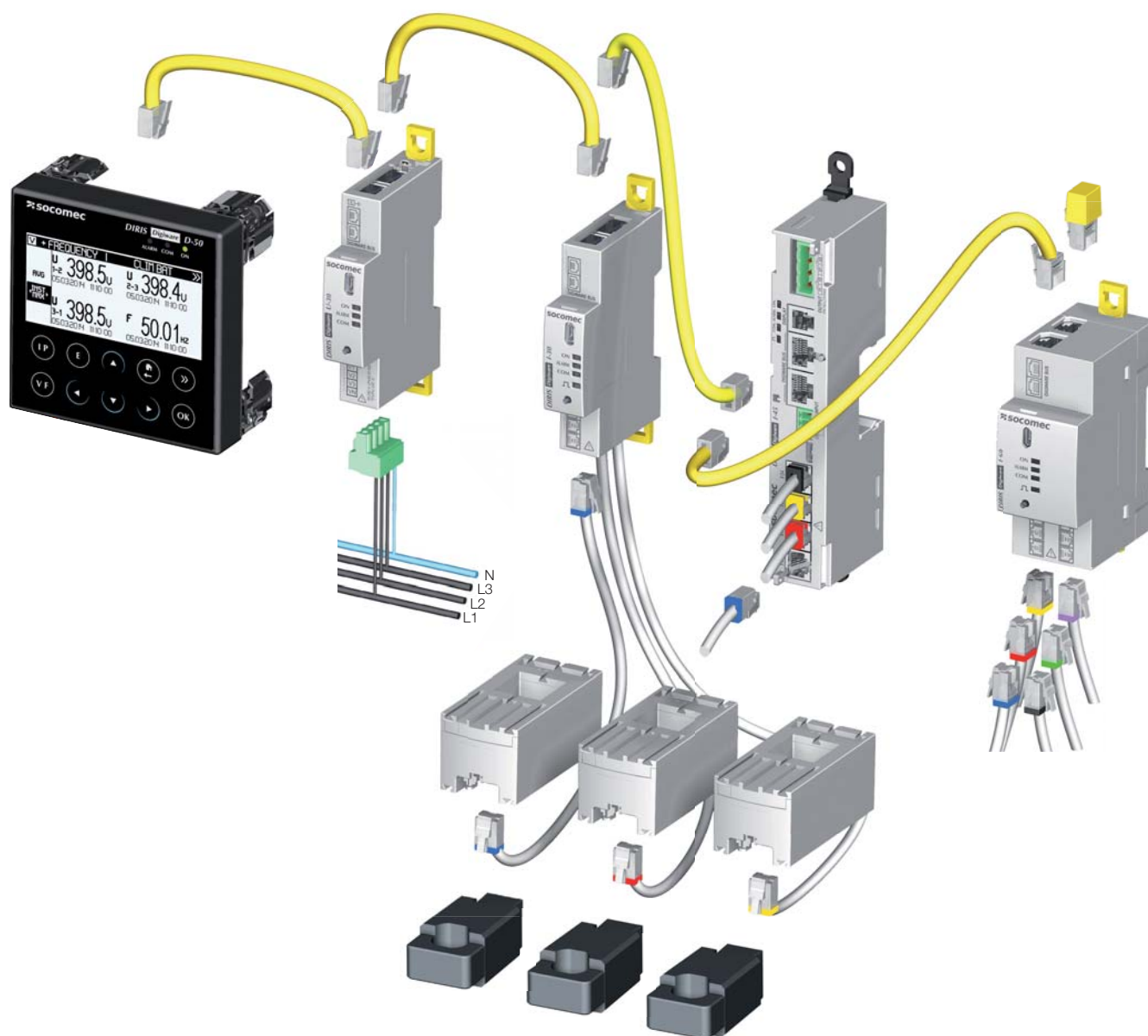


USER MANUAL

DIRIS Digiware

Measuring and monitoring system and
associated current sensors for electrical
installation

EN



[www.socomec.com/
en/diris-digiware](http://www.socomec.com/en/diris-digiware)

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Innovative Power Solutions

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1. DOCUMENTATION

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

www.socomec.com/en/diris-digiware



2. HAZARDS AND WARNINGS

The term "device" used in the following paragraphs encompasses the DIRIS Digiware and its associated current sensors (TE, TR 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)

- This device must only be installed and serviced by qualified personnel who have in-depth knowledge of installing, commissioning and operating the device and who have had appropriate training. He or she should have read and understood the various safety measures and warnings stated in the instructions.
- Before starting any type of work on the device, switch it off and disconnect it from the mains.
- Always use an appropriate voltage detection device to confirm the absence of voltage.
- Replace all devices, doors and covers before connecting the device to the power again.
- Always power the device with the correct rated voltage.
- Install the device in accordance with the recommended installation instructions and in a suitable electrical cabinet.
- Always connect the TE, TR or TF current sensors using the recommended connection cables and observing the maximum prescribed currents.

	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 take these precautions could cause serious injuries or death.

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%.
- Use 230 VAC / 24 VDC SOCOMEK or use a 1 A 24 VDC safety 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 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. Liability

- 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 device may compromise the device's intrinsic protection.
- The device must be positioned within an installation which complies with the standards currently in force.
- Any cables which need to be replaced may only be replaced with cables with the correct ratings.

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 transportation,
- The device reference number conforms to your order,
- The packaging includes the device fitted with removable terminal blocks and a Quick Start guide.

4. PRESENTATION

4.1. DIRIS Digiware System

The DIRIS Digiware is a measuring system (PMD*) with modular format. It is designed for monitoring and reporting electrical energy. The 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.

The DIRIS Digiware is an innovative concept based on centralising the voltage measurement and distributing 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 Bus Digiware. On DIRIS Digiware I modules, three or four 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 the DIRIS Digiware means the overall accuracy of the DIRIS Digiware + Current sensor measurement chain can be guaranteed for all values measured.

The 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 the DIRIS G communication gateways. The consumption data are also accessible from the HYPERVIEW energy management software.

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

**PMD: Performance Measuring and Monitoring Device in accordance with IEC 61557-12.*

4.1.1. Range

Control and power supply interface (24 VDC)

	
DIRIS Digiware D Multipoint display DIRIS Digiware D-40 Ref. 4829 0199 DIRIS Digiware D-50 Ref. 4829 0201	DIRIS Digiware C System interface* DIRIS Digiware C-31 Ref. 4829 0101

* if there is no multipoint display

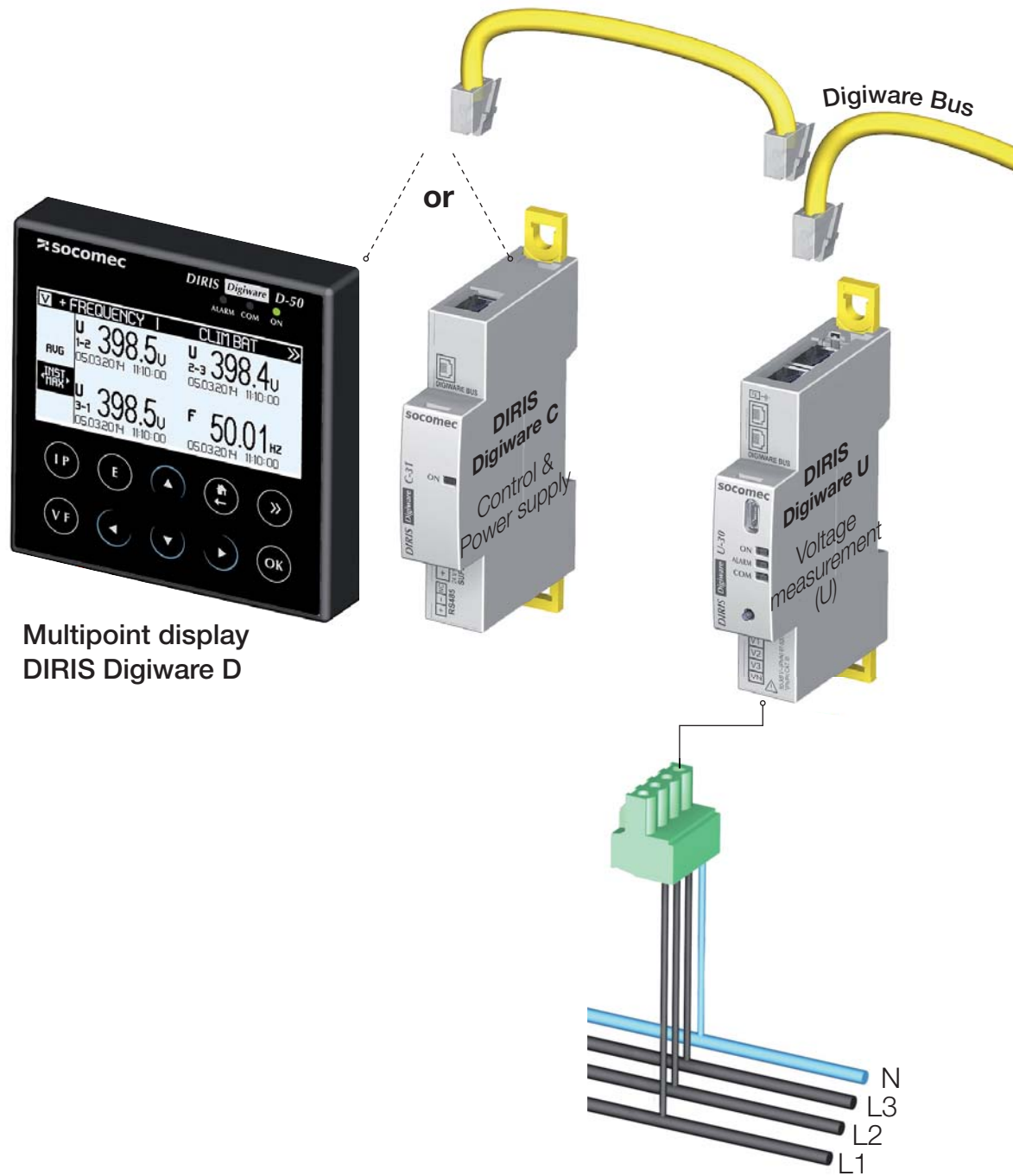
Voltage measurement module

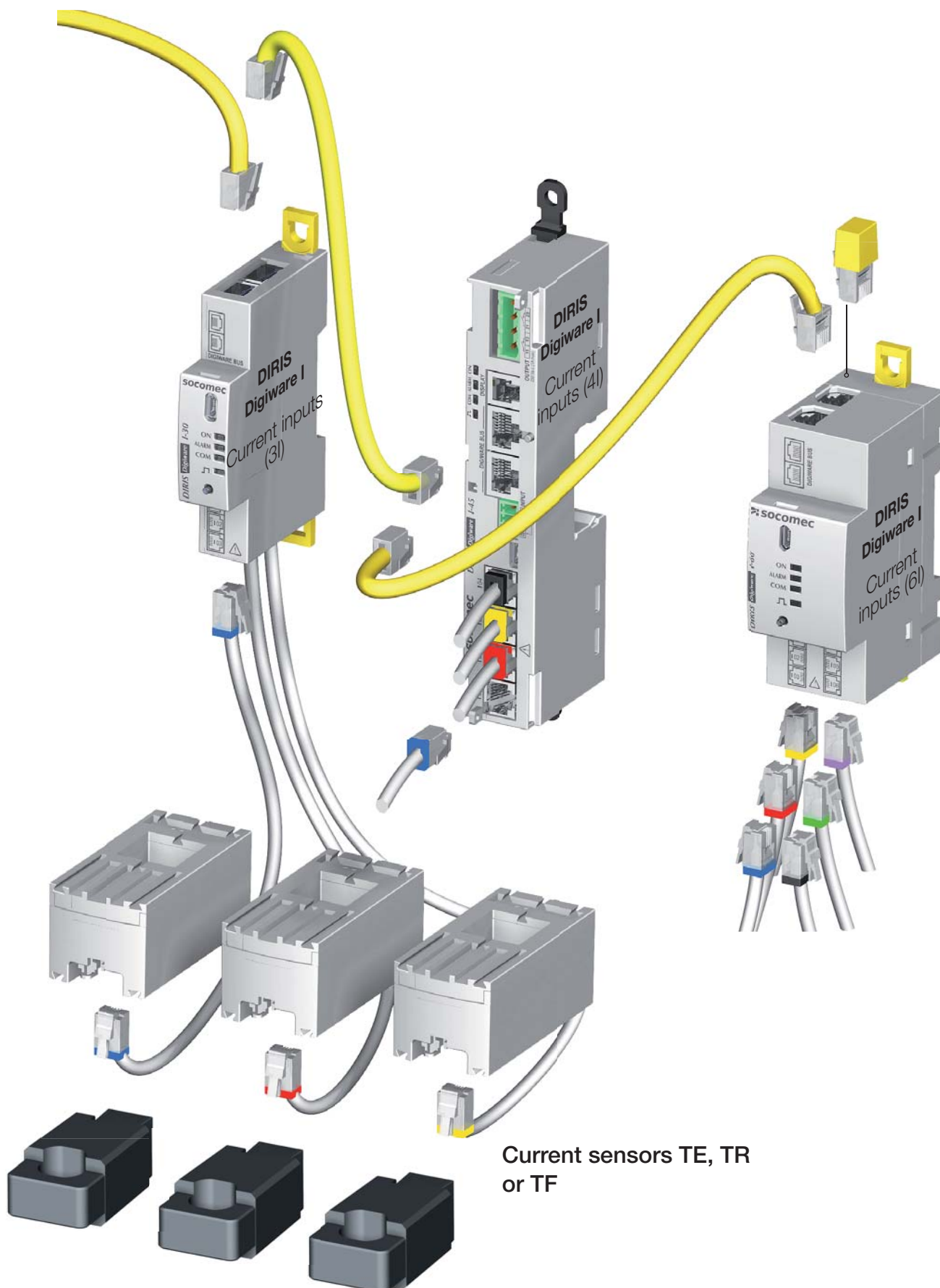

DIRIS Digiware U-x Voltage measurement DIRIS Digiware U-10 Ref. 4829 0105 DIRIS Digiware U-20 Ref. 4829 0106 DIRIS Digiware U-30 Ref. 4829 0102

Current measurement module

		
DIRIS Digiware I-3x 3 current measurement inputs DIRIS Digiware I-30 Ref. 4829 0110 DIRIS Digiware I-31 Ref. 4829 0111 DIRIS Digiware I-33 Ref. 4829 0128 DIRIS Digiware I-35 Ref. 4829 0130	DIRIS Digiware I-4x 4 current measurement inputs DIRIS Digiware I-43 Ref. 4829 0129 DIRIS Digiware I-45 Ref. 4829 0131	DIRIS Digiware I-6x 6 current measurement inputs DIRIS Digiware I-60 Ref. 4829 0112 DIRIS Digiware I-61 Ref. 4829 0113

4.1.2. Principle





4.1.3. Functions

The DIRIS Digiware boasts numerous functions, including:

- **General measurements**

- Voltage measurement
- Multi-load current measurement
- Power, power factor, ϕ , $\cos \phi$ and $\tan \phi$
- Operation across 4 quadrants
- Predictive power
- Guarantees the overall accuracy of the DIRIS Digiware + Sensor measurement chain in terms of power and active energy up to class 0.5, as per IEC standard 61557-12

- **Quality**

- Direct, inverse and zero-sequence voltages
- THD and harmonics up to order 63 for voltage and current
- Current and voltage imbalance
- EN50160 events (Uswl, Udip, Uint) and current overloads

- **Logging**

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

- **Metering**

- Partial and total apparent, reactive and active power
- 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
- Guarantees the overall accuracy of the DIRIS Digiware + Sensor measurement chain at Class 0.5 in terms of power and active energy as per IEC 61557-12

- **Communication**

- RS485 communication
- Works with the DIRIS Digiware D multi-device remote display
- Measurements available in the (WEBVIEW) web server of the DIRIS G gateway
- Time synchronisation by the DIRIS G gateway
- Auto-addressing with the gateway or the remote display.

4.1.4. Electrical values measured

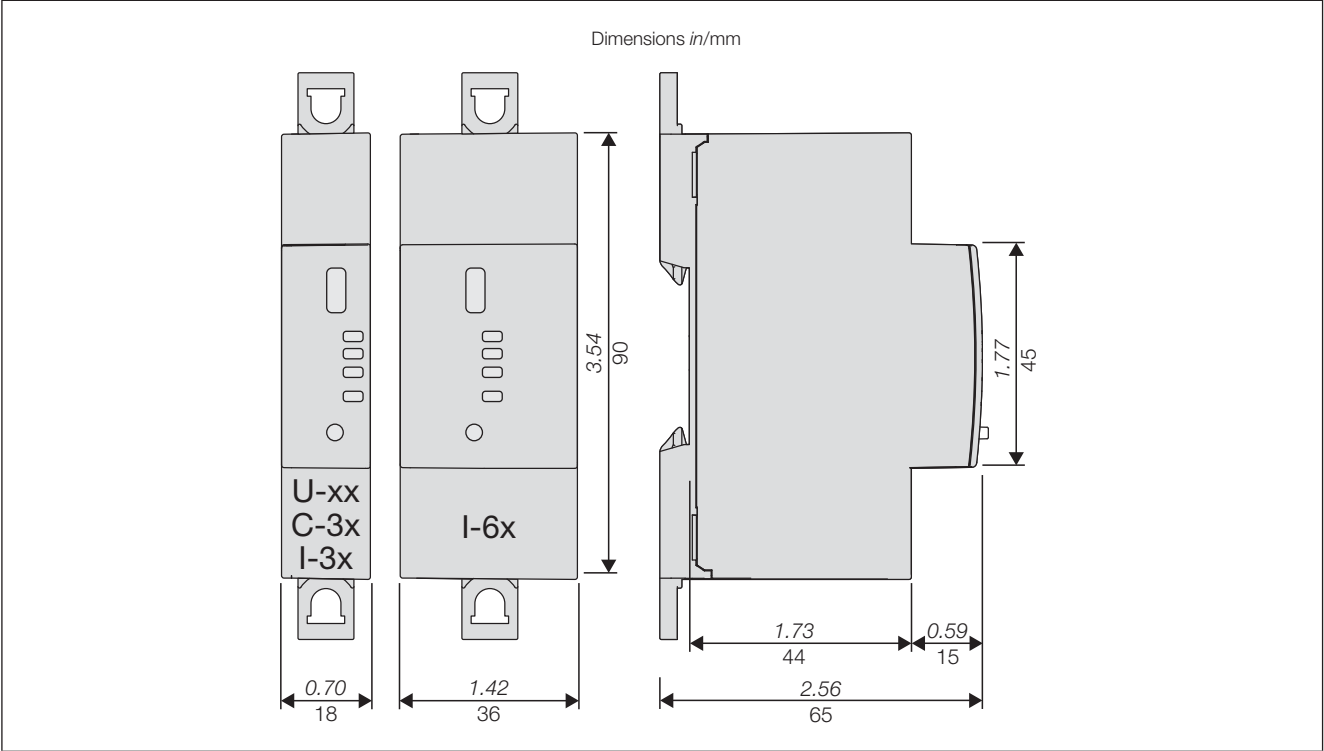
	DIRIS Digiware		
	D-40	D-50	C-31
Function			
Centralisation of measurement points	•	•	•
High-resolution LCD display (configuration, selection and visualisation display of circuits)	•	•	
Power supply			
24 VDC	•	•	•
Communication			
Slave RS485 modbus	•		•
Master RS485 modbus		•	
Digiware Bus	•	•	•
Ethernet Modbus TCP		•	
Format			
Width/Number of modules	97x97 mm	97x97 mm	18 mm / 1
Reference	4829 0199	4829 0201	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)			•
Quality analysis			
THDv1, THDv2, THDv3, THDu12, THDu23, THDu31		•	•
Individual harmonics U & V (up to rank 63)			•
Voltage dips, cut-offs and surges EN50160			•
Alarms			
Upon overloads			•
History of average values			
			•
Format			
Width/Number of modules	18 mm / 1	18 mm / 1	18 mm / 1
Reference	4829 0105	4829 0106	4829 0102

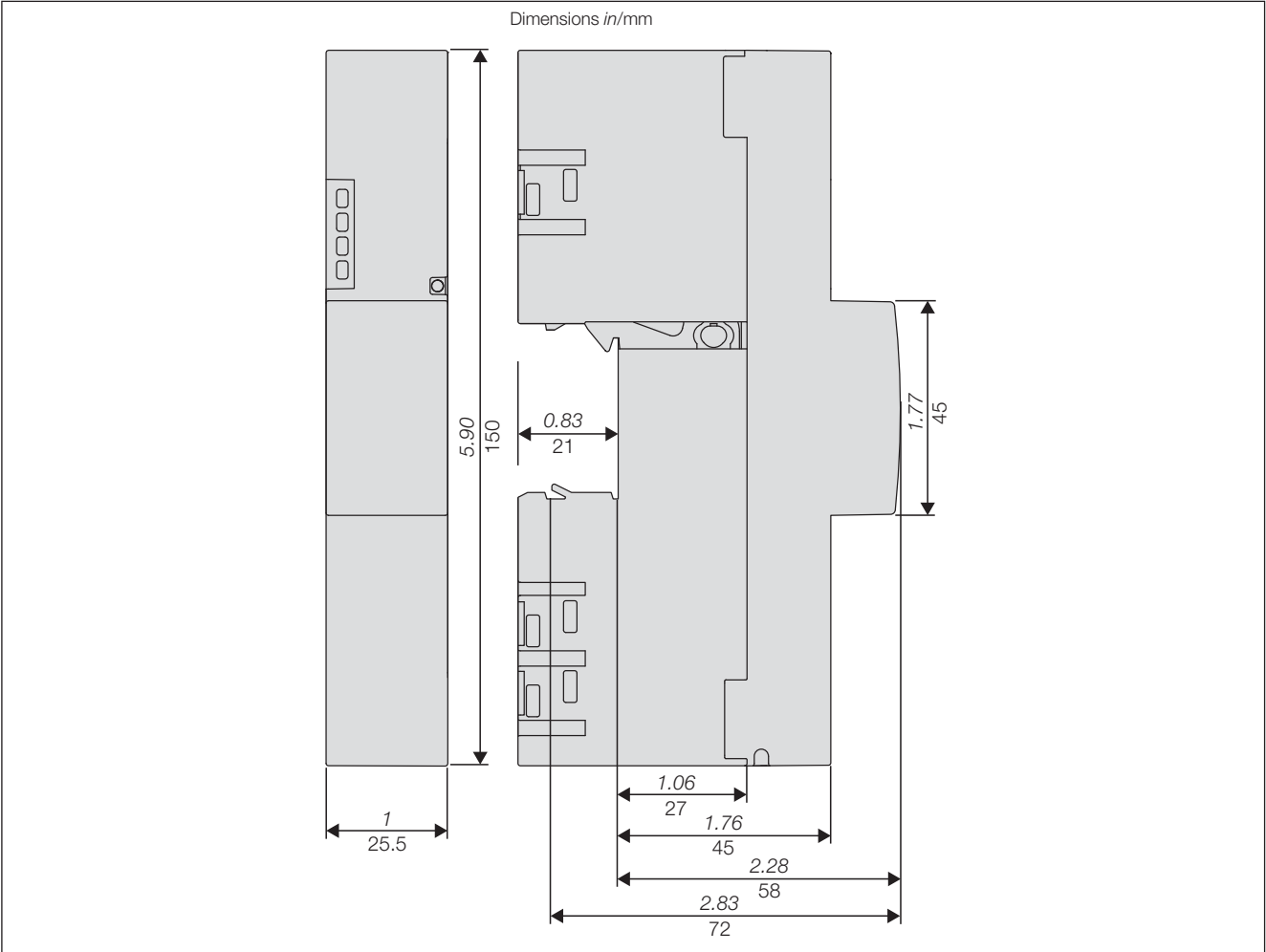
DIRIS Digiware I								
	I-30	I-31	I-33	I-35	I-43	I-45	I-60	I-61
Application	Metering		Monitoring	Analysis	Monitoring	Analysis	Metering	
Number of current inputs	3	3	3	3	4	4	6	6
Metering								
± kWh, ± kvarh, kVAh	•	•	•	•	•	•	•	•
Multi-tariff (max. 8)		•		•		•		•
Load curves		•		•		•		•
Multi-measurement								
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			•	•	•	•		
Individual harmonics I (up to level 63)				•		•		
Overcurrents				•		•		
Alarms								
Thresholds				•		•		
Inputs/outputs								
Number					2/2	2/2		
Trends								
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
Reference	4829 0110	4829 0111	4829 0128	4829 0130	4829 0129	4829 0131	4829 0112	4829 0113

