

Power Monitoring Device with wireless LoRaWAN communication

DIRIS B-10L



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1. DOCUMENTATION

All documentation relating to the DIRIS B-30 and its associated sensors is available on the SOCOMEC website at the following address:

www.socomec.com/en/diris-b





2. HAZARDS AND WARNINGS

The term “device” used in the following paragraphs encompasses the DIRIS B-10L, its optional modules and its associated current sensors (TE, TR /iTR or TF).

The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals. SOCOMEC shall not be held responsible for failure to comply with the instructions in this manual.

2.1. Risk of electrocution, burns or explosion

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



- This device must only be installed and serviced (cleaning with a dry cloth) 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.
- Use connection cables compatible with the voltage and connection terminals of the devices.
- Prior to any work on or in the unit, disconnect all power sources (voltage inputs, the unit's auxiliary power supply and dry contact supplies).
- The isolation options must be:
 - within the electrical installation itself
 - located somewhere convenient and easily accessible
 - labelled as the unit's power switching device
- Always use an appropriate voltage detection device to confirm the absence of voltage.
- Replace all devices, doors and covers before turning on power to this equipment.
- Always power the device with the correct rated voltage.
- Install the unit following the recommended installation instructions and in a suitable electrical cabinet.
- These devices are designed to be integrated; they must be installed in an additional enclosure providing protection against electric shocks and fire.
- Always connect TR/iTR or TF current sensors using the recommended connection cables and observing the maximum prescribed currents.
- For safety reasons, only use accessories that conform to the manufacturer's specifications.
- During installation, the safety of any system integrating the device is the responsibility of the system installer.



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: 110 V - 230 VAC ($\pm 15\%$).
- 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.

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 B-10L presentation

The DIRIS B-10L is a compact PMD* which communicates measurement data over a LoRaWAN wireless communication network. The wireless communication link is particularly useful for monitoring loads located in isolated, remote areas, without the need to set up a cabled communication link.

The DIRIS B-10L is designed for monitoring energy, power and various other parameters and can be used to jointly analyse single-phase and three-phase loads. Optional modules can be added to manage multi-utility energy meters (water, gas, etc.) and additional inputs/outputs (Digital, temperature, etc.)

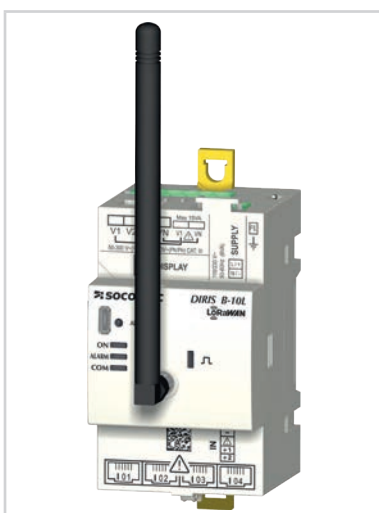
Current sensors are connected via an RJ12 cable which allows a quick and easy installation. The type of current sensor and their current rating is automatically detected by the DIRIS B-10L which significantly reduces the risk of errors during installation.

A global class 0.5 accuracy is guaranteed for the DIRIS B-10L and associated current sensors.

The DIRIS B-10L is configured from the Easy Config System software. The measurements can be accessed via the LoRaWAN network or via Modbus TCP thanks to a dedicated LoRaWAN to Ethernet gateway.

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

4.1.1. Range



PMD	DIRIS B-10L
Communication	LoRaWAN
	Ref. 4829 0900

Accessories

Remote antenna + 3m extension cable	Sealing kit. To secure terminals U / I	USB cable for configuration
Ref. 4854 0126	Ref. 4829 0049	Ref. 4829 0050

4.1.2. Functions

The DIRIS B-10L provides numerous functions and measurements:

- **General measurements**

- Current, frequency, voltage
- Total Active Power (P)
- Total Reactive Power (Q)
- Total Apparent Power (S)
- Total Power Factor (PF_{tot})
- Class 0.5 for active energy and active power for the global measurement chain (including current sensors) according to IEC 61557-12.

- **Metering**

- Active Energies (E_{a+} / E_{a-})
- Reactive Energies (E_{r+}/E_{r-})
- Load curves (P₊, P₋, Q₊, Q₋, S)
- Pulse Meters

- **Alarm**

- System alarms (CT disconnected, V/I association, bad CT primary, phase rotation)
- Measurement alarms
- Protection alarms (only available with iTR current sensors)
- Logical alarms (status change)

- **RJ12 inputs**

- Connection of TE solid-core, TR/iTR split-core and TF flexible current sensors.
- Measuring/monitoring 4 currents or 4 circuits.
- Automatic detection of the current sensor type and rating.
- Simultaneous management of several single-phase, two-phase and three-phase loads.

- **Inputs / Outputs**

- 2 digital inputs
- Optional extension modules for additional digital inputs/outputs and temperature inputs

- **Communication**

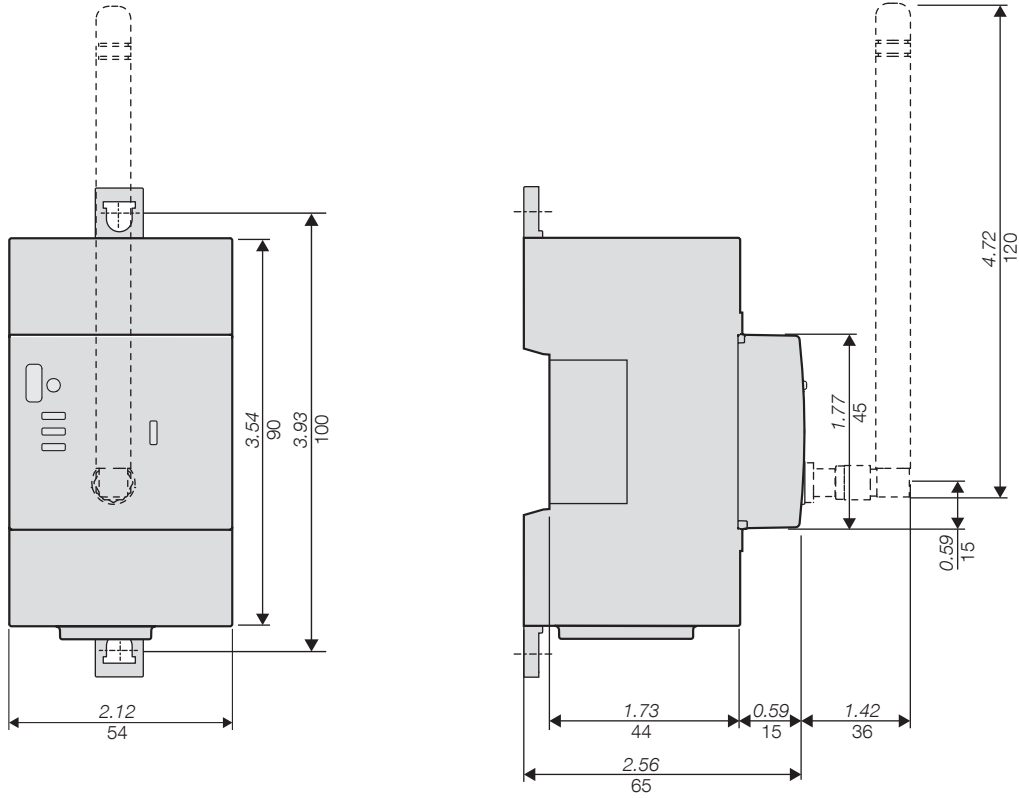
- Wireless LoRaWAN communication
- Time synchronisation done by the LoRa gateway

- **Visualisation**

- Local visualisation on dedicated DIRIS D-30 display

4.1.3. Dimensions



Dimensions in/mm



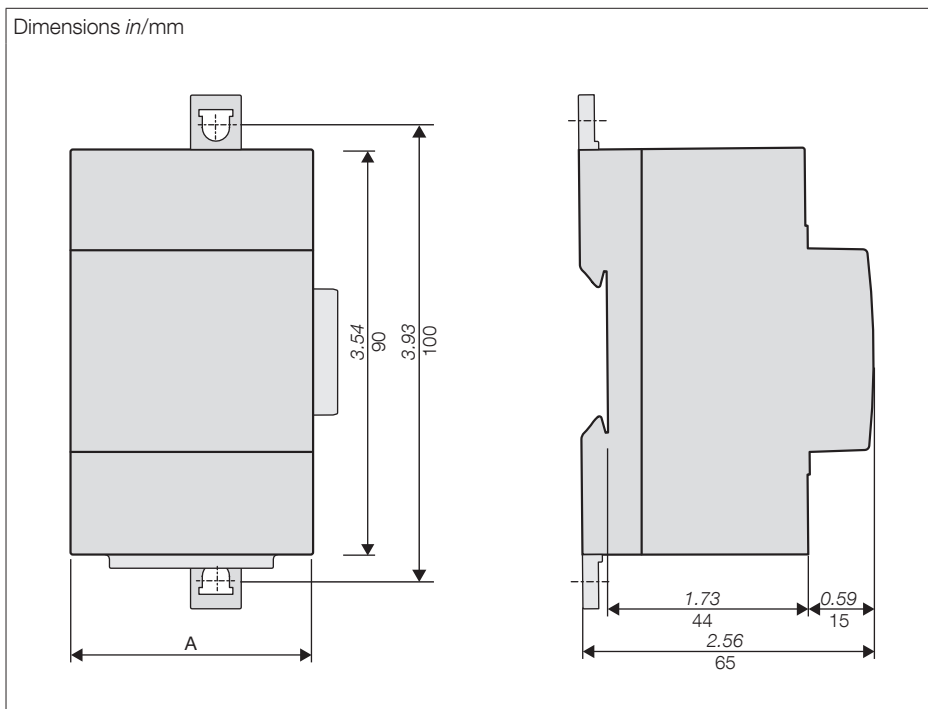
4.2. Optional modules presentation

The optional modules, which have a modular format, are fitted on the DIRIS B-10L ; they are used to extend its functionalities.

4.2.1. Range

	
<p>DIRIS O-iod Module with 2 digital inputs/outputs Ref. 4829 0030</p>	<p>DIRIS O-it Module with 3 temperature inputs Ref. 4829 0032</p>

4.2.2. Dimensions



	DIRIS O-iod	DIRIS O-it
A	1.77in / 45mm	

4.3. Presentation of the remote antenna

When the DIRIS B-10L is installed inside an electrical panel, losses ranging from -15 to -10 dB must be taken into account and can have an impact on the strength of the signal.

The DIRIS B-10L can be connected to a remote antenna, located outside the electrical panel:



The remote antenna is connected to the DIRIS B-10L via a 3-meter SMA cable. The losses incurred by the antenna and the extension cable are about -4 dB.

Therefore, the overall gain of the external antenna ranges from 11 to 16 dB.

Part no	Description
Ref. 4829 0922	Remote antenna with mounting bracket and 3m SMA extension cable

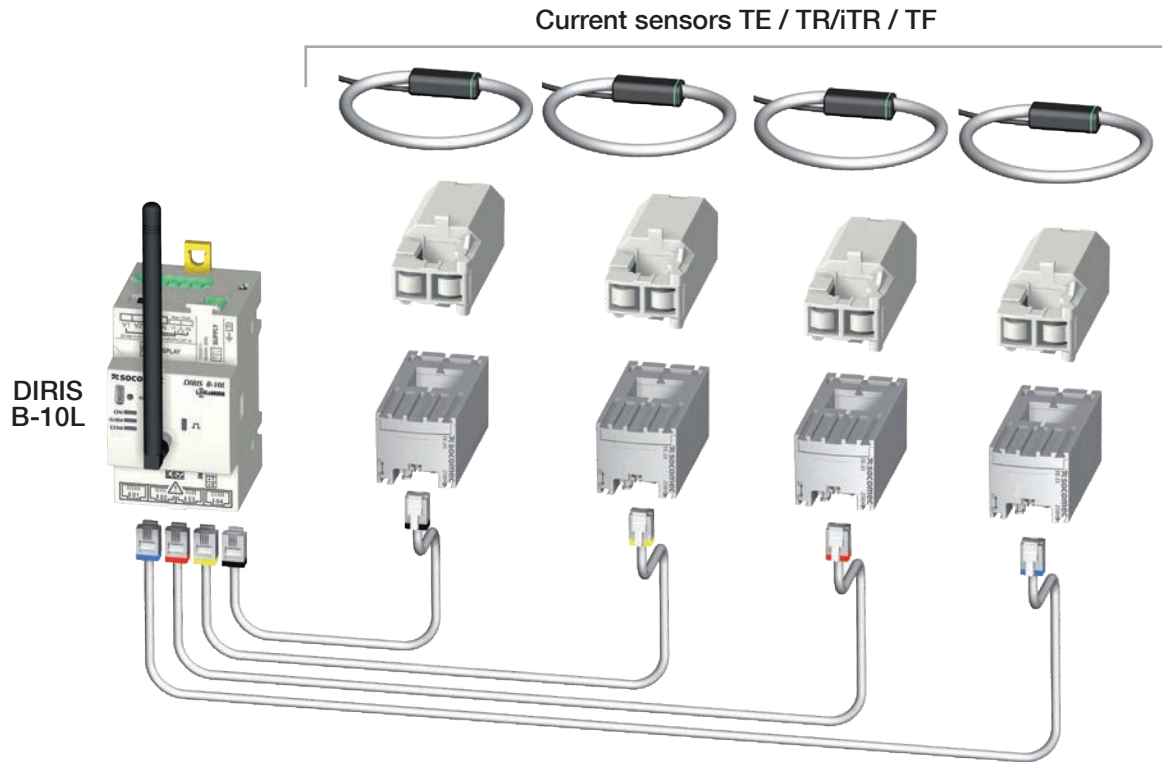


CAUTION ! The extension cable must not be in contact with live bare parts.

4.4. Presentation of associated current sensors

Various types of current sensors can be connected to the DIRIS B-10L: solid core (TE), split core (TR/iTR) or flexible (TF). This makes the DIRIS B-10L suitable with all types of new or existing installations. A rapid RJ12 connection makes wiring easy and reliable and prevents wiring errors. The DIRIS B-10L automatically recognises the type of sensor used and its current rating.

This guarantees the overall accuracy of the DIRIS B-10L + current sensor measurement chain.



Recommendations:

For connecting the current sensors, use SOCOMEC cables only: RJ12 straight, twisted pair, unshielded, 600 V, -10°C / +70°C as per IEC 61010-1 version 3.0.

It is recommended that all the current sensors be installed in the same direction.

