the alarms created.

Up to 25 alarms detected are saved and timestamped; an alarm can have 3 distinct statuses: Alarm active, Alarm completed, Alarm completed and acknowledged. Alarms can be acknowledged either automatically or by user action, as required.

Up to 8 alarms on electrical measurements can be configured of equipment and 4 for the status change of a digital input. The digital inputs are available only on DIRIS Digiware modules I-43, I-45 and IO-10.

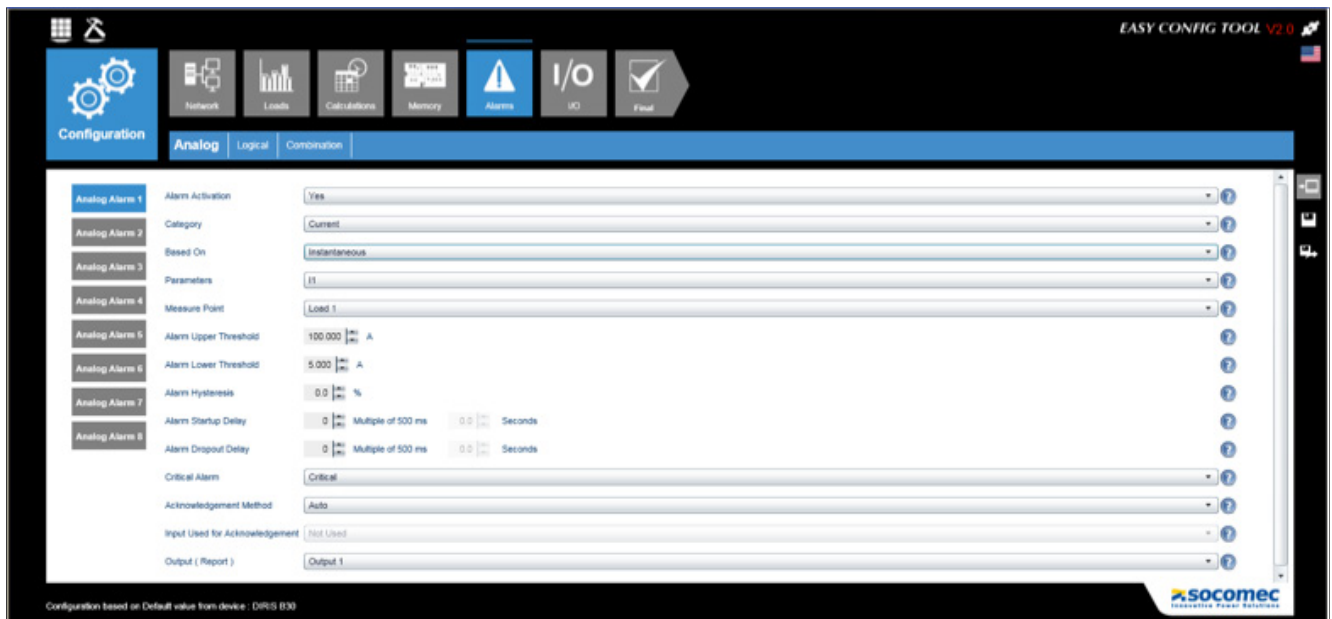
The alarms are configured via the Easy Config software.

11.1.1. Electrical parameters

The alarms available are based on electrical parameters measured in the devices.

- Alarm upon variation in the instantaneous or average value of an electrical value: Current, voltage, frequency, power, power factor, Cos phi, harmonic distortion or an analogue quantity on the DIRIS Digiware IO-20 module.
- Selection of the hysteresis and high/low threshold.
- Setting a time delay at the start and end of the alarm.
- For the associated total harmonic distortion, voltage and current three-phase values, an alarm may be generated if the condition is fulfilled on a combination of phases:
 - On a single-phase: Phase1, Phase2, Phase3
 - On all the phases simultaneously: Phase1 and Phase2 and Phase3
 - On one phase of the three phases: Phase1 or Phase2 or Phase3

Example of configuring an alarm on the current via Easy Config:



11.1.2. Voltage and current unbalance (in a three-phase network)

- Alarms on voltage unbalances: Unba, Unb
- Alarm upon current unbalance: Inba, Inb
- Selection of the hysteresis and high/low threshold
- Setting a time delay at the start and end of the alarm

11.1.3. EN 50160 voltage quality events

- Alarms on quality events for the voltage provided: voltage dips (Udip), voltage swells (Uswl) and voltage interruptions (Uint), taking the occurrence into account: number, reference period.

11.1.4. Consumption

- Alarm on the energies: Partial Ea+, Ea-, Er+, Er-, Eap
- Selection of a high threshold (excessive consumption)