4.1.5. Dimensions

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

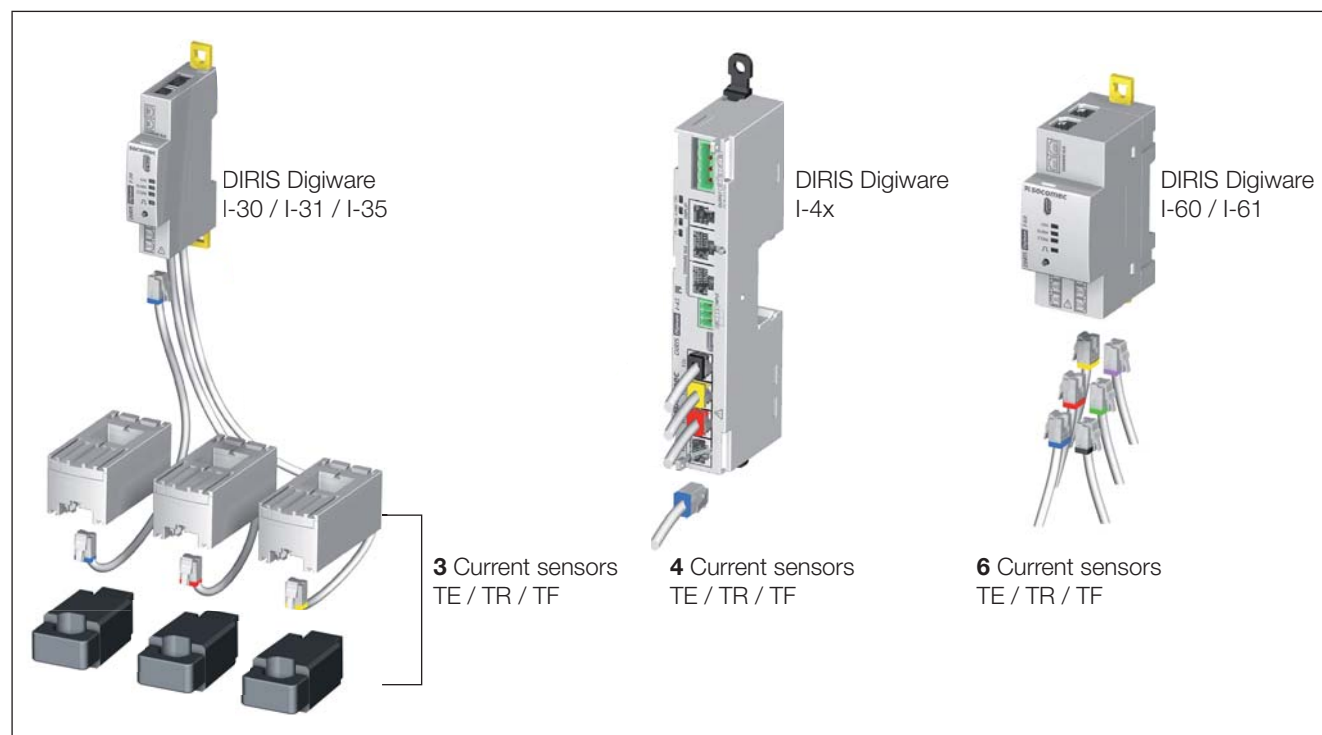


4.1.5.2. DIRIS Digiware I-4x



4.2. Presentation of associated current sensors

Various types of current sensors are connected to the DIRIS Digiware: closed (TE), open (TR) or flexible (TF). The difference between these sensors means they can be adapted to 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. The DIRIS Digiware recognises the sensor size and type. In addition, combining them means the overall accuracy of the DIRIS Digiware + Current sensor measurement chain can be guaranteed over a large measurement range.



Recommendations:

For connecting the current sensors, use SOCOMEC cables or equivalent only, RJ12 straight cables, twisted pair, unshielded, 300 V cat.III., -40°C / +85°C as per IEC 61010-1 version 3.0.

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 + 50 connectors*
Number of cables	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
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 respect 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.

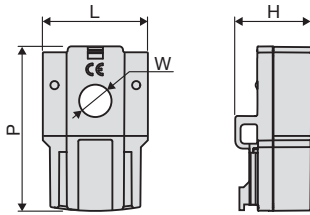
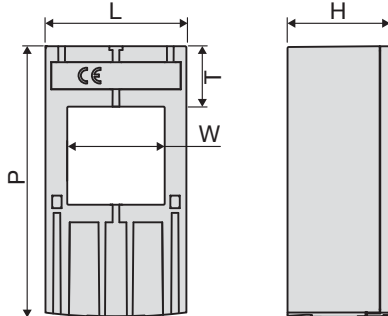
Thanks to the specific link, they are recognised by the DIRIS Digiware and a high level of overall accuracy for the measurement chain is guaranteed.

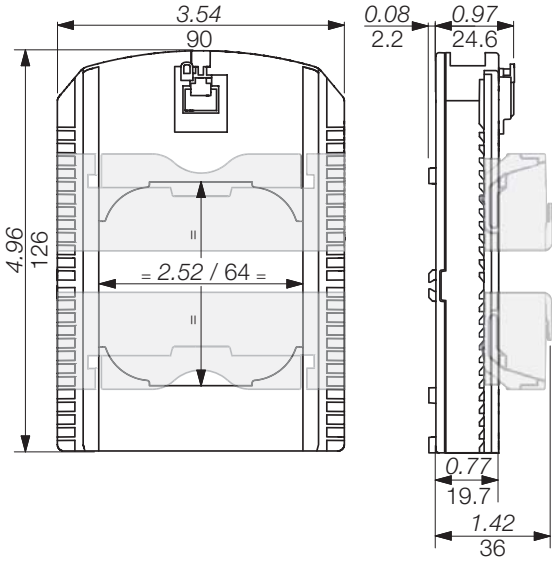
4.2.1.1. Range

						
	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 I_n	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
Reference	4829 0500	4829 0501	4829 0502	4829 0503	4829 0504	4829 0505

	
	TE-90
Pitch	90 mm
Nominal current range I_n	600 - 2000 A
Maximum I	2400 A
Reference	4829 0506

4.2.1.2. Dimensions

					
	TE-18	TE-25	TE-35	TE-45	TE-55
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

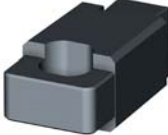
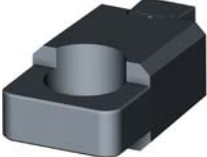
	
Dimensions in/mm	TE-90

4.2.2. TR split-core current sensors

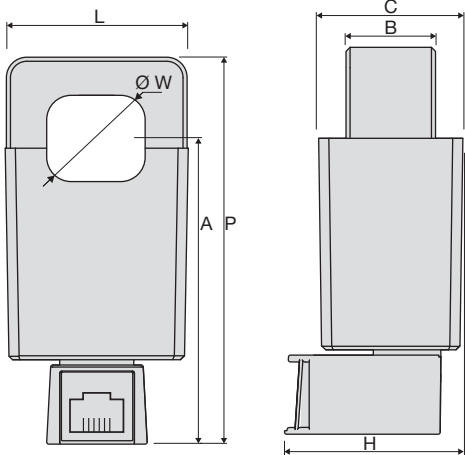
The TR split-core current sensors are used to set up measurement points in a new or existing installation without interfering with its cabling. Thanks to the specific link, they are recognised by the DIRIS Digiware and the overall accuracy of the measurement chain is guaranteed.

4.2.2.1. Range

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

				
	TR-10	TR-16	TR-24	TR-36
Cable passage diameter	diameter 10 mm	diameter 16 mm	diameter 24 mm	diameter 36 mm
Nominal current range I_n	25 - 75 A	32 - 100 A	63 - 200 A	200 - 600 A
Maximum I	90 A	120 A	240 A	720 A
Reference	4829 0551	4829 0552	4829 0553	4829 0554

4.2.2.2. Dimensions

				
Dimensions in/mm	TR-10	TR-16	TR-24	TR-36
LxHxD	0.98 x 1.54 x 2.79 25 x 39 x 71	1.18 x 1.65 x 2.91 30 x 42 x 74	1.77 x 1.73 x 3.74 45 x 44 x 95	2.24 x 1.65 x 4.37 57 x 42 x 111
W	0.39 10	0.63 16	0.94 24	1.42 36
A	2.28 58	2.40 61	2.83 72	3.23 82
B	0.57 14.5	0.75 19	0.87 22	0.87 22
C	1.02 26	1.22 31	1.34 34	1.59 40.5

4.2.3. TF flexible current sensors

The TF flexible current sensors use the Rogowski principle which enables a large current range to be covered without saturation. Flexible design and easy-opening system for quick installation in electrical enclosures. They are particularly suitable for adding measuring points in existing installations and for test campaigns.

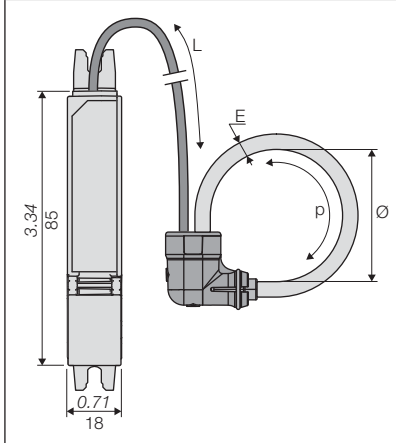
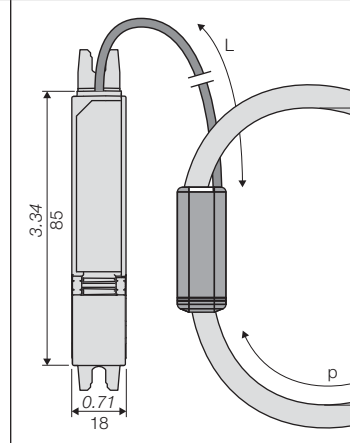
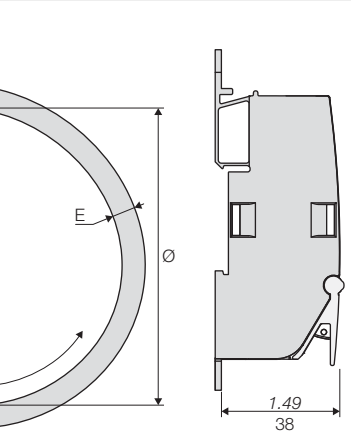
4.2.3.1. Range

Three models are available, covering a large current range up to 6000 A with openings of different shapes and sizes.

An integrator will be required to shape the current signal. With its specific link you can connect it directly to the DIRIS Digiware, which can identify it.

					
TF-55		TF-120		TF-300	
Loop length	55 mm	120 mm		300 mm	
Nominal current range In	150 - 600 A	500 - 2000 A		1600 - 6000 A	
Reference	4829 0570	4829 0571		4829 0572	

4.2.3.2. Dimensions

			
Dimensions in/mm	TF-55	TF-120	TF-300
Diameter	2.16 55	4.72 120	11.81 300
p	7.16 182	14.80 376	37.08 942
T	0.23 6	0.43 11	0.43 11
L	59.05 1500		

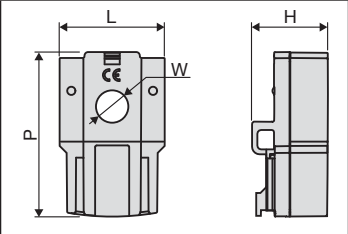
4.2.4. Adapters for 5A sensors

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

4.2.4.1. Range

	
5A adapter	
I nom.	5 A
I max.	6 A
Reference	4829 0599

4.2.4.2. Dimensions

	
Dimensions in/mm	5A adapter
LxHxD	1.10 x 0.79 x 1.77 28 x 20 x 45
Aperture (W)	∅ 0.33 ∅ 8.4

5. MOUNTING

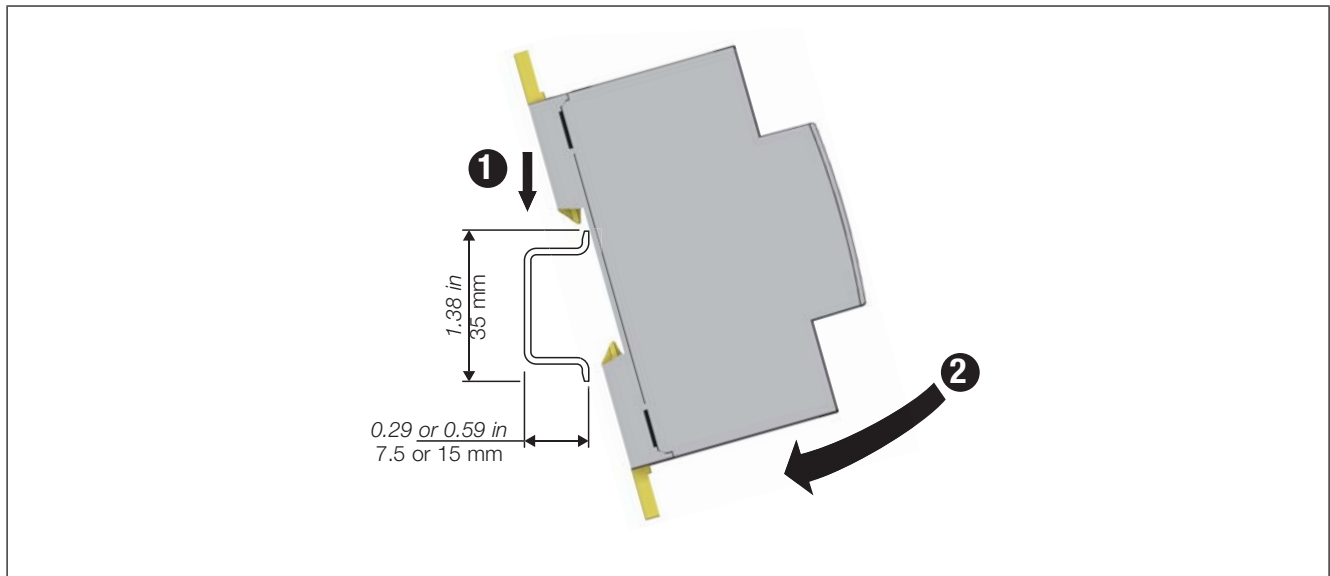
The following paragraphs describe the installation of the DIRIS Digiware and associated sensors.

5.1. Recommendations and safety

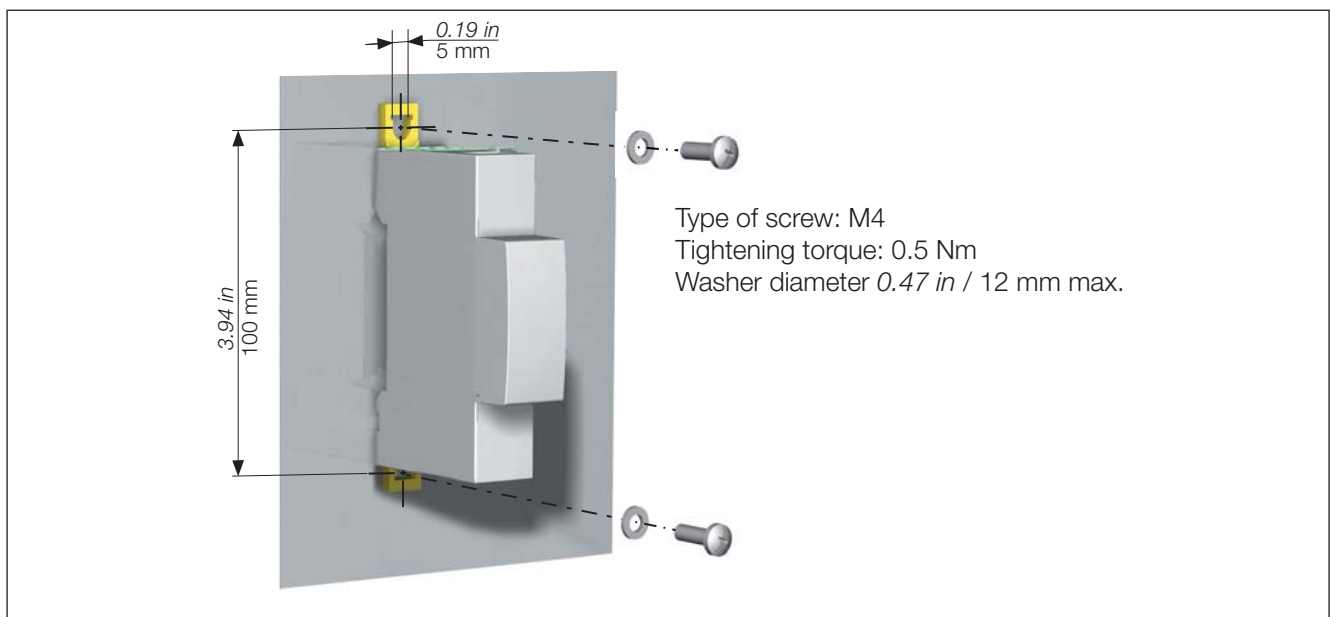
Refer to the safety instructions (section “2. Hazards and warnings”, page 5)

5.2. DIRIS Digiware mounting

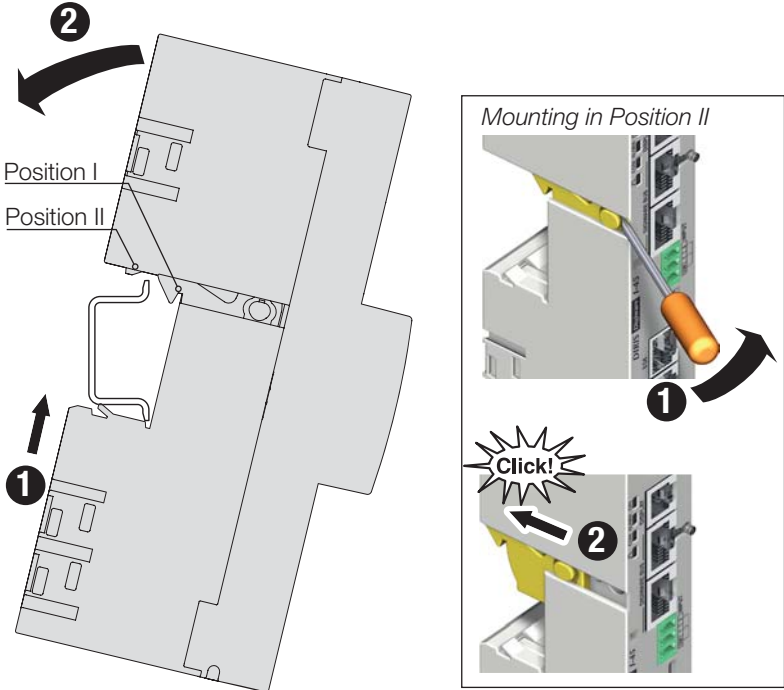
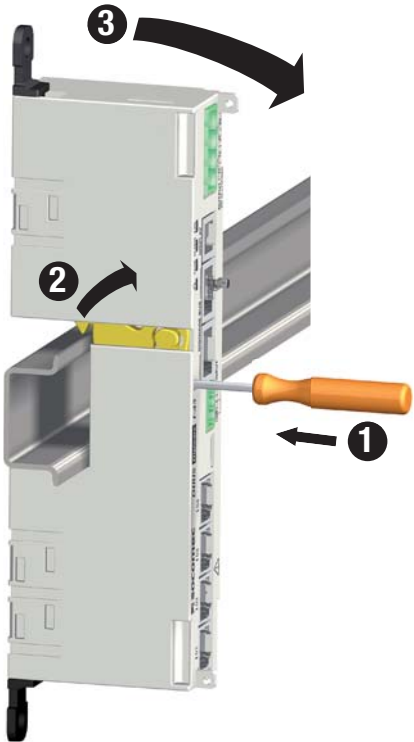
5.2.1. DIRIS Digiware C, U, I-3x, I-6x - DIN rail mounting