Connection cables for current sensors:

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







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

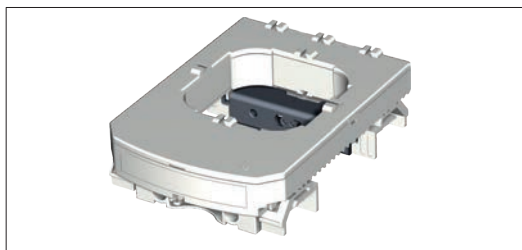
4.4.1. TE solid-core current sensors

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 B-30 and the overall accuracy of the measurement chain is guaranteed.

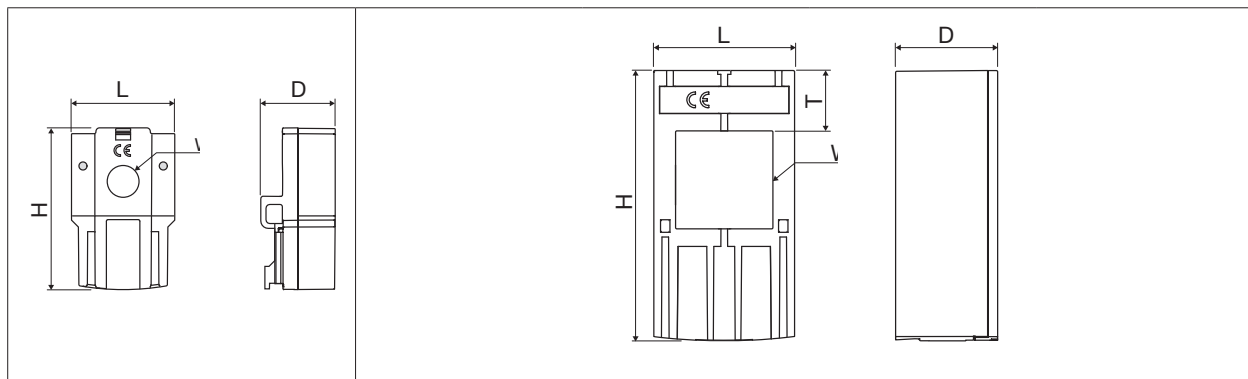
4.4.1.1. Range

						
	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
I Max	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

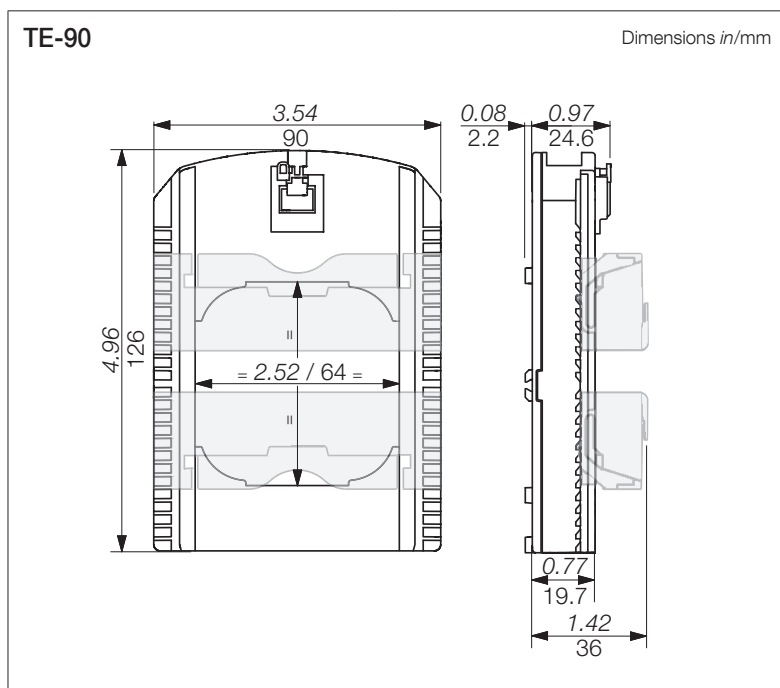


	TE-90
Pitch	90 mm
Nominal current range I_n	600 - 2000 A
I Max	2400 A
Reference	4829 0506

4.4.1.2. 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)	∅ 0.39 ∅ 9	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







4.4.2. TR split-core current sensors

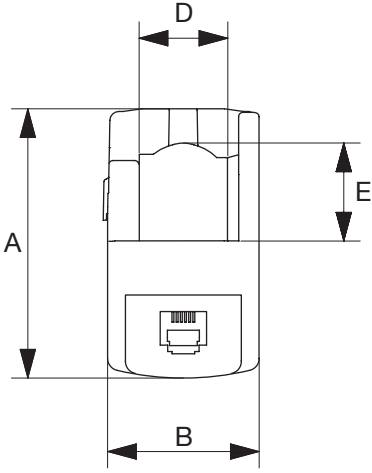
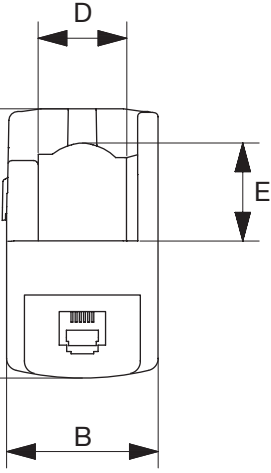
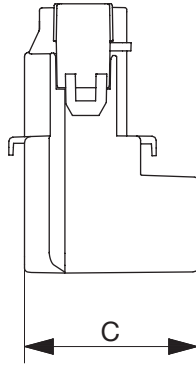
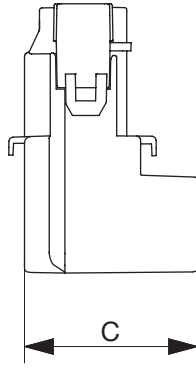
The TR split-core current sensors are used to set up measurement points in a new or existing installation without interfering with its cabling. Thanks to the specific link, they are recognised by the DIRIS B-10L and a high level of overall accuracy for the measurement chain is guaranteed.

4.4.2.1. 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
APERTURE	Ø 10 mm	Ø 14 mm	Ø 21 mm	Ø 32 mm
Nominal current range I _n	25 - 63 A	40 - 160 A	63 - 250 A	160 - 600 A
Recommended cable section	6 mm ² (iTR-10)	10 mm ² (iTR-14)	50 mm ² (iTR-21)	50 mm ² (iTR-32)
I MAX	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

4.4.2.2. 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

4.4.3. 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. Thanks to the specific link, they are recognised by the DIRIS B-10L and a high level of overall accuracy for the measurement chain is guaranteed.

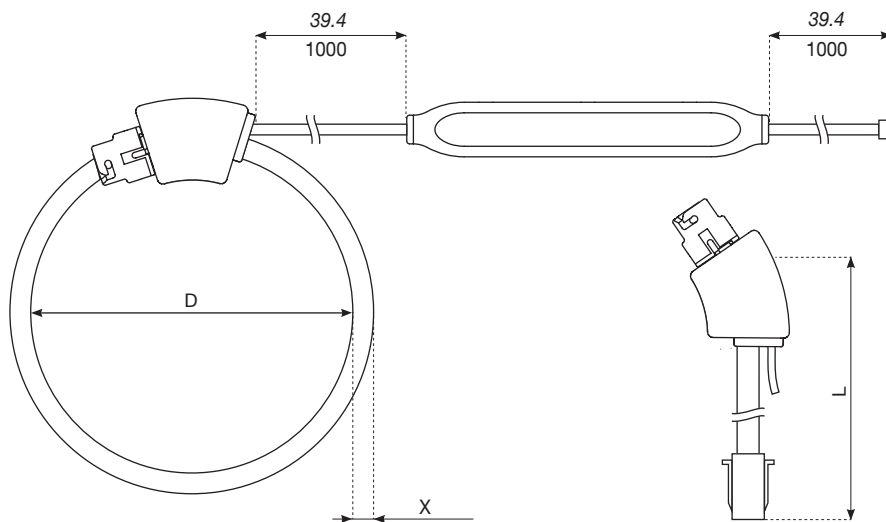
4.4.3.1. Range

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.

	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

4.4.3.2. 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 L	4.96 126	9.88 251	14.84 377	24.72 628	37.09 942	74.21 1885
Diameter X	0.28 7	0.33 8.4				
Integrator	8.04 x 0.75 x 0.6 128 x 19 x 15					



4.4.4. Adaptor for 5A or 1A current transformers

The adaptor allows you to retrofit an existing 1 A or 5 A secondary current transformer and use it with your DIRIS Digiware system. The overall DIRIS Digiware system accuracy is no longer guaranteed, as it depends on the accuracy of the associated CT (see standard «IEC 61557-12 annex F» for more information). The primary current is maximum 10000 A for a 5 A secondary CT and 2000 A for a 1 A secondary CT.

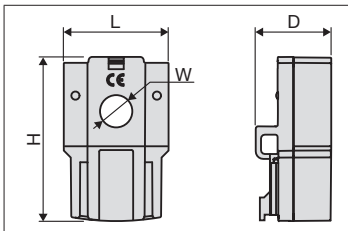
4.4.4.1. Range



5A adaptor

I name.	5 A
I Max.	6 A
Reference	4829 0599

4.4.4.2. Dimensions



Dimensions in/mm

5A adaptor

LxHxD	28 x 20 x 45
Aperture (W)	∅ 9

5. MOUNTING

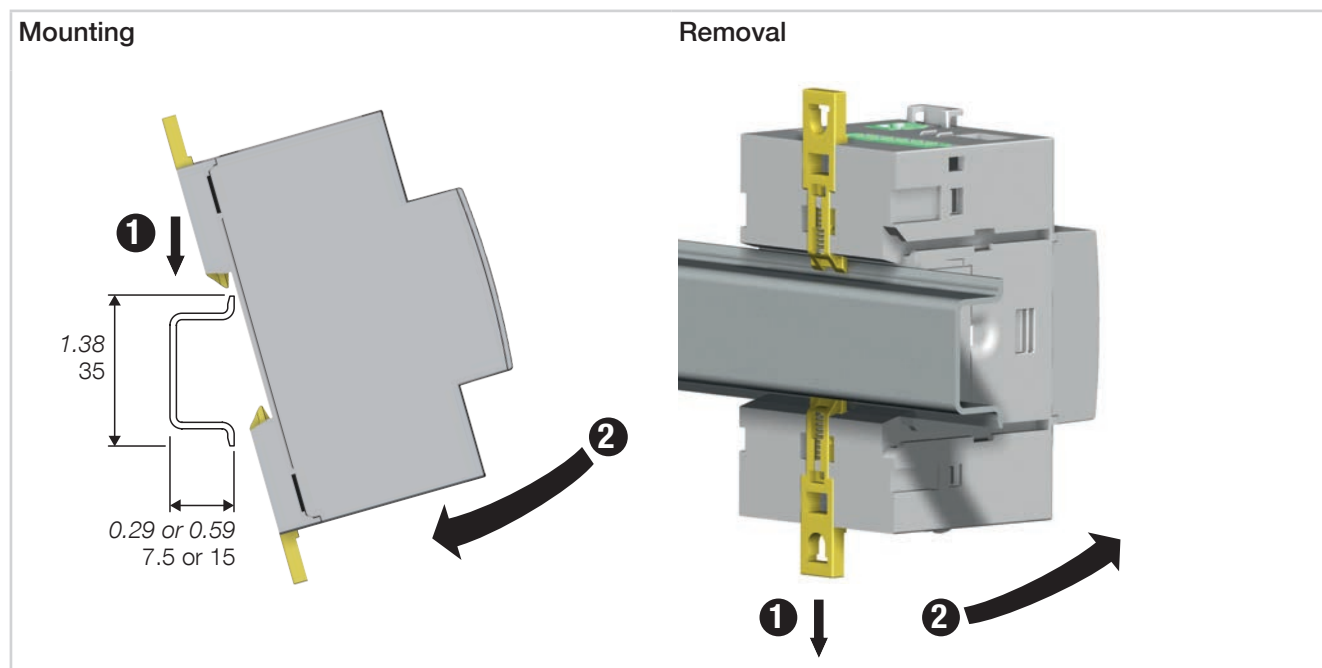
The following paragraphs describe the installation of the DIRIS B-10L, the optional modules and the associated sensors.

5.1. Recommendations and safety

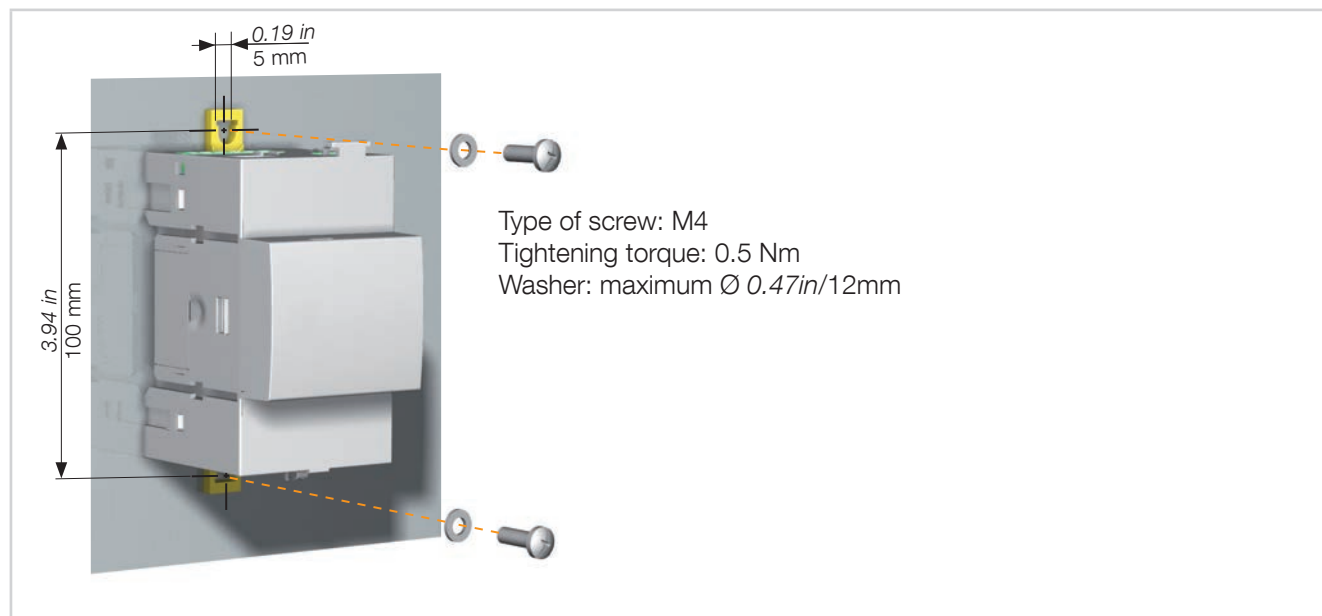
Refer to the safety instructions (section “2. Hazards and warnings”, page 7)