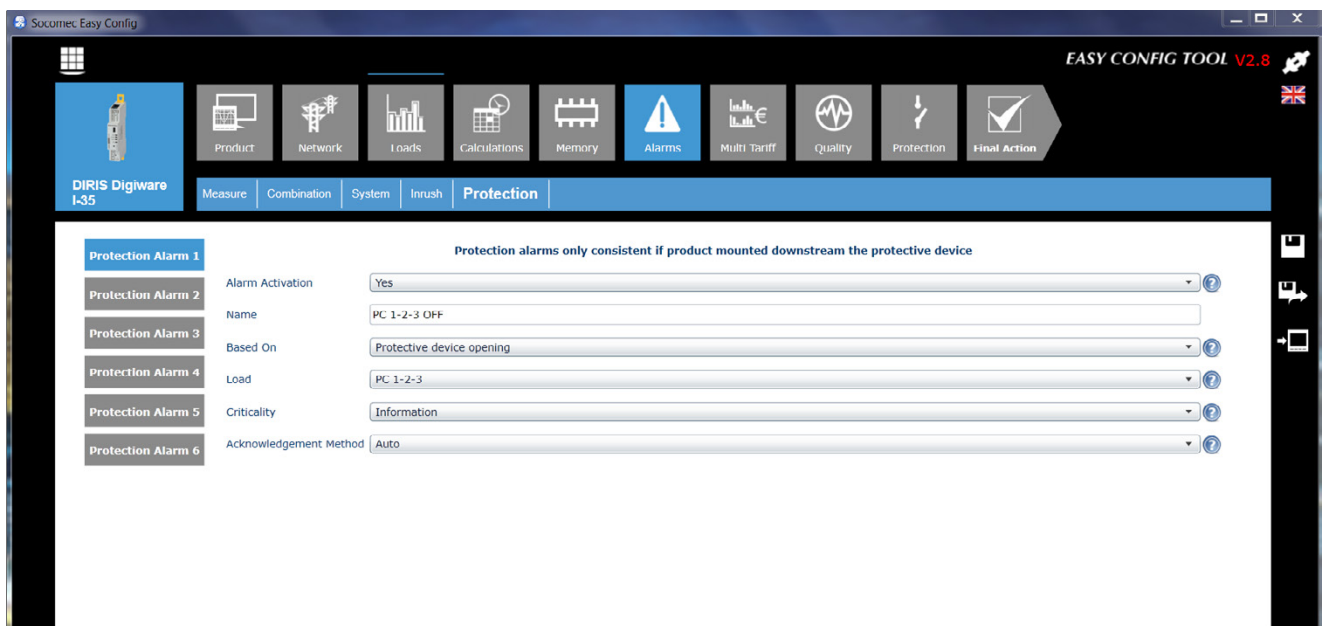
11.1.5. Protection counters

Alarms on protection counters can be configured thanks to the VirtualMonitor technology (only available if iTR current sensors are used):- 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 12 of this instruction manual) for more information on protection counters.

Example of configuring an alarm on the protection counters via Easy Config:

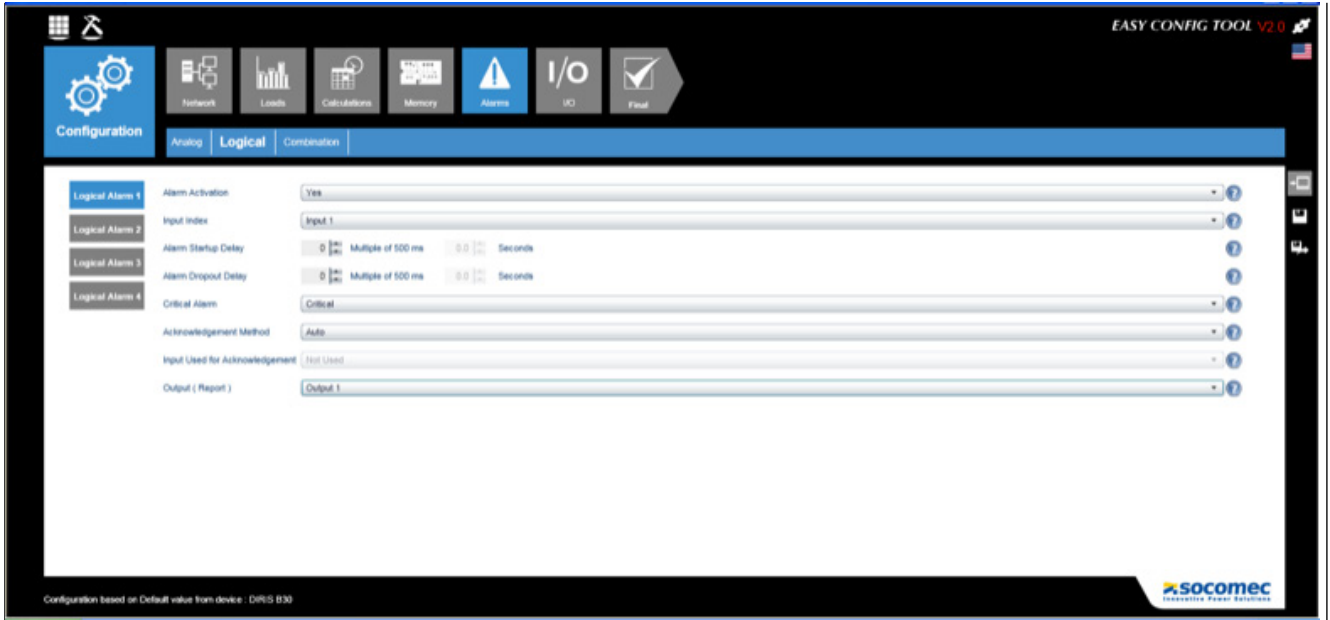


11.1.6. Digital inputs

This function is available on DIRIS Digiware I-43, I-45 and IO-10.