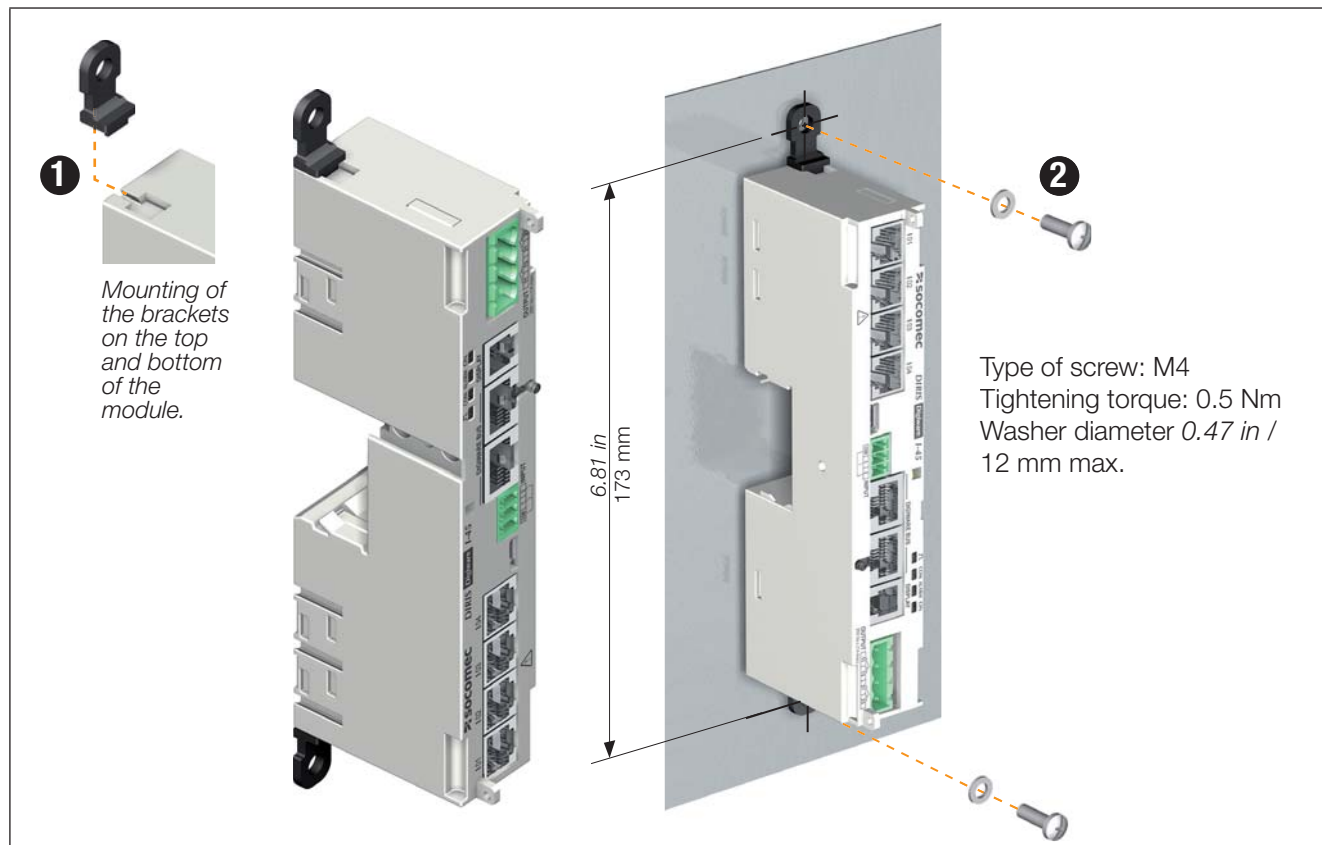
5.2.2. DIRIS Digiware C, U, I-3x, I-6x - back-plate mounting



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

DIRIS Digiware I-4x mounting	DIRIS Digiware I-4x dismounting
Two mounting positions are possible: Position I (factory assembly): for 15mm rail. Position II: for 7.5mm rail  Position I Position II Click! Mounting in Position II	

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



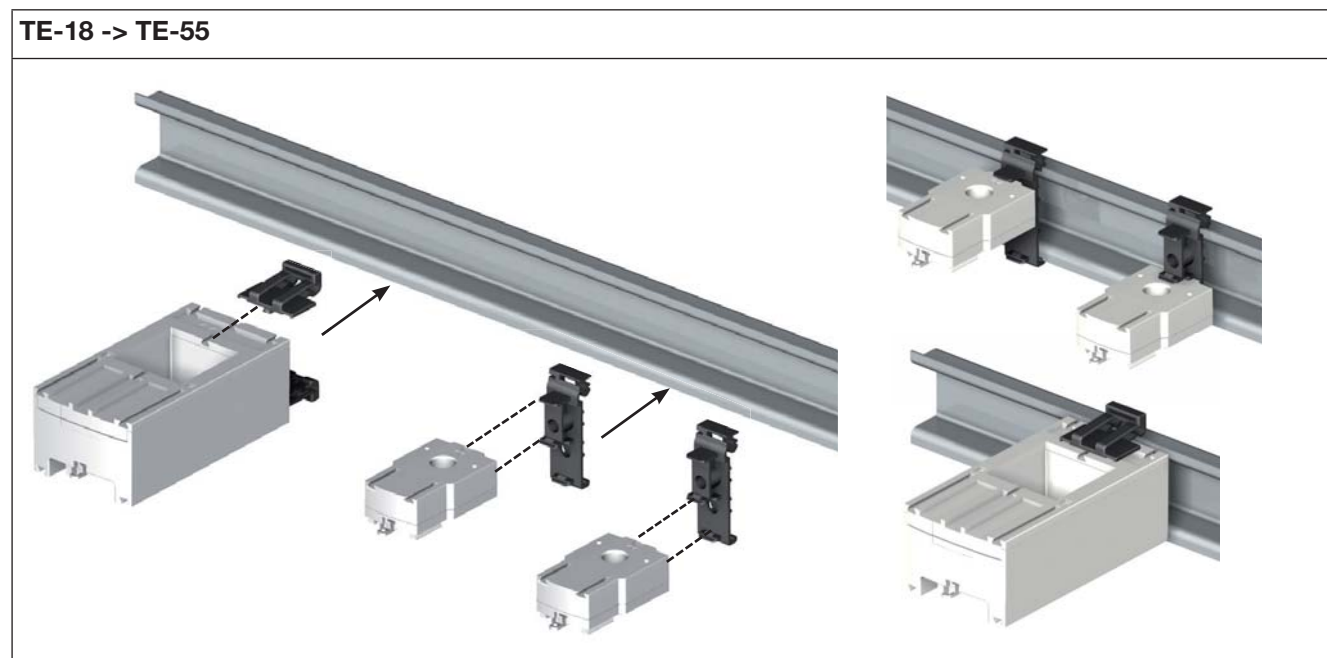
5.3. TE solid-core sensors mounting

5.3.1. Mounting accessories

The list of mounting accessories supplied with the sensors are listed below:

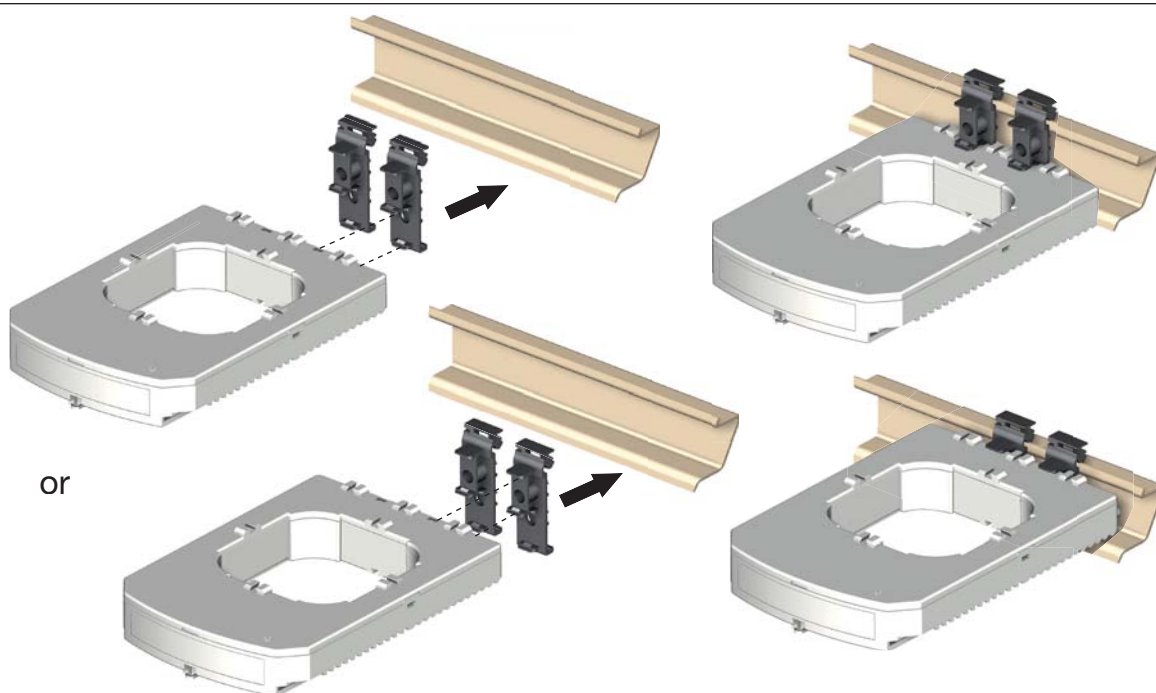
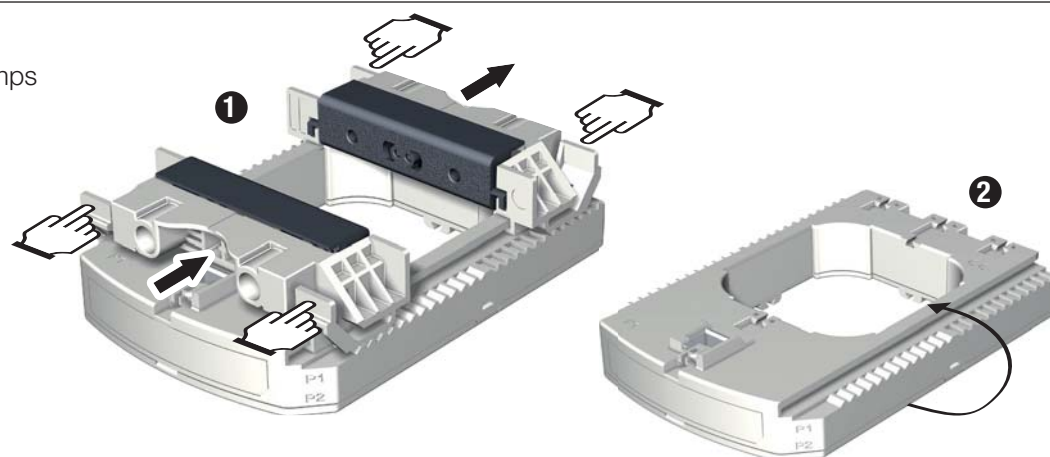
						
Reference		Pitch	DIN rail and plate mounting	DIN rail mounting	Plate mounting	Busbar mounting
4829 0500 4829 0501	TE-18	18 mm	x 1			
4829 0502	TE-25	25 mm		x 2	x 4	
4829 0503	TE-35	35 mm		x 2	x 4	x 2
4829 0504	TE-45	45 mm		x 2	x 4	x 2
4829 0505	TE-55	55 mm		x 2	x 4	x 2
4829 0506	TE-90	90 mm	x 2		x 6	

5.3.2. DIN rail mounting



TE-90

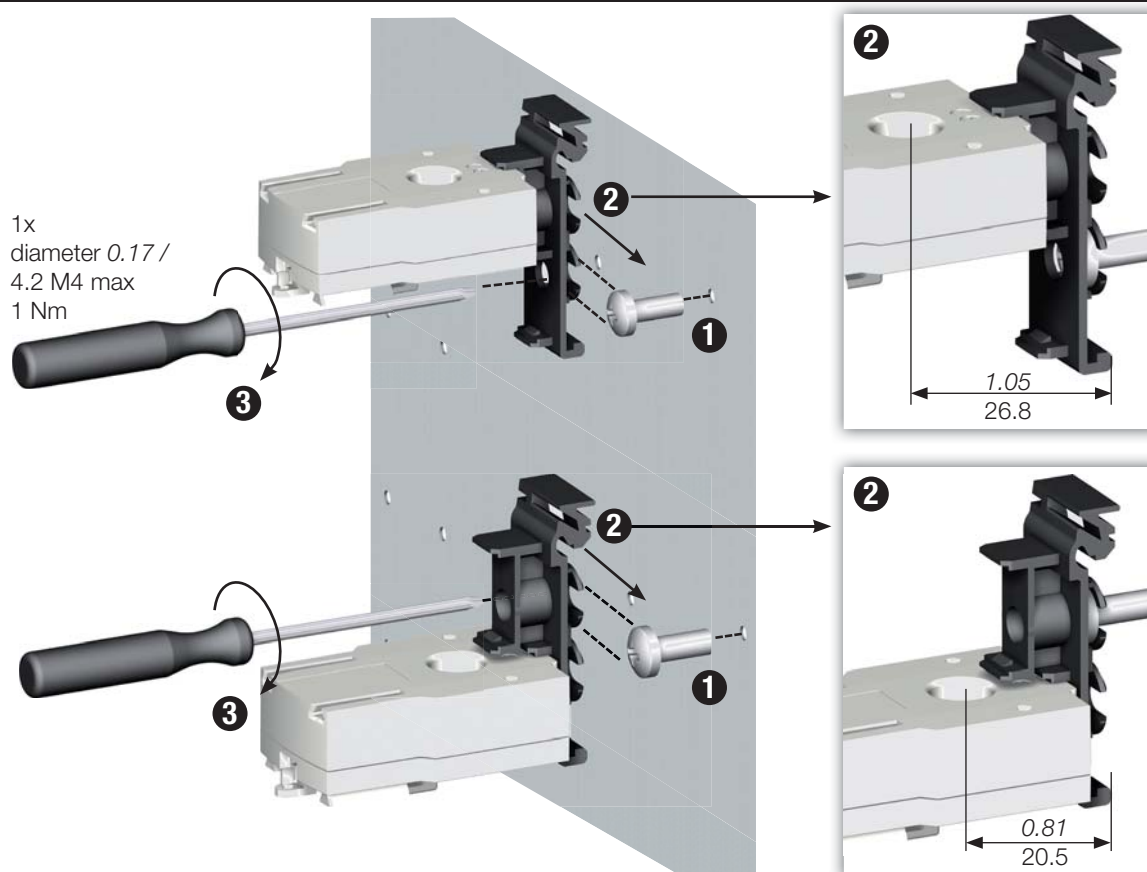
Removing clamps



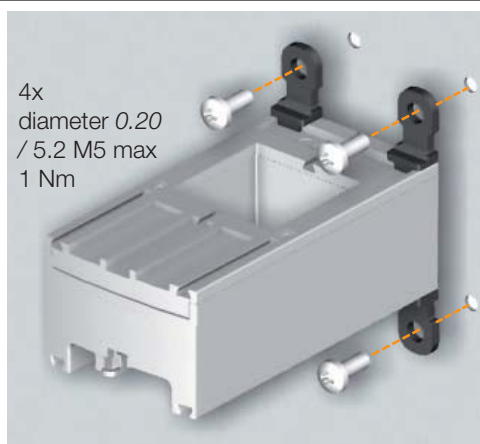
NB: Install sensor TE-90 to the DIN rail to make it easier to install. This is a temporary installation. Use the clamps to install the TE-90 sensors on the DIN rail.

5.3.3. Plate mounting

TE-18

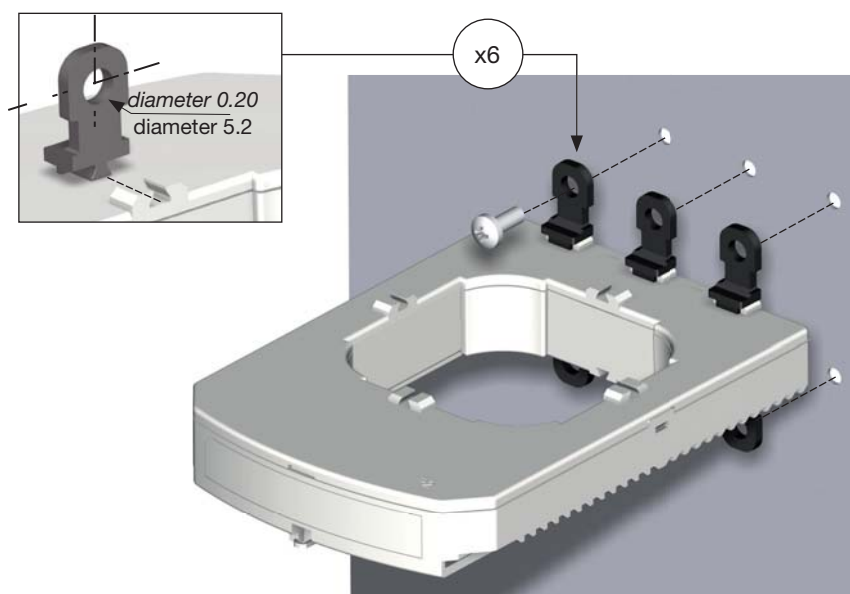
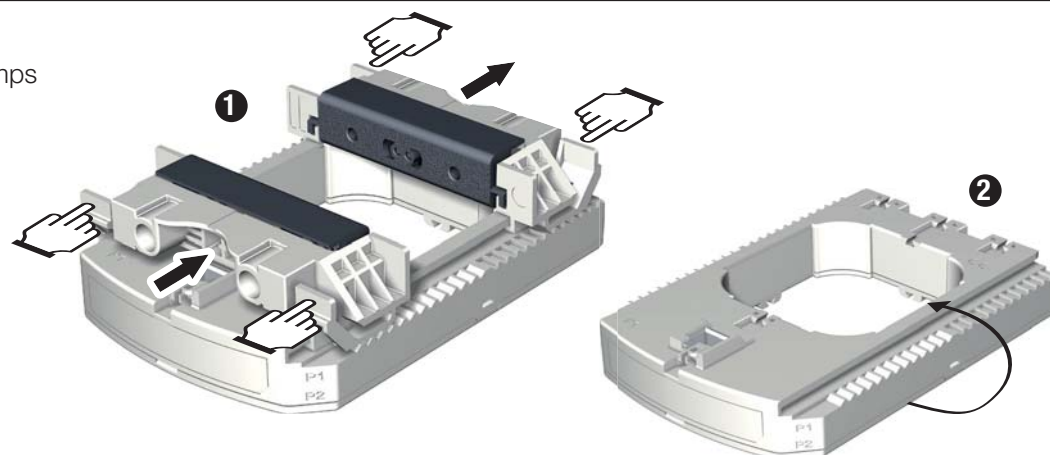


TE-25 - > TE-55



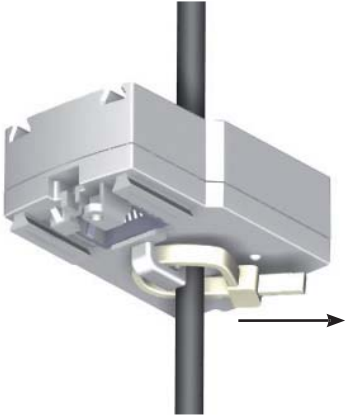
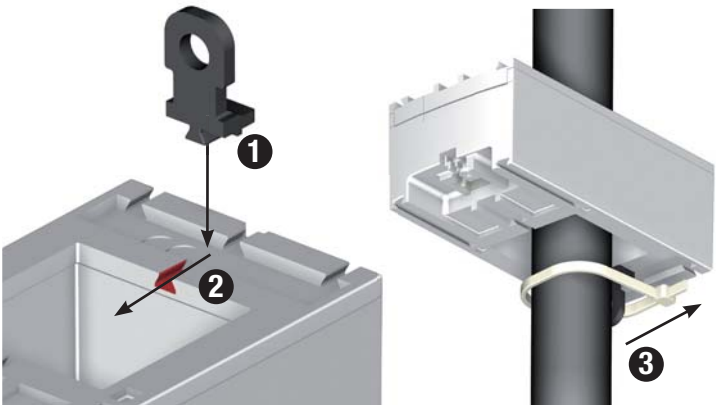
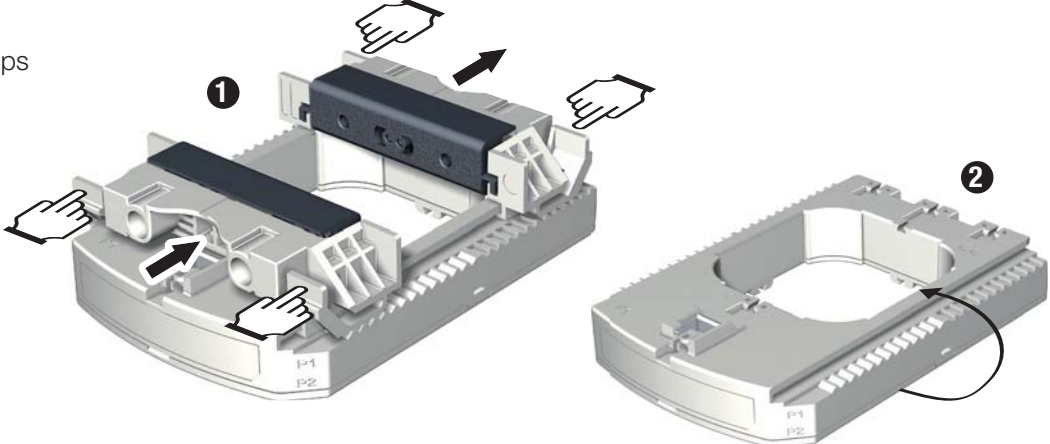
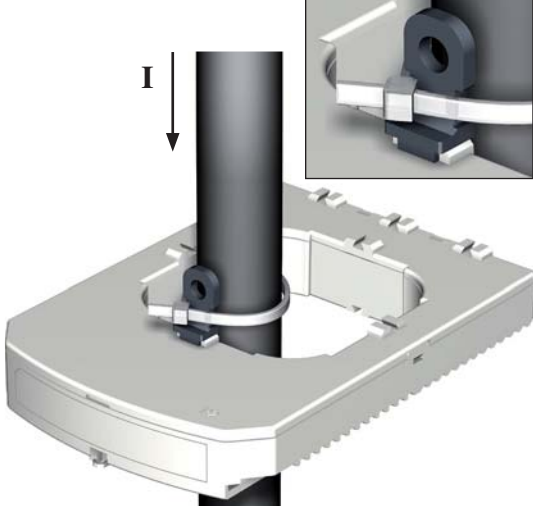
TE-90

Removing clamps



NB: Use the clamps to install the TE-90 sensors on the board.