5.2. DIRIS B-10L mounting

5.2.1. DIN rail mounting

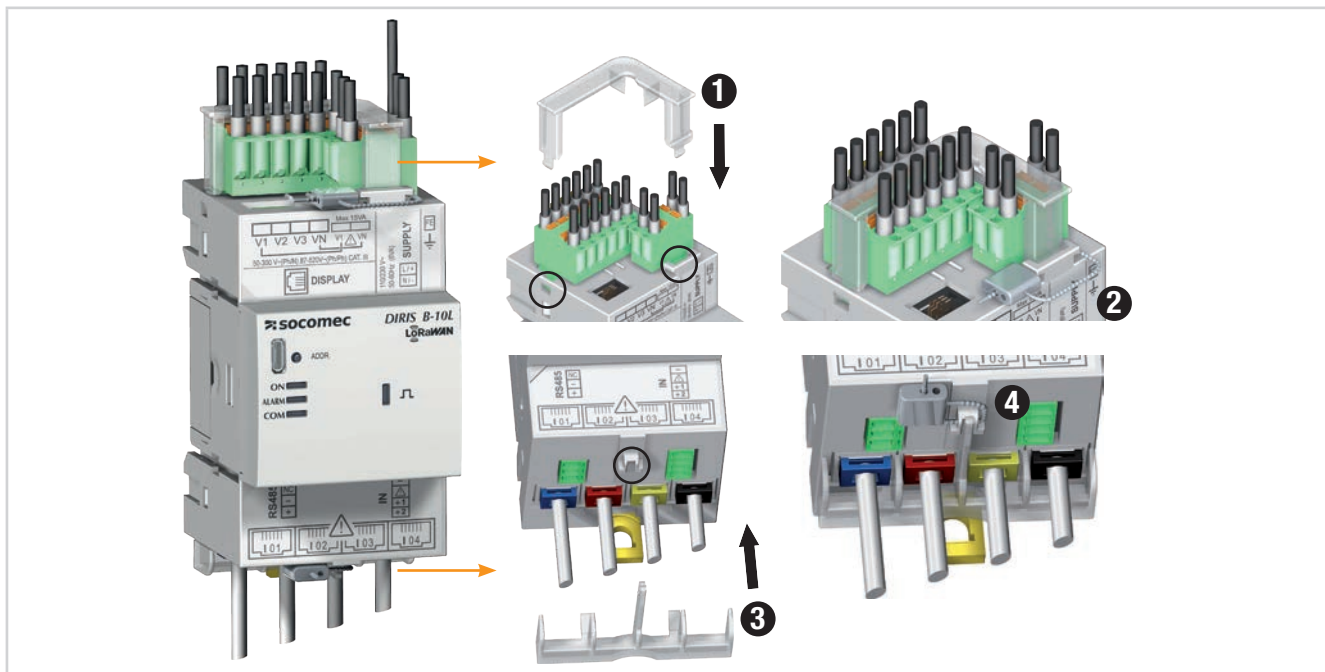


5.2.2. Plate mounting



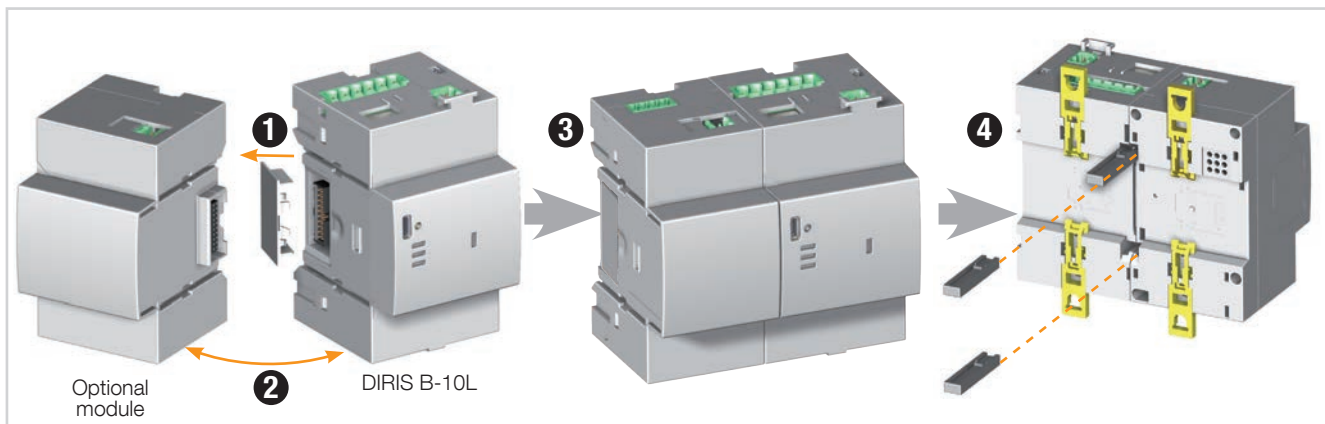
5.2.3. Sealing accessory for sensors

Reference	Sealing case for terminal
4829 0600	x20

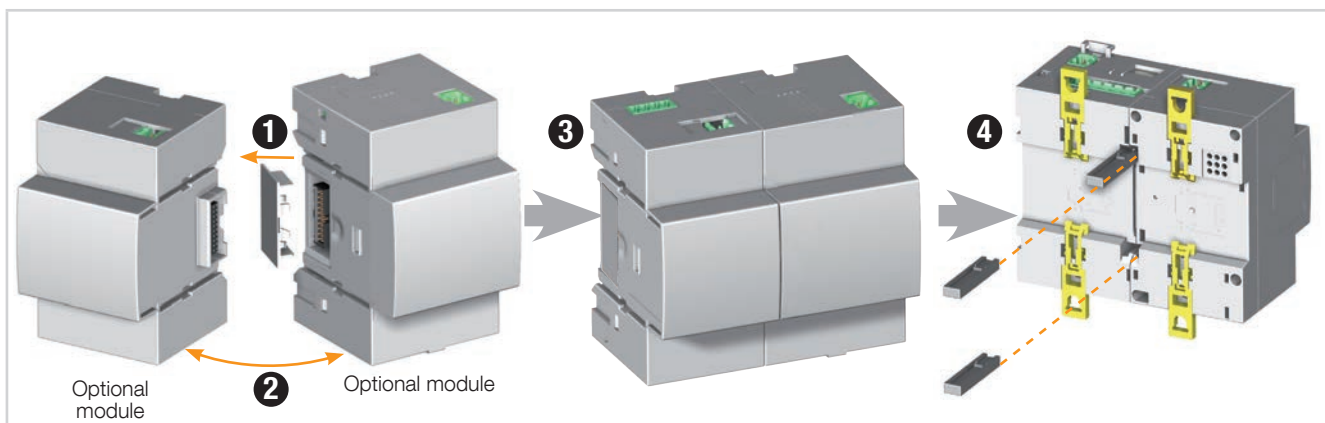


5.3. Optional modules mounting

5.3.1. Optional module mounted on DIRIS B-10L



5.3.2. Mounting an optional module on an optional module



The following guidelines for installation must be observed:

- A maximum of 4 optional modules can be installed on the DIRIS B-10L
- One single temperature module (DIRIS O-it) may be used.
- The DIRIS B-10L assembly with its optional modules must be installed on a DIN rail or base plate.
- Remote antenna mounting.

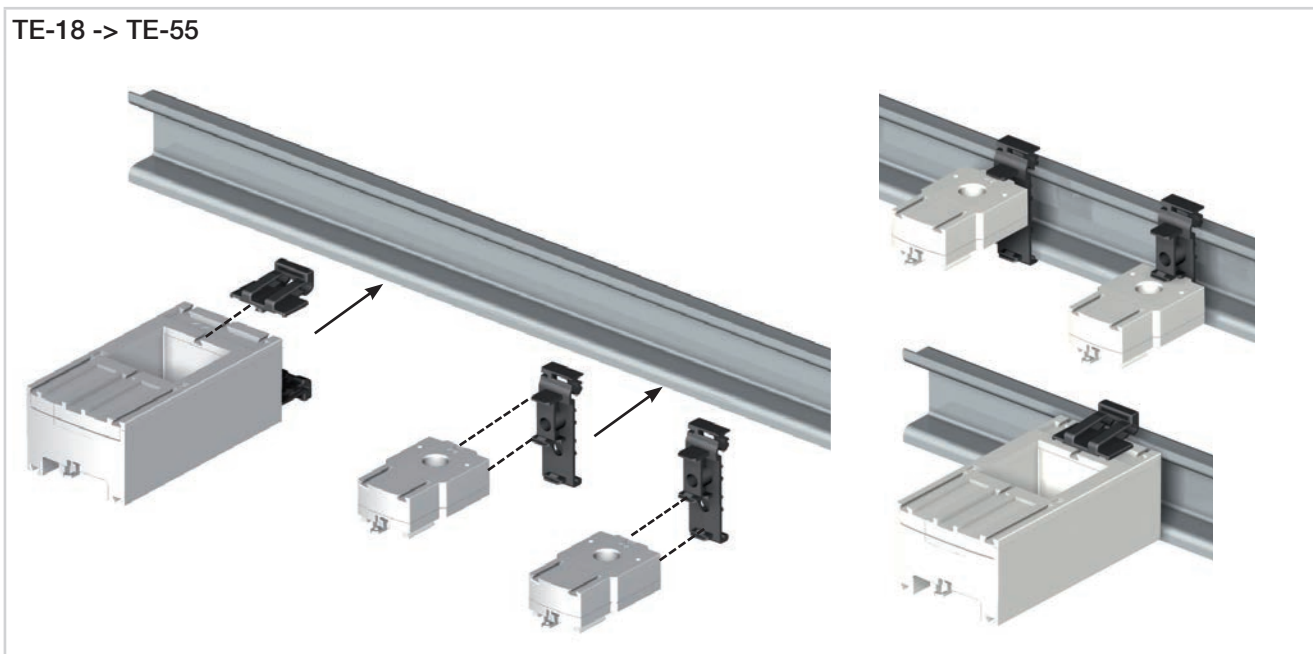
5.4. TE solid-core sensors mounting

5.4.1. Mounting accessories

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

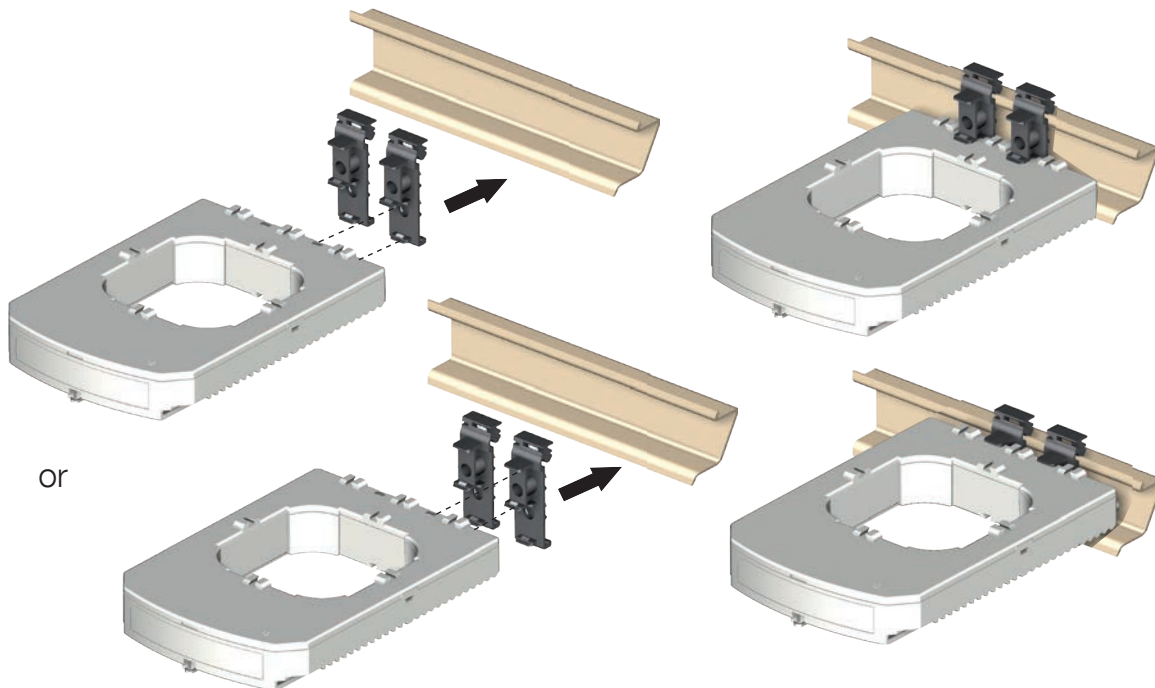
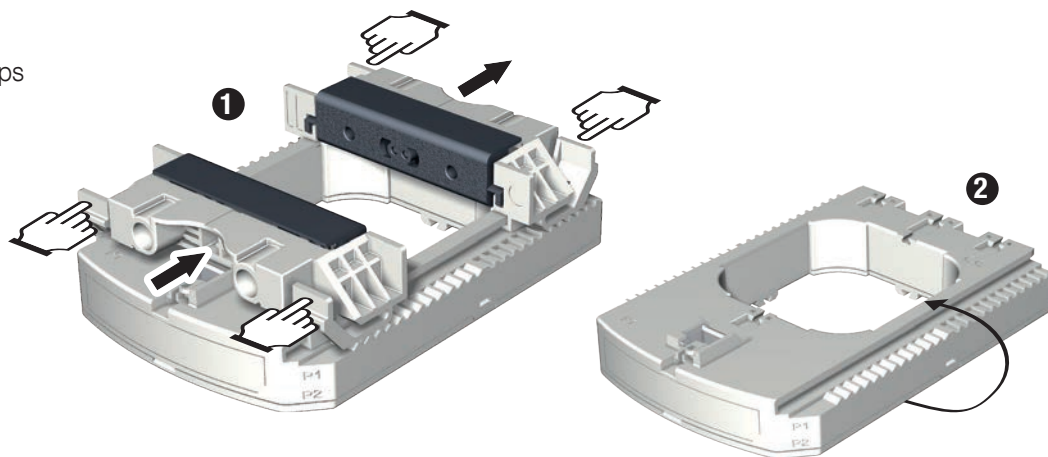
Reference	Pitch	DIN rail and plate mounting	DIN rail mounting	Plate mounting	Busbar mounting
4829 0500 4829 0501	TE-18 18 mm	x1			
4829 0502	TE-25 25 mm		x2	x4	
4829 0503	TE-35 35 mm		x2	x4	x2
4829 0504	TE-45 45 mm		x2	x4	x2
4829 0505	TE-55 55 mm		x2	x4	x2
4829 0506	TE-90 90 mm	x2		x6	