- Alarm upon change of status of a digital input
- Choice of a rising or falling edge
- Setting a time delay at the start and end of the alarm

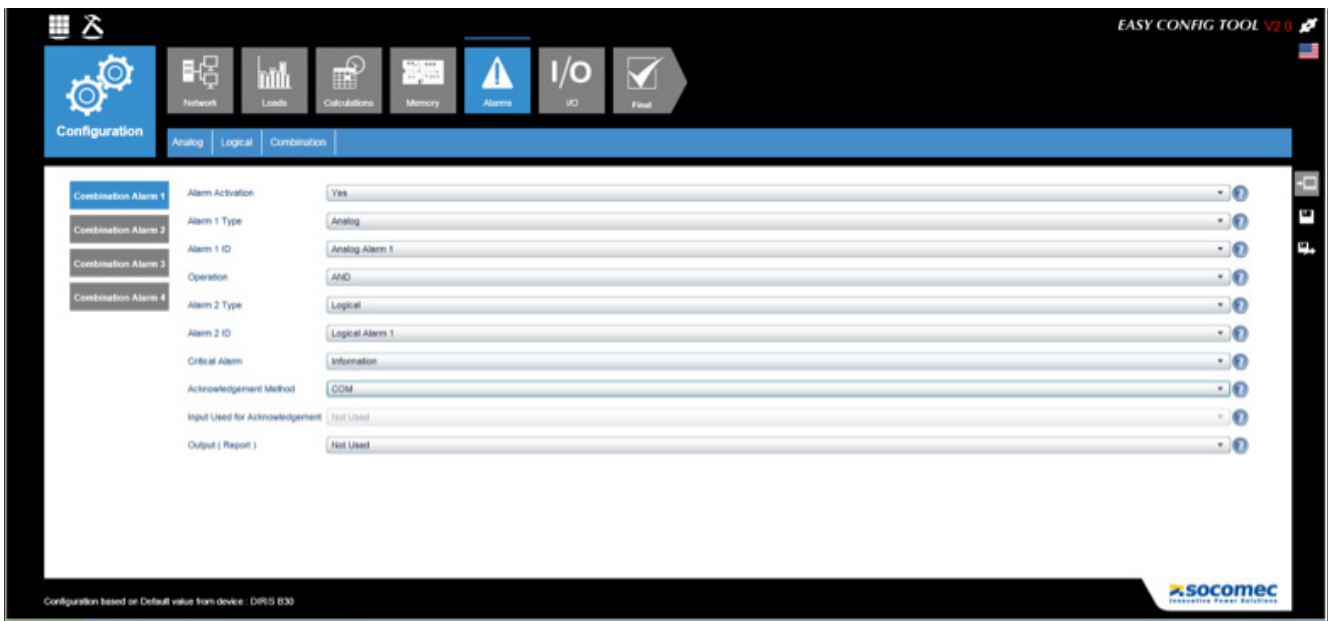
Example of configuring an alarm on a digital input via Easy Config:



11.2. Combination of alarms

- 4 boolean combinations (OR, AND) on the defined alarms (electrical values, energy, inputs, etc.)

Example of configuring an alarm on a digital input via Easy Config:



11.3. System alarms

If an installation error is detected during setup, a system alarm is automatically generated.

11.3.1. Voltage/current association

- Alarm upon connection error: wrong association between the current inputs of the DIRIS Digiware I 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 $I > 2\% I_n$
- If iTR current sensors are used, this feature also works off-load

11.3.2. Incorrect direction of rotation (three-phase network)

- Alarm upon identification of the incorrect direction of phase rotation (for example 3-2-1 instead of 1-2-3)

11.3.3. Current sensor disconnected

- Alarm detecting if a current sensor is disconnected

11.4. Protection alarms

DIRIS Digiware I modules have 6 protection alarms alerting the user of an event on a protective device.

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

Protection alarms can be configured in case of an opening of the protective device, a trip of the circuit breaker, or the defect of the protective device.

Example of configuring a protection alarm via Easy Config:

The screenshot displays the 'Easy Config TOOL v2.8' interface for a 'DIRIS Digiware I-35' device. The 'Protection' menu is active, showing six protection alarm settings. A warning message states: 'Protection alarms only consistent if product mounted downstream the protective device'. The settings are as follows:

Protection Alarm	Parameter	Value
Protection Alarm 1	Alarm Activation	Yes
Protection Alarm 2	Name	PC 1 2 3 OFF
Protection Alarm 3	Based On	Protective device opening
Protection Alarm 4	Load	PC 1-2-3
Protection Alarm 5	Criticality	Information
Protection Alarm 6	Acknowledgement Method	Auto

At the bottom of the window, it shows 'Read from device : I35@4' and 'Profile Level : User'. The Socomec logo is visible in the bottom right corner.

11.5. Setting up alarms

Alarms are configured with the Easy Config software.

There are several ways of identifying the presence of an alarm:

11.5.1. ALARM LED on front

- Blinking: System alarm
- Fixed: Alarm upon event (does not take priority if there is a system alarm at the same time)

11.5.2. Activation of an output

- On DIRIS Digiware I-4x and IO-10, an output may be enabled when an alarm is detected

11.5.3. Activation of an input

- If an input is present, the alarm can be acknowledged from this input. Acknowledgement of an alarm can only be taken into account if the alarm is finished

11.5.4. RS485 Modbus

- Information on the alarms with timestamping available via the RS485 communication bus
- Sends alarm acknowledgement

11.5.5. Display and WEBVIEW

- Information on the alarms with timestamping
- Sends alarm acknowledgement

12. VIRTUALMONITOR TECHNOLOGY: MONITORING OF PROTECTIVE DEVICES (ONLY AVAILABLE WITH ITR SENSORS)

iTR split-core current sensors embed the VirtualMonitor technology. When connected to DIRIS Digiware I modules, the technology offers an advanced real-time monitoring of protective devices (circuit breakers, fusible switches etc.) without using auxiliary contacts:

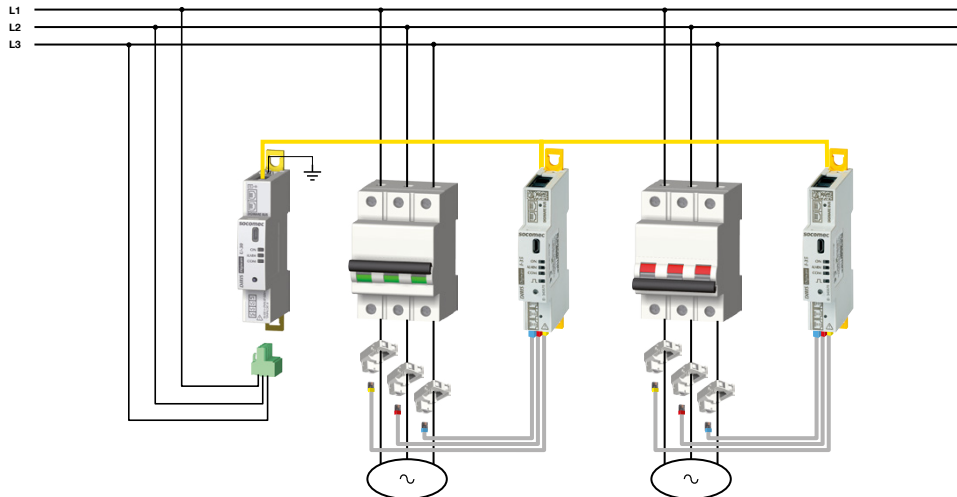
- Position (open/closed)
- Trip information
- Operation counters and trip counters
- Alarms on the opening or the defect of the protective device or on operation/trip counters exceeding configurable thresholds

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

In the Easy Config software, the type of protective device must be configured in the “Protection” menu for the VirtualMonitor function to be used:

The screenshot displays the 'Socomec Easy Config' software interface. The main window is titled 'EASY CONFIG TOOL V2.8'. The top navigation bar includes icons for Product, Network, Loads, Calculations, Memory, Alarms, Multi Tariff, Quality, Protection (highlighted), and Final Action. The left sidebar shows 'DIRIS Digiware I-35' and the 'Protection' menu is selected. The main configuration area is divided into three load sections: Load 1, Load 2, and Load 3. For Load 1, the 'Protective device' is set to 'Breaker', 'Position Input' is 'Virtual Monitor', and 'Trip Input' is 'Virtual Monitor'. For Load 2 and Load 3, the 'Position Input' and 'Trip Input' are also set to 'Virtual Monitor'. Below these sections, there are three threshold settings: 'No load threshold' at 5.0%, 'High load threshold' at 100.0%, and 'Trip threshold' at 120.0%. The bottom status bar shows 'Read from device : ___USB_1_135' and 'Profile Level : User'. The Socomec logo is visible in the bottom right corner.

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



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

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

- the iTR records an opening of the protective device
- the iTR records a current surge $\geq 120\% I_n$ (*)

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

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 $\leq 5\% I_{nom}$
On-load operation counter	Number of times the protective device was opened when load current was $[5\% I_{nom} - 100\% I_{nom})$
Overload operation counter	Number of times the protective device was opened when load current was $\geq 100\% I_{nom}$
Trip Counter	Number of times the protective device has tripped (only available if the protective device is a breaker)

	DIRIS Digiware I and iTR are able to detect several successive openings of a protective device if the interval between 2 openings is greater than or equal to 200ms.
	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, 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

13. 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 module detects an incorrect voltage/current association between the voltage module and the current module, a system alarm will go off on the Digiware I module and on the display if a DIRIS Digiware D-40/D-50/D-70 is used.

13.1. Identifying the wiring error from the DIRIS Digiware D-40/D-50/D-70 display

- Go to PARAMETERS --> CONFIGURE A DEVICE
- Select a Digiware I module connected to iTR 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 iTR current sensors 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:

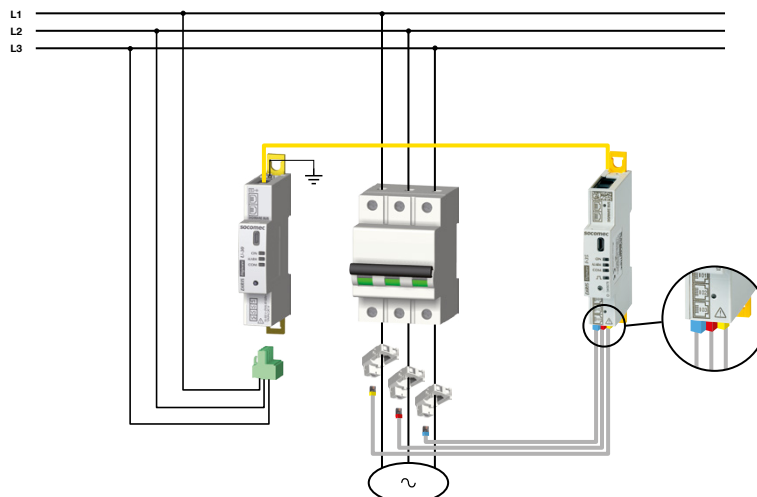
AUTOCORRECT		PC 1-2-3			
		INPUT:	WAY	V	P
x	P1	I01	-/INV	V1	-
✓	P2	I02	+ /DIRECT	V2	+
✓	P3	I03	+ /DIRECT	V3	+