5.3.4. Mounting on a cable with clamping collar

TE-18	TE-25 - > TE-55
	
TE-90	
Removing clamps 	
	

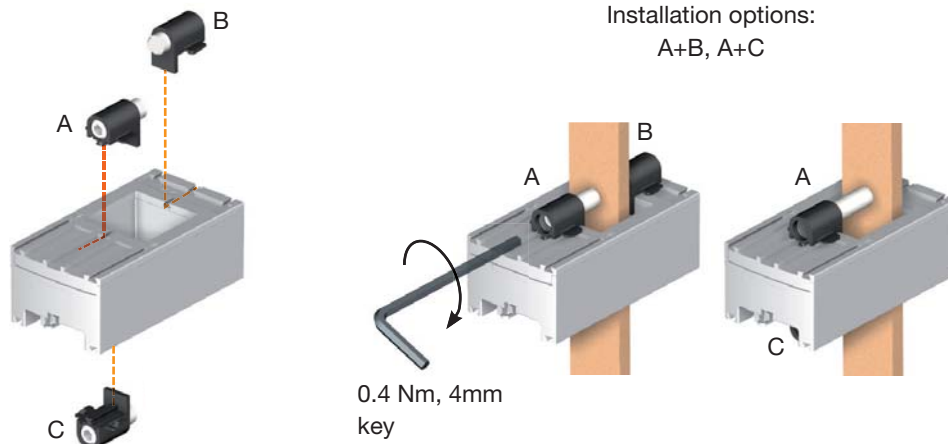
NB: Use the clamps to install the TE-90 sensors on a cable with clamping collar.



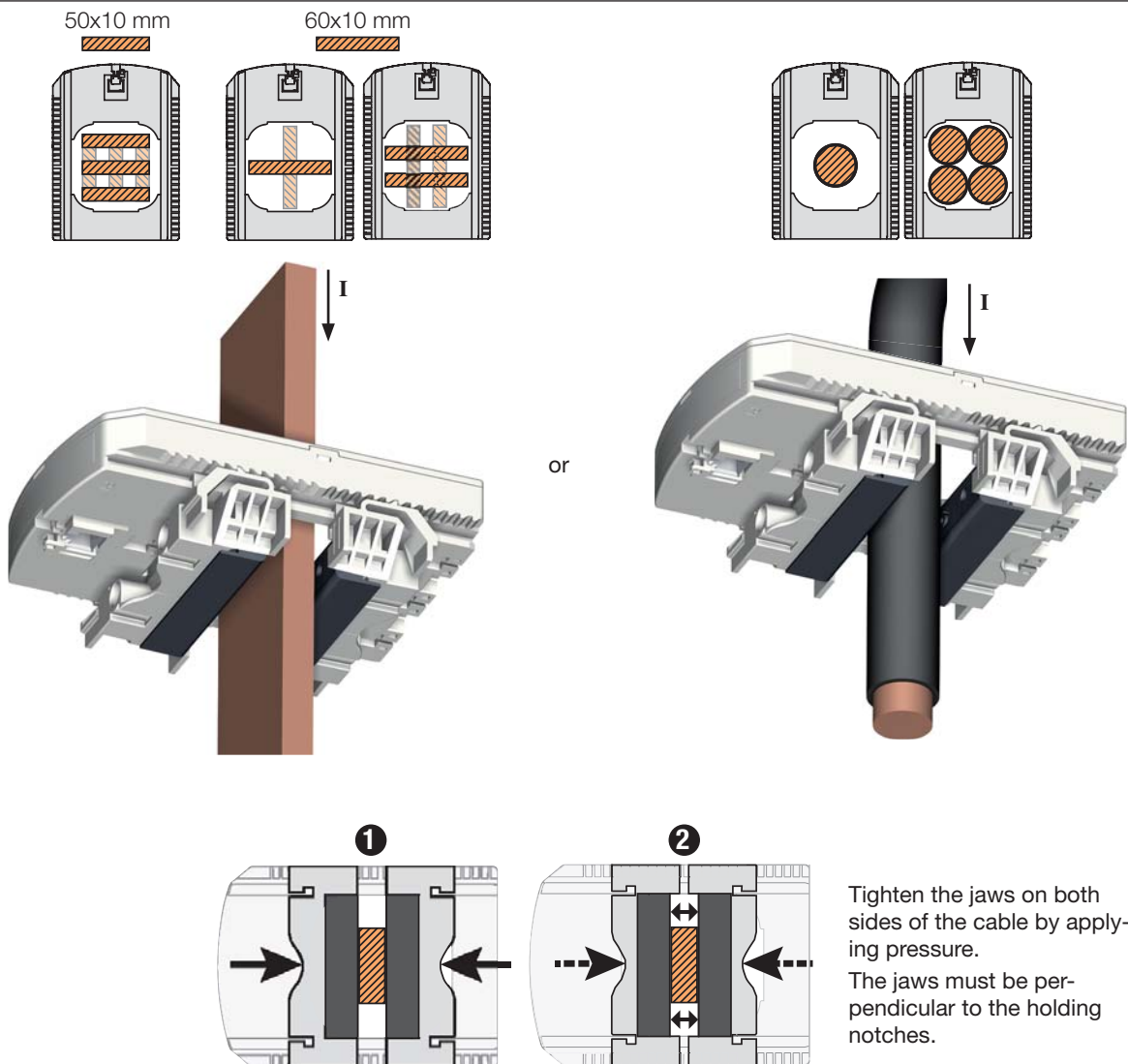
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

5.3.5. Busbar mounting

TE-35 - > TE-55

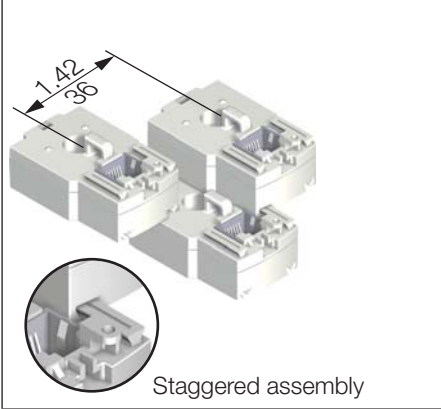
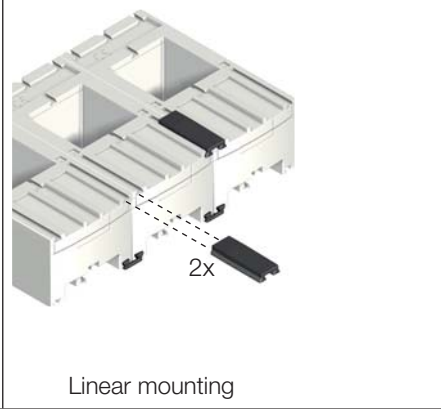
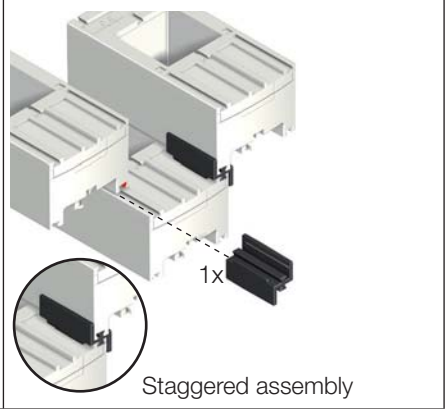


TE-90



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

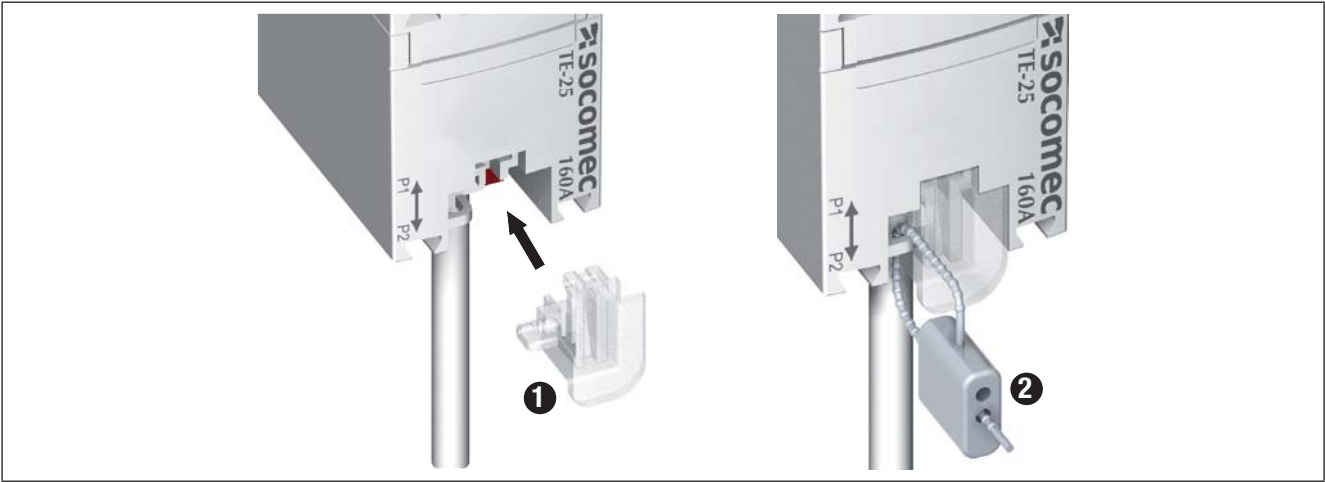
TE-18	TE-25 - > TE-55	TE-35 - > TE-55
 Staggered assembly	 Linear mounting	 Staggered assembly

Mounting accessories for sensor combination:

		
Reference	Linear assembly	Staggered assembly
4829 0598	x30	

These accessories must be ordered separately.

5.3.7. Sealing accessories for sensors

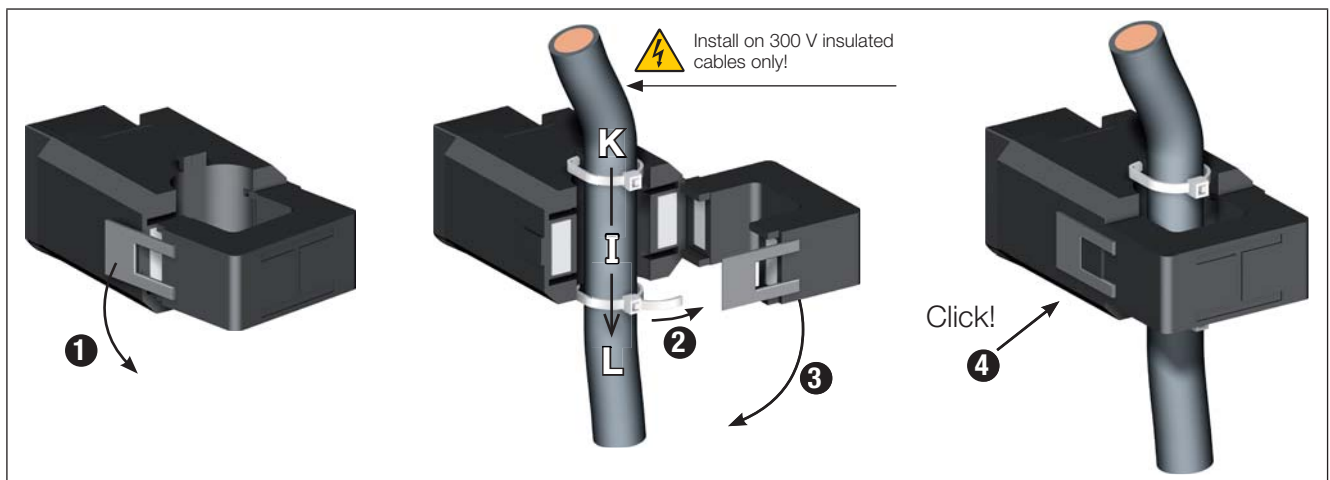


Reference	Sealing case for terminal
4829 0600	x20

These accessories must be ordered separately.

5.4. TR split-core sensors mounting

5.4.1. Cable mounting



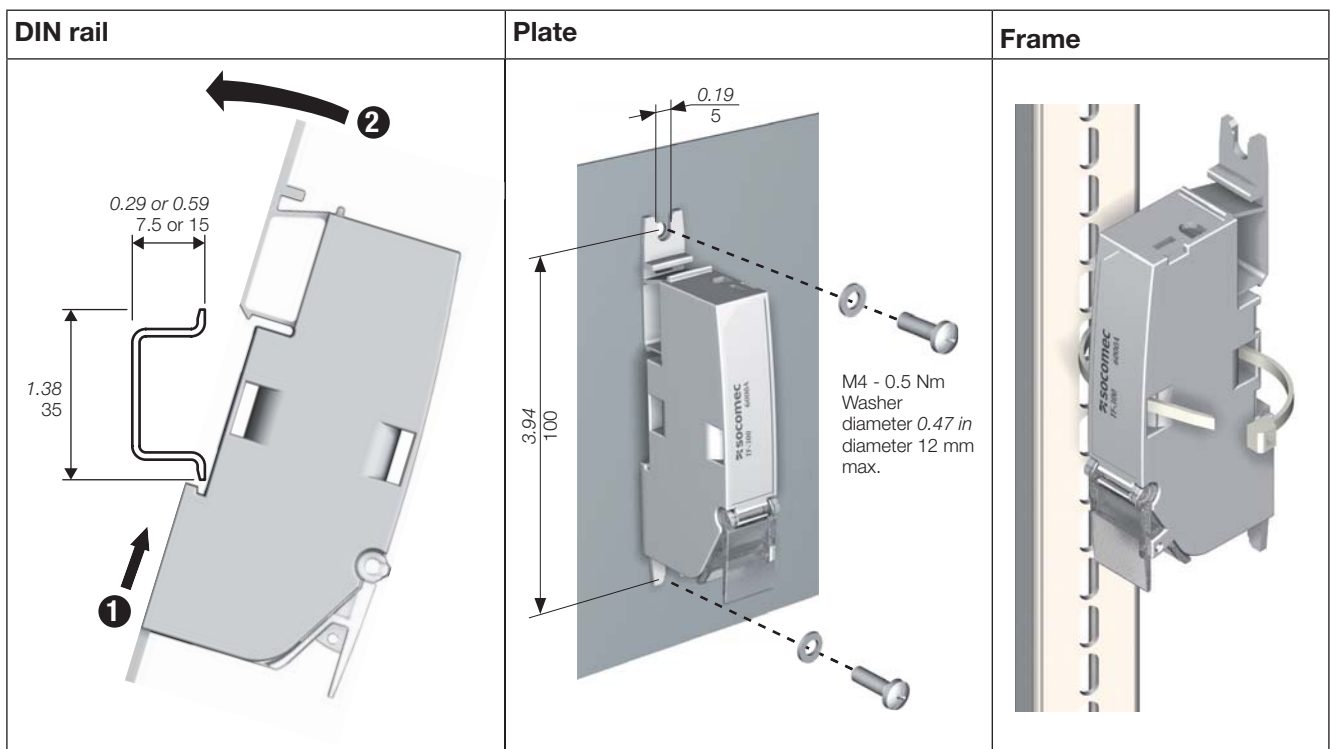
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032



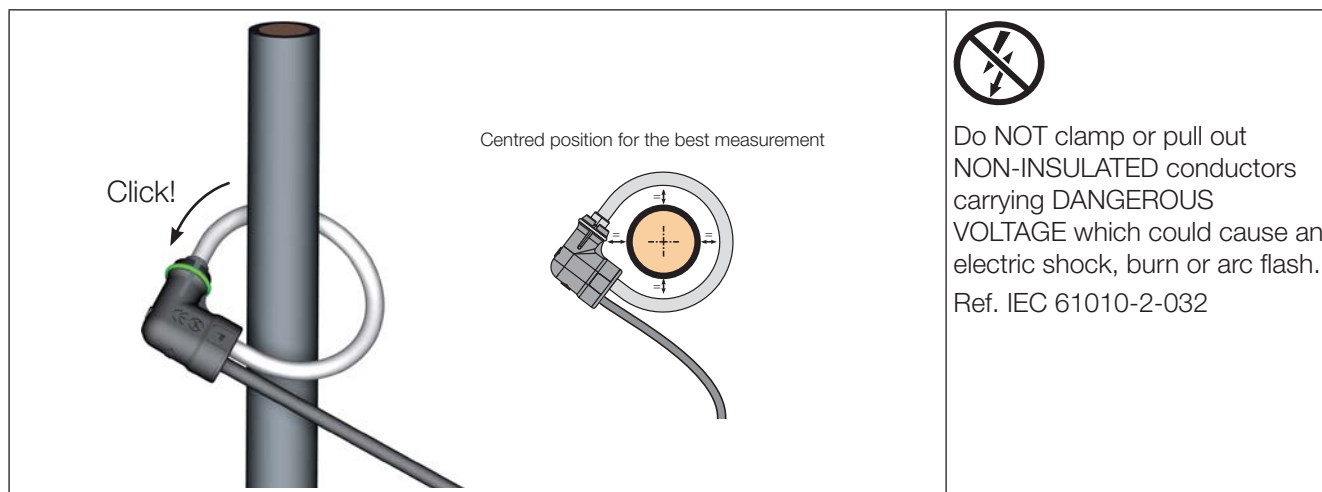
Before closing the TR sensor, check that the air gap is clean (no contamination or corrosion)

5.5. TF stranded sensors mounting

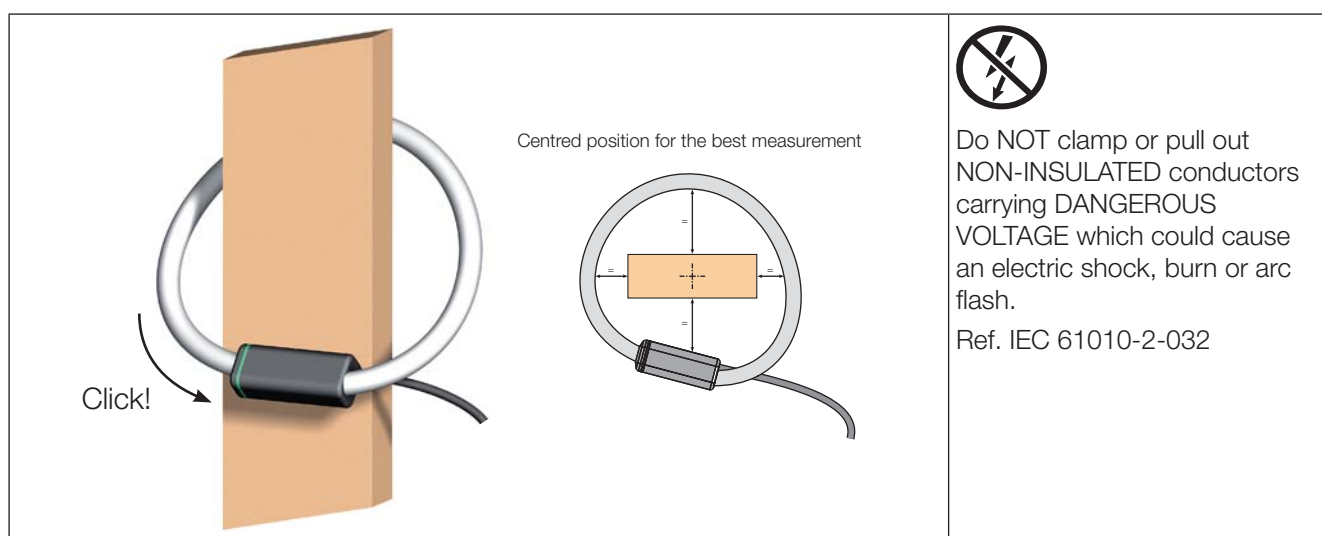
5.5.1. Casing mounting



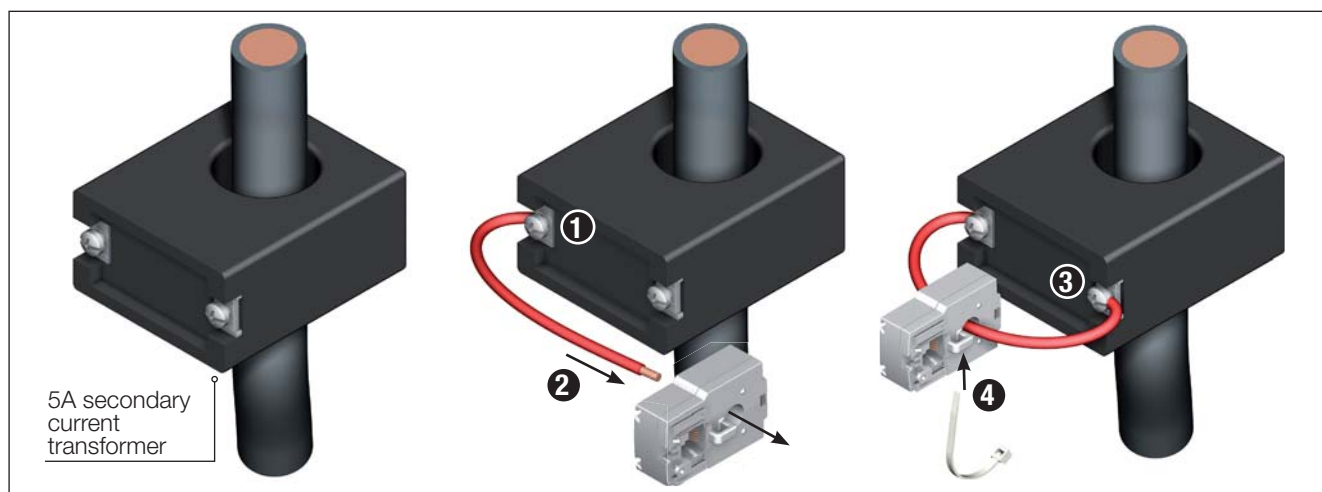
5.5.2. Cable mounting



5.5.3. Busbar mounting



5.6. 5A adapter mounting

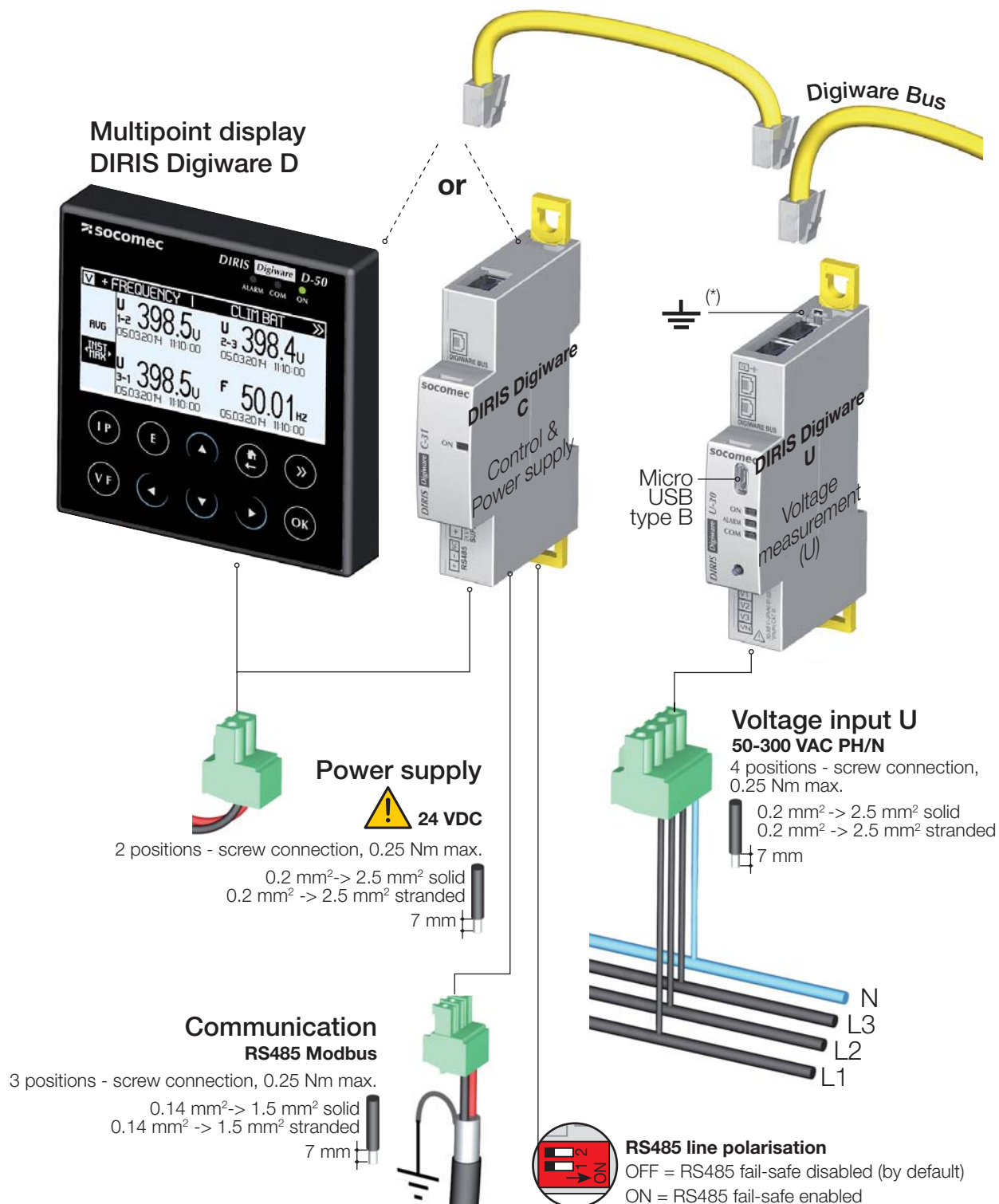


Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

6. CONNECTION

6.1. DIRIS Digiware connection

Recommendation: Only use a SOCOMEC Digiware bus cable (UTP RJ45 straight, twisted pair, unshielded, AWG24, 300 V cat.III., -40 / +85°C in accordance with IEC 61010-1 version 3.0).