5.4.2. DIN rail mounting



TE-90

Removing clamps

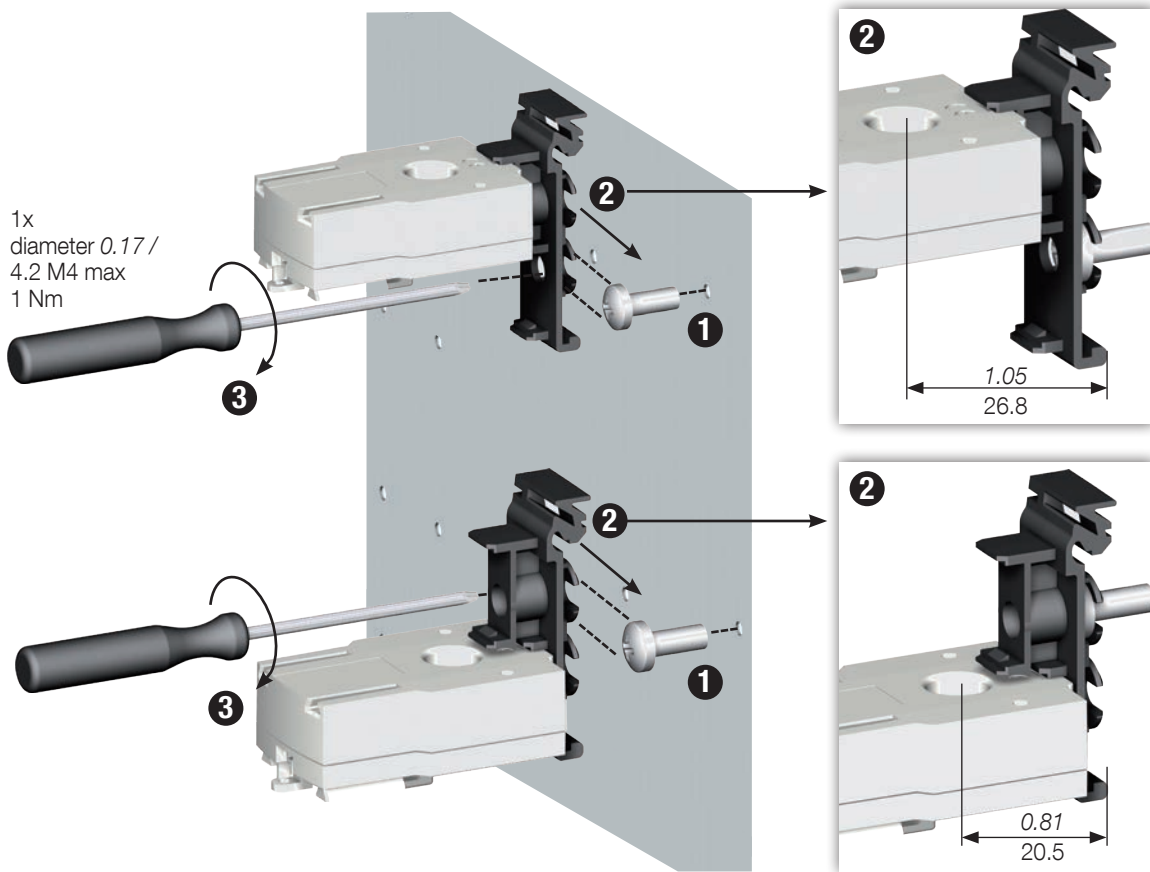


or

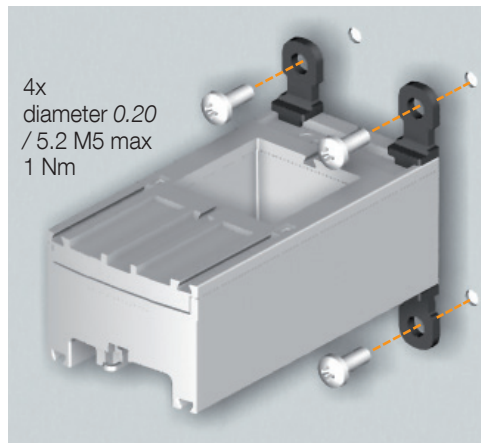
i Fix sensor TE-90 to the DIN rail to make it easier to install. This is a temporary installation. Use the clamps to install the TE-90 sensors on the DIN rail.

5.4.3. Plate mounting

TE-18

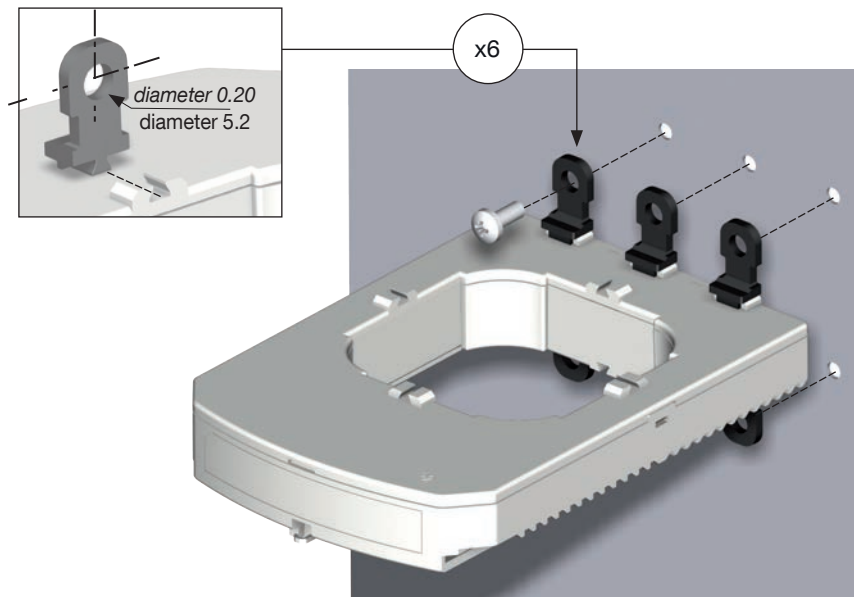
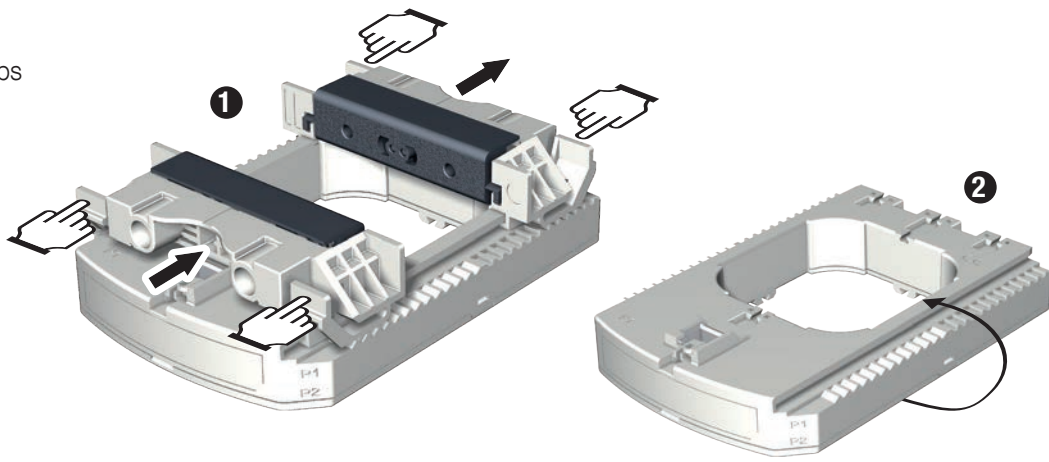


TE-25 -> TE-55



TE-90

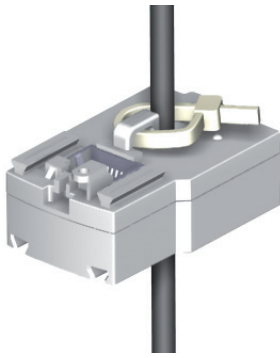
Removing clamps



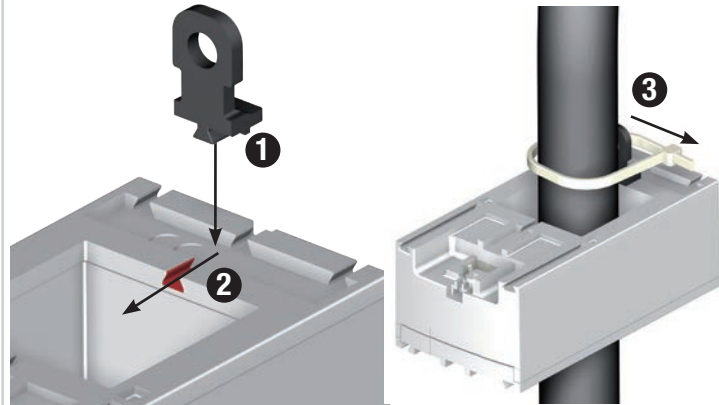
i Use the clamps to install the TE-90 sensors on the board.

5.4.4. Mounting on a cable with clamping collar

TE-18

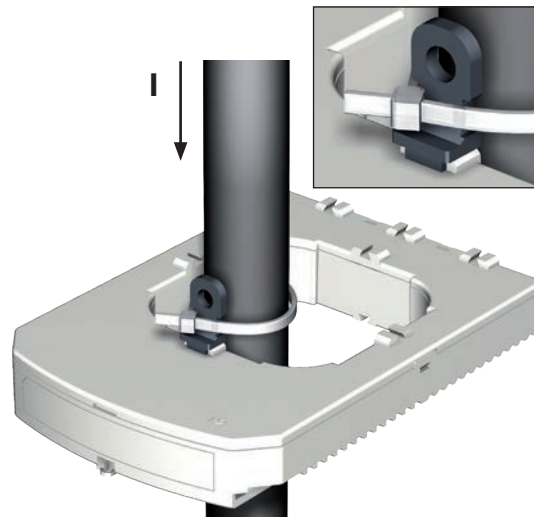
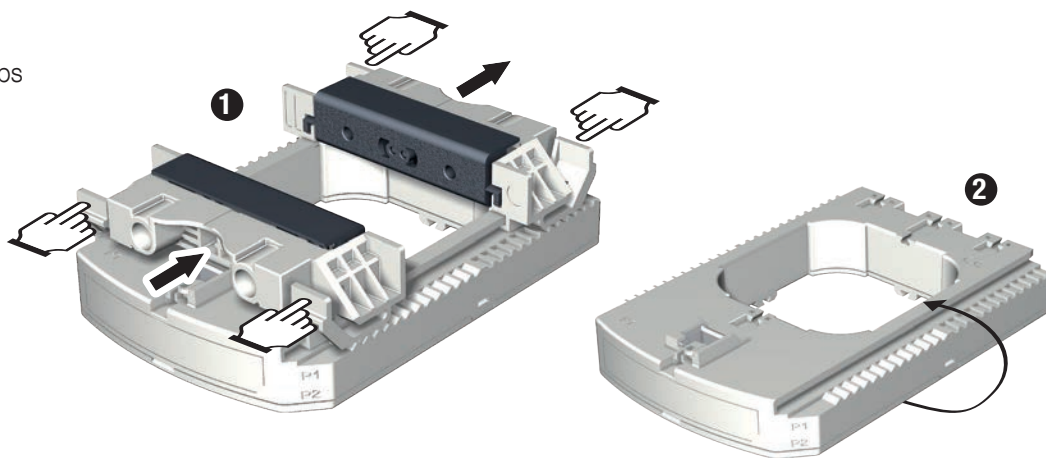


TE-25 -> TE-55



TE-90

Removing clamps



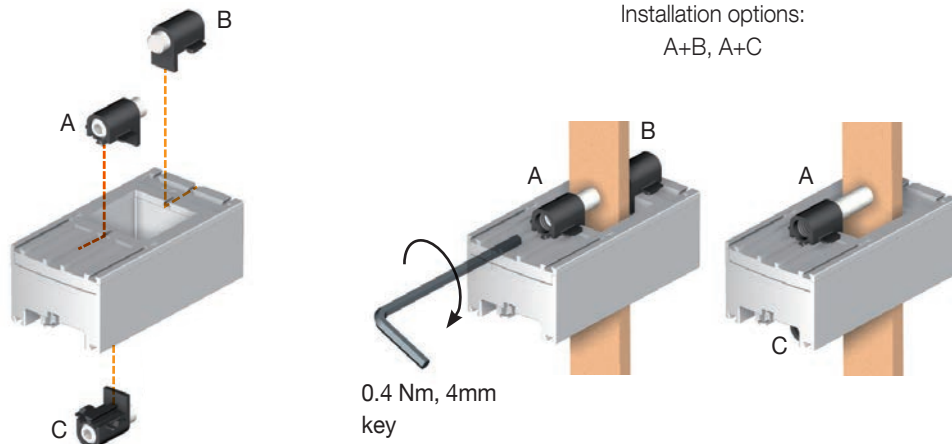
Use the clamps to install the TE-90 sensors on a cable with clamping collar.