PRESS OK TO LAUNCH AUTOCORRECT

The table indicates that the load power P1 will be correctly calculated by associating current from the iTR connected 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: 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
x	P1	I03	+ / DIRECT	V1	-
✓	P2	I02	+ / DIRECT	V2	+
x	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			
x	AUTOCORRECT: SOFTWARE CORRECTION MANUAL: PHYSICAL WIRING CORRECTION ◀ AUTOCORRECT ▶				
✓					
x					

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

AUTOCORRECT		PC 1-2-3			
x	CHOOSE POWER SIGN ◀ POSITIVE ▶				
✓					
x					

- 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
x	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.

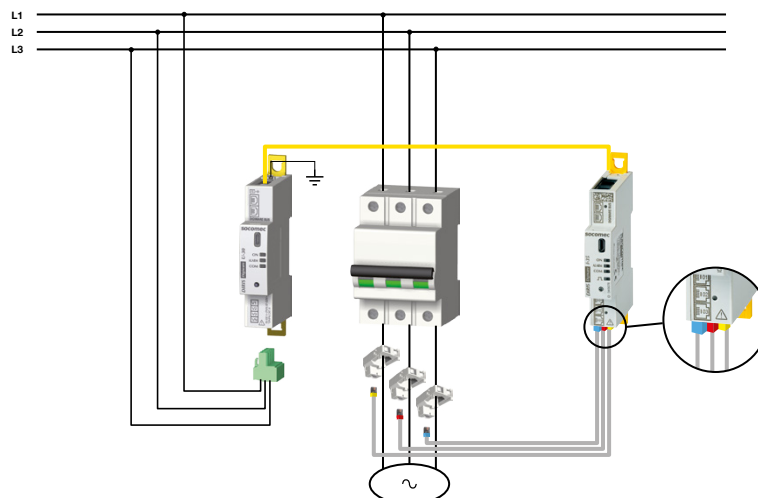
- Press "OK" to launch AUTOCORRECT, and choose a positive power sign. The error mark is cleared and the cell WAY is no longer gray:

AUTOCORRECT		PC 1-2-3			
		INPUT:	WAY	V	P
✓	P1	I01	-/INV	V1	+
✓	P2	I02	+ /DIRECT	V2	+
✓	P3	I03	+ /DIRECT	V3	+

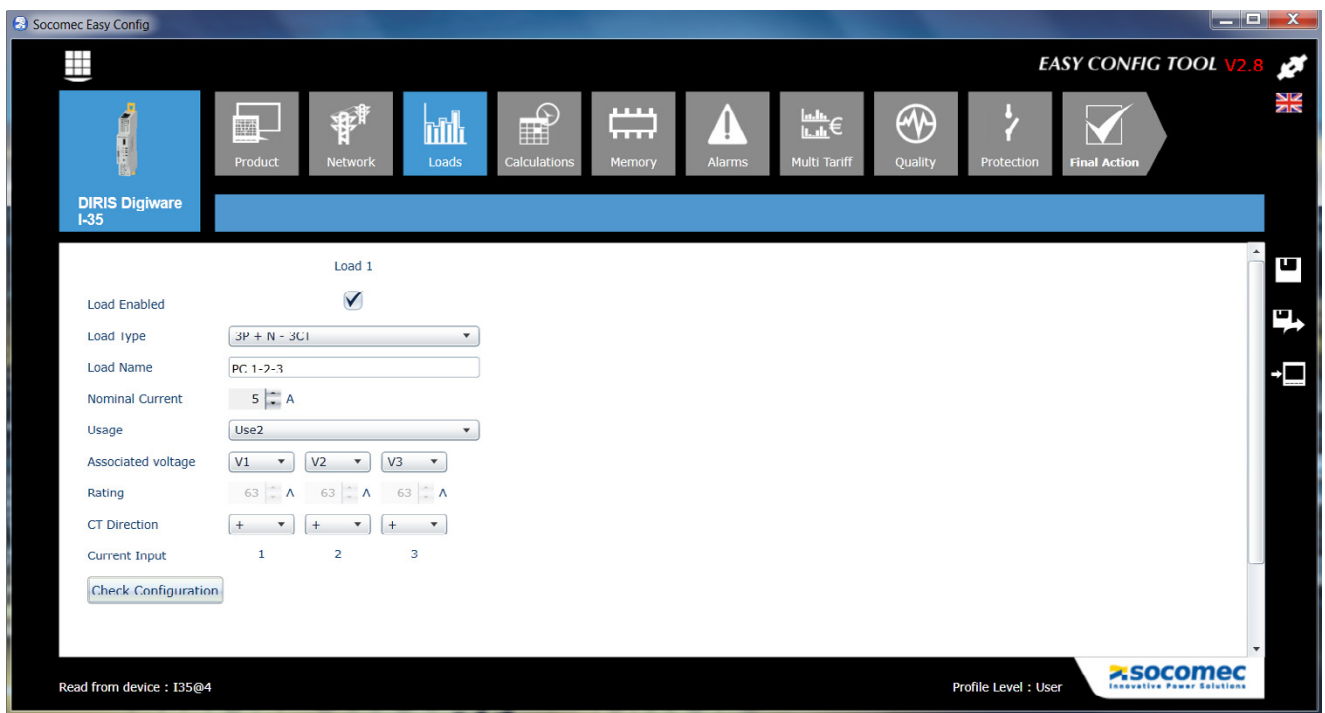
PRESS OK TO LAUNCH AUTOCORRECT

13.2. Identifying the wiring error from the Easy Config software:

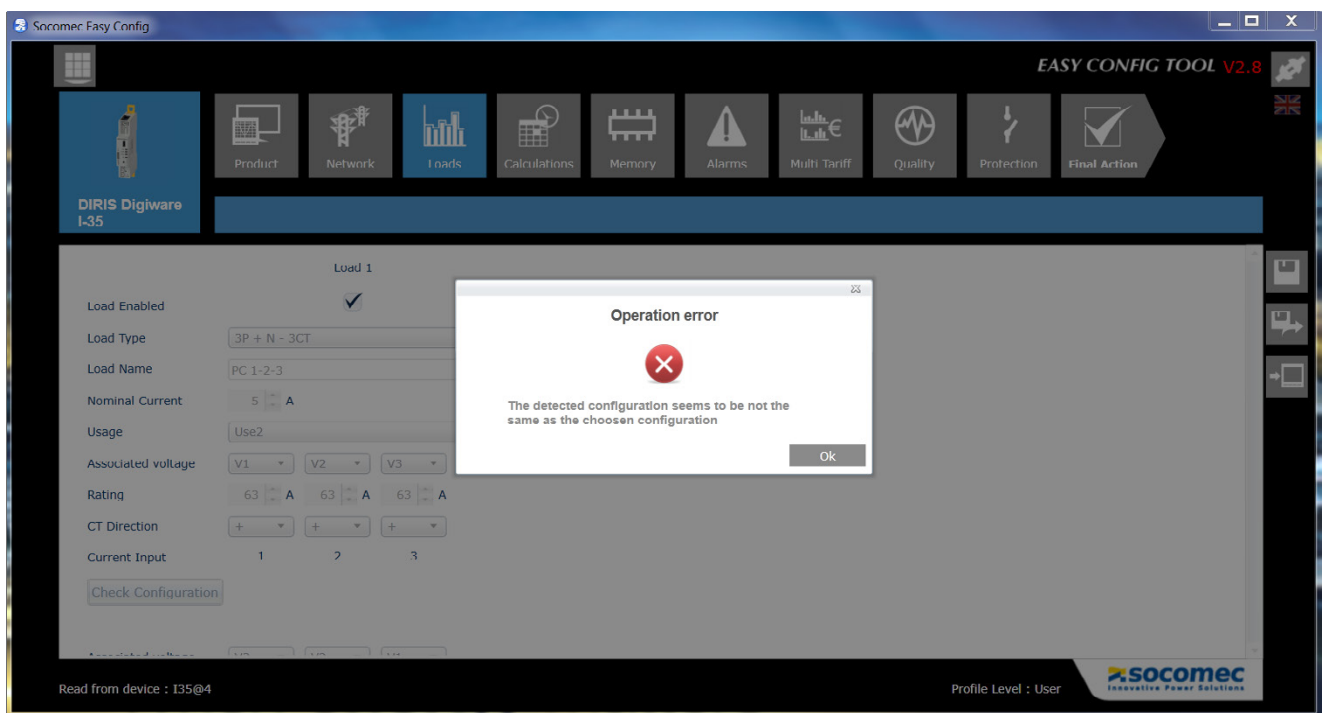
Let's use the previous phase inversion example as per the following picture:



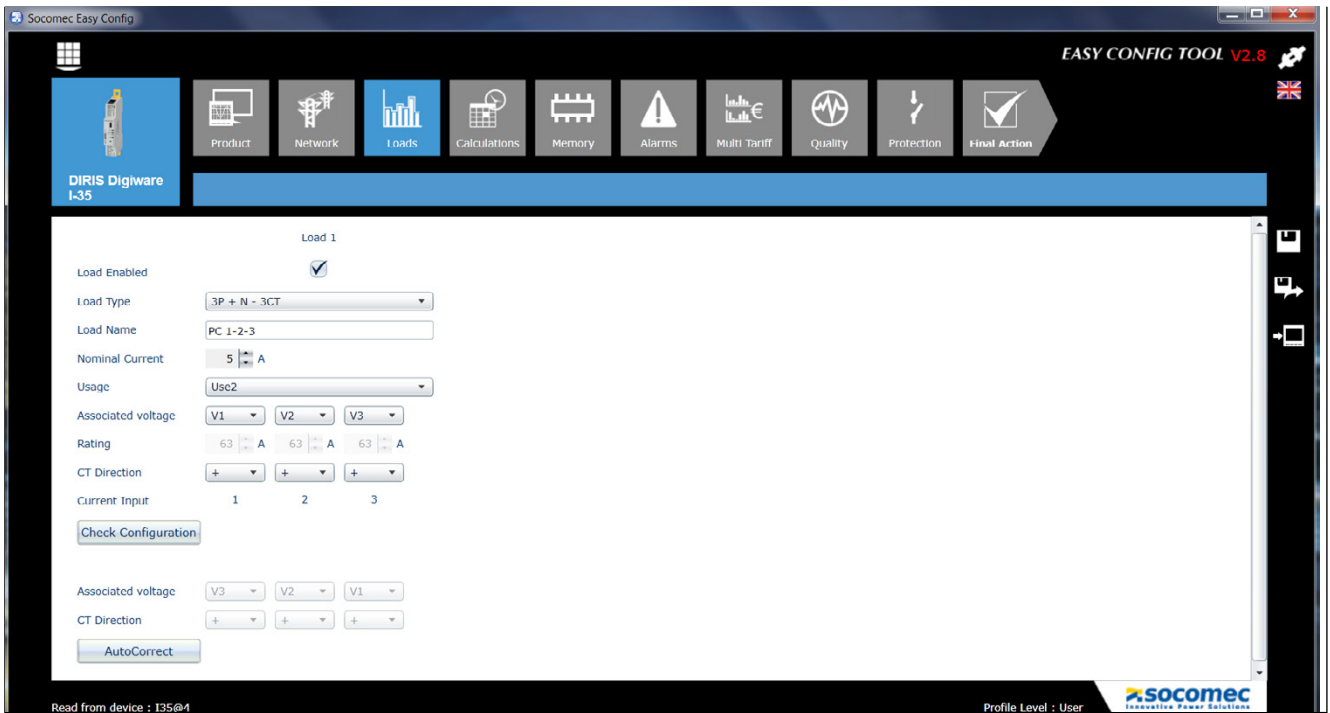
- On Easy Config, go to the “Loads” menu. The current configuration is displayed:






- Click on “Check Configuration” to display what is detected by the iTR sensors. A pop-up message will indicate if the current configuration of the module is consistent with what is detected by the iTR sensors:



- The result of the operation is then displayed:



- You can correct the wrong voltage/current association either by clicking on AutoCorrect or by manually changing the associated voltage. Don't forget to send the configuration to the device to apply the modifications before exiting Easy Config.

	Make sure Earth is connected on the DIRIS Digiware U module to use the AutoCorrect technology.										
	Make sure Earth is connected on the DIRIS Digiware U module to use the VirtualMonitor 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:										
	<table border="1"> <thead> <tr> <th>iTR Type</th> <th>iTR-10</th> <th>iTR-14</th> <th>iTR-21</th> <th>iTR-32</th> </tr> </thead> <tbody> <tr> <td>Min cable section (mm²)</td> <td>6</td> <td>10</td> <td>50</td> <td>50</td> </tr> </tbody> </table>	iTR Type	iTR-10	iTR-14	iTR-21	iTR-32	Min cable section (mm²)	6	10	50	50
iTR Type	iTR-10	iTR-14	iTR-21	iTR-32							
Min cable section (mm²)	6	10	50	50							

14. TECHNICAL CHARACTERISTICS

14.1. DIRIS Digiware C, U, I and IO technical characteristics

14.1.1. 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 / I-3x / I-4x / I-6x / IO-xx	65 g / 64 g / 63 g / 133 g / 83 g / 63 g

14.1.2. Electrical characteristics

DIRIS Digiware C-31	
Input voltage	24 VDC \pm 20 % - 20 W max - SELV
Connection	Removable screw terminal block, 2 positions, stranded or solid 0.2 - 2.5 mm ² cable
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

14.1.3. 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	0.2 DIRIS Digiware class only Class 0.5 with TE, iTR or TF sensors Class 1 with TR sensors
Accuracy of reactive energy	Class 2 with TE, TR/iTR or TF sensors
Power factor measurement	
Accuracy	Class 0.5 with TE, iTR or TF sensors Class 1 with TR sensors
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	\leq 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 mm ² cable
Link with DIRIS Digiware I current module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus

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	0.2 DIRIS Digiware class only Class 0.5 with TE, iTR or TF sensors Class 1 with TR sensors
Connection	Specific Socomec cable with RJ12 connectors
Link with DIRIS Digiware U voltage module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus
Link with DIRIS Digiware I current module	The DIRIS Digiware I current modules are interconnected by Digiware Bus with bus termination for the last module
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, pulse meter
Connection	Removable screw terminal block, stranded or solid 0.14 - 1.5 mm ² cable (max. length 1000 m)
Outputs - DIRIS Digiware I-4x	
Number of outputs	2
Relay type	230 V \pm 15% - 1 A 30 VDC - 3 A
Function	Configurable alarm (current, power,...) on threshold overruns or remote controlled status
Connection	Removable screw terminal block, stranded or solid 0.2 to 2.5 mm ² 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 of protective device Pulse counter: choice of pulse weight, measurement unit, multiple tariff rates (max. 8)
Connection	Removable screw terminal block, 9 positions - 5 dedicated to inputs, stranded or solid 0.14 - 1.5 mm ² cable
Number of outputs	2
Type	Insulated output, 48 VDC max., 50 mA and 24 VAC max. - SELV
Output functions	Configurable alarm on threshold overruns Remote control
Connection	Removable screw terminal block, 9 positions - 4 dedicated to outputs, stranded or solid 0.14 - 1.5 mm ² cable
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 mm ² cable

14.1.4. 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 115200 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
Connection	Removable screw terminal block, 3 positions, stranded or solid 0.14 - 1.5 mm ² cable
USB	
Protocol	Modbus RTU on USB
Function	Configuration of DIRIS Digiware U and I modules
Location	On each DIRIS Digiware U and I measurement module
Connection	Type B micro USB connector

14.1.5. Environmental characteristics

Ambient operating temperature	-10 ... +70°C (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature	-25 ... +70°C (IEC 60068-2-1/IEC 60068-2-2)
Operating humidity	55°C / 97% 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 - 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 I: SOCO-2014-06-v1-fr, SOCO-2014-06-v1-en DIRIS Digiware IO :SOCO-00001-V01.01-fr, SOCO-00001-V01.01-en