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

Option of connecting
a local single-point
display DIRIS D-30 on
the I-4x

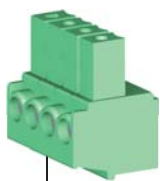


2x digital outputs

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 stranded
7 mm

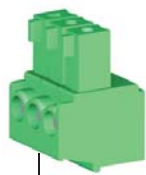


2x digital inputs

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 stranded
7 mm



**Digiware Bus
Termination**

Micro
USB
type B

**DIRIS
Digiware I
Current inputs
(3I)**

Micro
USB
type B

**DIRIS
Digiware I
Current inputs
(6I)**

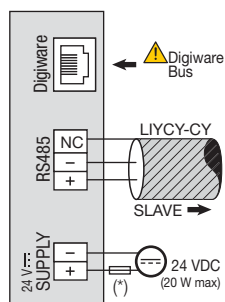
**3x current
sensor
inputs**

**4x current
sensor
inputs**

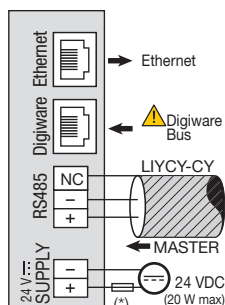
**6x current
sensor
inputs**

Description of the terminals

DIRIS Digiware D-40



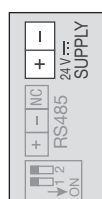
DIRIS Digiware D-50



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

DIRIS Digiware C-31

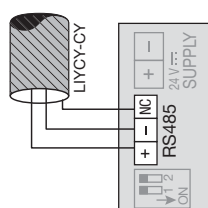
Power supply



Digiware BUS



Communication



RS485 fail-safe activation

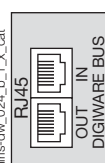


DIRIS Digiware C-32

Power supply



Digiware BUS

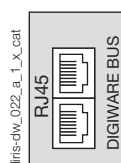


DIRIS Digiware U

Voltage measurement

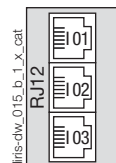


Digiware BUS



DIRIS Digiware I-3x

Current measurement(*)

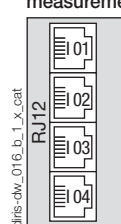


Digiware BUS

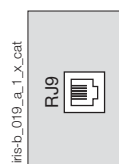


DIRIS Digiware I-4x

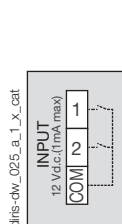
Current measurement(*)



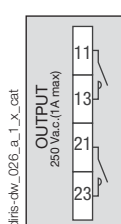
RJ9 for DIRIS D-30 (Self-powered and data)



Inputs



Outputs

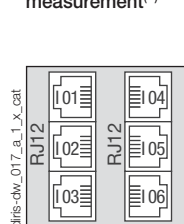


Digiware BUS

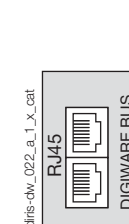


DIRIS Digiware I-6x

Current measurement(*)



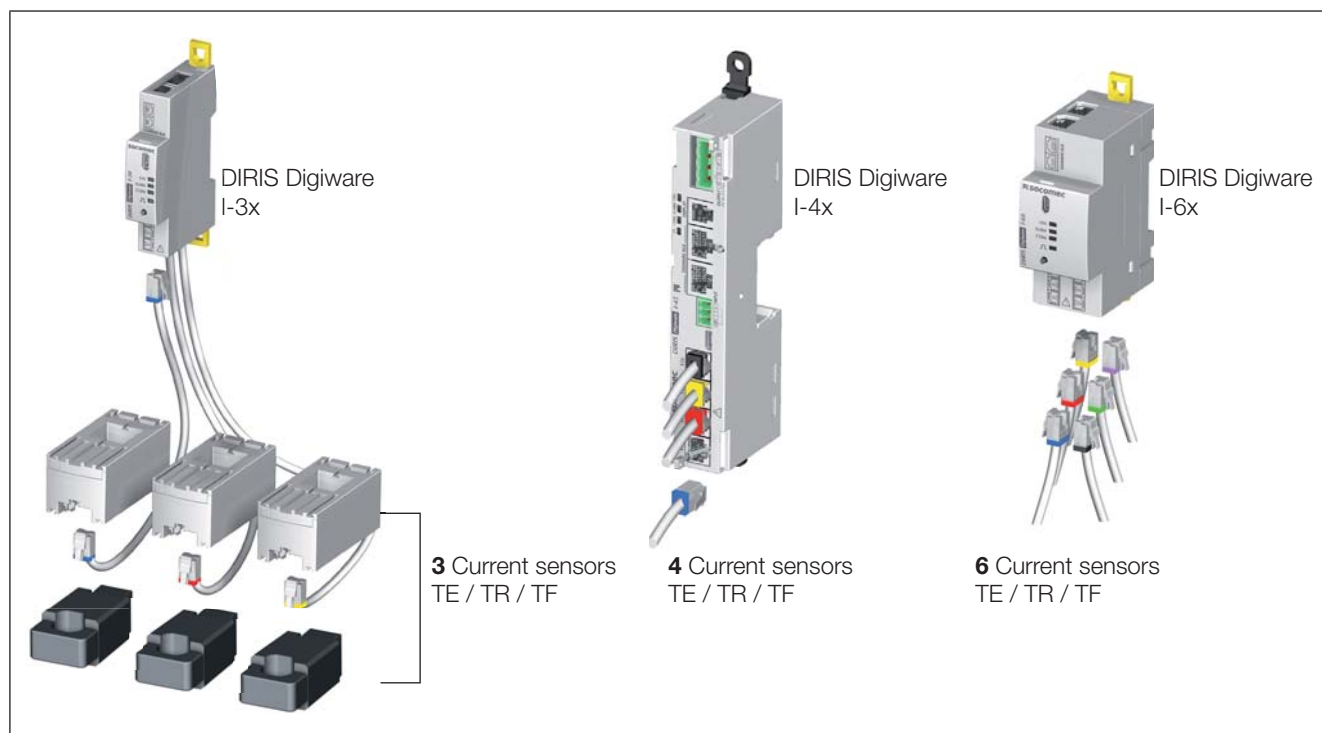
Digiware BUS



(**) Always connect input IO1 first.

6.2. Connecting the current sensors

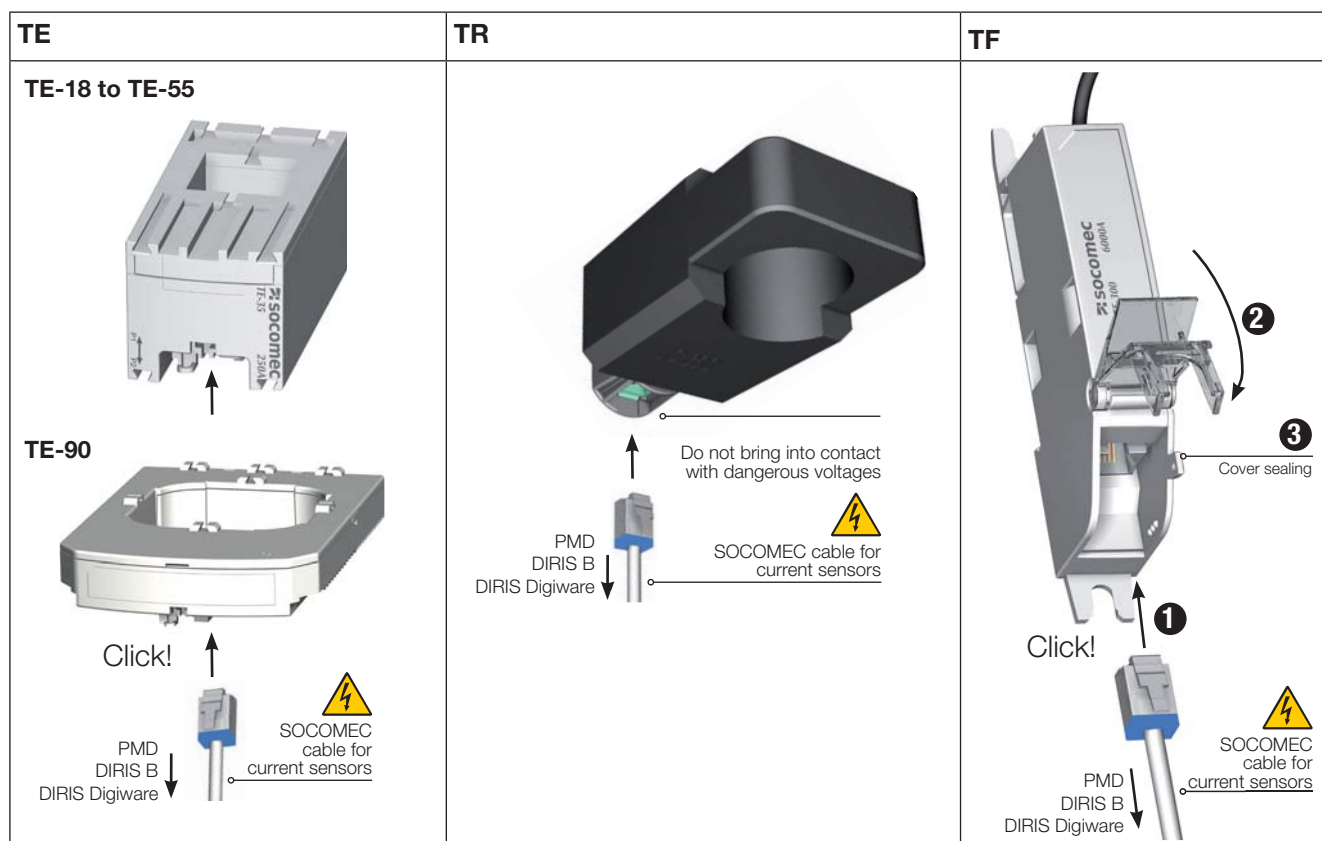
6.2.1. Connection concept



Recommendations:

- Use only SOCOMEC cables for the current sensors or equivalent cables of the following type: RJ12, straight, twisted pair, unshielded, 300 V cat.III. -40 / +85°C in accordance with IEC 61010-1 Ed. 3.0.
- It is recommended that current sensors are installed in the same direction.
- Always connect input IO1 first.

6.2.2. Details of the RJ12 connections for each current sensor



6.3. Connection to the electrical network and to the loads

The 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 sensor (closed, 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 devices without any risk of cabling error and in complete safety. The connected sensors are automatically detected.

In addition, the 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 DIRIS Digiware + sensors measurement chain 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

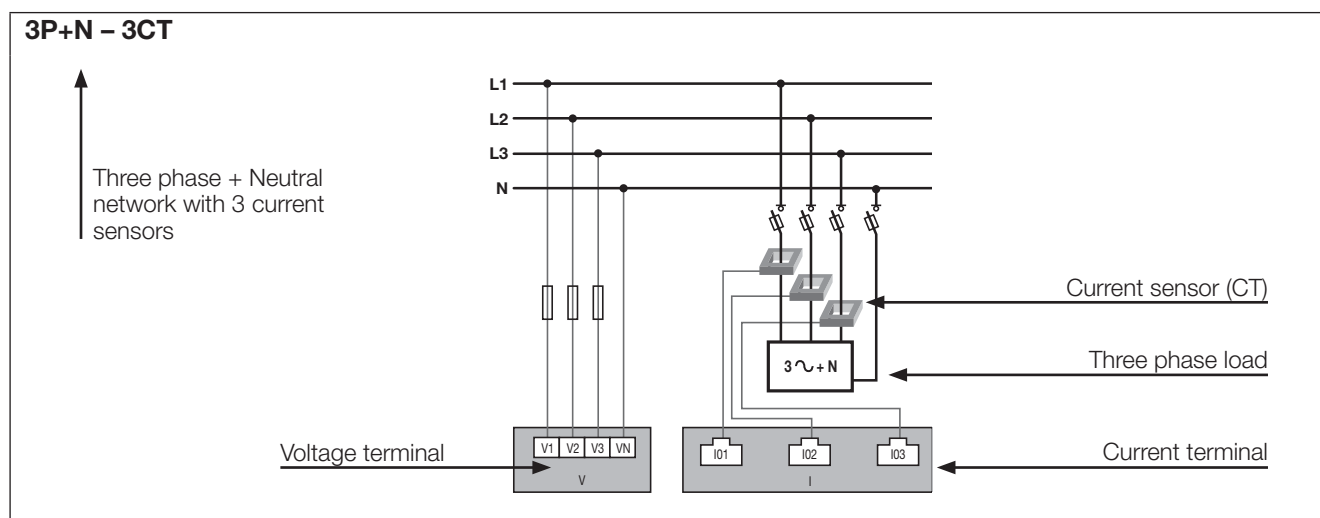
The following table summarises the loads which can be configured based on the installation's network type

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.

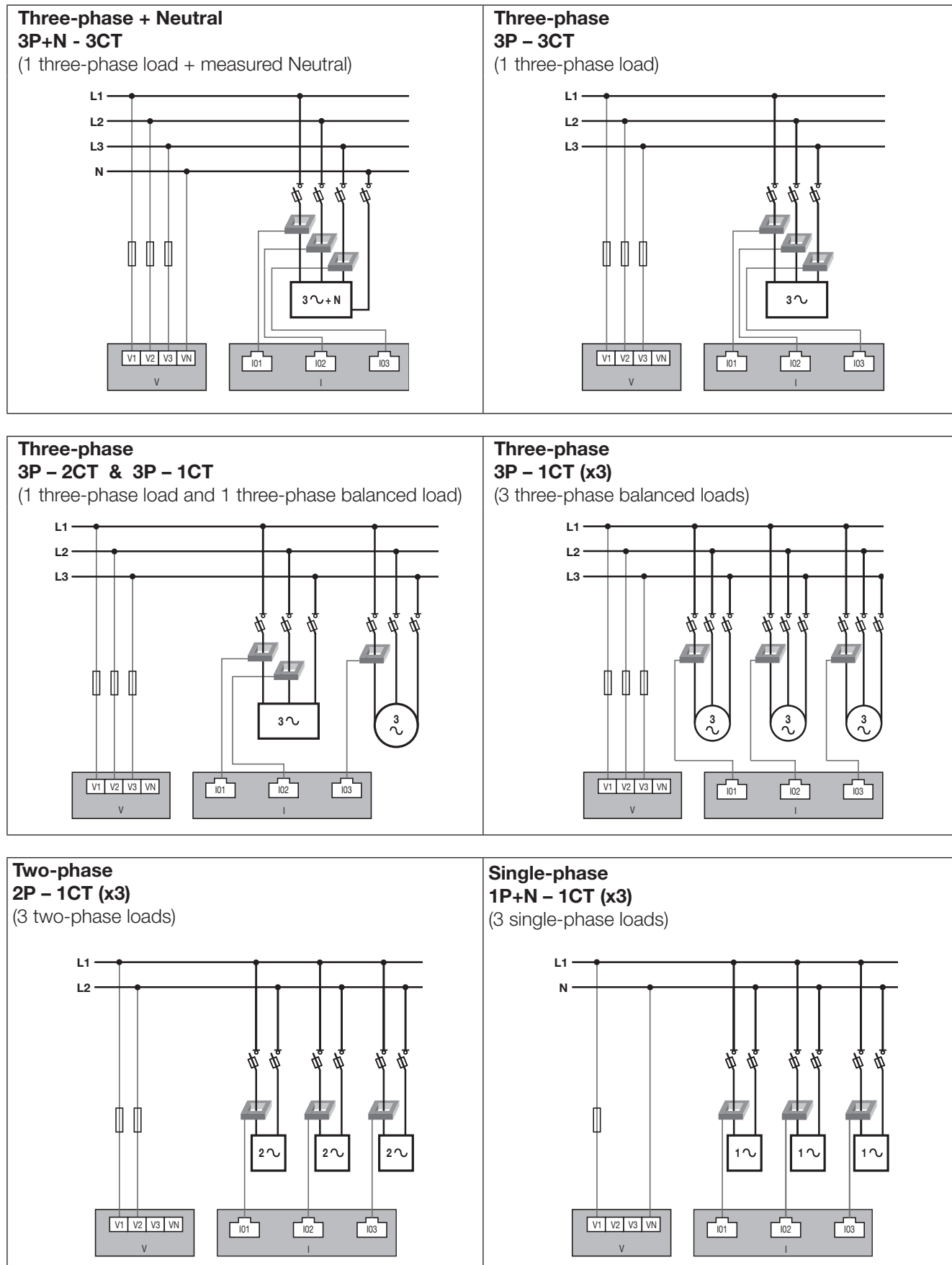
6.3.2. Description of the main network and load combinations

Legend:



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

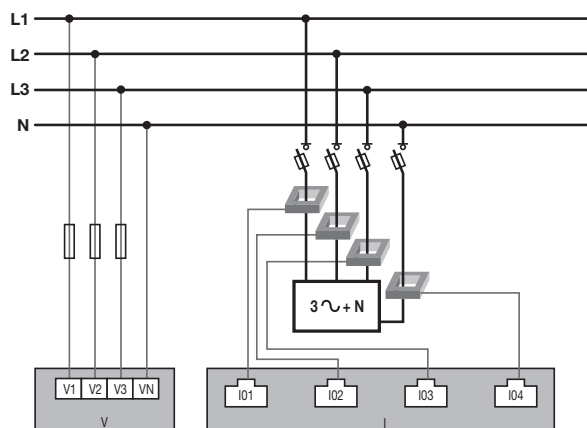
6.3.2.1. DIRIS Digiware I-3x



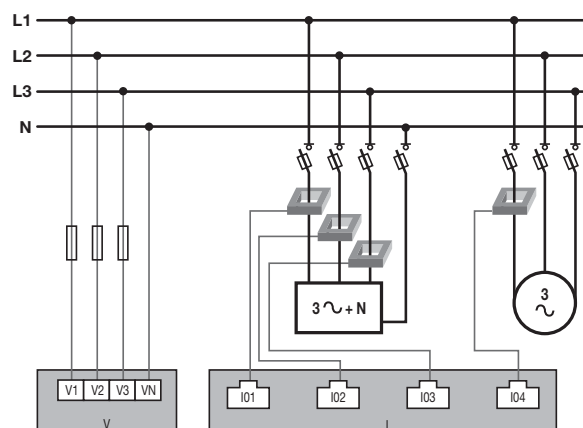
Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

Three-phase + Neutral**3P+N – 4CT**

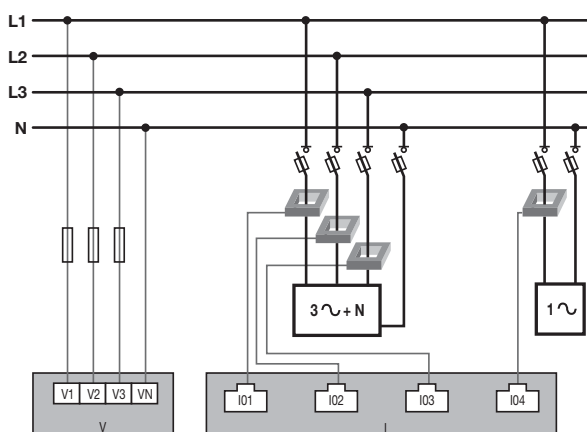
(1 three-phase load + measured Neutral)

**Three-phase + Neutral****3P+N – 3CT & 3P – 1CT**

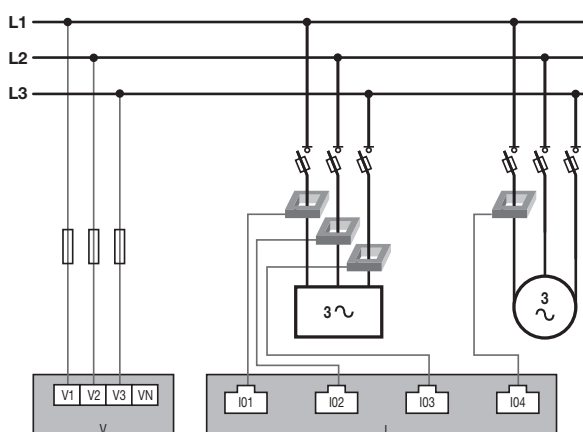
(1 three-phase load + calculated Neutral + 1 three-phase balanced load)