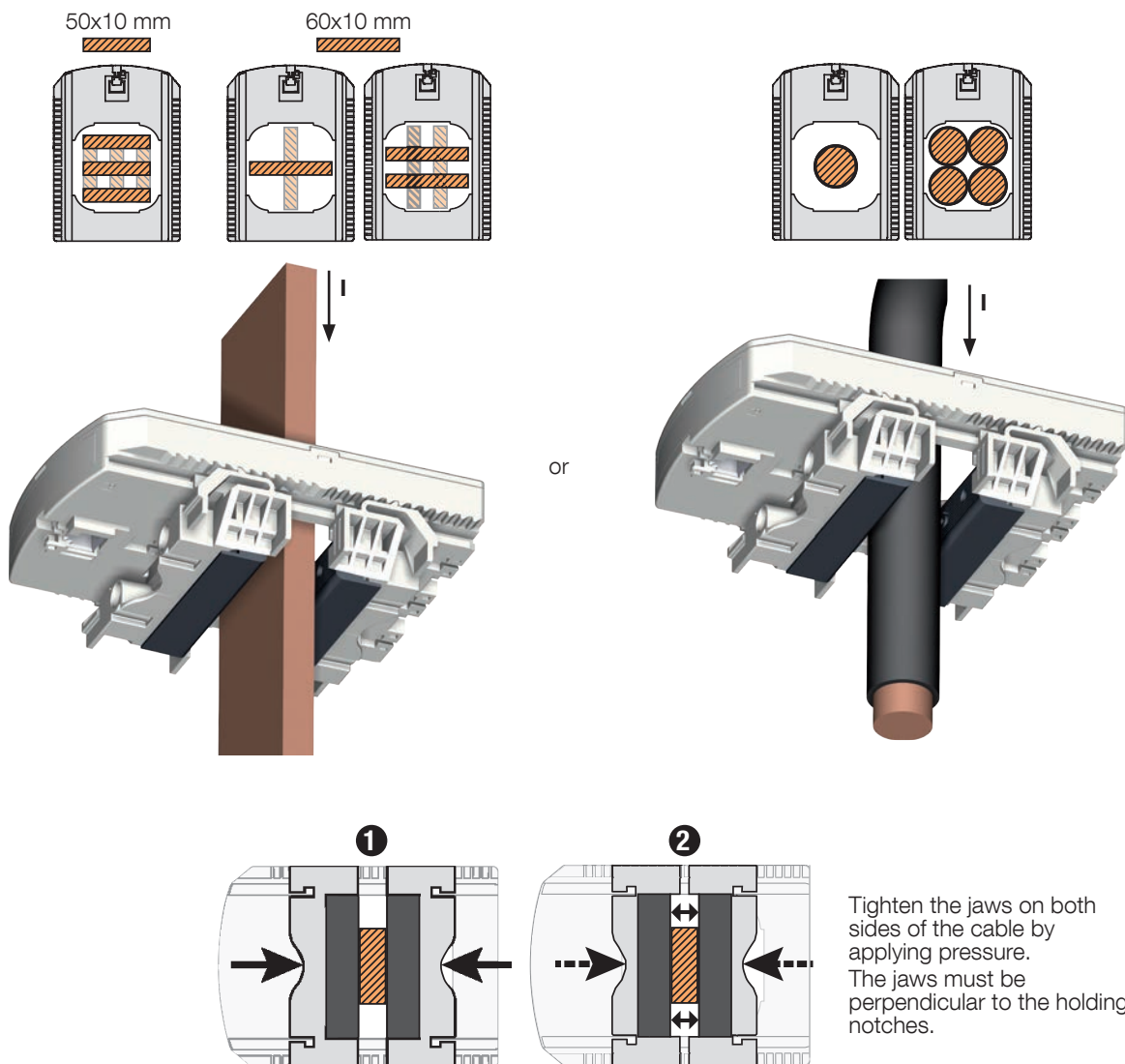
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032

5.4.5. Busbar mounting

TE-35 -> TE-55

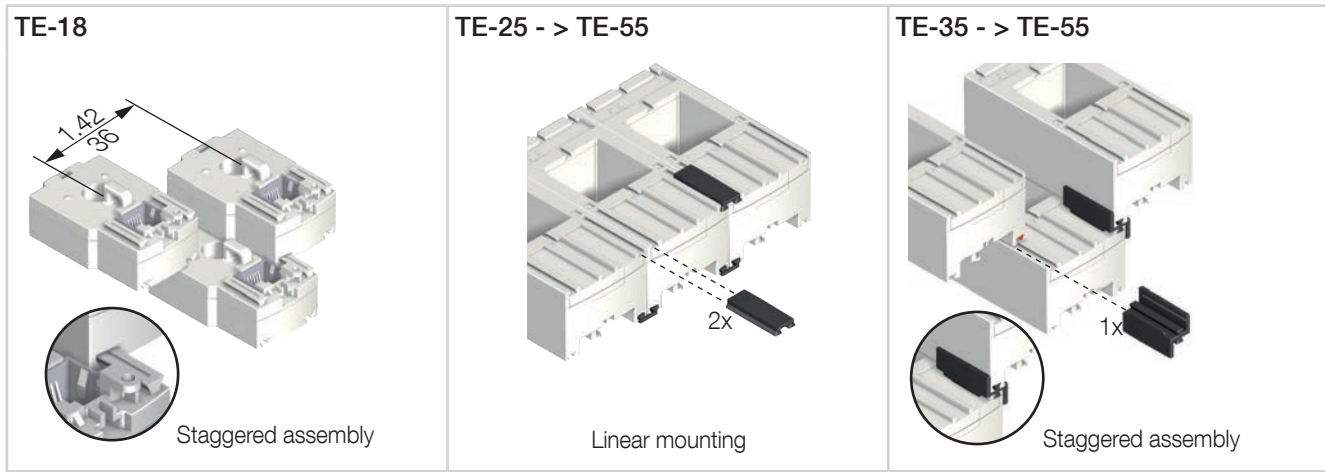


TE-90

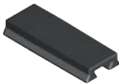



Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032

5.4.6. Sensors assembly

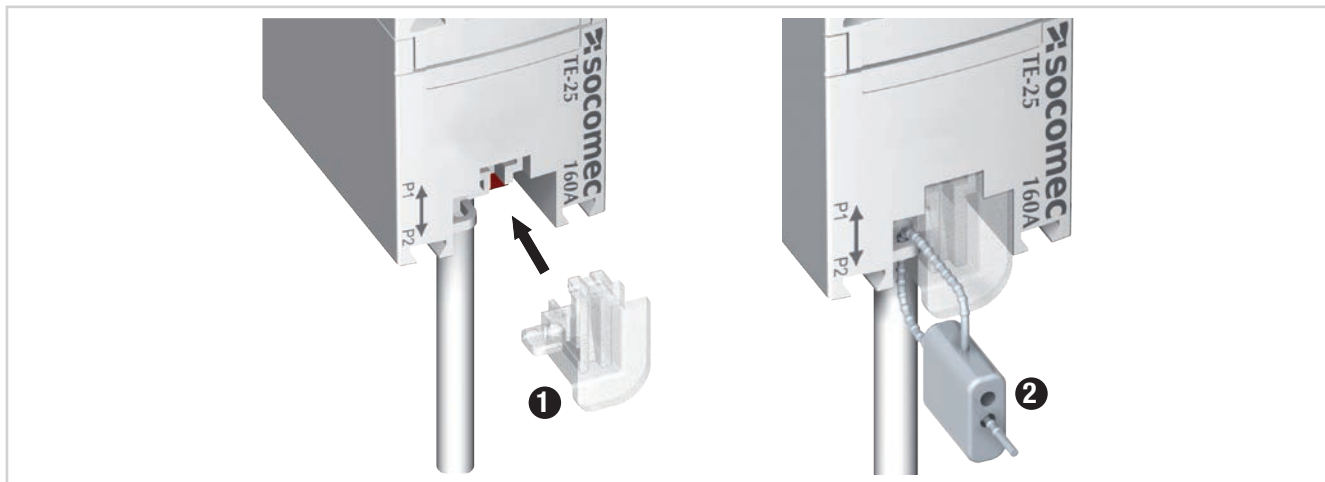


Mounting accessories for combining sensors:

		
Reference	Linear assembly	Staggered assembly
4829 0598	x30	

These accessories must be ordered separately.

5.4.7. Sealing accessories for sensors

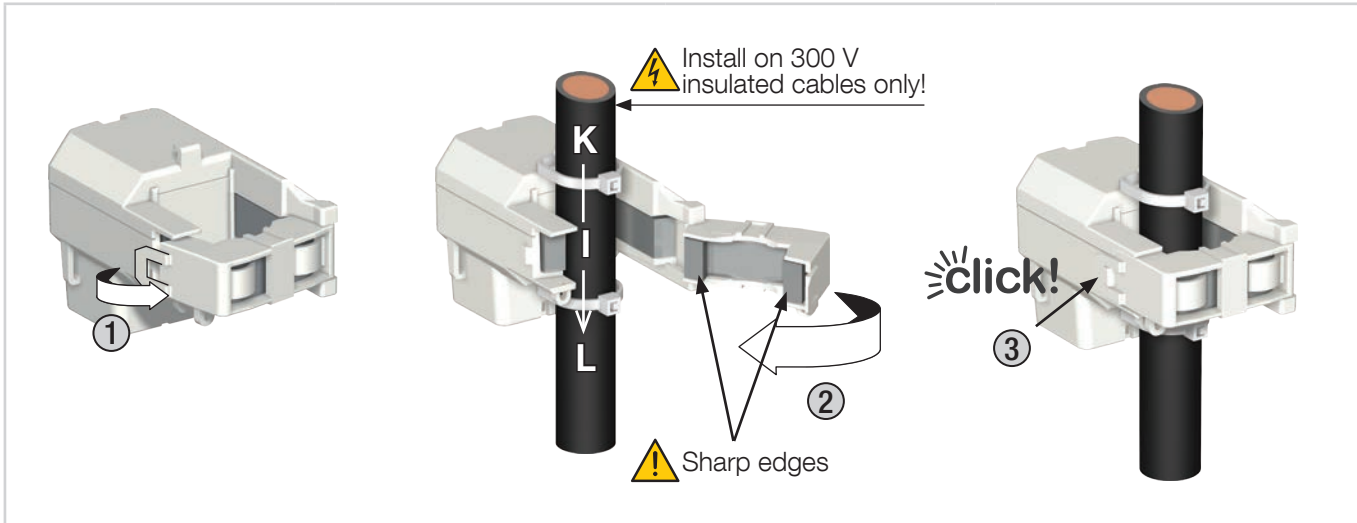


Reference	Sealing case for terminal
4829 0600	x20

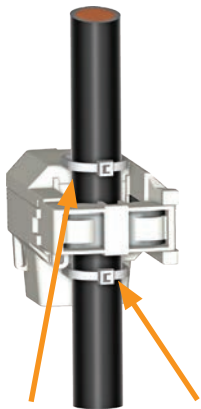
These accessories must be ordered separately.

5.5. TR/iTR split-core sensors mounting

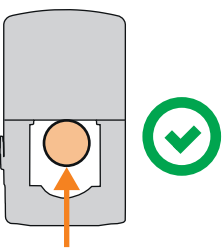
5.5.1. Cable mounting



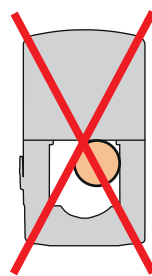
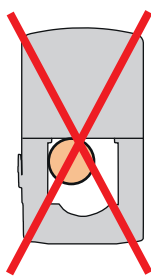
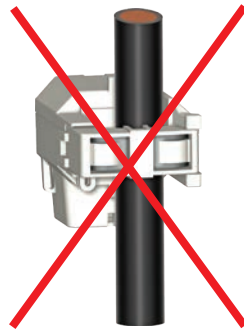
Recommended installation:



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



Not recommended



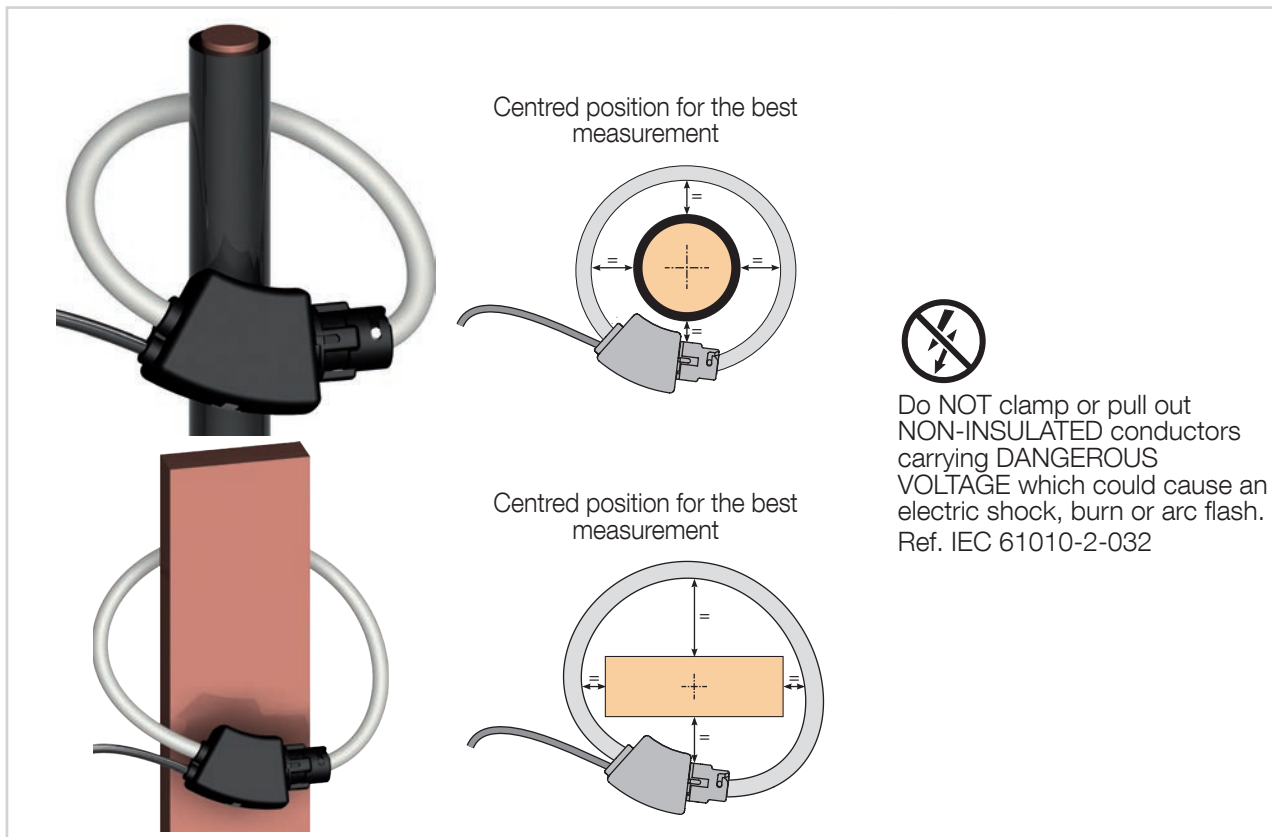
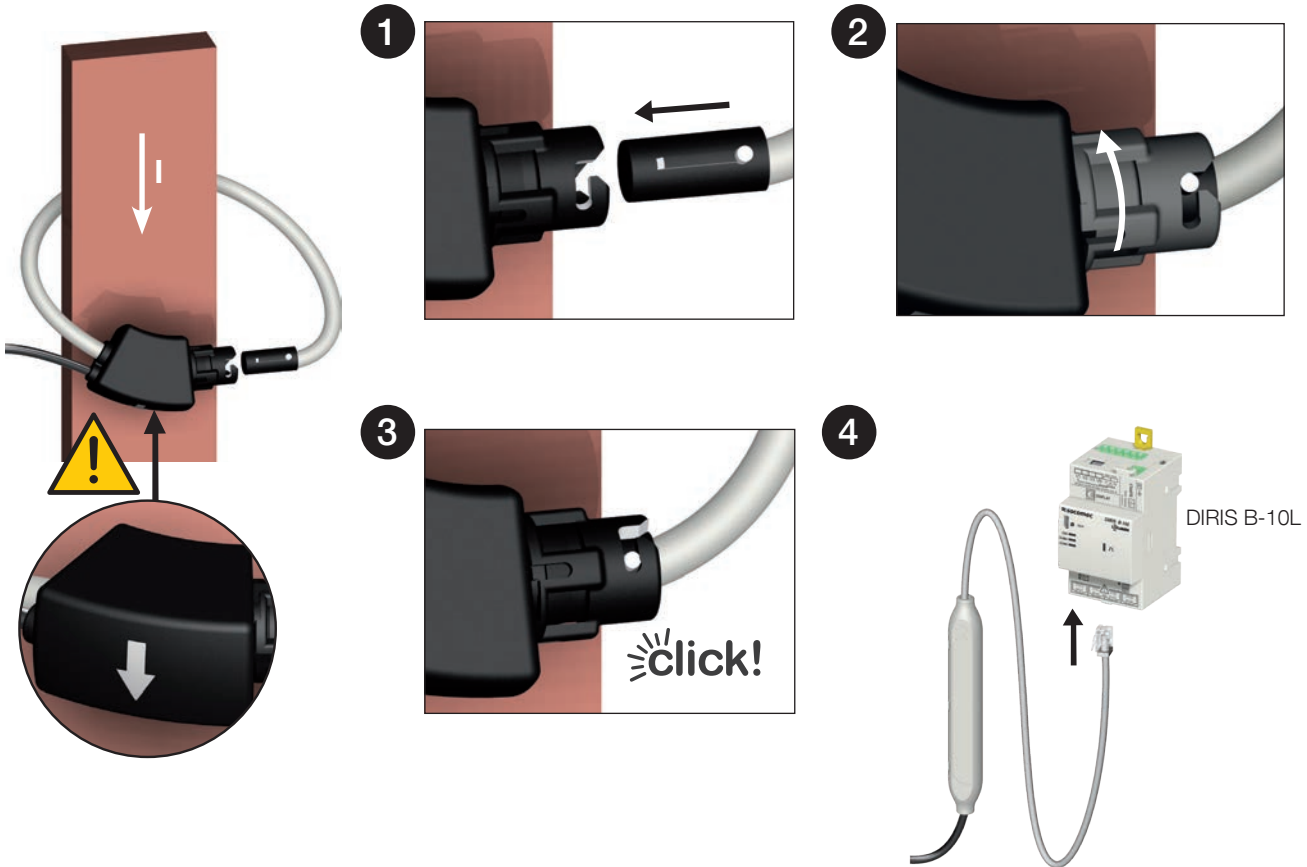
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032.