14.1.6. 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

14.1.7. Standards and safety

Device	IEC 61557-12, performance measuring and monitoring device (PMD)
Safety	Low voltage directive 2014/35/CE dated 26 February 2014
Insulation	Installation category III (300VAC Ph/N), degree of pollution 2
UL	UL 61010 compliance

14.1.8. Service life

MTTF (mean time to failure)	> 100 years
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14.2. TE, TR/iTR and TF sensor technical characteristics

14.2.1. 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					
Rated withstand voltage	3 kV					
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	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 600 V -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					
Operating temperature	-10 ... +70°C					
Storage temperature	-25 ... +85°C					
Relative humidity	95% RH without condensation					
Altitude	< 2,000 m					
Connection	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 600 V -10 / +70°C.					
<i>(1) 5A CT adaptor (max primary current is 10 000 A for 5A CT).</i>						

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 ... +70°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	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 600 V -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 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, DIRIS B-30 and DIRIS A-40 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	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 600 V -10 / +70°C.					

14.2.2. 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

14.3. DIRIS D-30 and DIRIS Digiware D-40/D-50/D-70 - technical characteristics

14.3.1. 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 D-40: 180 g D-50/D-70: 210 g

14.3.2. 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

14.3.3. DIRIS Digiware D-40 communication characteristics

Type of screen	Multipoint remote screen
RJ45 Digiware	Control and power supply interface function
RS485 2-3 wires	Modbus RTU slave communication function
USB	Upgrade and configuration via type B micro USB connector

14.3.4. DIRIS Digiware D-50 communication characteristics

Type of screen	Multipoint remote screen
Ethernet RJ45 10/100 Mbs	Gateway function: - Modbus TCP (max. 32 simultaneous connections) - BACnet IP - SNMP v1, v2 & v3
SNTP protocol	Allows time synchronisation of the display with an SNTP server. The display updates the connected devices.
SMTP protocol	Sends email notifications from the display.
RJ45 Digiware	Control and power supply interface function
RS485 2-3 wires	Modbus RTU master communication function
USB	Upgrade and configuration via type B micro USB connector

14.3.5. DIRIS Digiware D-70 communication characteristics

Type of screen	Multipoint remote screen
Ethernet RJ45 10/100 Mbs	Gateway function: - Modbus TCP (max. 32 simultaneous connections) - WEBVIEW-M embedded web server - BACnet IP - SNMP v1, v2 & v3
SNTP protocol	Allows time synchronisation of the display with an SNTP server from an NTP server. The display updates the connected devices.
SMTP protocol	Sends email notifications from the display.
FTP protocol	Automatically exports data via FTP standard or secure server (consumption curves, load curves, measurement logs)
RJ45 Digiware	Control and power supply interface function
RS485 2-3 wires	Modbus RTU master communication function
USB	Upgrade and configuration via type B micro USB connector

14.3.6. Electrical characteristics

Power supply	24 VDC +10% / -20%
Power consumption	D-40: 2 VA D-50/D-70: 2.5 VA
Battery life (D-50/D-70 only)	Total = 10 years Typical battery profile over its lifetime (product storage + product life): - Product storage: 1 year of full time battery back-up (based on an average storage temperature of 25°C). - Product life: 10 days / year of battery back-up over 9 years
Battery type (D-50/D-70 only)	3V Lithium cell battery, 48mAh rated capacity

14.3.7. Environmental characteristics

Characteristic	Data
Operating altitude	< 2000 m
Operating temperature	-10°C ... +70°C (CEI 60068-2-1 / EN/IEC 60068-2-2)
Storage temperature	-40°C ... +85°C (CEI 60068-2-1 / EN/IEC 60068-2-2)
Operating humidity	55°C / 97% RH (CEI 60068-2-30)
Vibration	2.0 Hz à 25.0 Hz – amplitude \pm 1,6 mm (CEI 60068-2-6) 25.0 Hz à 100 Hz – accélération \pm 4g (CEI 60068-2-6) 3Hz à 8.7Hz- amplitude \pm 10 mm (CEI 60068-2-6) 8.7Hz à 150Hz – accélération \pm 3 g (CEI 60068-2-6)
Impact resistance	10 g / 11 ms, 3 pulses (CEI 60068-2-27) 30 g / 18 ms, 3 pulses (CEI 60068-2-27) 40 g / 6 ms, 3 pulses (CEI 60068-2-27)
Protection index	IP65 (front face)

15. PERFORMANCE CLASSES

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

15.1. Specification of the characteristics

Symbol	Function	Overall operating performance class DIRIS Digiware + 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)	1 with TE, TR/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
E_{r_A}, E_{r_V}	Total reactive energy (arithmetic, vectorial)	2 with TE, TR/iTR or TF sensors	5% ... 120% In
E_{ap_A}, E_{ap_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 connection cables.

15.2. Evaluation of the power supply quality

Symbol	Function	Overall operating performance class DIRIS Digiware + dedicated sensors (TE, TR/iTR, TF) in compliance with IEC 61557-12	Measurement range
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 solid-core 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
Pst, PIt	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	-
Uh	Voltage harmonics	1	-
Ih	Current harmonics	1 with sensors TE, TR/iTR or TF	-
Msv	Centralised remote control signals	-	-



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