**Three-phase + Neutral****3P+N – 3CT & 1P+N – 1CT**

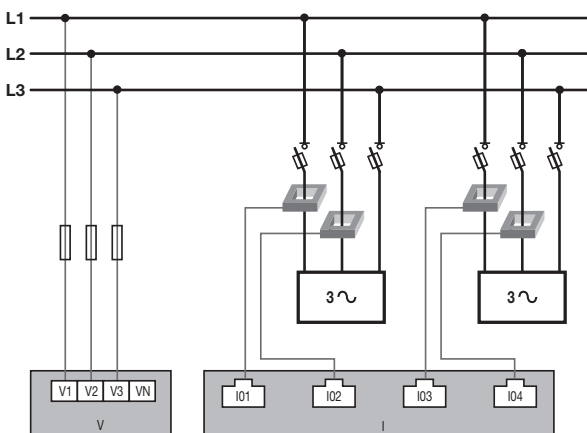
(1 three-phase load + calculated Neutral + 1 single-phase load)

**Three-phase****3P – 3CT & 3P – 1CT**

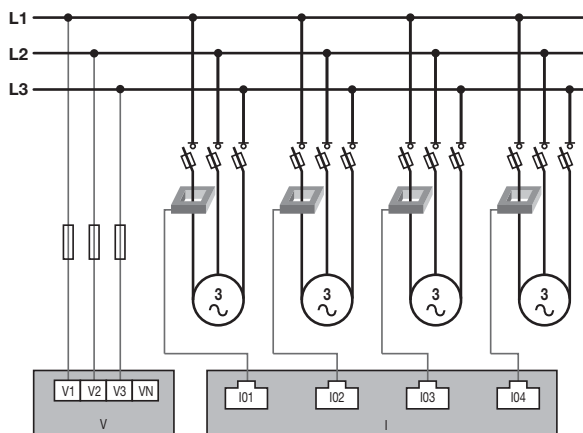
(1 three-phase load and 1 three-phase balanced load)

**Three-phase****3P – 2CT (x2)**

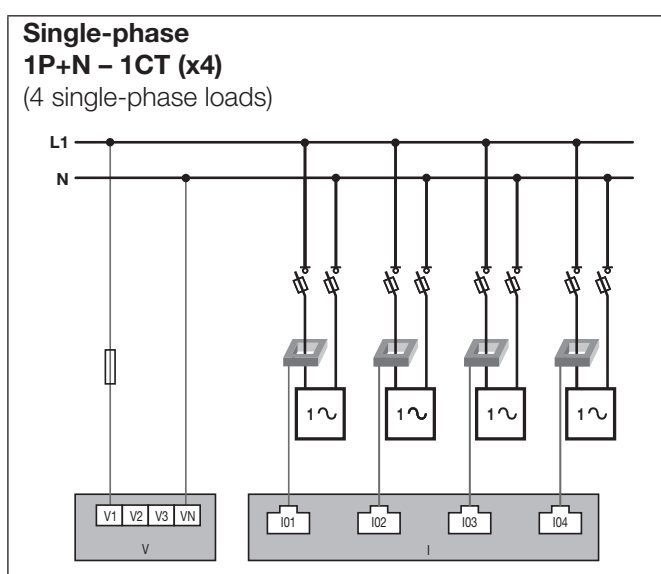
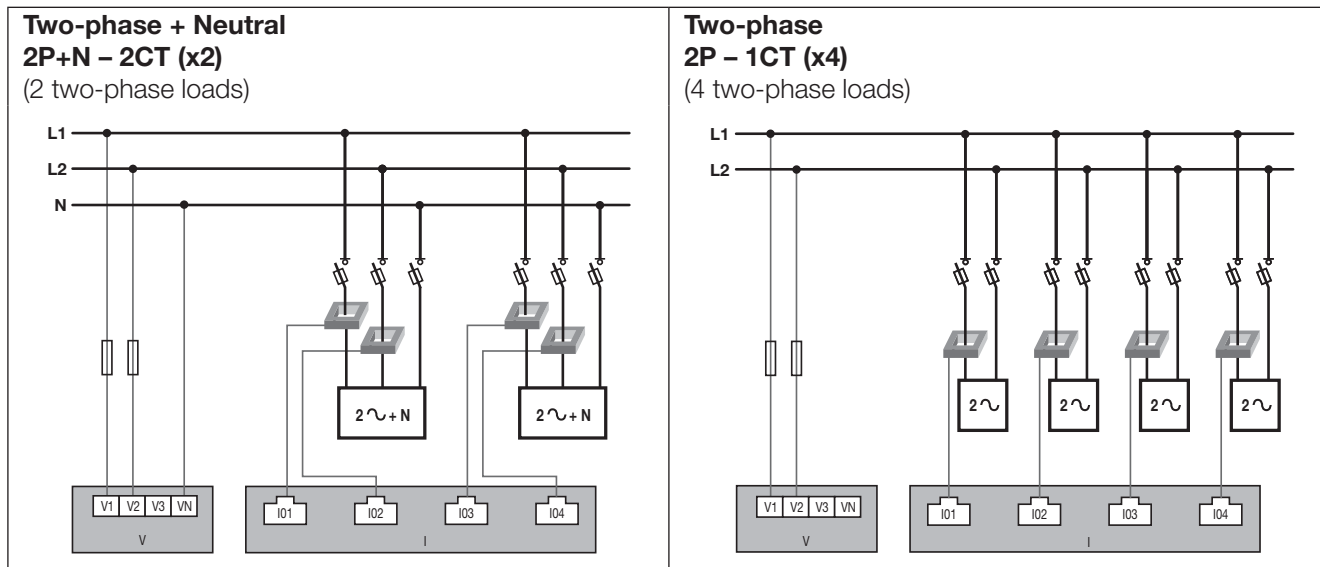
(2 three-phase loads)

**Three-phase****3P – 1CT (x4)**

(4 three-phase balanced loads)

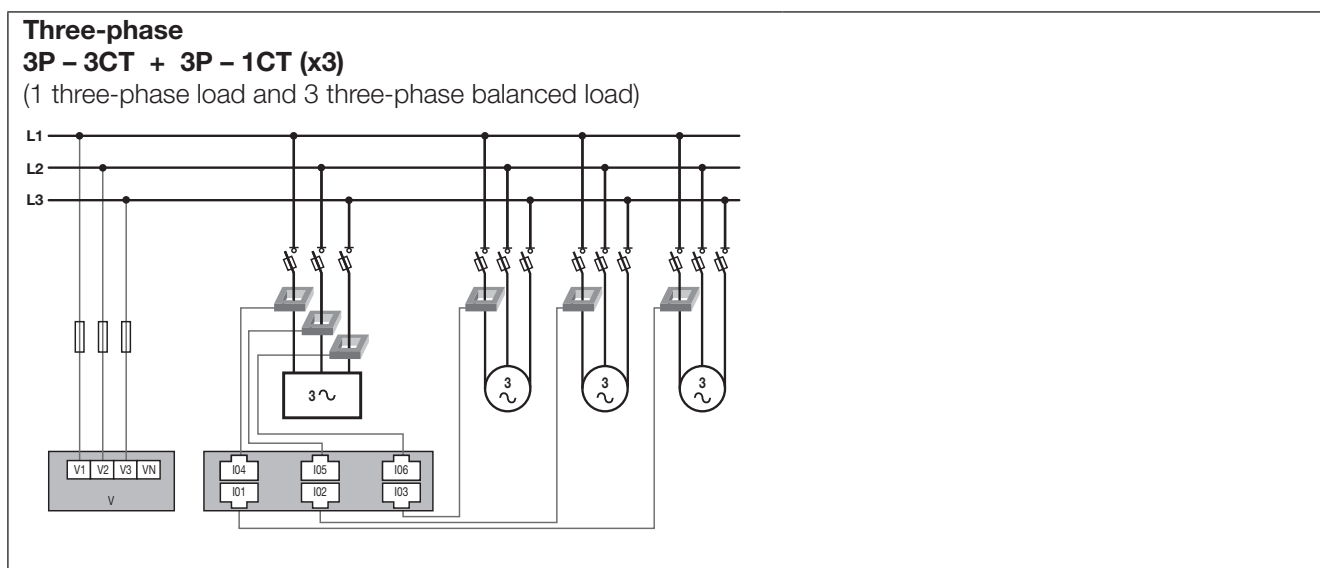


Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC



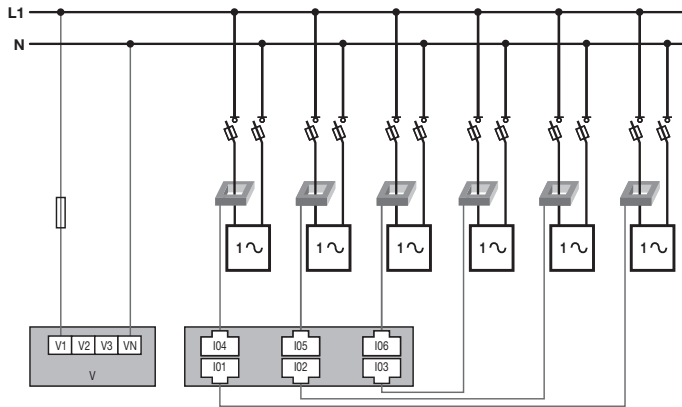
Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

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%.

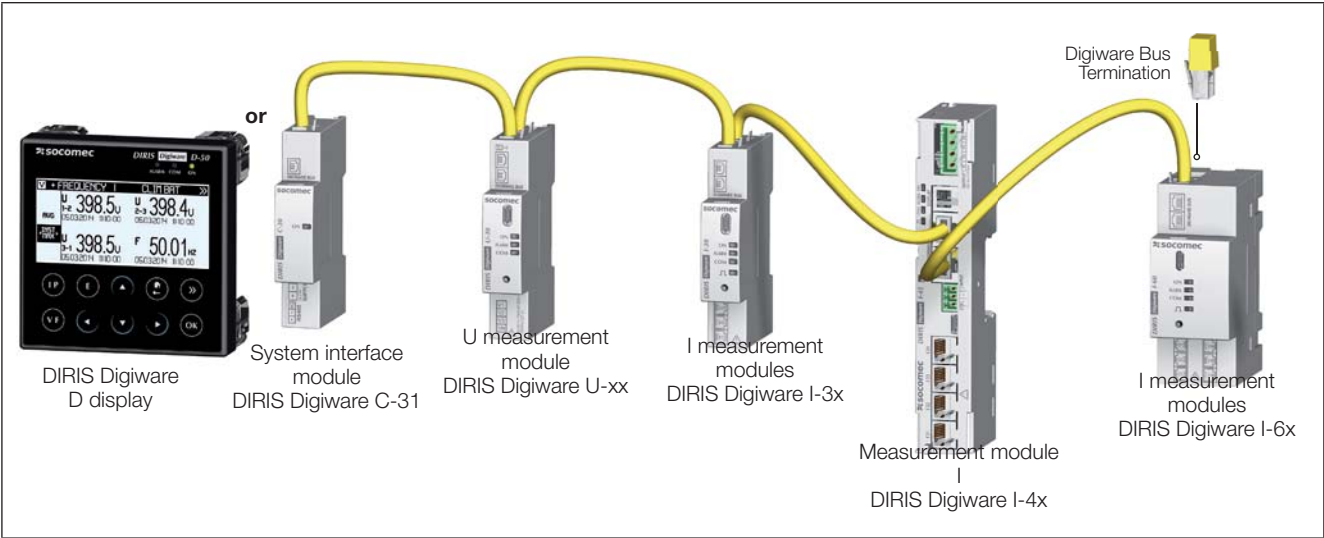
3P – 1CT: this connection requires a three-phase network that is perfectly balanced.

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). Earth must not be used in a neutral IT system.

7. DIGIWARE BUS

7.1. Principle



The DIRIS Digiware is a system which must comprise the following elements:

- One DIRIS Digiware D remote display or one DIRIS Digiware C-31 system interface module
- A DIRIS Digiware U voltage measurement module
- One or more DIRIS Digiware I current measurement modules
- A Digiware bus termination (ref. 4829 0180) positioned on the last current 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	Reference
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 + 50 connectors		4829 0185

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

The total max. width must not exceed 100 metres.

Use only SOCOMEC cables for the Digiware bus.

7.1.2. Digiware Bus Termination

	Quantity	Reference
	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 devices are supplied by a single 24 VDC power point via the DIRIS Digiware C-31 system interface module.



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

Characteristics:

- 230 VAC / 24 VDC - 0.63 A - 15 W
- Modular format
- Dimensions (H x W): 90 x 25 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		2
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
Repeater		
DIRIS Digiware C-32		1.5
Single-point display		
DIRIS D-30		2

7.2.2. Calculation rules for the max. number of products on the Digiware BUS

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

Power supply must not exceed 20 W.

Size with P15 power supply (ref: 4829 0120) delivering 15 W

For example, it is possible to use

- 1 DIRIS Digiware D-50 (2 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-50 (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.

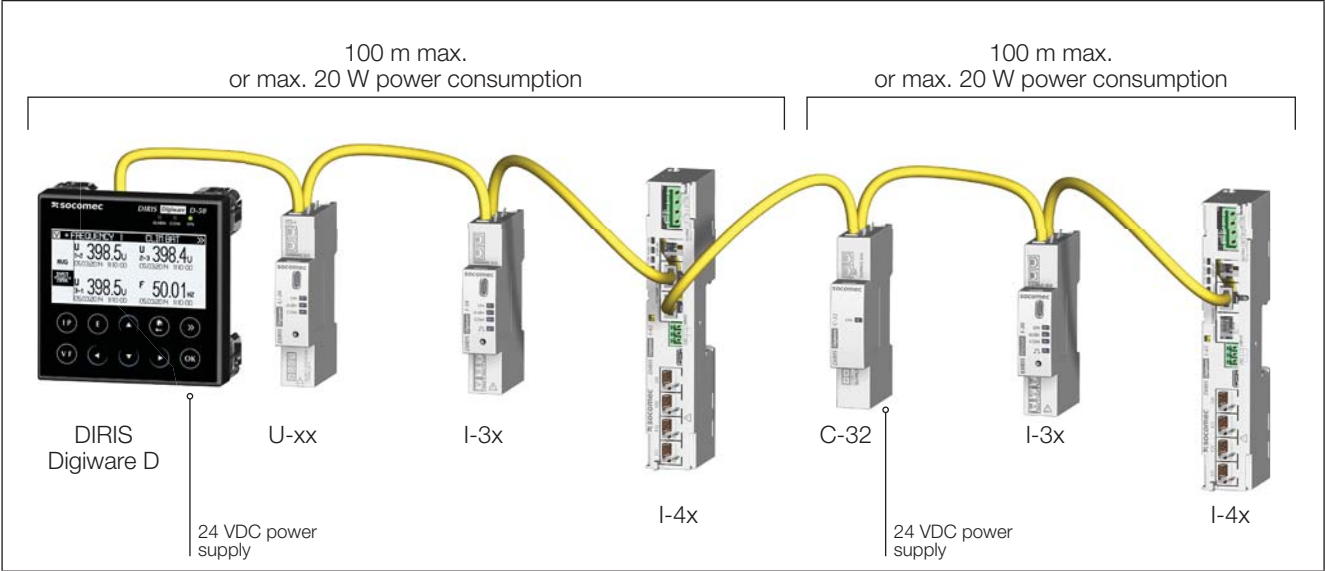
In a DIRIS Digiware system, a maximum of 2 repeaters may be used.



**DIRIS Digiware C-32
repeater**

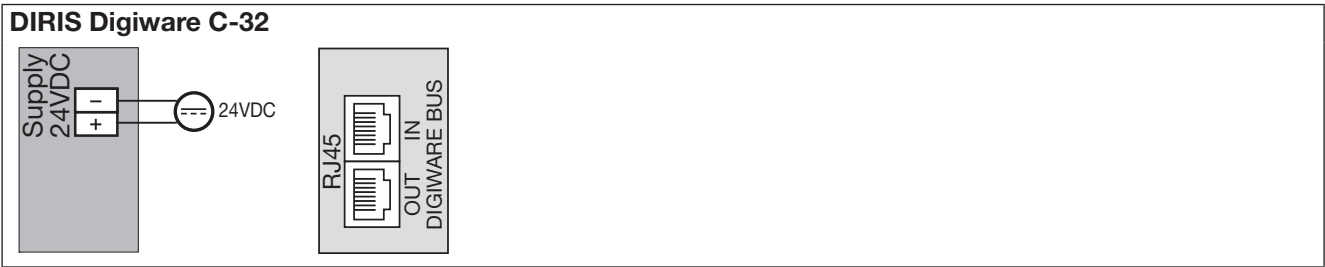
Reference	4829 0103
------------------	-----------

Configuration example:



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

The repeater has a 24 VDC power supply.

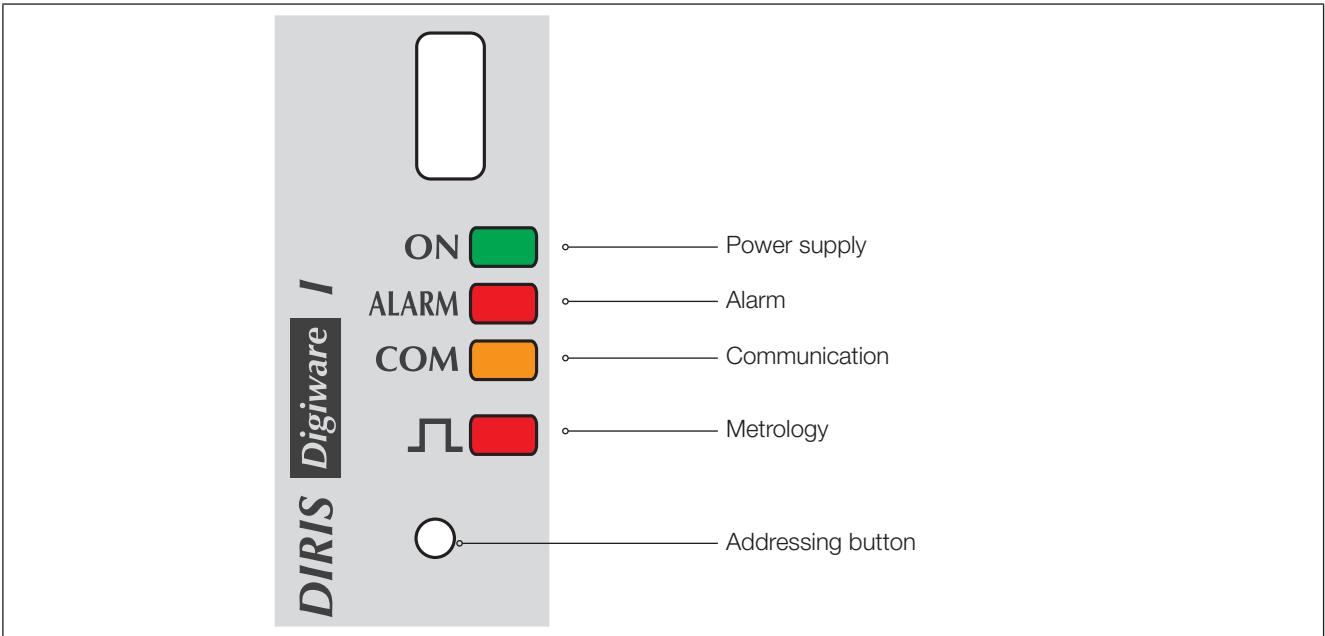


8. STATUS AND AUTO-ADDRESSING LEDS

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 to start-up
/ALARM	An alarm (logical/analogue, etc.) is active (takes priority if there is a setup alarm at the same time)	At least one setup alarm is active (current sensor disconnected, V/I not compatible, etc.)	1 second to start-up
COM	Addressing problem.	Address OK	1 second to start-up and when a frame received is processed
⏏	-	-	Corresponds to the metrological pulse weight

8.2. Auto-addressing

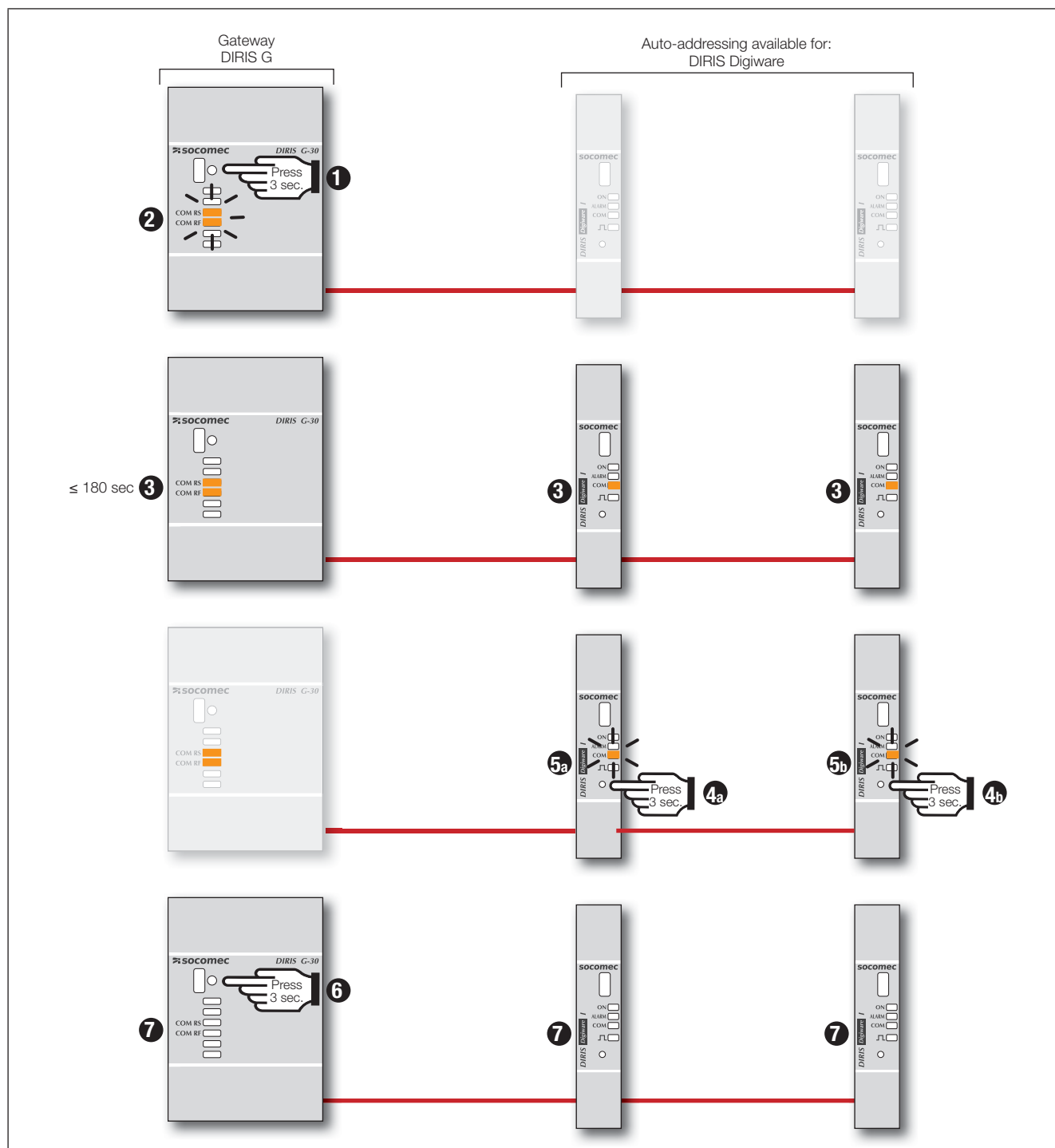
With auto-addressing mode you can have the system automatically assign addresses to products connected to the DIRIS G gateways or DIRIS Digiware D remote displays. This mode is only compatible with DIRIS B-30 and DIRIS Digiware PMDs. The addresses will be allocated manually on the other PMD (DIRIS A) and meters (COUNTIS).