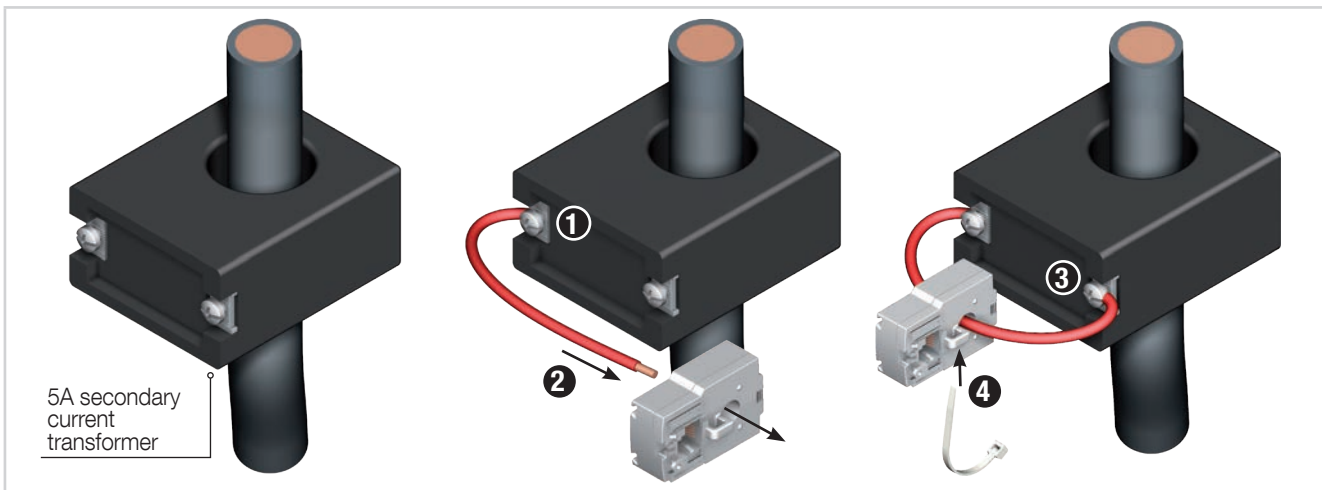
Before closing the TR /iTR sensor, check that the air gap is clean (no contamination or corrosion).

5.6. TF flexible sensors mounting

5.6.1. Cable or bus bar-mounting



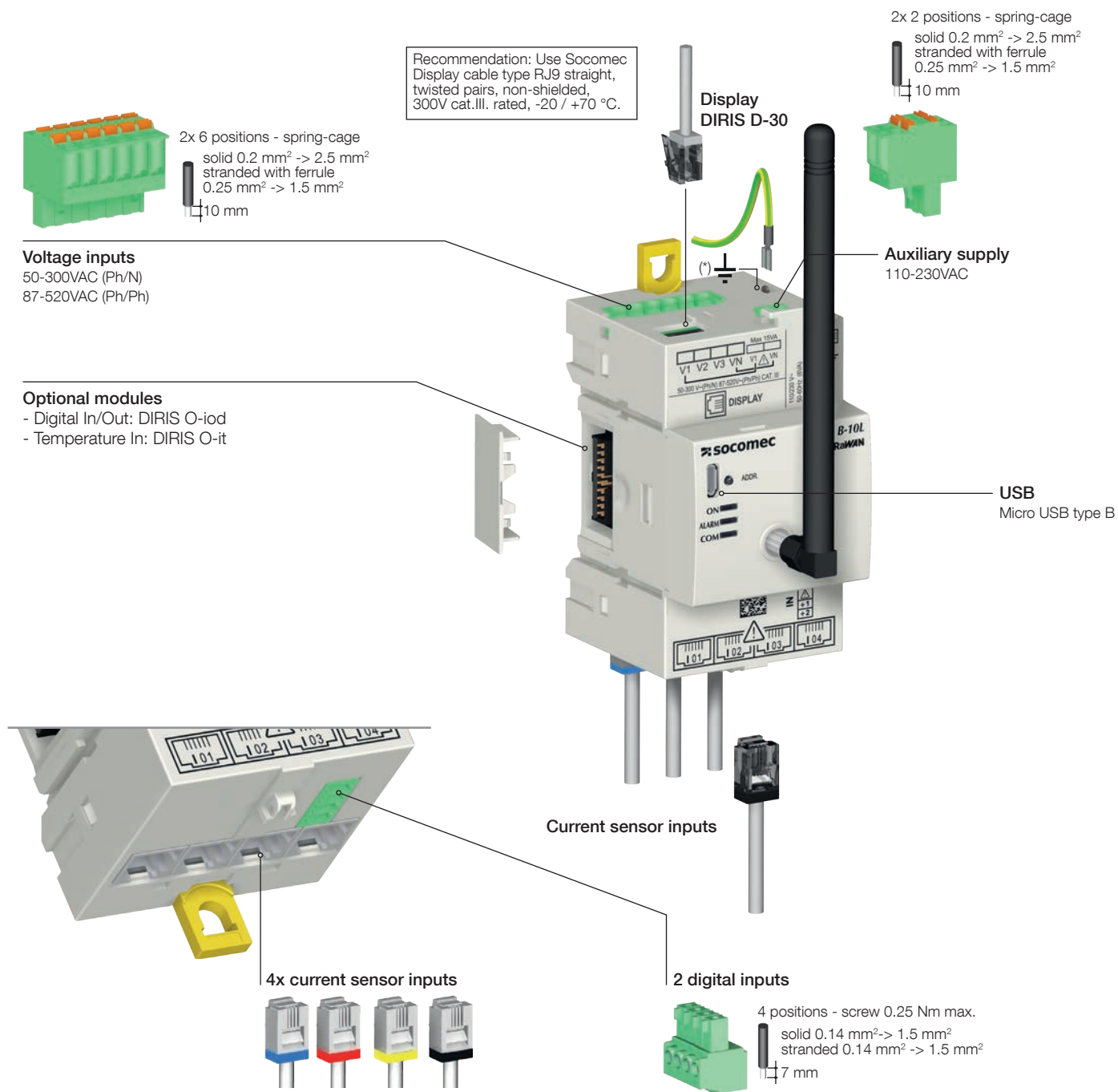
5.7. Installing the 5A adaptor



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

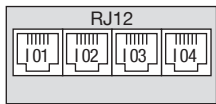
6. CONNECTION

6.1. DIRIS B-10L connection



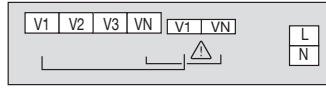
(*) Do not forget to connect earth to the DIRIS B-10L.

Current measurement



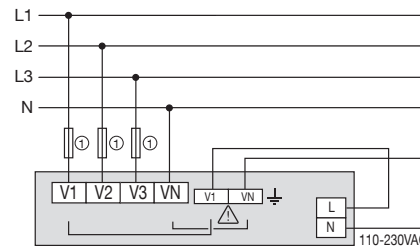
Always connect input I01 first.

Voltage and auxiliary power supply measurement



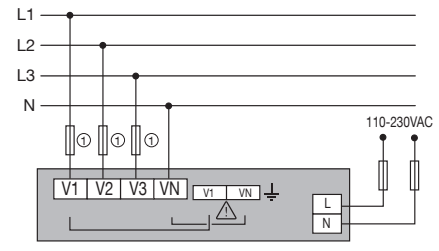
Self-powered

Easy connection of the power supply from the measurement terminal (specific terminals)



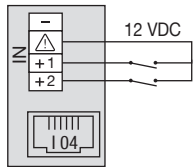
1. 0.5 A gG / 0.5 A class CC fuses.

Separated power supply

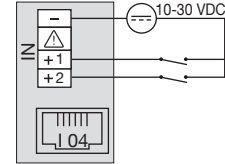


1. 0.5 A gG / 0.5 A class CC fuses.

2 inputs supplied by the device



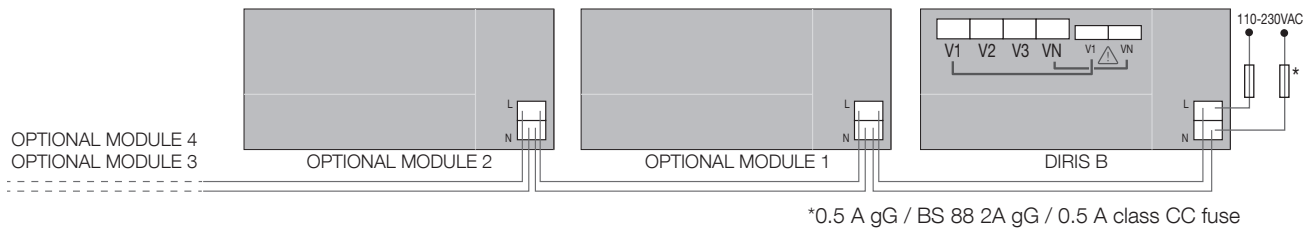
2 inputs with external power supply



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

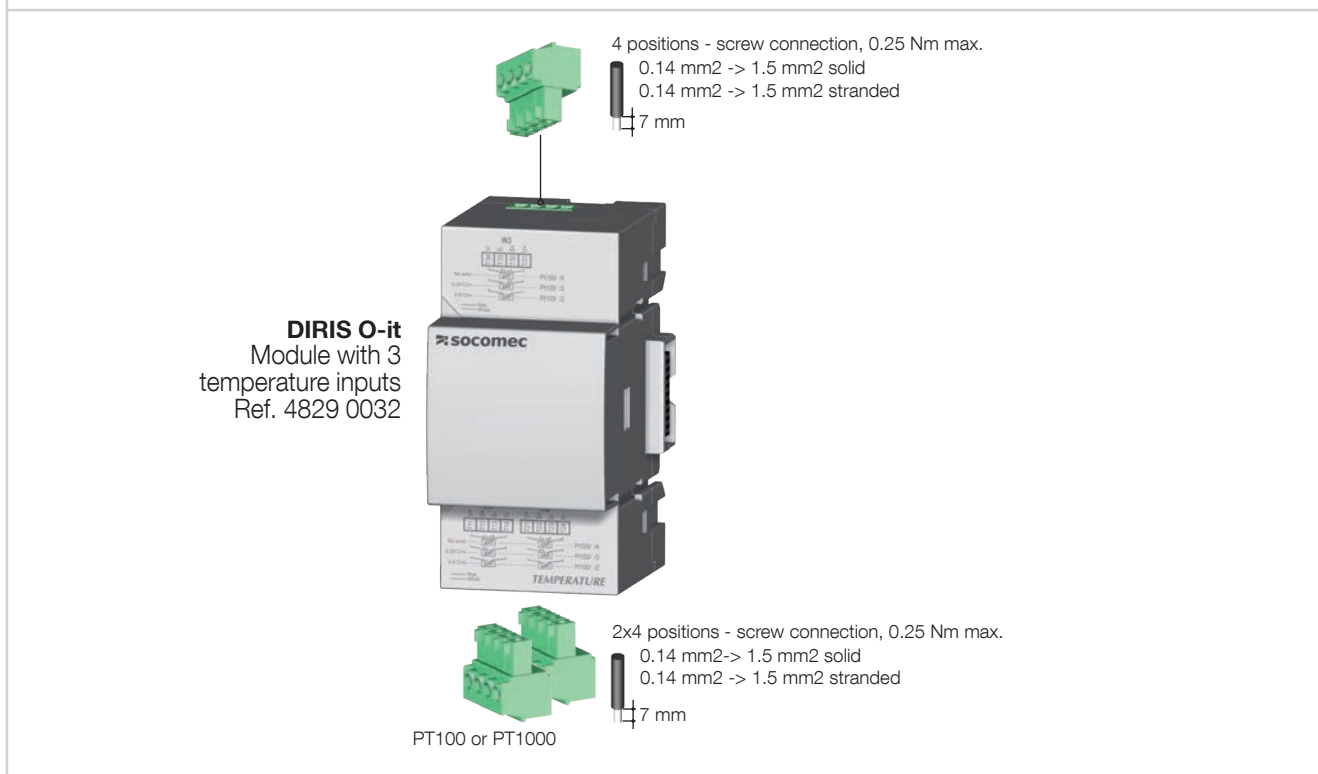
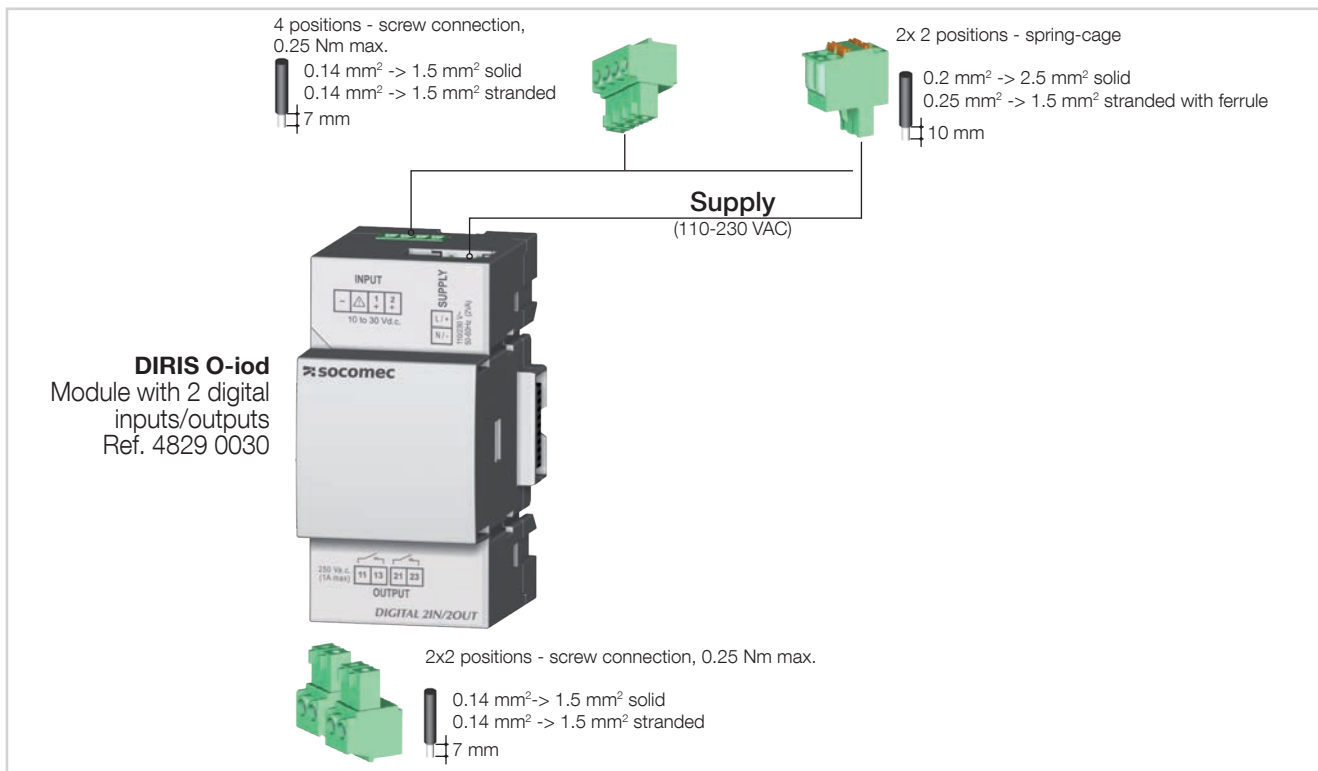