Two modes are available:

- Mode 1 - Auto-detection and automatic addressing
- Mode 2 - Auto-detection and address selection

Mode 1 is without external equipment (see description below).

Mode 2 is carried out from a PC equipped with Easy Config.



The DIRIS Digiware U and DIRIS Digiware I modules benefit from auto-addressing mode. They are always connected to the DIRIS G gateway via a DIRIS Digiware C module or via a DIRIS Digiware D-40 display.

If using a DIRIS Digiware D-50 remote display, it replaces the DIRIS G gateway for auto-addressing.

Note: 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

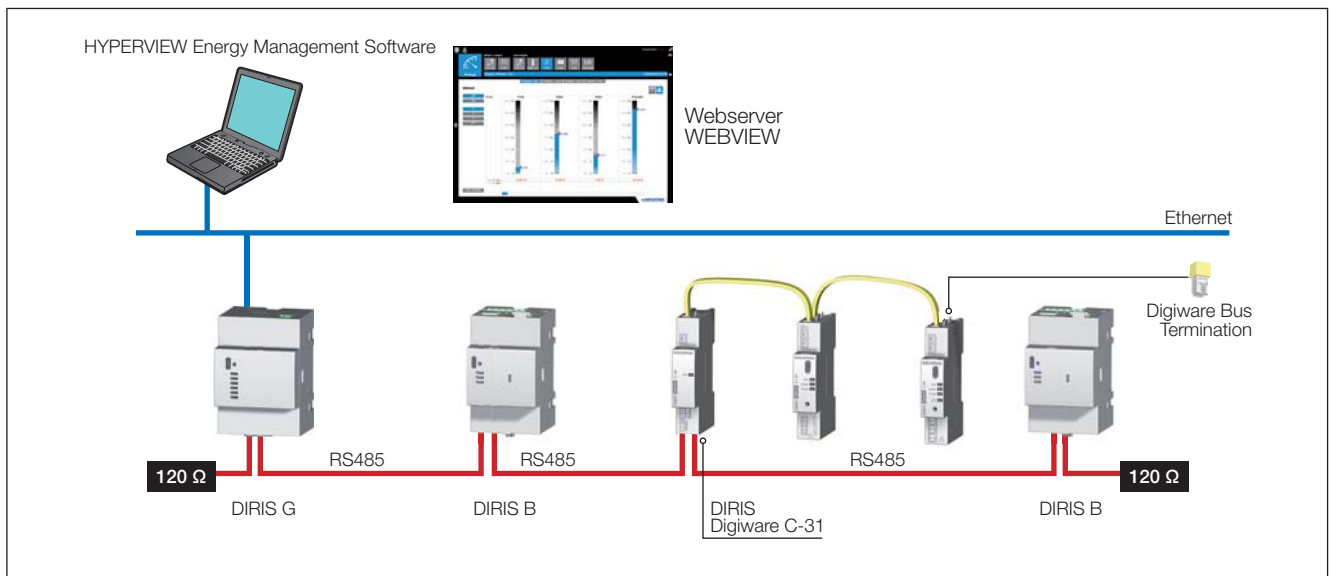
9.1. General information

The 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 takes place via an RS485 serial link (2- or 3-wire) in accordance with the Modbus RTU protocol.

With the RS485 link, the DIRIS Digiware can be directly connected to a PC, a PLC or to the G-30, G-40, G-50 and G-60 gateways (see the corresponding manual for more details) to exploit the data.

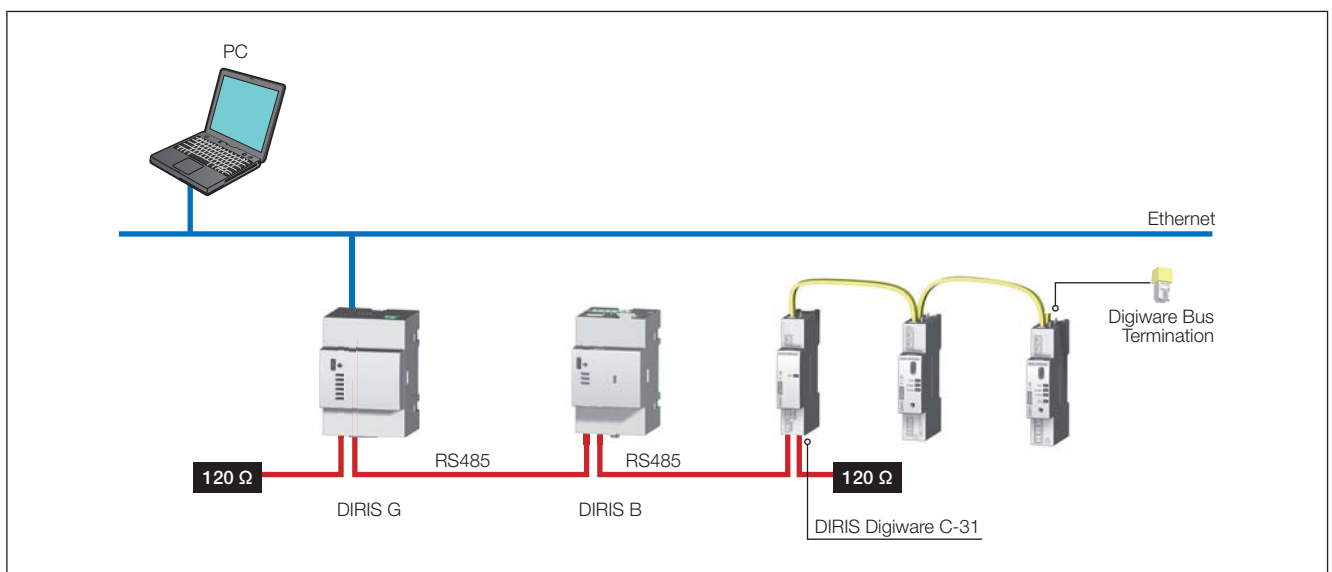
The Modbus protocol requires a dialogue with a master/slave structure. The mode of communication is the RTU (Remote Terminal Unit). In a standard setup, an RS485 link enables the interconnection of 32 RS485 devices to a PC (with DIRIS Digiware C-31 counting as one device), a PLC or the gateway over a 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 the DIRIS Digiware is connected using RS485. These rules are set out in the paragraphs below.



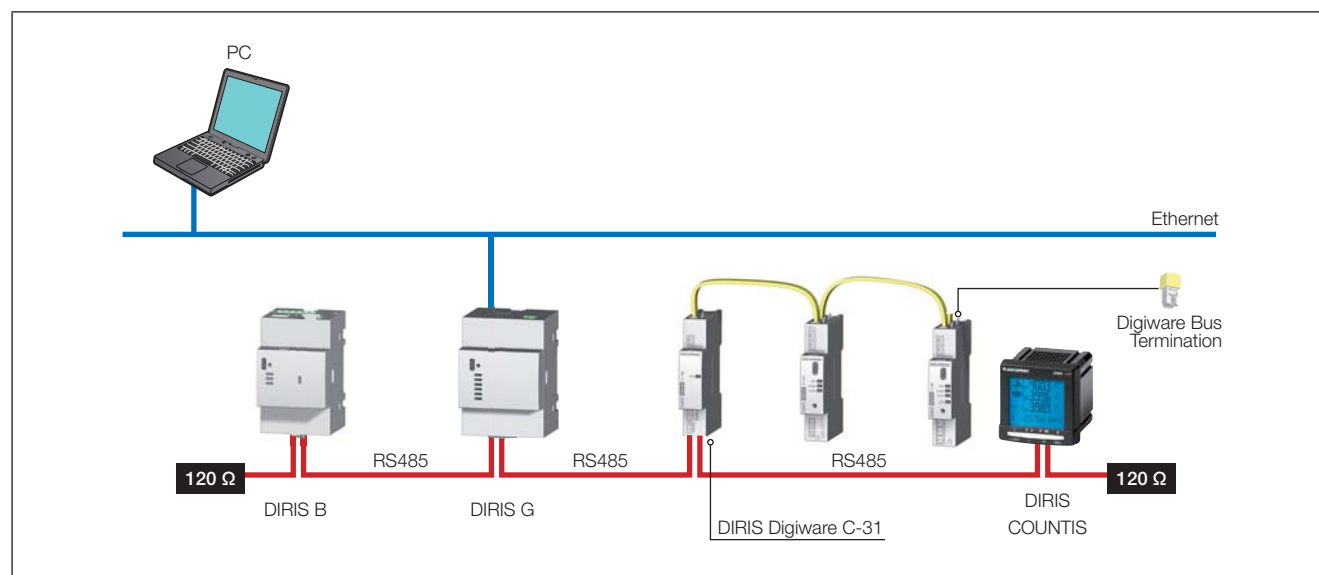
9.2.1. Connection with the DIRIS Digiware C-31 system interface module

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:



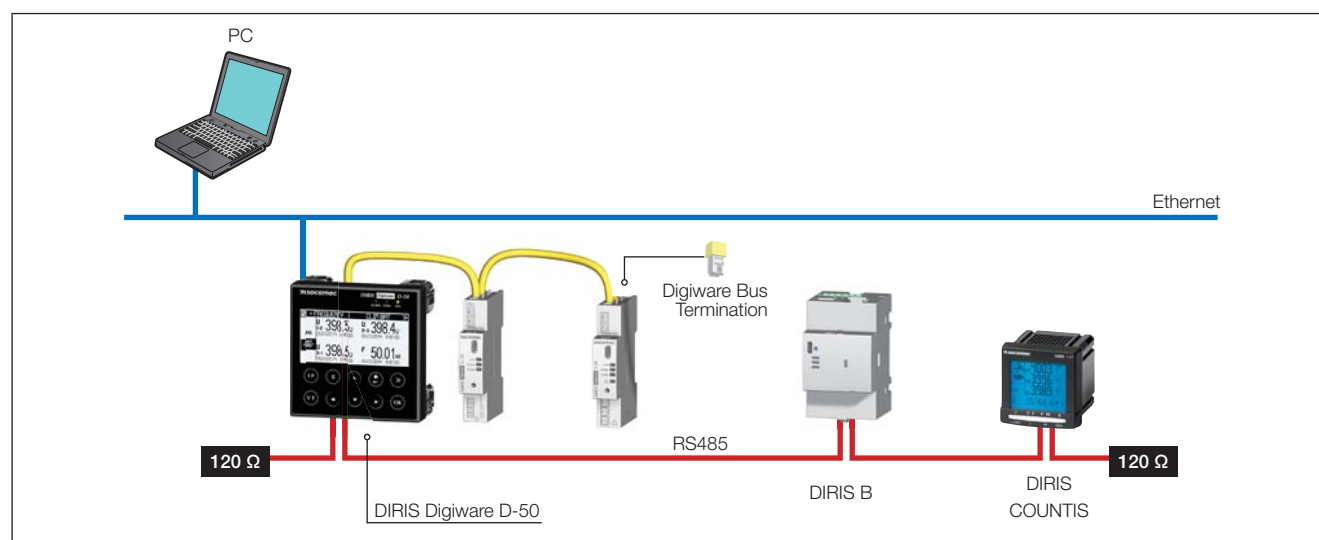
9.2.2. Connection with the DIRIS Digiware D-50 remote display

In an RS485 link, a DIRIS Digiware D-50 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 the DIRIS Digiware D-50 display.

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

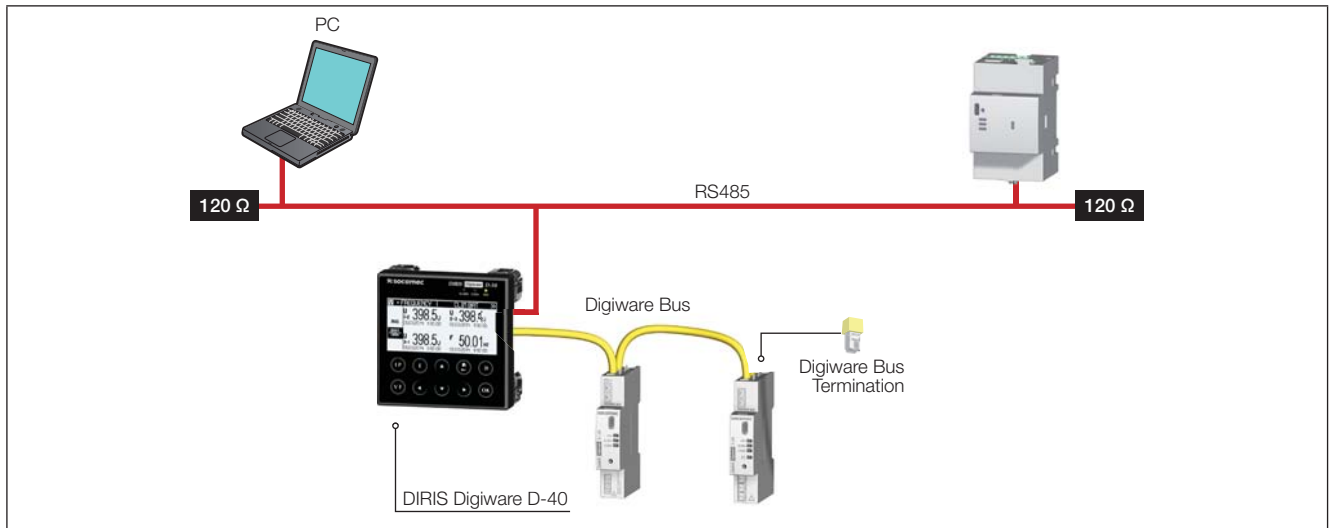
9.2.3. Connection with the DIRIS Digiware D-40 remote display

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 the DIRIS Digiware on the SOCOMEC website at the following address:
www.socomec.com/en/diris-digiware



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 the DIRIS Digiware directly via RS485 or USB. Easy Config must be installed before using the USB connection.

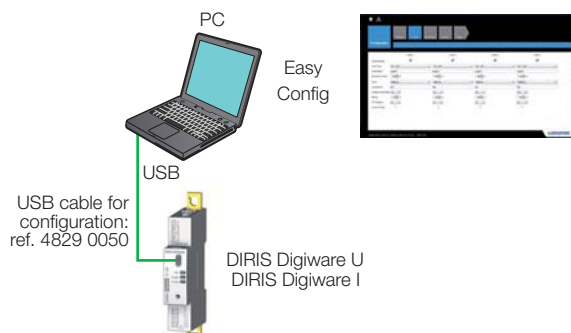
If the DIRIS Digiware is combined with the G-30, G-40, G-50 or G-60 gateway, it can be configured via this and the Ethernet port or USB.

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

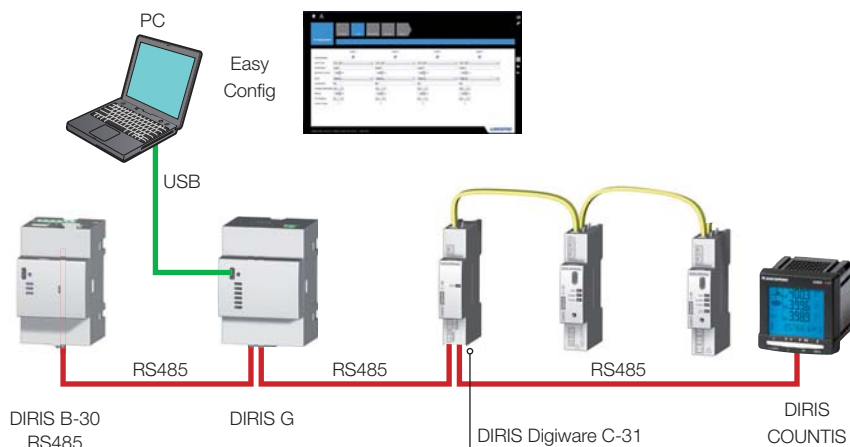
10.1. Configuration using Easy Config

10.1.1. Connection modes

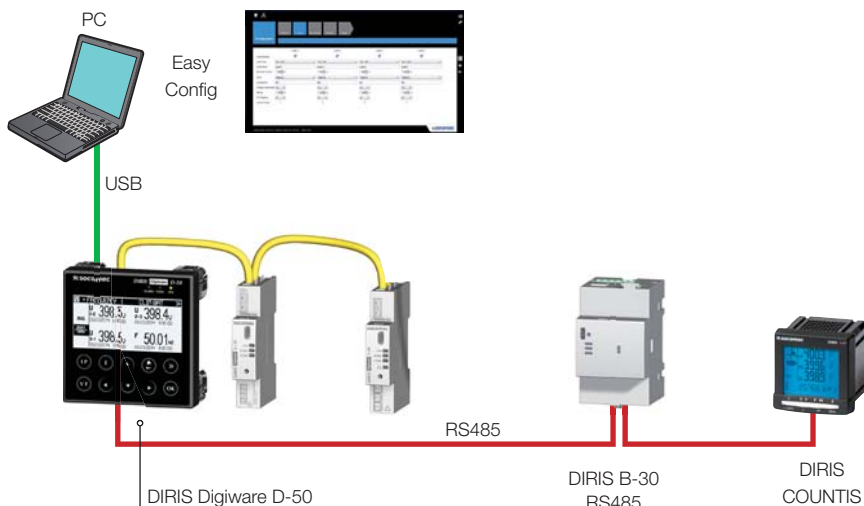
Configuration using Easy Config directly (USB)



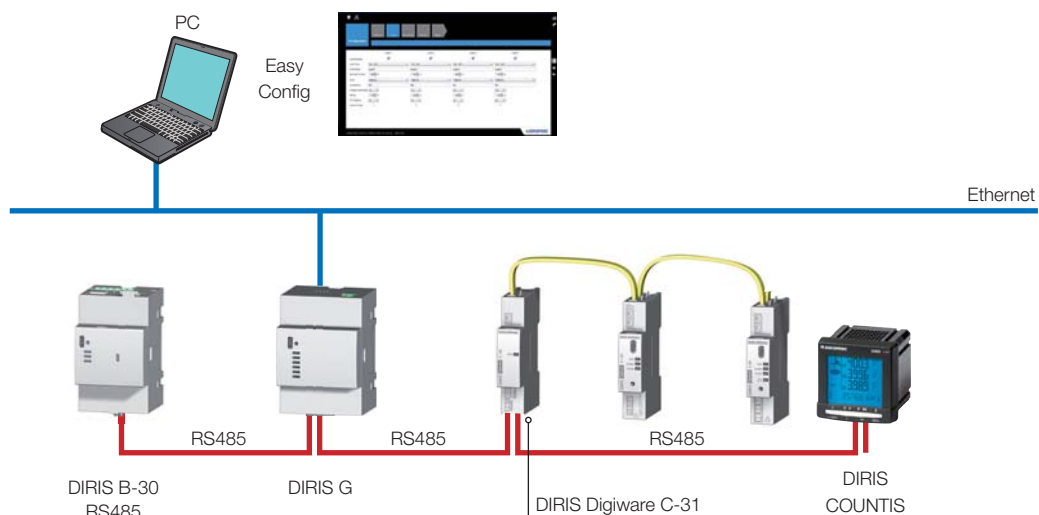
Configuration using Easy Config via a DIRIS G gateway (USB)



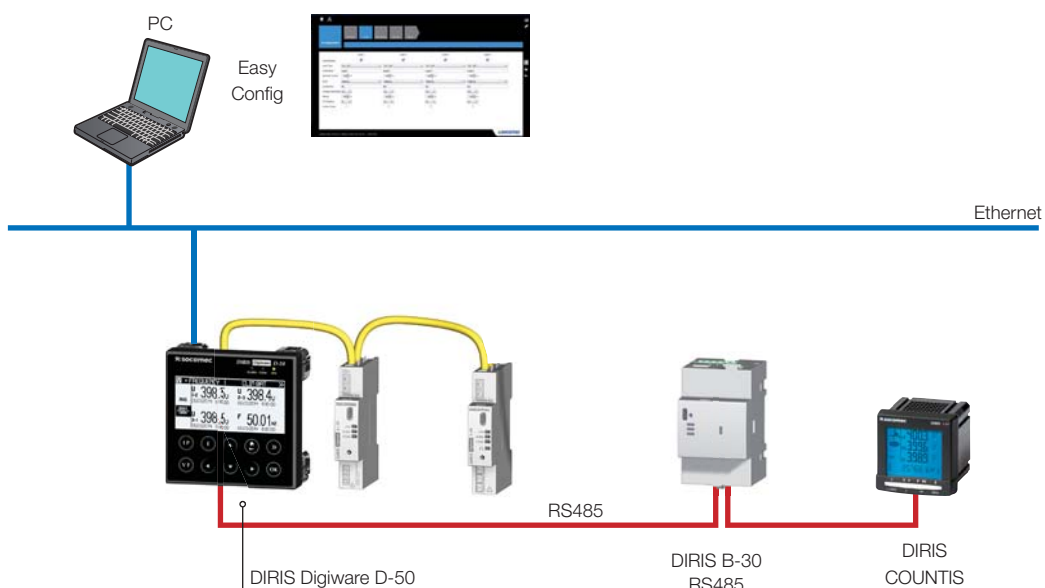
Configuration using Easy Config via a DIRIS G monitor (USB)



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



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



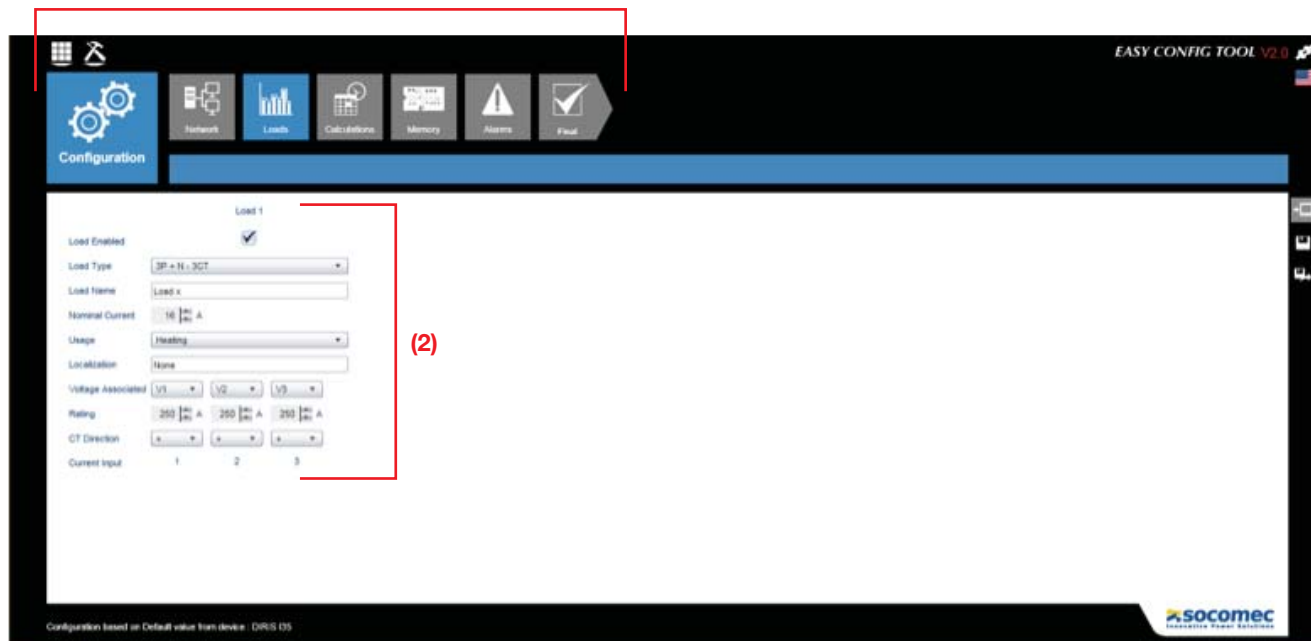
These products must be connected to the power supply before you configure them.
For the Digiware bus and 120-ohm termination resistors, see section “Communication”, page 49.