Power supply of optional modules

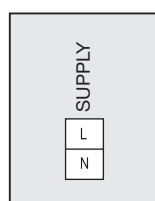


6.2. Connecting the optional modules

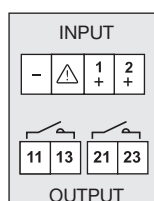
6.2.1. Input/output modules



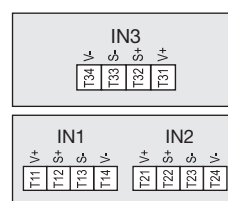
Power supply of optional modules DIRIS O-iod and O-ia



DIRIS O-iod

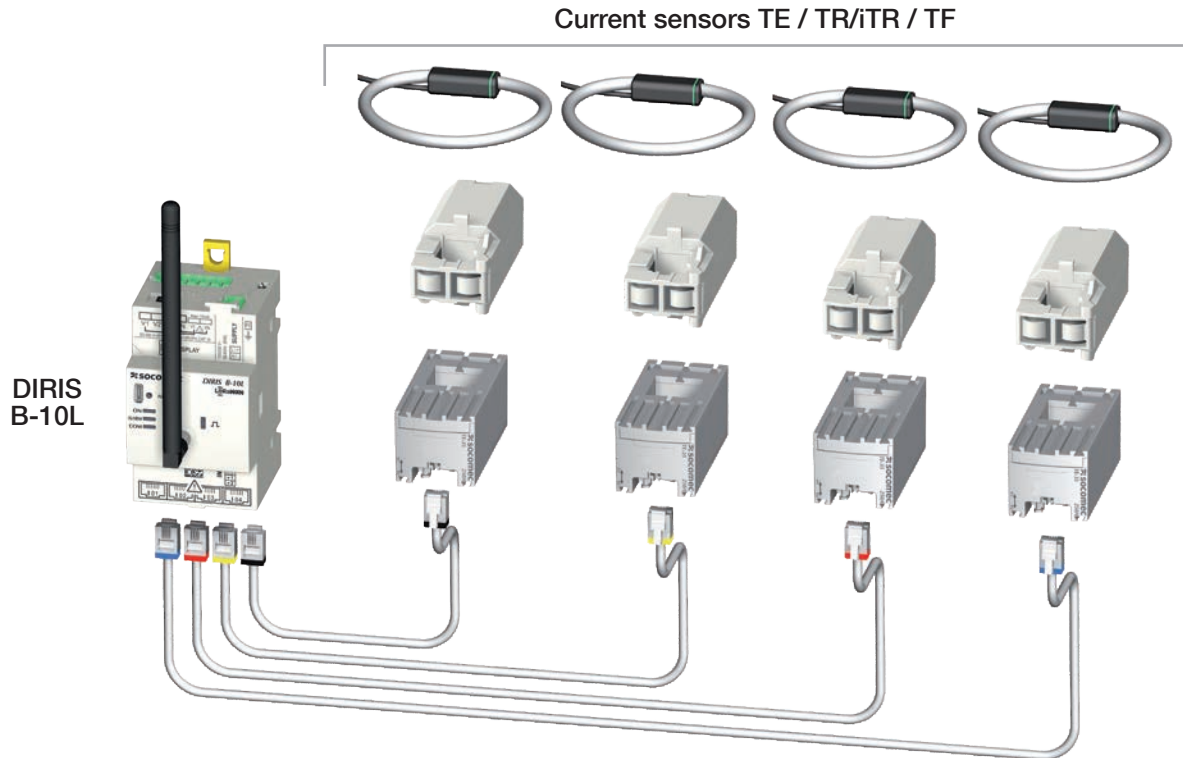


DIRIS O-it



6.3. Connecting the current sensors

6.3.1. Connection concept

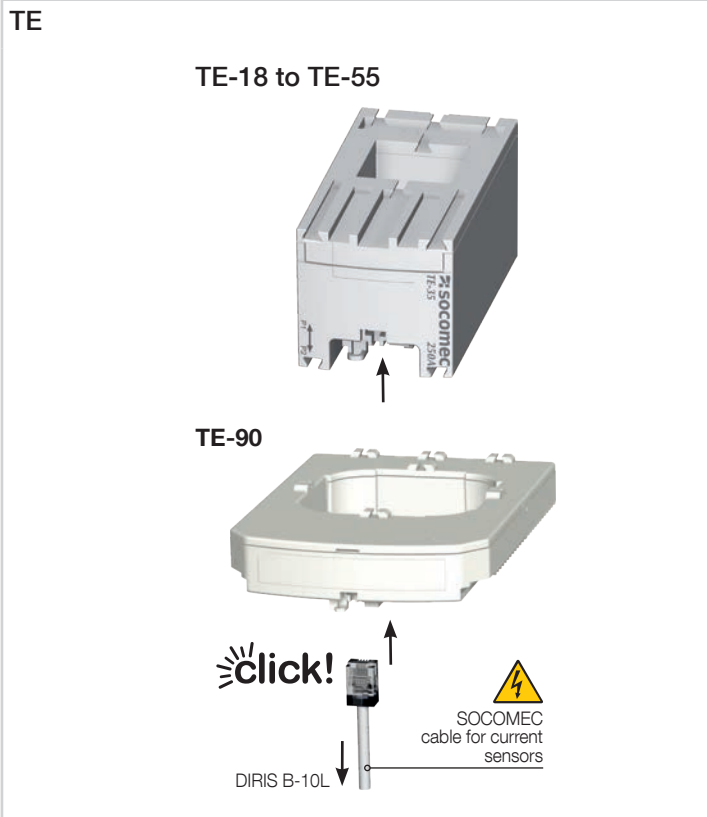


Recommendations:

For connecting the current sensors, use SOCOMEC cables only: RJ12 straight, twisted pair, unshielded, 600 V, -10°C / +70°C as per IEC 61010-1 version 3.0.

It is recommended that all the current sensors are installed in the same direction.

6.3.2. Details of the RJ12 connections for each current sensor



6.3.3. Connection to the electrical network and to the loads

The DIRIS B-10L can be used on either single-phase, two-phase or three-phase networks.

Different loads will then be measured simultaneously, allowing great flexibility in terms of where it is fitted in the installation. The loads are measured using several types of sensor (closed, split-core, flexible) selected depending on the application. The link between the DIRIS B-10L and its associated sensors is performed using cables with RJ12 connectors. These connectors enable rapid, trouble-free installation, in complete safety, with no risk of the connector being inverted, and also offers automatic detection of the connected sensors.

In addition, the DIRIS B-10L is able to 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. Several loads can be measured simultaneously. The overall accuracy of the DIRIS B-10L + sensors measurement chain is guaranteed. To guarantee this accuracy, SOCOMEC cables must be used for the current sensors.

6.3.3.1. Configurable loads based on the network type

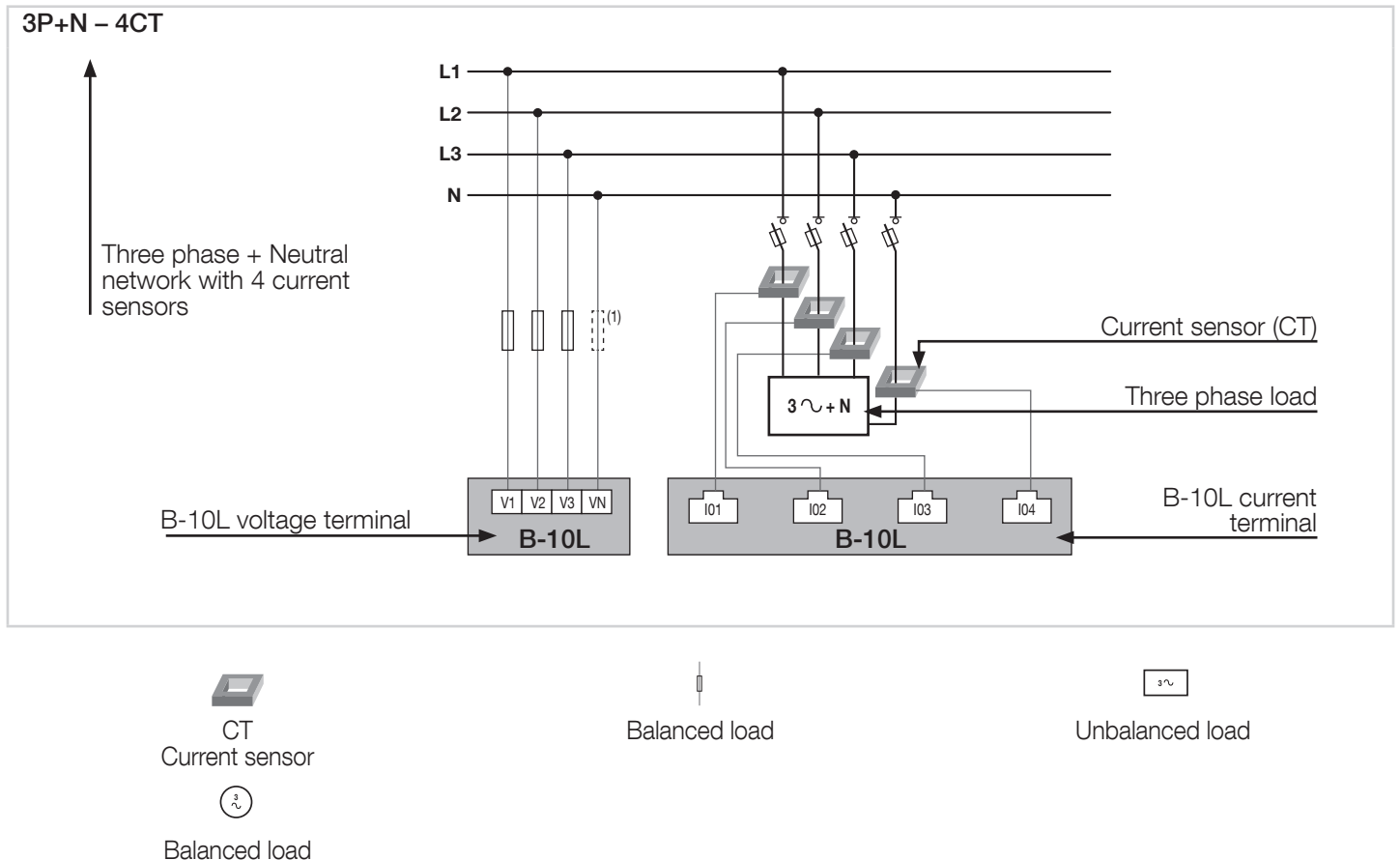
The table below summarises the loads that it is possible to configure depending on the type of network at the installation.

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.