10.1.2. Using Easy Config

Easy Config is 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

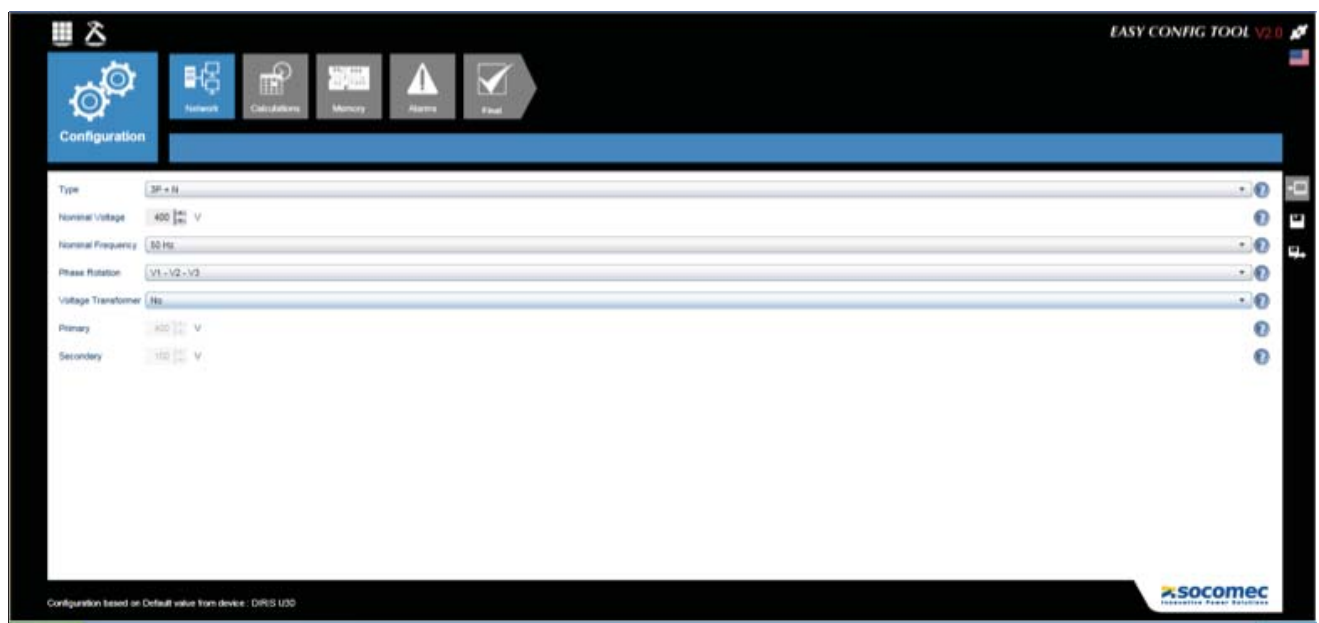
(1)



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.

The screenshot shows the 'EASY CONFIG TOOL v2.0' interface. The top navigation bar includes icons for Configuration, Network, Loads, Calculations, Memory, Alarms, and Fault. The 'Configuration' tab is active. The main area displays three load configurations (Load 1, Load 2, Load 3). Each load has a 'Load Enabled' checkbox (checked), a 'Load Type' dropdown (set to '1P+N-1CT'), a 'Load Name' text field (set to 'Load x'), a 'Nominal Current' dropdown (set to '16 A', '0 A', and '0 A' respectively), a 'Usage' dropdown (set to 'Heating'), a 'Localization' dropdown (set to 'None'), a 'Voltage Associated' dropdown (set to 'V1'), a 'Rating' dropdown (set to '250 A', '250 A', and '250 A' respectively), a 'CT Direction' dropdown (set to '+'), and a 'Current Input' dropdown (set to '1', '2', and '3' respectively). The bottom status bar indicates 'Configuration based on Default value from device: DIRIS I35' and the Socomec logo.

Calculation method

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

The screenshot shows the 'EASY CONFIG TOOL v2.0' interface. The top navigation bar includes icons for Configuration, Network, Loads, Calculations, Memory, Alarms, and Fault. The 'Calculations' tab is active. The main area displays the following fields: 'Integration Period Inst. Values' (set to '10' with a dropdown for 'Multiple of 200 ms' and 'Seconds'), 'Integration Period Avg. Values' (set to '10 Minutes'), 'Power Integration Period' (set to '10 Minutes'), and 'Synchronization' (set to 'Internal RTC'). The bottom status bar indicates 'Configuration based on Default value from device: DIRIS I35' and the Socomec logo.

Alarms

The type of alarm and the configuration is performed via Easy Config, see section “11. ALARMS”, page 58 for more details.

10.1.3. Time setting

Ensure that all connected products are set to the same time, their time is controlled on an SNTP server (DIRIS G, DIRIS Digiware D-50) or manually (DIRIS G, DIRIS Digiware D-40/D-50).

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 displayed on connected products automatically based on a configurable update schedule.

The screenshot displays the 'EASY CONFIG TOOL V2.2' interface for configuring a DIRIS G-30/G-40/G-50/G-60 device. The top navigation bar includes icons for Date / Time, E-mail, Alarms, I/O, and Final Action. The main configuration area is divided into several sections:

- SNTP server settings:** Includes fields for Activation (Yes), SNTP server IP address (0.0.0.0), and SNTP Server Port (123).
- Slave Time Diffusion:** Includes fields for Automatic slaves time update (Yes), Gateway time update frequency (60 s), and Slaves time update frequency (30 s).
- Slaves Information Diffusion:** Includes fields for Slaves load curve synchronisation method (Disabled), Slaves load curve integration time (1.5 Min), Slaves historical values synchronisation method (Disabled), and Slaves historical values integration time (60 Min).
- Date/Time:** Includes a Time Zone dropdown set to UTC.

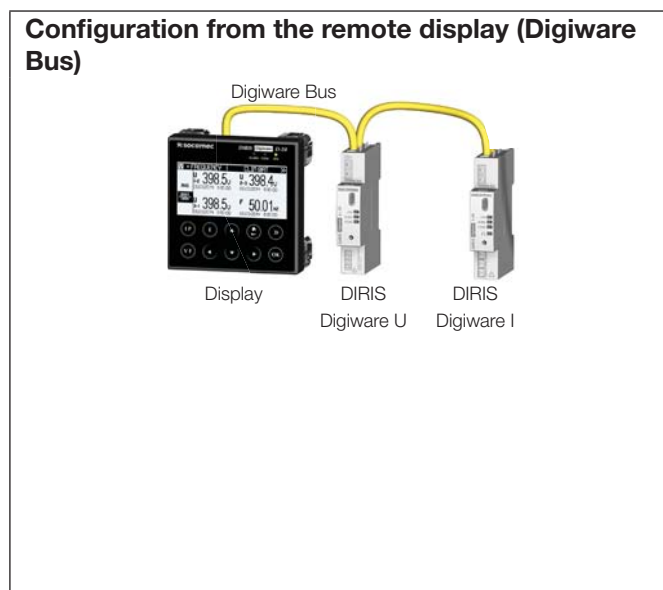
At the bottom, there are options for 'Automatic' (Sync from PC Date/Time) and 'Manual' (5/15/2014 3:04:28 PM) synchronization, with a 'Send' button. The status bar at the bottom indicates 'New File : DIRIS G-30/G-40/G-50/G-60' and 'Profile Level : Super User'.



Do not use the synchronisation function on a single-point DIRIS D-30 screen as part of a multiproduct 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 in DIRIS Digiware U-30, I-35 and I-45.

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

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 are configured for an electrical measurement per item of equipment and 4 for changes in status of a digital input (digital inputs are available only on DIRIS Digiware modules I-43 and I-45).

The alarms are configured via the Easy Config software.

11.1.1. Electrical parameters

The alarms available will be based on electrical parameters measured in the products.

- Alarm upon variation in the instantaneous or average value of an electrical value: Current, voltage, frequency, power, power factor, Cos phi, total harmonic distortion
- 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), temporary overvoltages (Uswl) and voltage outages (Uint), taking the occurrence into account: number, reference period.

11.1.4. Consumption

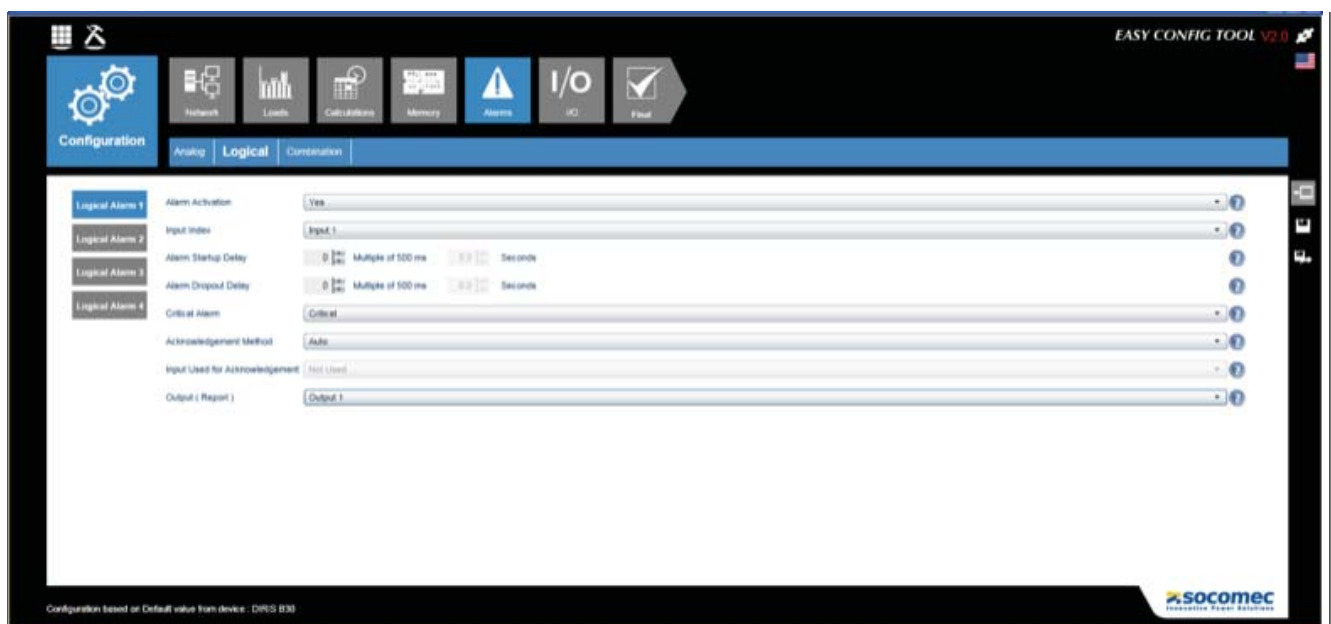
- Alarm on the energies: Ea+, Ea-, Er+, Er-, Eap (total or partial)
- Choice of a high (consumption too high) or low (consumption too low) threshold

11.1.5. Digital inputs

This function is available on DIRIS Digiware I-43 / I-45.

- Alarm upon change of status for 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:



11.1.6. 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:



11.2. Setup alarms

If an installation error is detected during setup, an alarm will be automatically generated.

11.2.1. Current/voltage compatibility

- Alarm upon connection error between the current and the voltage
- Requires a certain load level: $0.6 < PF < 1$ and $I > 2\% I_n$

11.2.2. 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)

11.2.3. Faulty current sensor

- Alarm for detecting the absence of a current sensor

11.3. Setting up alarms

The installation alarms are automatically detected and alarms upon events are configured with the Easy Config software.

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

11.3.1. ALARM LED on front

- Blinking: Setup alarm
- Fixed: Alarm upon event (takes priority if there is a commissioning alarm at the same time)

11.3.2. Activation of an output

- On the DIRIS Digiware I-4x an output may be enabled when an alarm is detected

11.3.3. 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 complete

11.3.4. RS485 Modbus

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

11.3.5. Display and Webview

- Information on the alarms with timestamping
- Sends alarm acknowledgement

12. CHARACTERISTICS

12.1. DIRIS Digiware C, U and I characteristics

12.1.1. 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	65 g / 64 g / 63 g / 133 g / 83 g

12.1.2. Electrical characteristics

DIRIS Digiware C-31	
Input voltage	24 VDC $\pm$ 20% - 20 W max.
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	Characteristics: 230 VAC / 24 VDC - 0.63 A - 15 W Modular format - Dimensions (H x L): 90 x 25 mm

12.1.3. Measuring characteristics

Measurement accuracy	
Accuracy	According to IEC 61557-12 PMD DD classification in association with specified census (TE, TR, TF)
Measuring energy and power	
Active energy and active power accuracy	0.2 DIRIS Digiware class only Class 0.5 with TE or TF sensors Class 1 with TR sensors
Accuracy of reactive energy	Class 2 with TE, TR or TF sensors
Power factor measurement	
Accuracy	Class 0.5 with TE 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 TE, split-core TR, flexible TF current sensors
Accuracy of current measurement	0.2 DIRIS Digiware class only Class 0.5 with TE 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	Logic status, pulse meter
Connection	Removable screw terminal block, stranded or solid 0.14 to 1.5 mm ² cable
Outputs - DIRIS Digiware I-4x	
Number of outputs	2
Relay type	230 V $\pm$ 15% - 1 A
Function	Configurable alarm (current, power, etc.) on threshold overruns or remote controlled status
Connection	Removable screw terminal block, stranded or solid 0.2 to 2.5 mm ² cable

12.1.4. 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	1200 - 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

12.1.5. Environmental characteristics

Operating temperature	-10 - +70°C (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature range	-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 (CEI 61557-12)
Impact resistance	Front panel: 5J - 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

12.1.6. Electromagnetic characteristics

Immunity to electrostatic discharges	IEC 61000-4-2 LEVEL III
Immunity to radiated radio-frequency fields	IEC 61000-4-3 LEVEL III
Immunity to electrical fast transients/bursts	IEC 61000-4-4 LEVEL IV
Immunity to impulse waves	IEC 61000-4-5 LEVEL IV
Immunity to conducted disturbances	IEC 61000-4-6 LEVEL III
Immunity to power frequency magnetic fields	IEC 61000-4-8 400A/m LEVEL IV
Conducted emissions	CISPR11 Group1 - CLASS B
Radiated emissions	CISPR11 Group1 - CLASS B
Immunity to voltage dips and short interruptions	IEC 61000-4-11 LEVEL III

12.1.7. Safety

Safety	Compliance with Low Voltage Directive 2006/95/EC of 12th December 2006 (EN 61010-1:2010)
Insulation	Installation category III (300 VAC Ph/N), degree of pollution 2
UL	UL 61010

12.1.8. Service life

MTTF (mean time to failure)	> 100 years
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12.2. TE, TR and RF sensors - characteristics

TE - closed sensor TE-18 to TE-55						
Model	TE-18	TE-18	TE-25	TE-35	TE-45	TE-55
Nominal current range I_n (A)	5 - 20	25 - 63	40 - 160	63 - 250	160 - 630	400 - 1000 ⁽¹⁾
Max. current (A)	24	75.6	192	300	756	1200
Weight (g)	24	24	69	89	140	187
Max. voltage	300 V					
Rated withstand voltage	3 kV					
Frequency	50/60 Hz					
Intermittent overload	10x I_n in 1 second					
Measurement category	CAT III					
Protection degree	IP30 / IK06					
Operating temperature range	-10 - +70°C					
Storage temperature range	-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, 300 V cat.III. -40/+85°C.				
(1) > 1000 A with adapter TC 5 A.					
TE - closed sensor TE-90					
Model	TE-90				
Nominal current range In	600 A - 2000 A				
Max. current	2400 A				
Weight	163g (118g without clamps)				
Max. voltage	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 range	-10 - +70°C				
Storage temperature range	-25 - +85°C				
Relative humidity	95% RH without condensation				
Altitude	< 2,000 m				
Connection	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 300 V cat.III. -40/+85°C.				
TR - Split-core sensor					
Model	TR-10	TR-16	TR-24	TR-36	
Nominal current range In (A)	25 - 75	32 - 100	63 - 200	200 - 600	
Max. current (A)	90	120	240	720	
Weight (g)	74	117	211	311	
Max. voltage	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 range	-10 - +70°C				
Storage temperature range	-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				
Connection	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 300 V cat.III. -40/+85°C.				
TF - Flexible current sensor					
Model	TF-55		TF-120		TF-300
Nominal current range In (A)	150 - 600		500 - 2000		1600 - 6000
Weight (g)	114		142		220

Max. voltage	600 V
Rated withstand voltage	3.6 kV
Frequency	50 / 60 Hz
Intermittent overload	10x In in 1 second
Measurement category	CAT III
Protection degree	IP30 / IK07
Operating temperature range	-10 - +70°C
Storage temperature range	-25 - +75°C
Relative humidity	95% RH without condensation
Altitude	< 2,000 m
UL	UL 61010 conformity
Connection	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 300 V cat.III. -40/+85°C.

12.3. DIRIS D-30 and DIRIS Digiware D-40/D-50 - characteristics

12.3.1. Mechanical characteristics

Type of screen	Capacitive touch-screen technology, 10 keys
Screen resolution	350 x 160 pixels
Front panel protection index	IP65
Weight of the DIRIS D-30 / DIRIS Digiware D-40/D-50	160 g / 180 g

12.3.2. 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

12.3.3. 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

12.3.4. DIRIS Digiware D-50 communication characteristics

Type of screen	Multipoint remote screen
Ethernet RJ45 10/100 Mbs	Modbus TCP gateway function
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
UL	UL 61010 conformity

12.3.5. Electrical characteristics

Power supply	24 VDC +10% / -20%
Power consumption	2 VA

12.3.6. Environmental characteristics

Storage temperature range	-20 - +70°C
Operating temperature range	-10 - +55°C
Humidity	95% at 40°C
Installation category - degree of pollution	CAT III, 2

13. PERFORMANCE CLASSES

Performance classes are drawn up in compliance with IEC 61557-12 version 1 (08/2007)

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

13.1. Specification of the characteristics

Symbol	Function	Overall operating performance class for DIRIS Digiware + associated sensors*(TE, TR, TF) in compliance with IEC 61557-12	Measurement range
Pa	Total active power	0.2% DIRIS Digiware only 0.5 with TE 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 or TF sensors	5% - 120% In
S_A , S_V	Total apparent power (arithmetic, vectorial)	0.5 with TE or TF sensors 1 with TR sensors	10% - 120% In
Ea	Total active energy	0.2% DIRIS Digiware only 0.5 with TE or TF sensors 1 with TR sensors	10% - 120% In 2% - 120% In 2% - 120% In
Er_A , Er_V	Total reactive energy (arithmetic, vectorial)	2 with TE, TR or TF sensors	5% - 120% In
Eap_A , Eap_V	Total apparent energy (arithmetic, vectorial)	0.5 with TE 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 or TF sensors 1 with TR sensors	5% - 120% In 10% - 120% In 10% - 120% In
INc	Calculated neutral current	1 with TE 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 or TF sensors 1 with TR sensors	0.5 lagging to 0.8 leading
Pst, PIt	Flicker (short-term, long-term)	-	-
Udip	Voltage dip (Lp-Lg or Lp-N)	0.5	-
Uswl	Temporary overvoltages (Lp-Lg or Lp-N)	0.5	-
Uint	Voltage outage (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 efficient 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 efficient value)	1 with sensors TE, TR or TF	Orders 1 to 63
Ih	Current harmonics	1 with sensors TE, TR or TF	-
Msv	Centralised remote control signals	-	-

*With SOCOMEC connection cables.

13.2. Evaluation of the power supply quality

Symbol	Function	Overall operating performance class for DIRIS Digiware + associated sensors (TE, TR, 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 or TF sensors 1 with TR sensors	5% - 120% In 10% - 120% In 10% - 120% In
INc	Calculated neutral current	1 with closed TE 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, Plt	Flicker (short-term, long-term)	-	-
Udip	Voltage dip (Lp-Lg or Lp-N)	0.5	-
Uswl	Temporary overvoltages (Lp-Lg or Lp-N)	0.5	-
Uint	Voltage outage (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 or TF	-
Msv	Centralised remote control signals	-	-

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542 875 D - EN - 02/16

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