6.3.3.2. Description of the main network and load combinations

Legend:

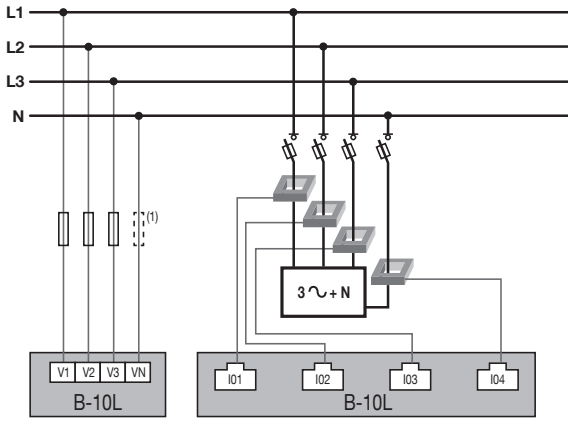


Each current input is individual; see below for some connection examples:

Three-phase + Neutral

3P+N – 4CT

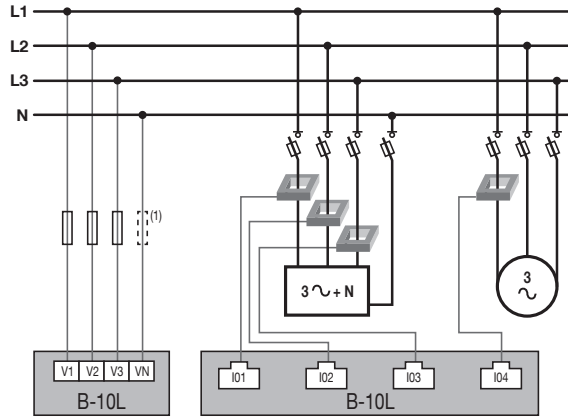
(1 three-phase load + measured Neutral)



Three-phase + Neutral

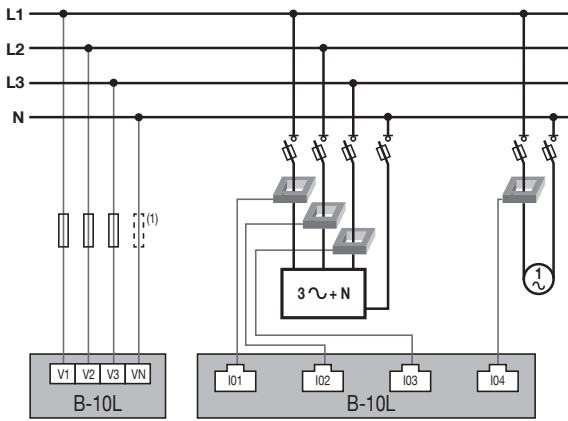
3P+N – 3CT & 3P – 1CT

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



Three-phase + Neutral

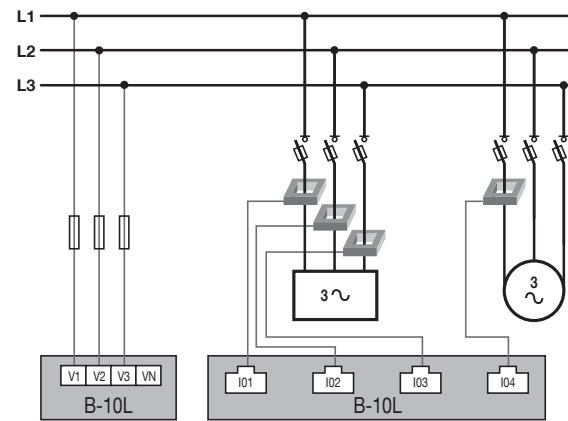
3P+N – 3CT & 1P+N – 1CT (1 three-phase load + calculated Neutral + 1 single-phase load)



Three-phase

3P – 3CT & 3P – 1CT

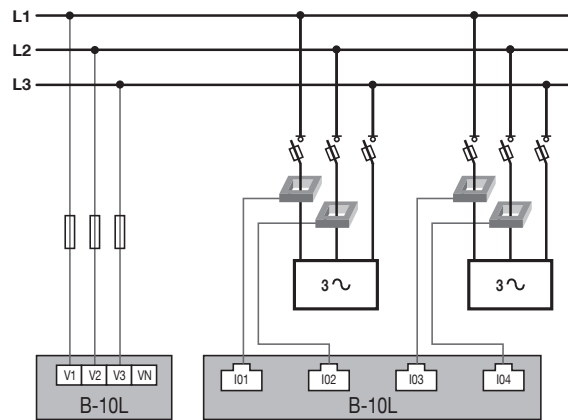
(1 unbalanced three-phase load + 1 three-phase balanced load)



Three-phase

3P – 2CT (x2)

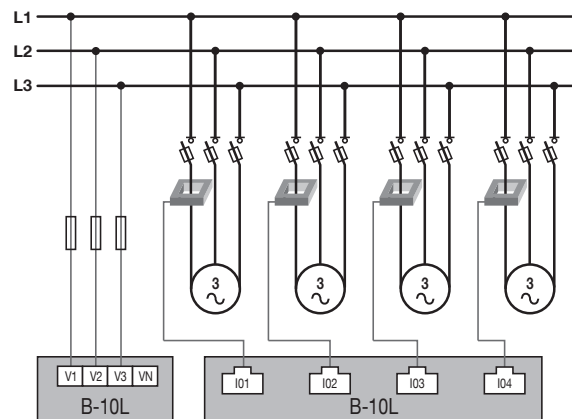
(2 three-phase loads*)



Three-phase

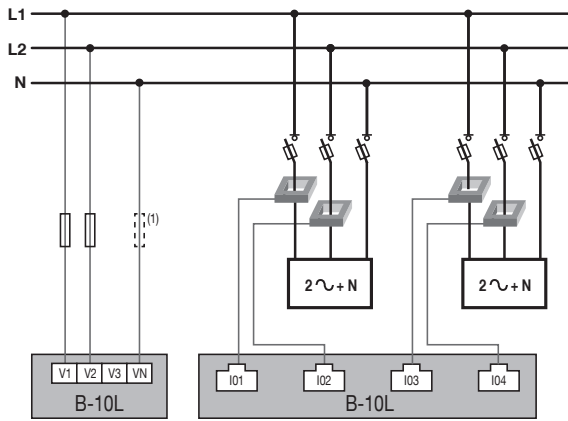
3P – 1CT (x4)

(4 three-phase balanced loads)

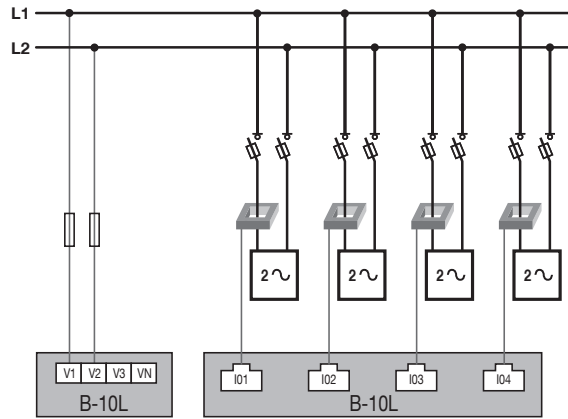


 Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

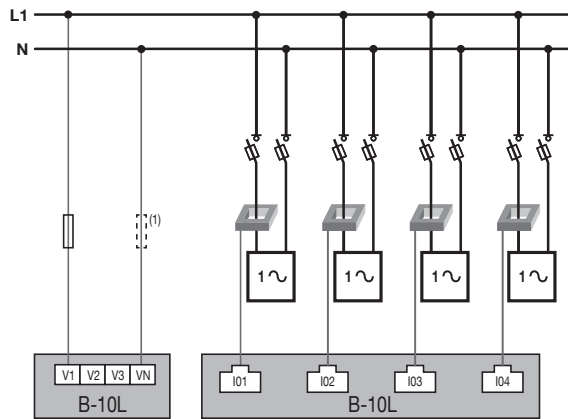
Two-phase + Neutral
2P+N – 2CT (x2)
 (2 two-phase loads)




Two-phase
2P – 1CT (x4)
 (4 two-phase loads)



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



0.5 A gG / BS 88 2A gG / 0.5 A class CC fuse
 For self-supply modules, a fuse must 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.

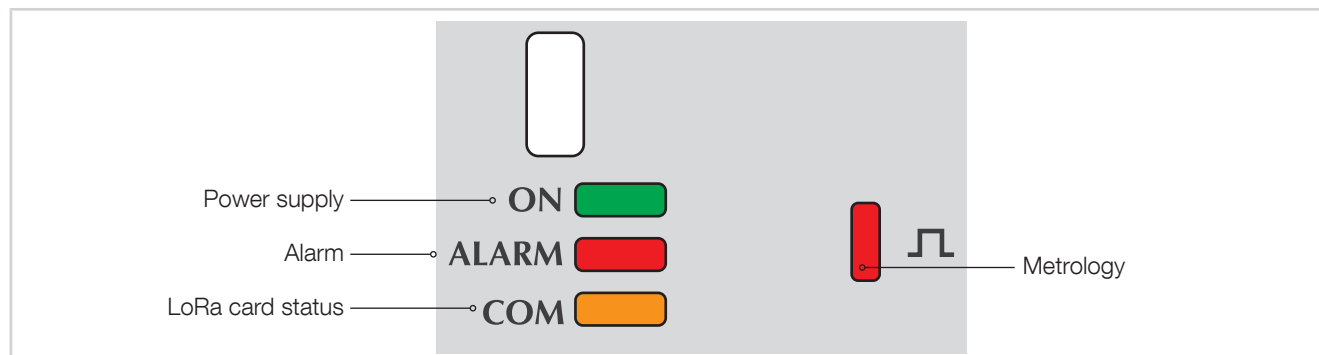
6.3.4. Connection of the functional earth


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

7. PRODUCT LEDES

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	OFF	Flashing	Stable
ON (Green)	Device is off	- 10 sec during startup - Manual blinking command	Product ON
ALARM (Red)	No active alarm	System alarm active on a device	At least one Protection Alarm and/or Logical Alarm and/or Measurement Alarm is active
COM (Orange)	LoRa card not started or not connected to LoRa network	LoRa card is pairing	LoRa card is connected and operational
 (Red)	No energy flowing	Energy is flowing (corresponds to the metrological pulse weight)	-

8. LoRaWAN COMMUNICATION

8.1. General information

LoRaWAN is a wireless communication protocol allowing to collect measurement data from remote DIRIS B-10L power monitoring devices.

The DIRIS B-10L can communicate via a private LoRaWAN network or via an operated network.

8.2. LoRa Key Recovery

- Go to www.socomec.com/activate-lora-product/ or flash the following QR code
- Fill in the form
- Retrieve your LoRa Keys



8.3. LoRa payloads for DIRIS B-10L measurements

The measurements from the DIRIS B-10L are organized under 7 LoRa profiles.

Profile 1 (default profile): Single-load – Energies (consumption/production)

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 1 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date/Time	2	s	U32	Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ea+	4	10 ⁻¹ Wh	U64	
Ea-	4	10 ⁻¹ Wh	U64	
Er+	4	10 ⁻¹ Varh	U64	
Er-	4	10 ⁻¹ Varh	U64	
Pulse Meter	4	NA	U64	Native Input 1
Digital Inputs and VirtualMonitor (iTR)	1	-	4 bits field	Bit field <ul style="list-style-type: none"> • Bit 0: Digital Input 1 (Native) • Bit 1: Digital Input 2 (Native) • Bit 2: Digital Input 1 (optional module 1) • Bit 3: Digital Input 2 (optional module 1) • Bit 4: Digital Input 1 (optional module 2) • Bit 5: Digital Input 2 (optional module 2) • Bit 6: Digital Input 1 (optional module 3) • Bit 7: Digital Input 2 (optional module 3) • Bit 8: Digital Input 1 (optional module 4) • Bit 9: Digital Input 2 (optional module 4) • Bit 10: Voltage Detection iTR1 • Bit 11: Voltage Detection iTR2 • Bit 12: Voltage Detection iTR3 • Bit 13: Voltage Detection iTR4
Status change counter	1	-		Half byte field: <ul style="list-style-type: none"> • 4 bits: status change counter - Native Input 1 • 4 bits: status change counter - Native Input 2 • 4 bits: status change counter - Digital Input 1 (optional module 1) • 4 bits: status change counter - Digital Input 2 (optional module 1)
TOTAL	25 (50 bytes)			

Profile 2: Multi-load – Energies (consumption)

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 2 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date/Time	2	s	U32	<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ea+ Load 1	2	kWh	U32	
Er+ Load 1	2	kVarh	U32	
Ea+ Load 2	2	kWh	U32	
Er+ Load 2	2	kVarh	U32	
Ea+ Load 3	2	kVarh	U32	
Er+ Load 3	2	kVarh	U32	
Ea+ Load 4	2	kVarh	U32	
Er+ Load 4	2	kVarh	U32	
Pulse Meter	4	NA	U64	Native Input 1
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> Bit 0: Digital Input 1 (Native) Bit 1: Digital Input 2 (Native) Bit 2: Digital Input 1 (optional module 1) Bit 3: Digital Input 2 (optional module 1) Bit 4: Digital Input 1 (optional module 2) Bit 5: Digital Input 2 (optional module 2) Bit 6: Digital Input 1 (optional module 3) Bit 7: Digital Input 2 (optional module 3) Bit 8: Digital Input 1 (optional module 4) Bit 9: Digital Input 2 (optional module 4) Bit 10: Voltage Detection iTR1 Bit 11: Voltage Detection iTR2 Bit 12: Voltage Detection iTR3 Bit 13: Voltage Detection iTR4
Status change counter	1	-	4 bits field	Half byte field: <ul style="list-style-type: none"> 4 bits: status change counter - Native Input 1 4 bits: status change counter - Native Input 2 4 bits: status change counter - Digital Input 1 (optional module 1) 4 bits: status change counter - Digital Input 2 (optional module 1)
TOTAL	25 (50 bytes)			

Profile 3: Multi-load – Energies (consumption/production)

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 3 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date/Time	2	s	U32	<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ea+ Load 1	2	kWh	U32	
Ea- Load 1	2	kWh	U32	
Ea+ Load 2	2	kWh	U32	
Ea- Load 2	2	kWh	U32	
Ea+ Load 3	2	kWh	U32	
Ea- Load 3	2	kWh	U32	
Ea+ Load 4	2	kWh	U32	
Ea- Load 4	2	kWh	U32	
Pulse Meter	4	NA	U64	Native Input 1
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> Bit 0: Digital Input 1 (Native) Bit 1: Digital Input 2 (Native) Bit 2: Digital Input 1 (optional module 1) Bit 3: Digital Input 2 (optional module 1) Bit 4: Digital Input 1 (optional module 2) Bit 5: Digital Input 2 (optional module 2) Bit 6: Digital Input 1 (optional module 3) Bit 7: Digital Input 2 (optional module 3) Bit 8: Digital Input 1 (optional module 4) Bit 9: Digital Input 2 (optional module 4) Bit 10: Voltage Detection iTR1 Bit 11: Voltage Detection iTR2 Bit 12: Voltage Detection iTR3 Bit 13: Voltage Detection iTR4
Status change counter	1	-	4 bits field	Half byte field: <ul style="list-style-type: none"> 4 bits: status change counter - Native Input 1 4 bits: status change counter - Native Input 2 4 bits: status change counter - Digital Input 1 (optional module 1) 4 bits: status change counter - Digital Input 2 (optional module 1)
TOTAL	25 (50 bytes)			

Profile 4: Single-load – Monitoring

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 4 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date/Time	2	s	U32	<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot average (+)	2	W	S32	Signed
Qtot average (+)	2	Var	S32	Signed
Stot average	2	VA	U32	Unsigned
PFtot average	1	-	S16	Signed
PFtot Type	1	-	U8	Power Factor Type : 0 : undefined 1 : leading 2 : lagging
I1 average	2	mA	U32	Unsigned
I2 average	2	mA	U32	Unsigned
I3 average	2	mA	U32	Unsigned
F average	2	mHz	U32	Unsigned
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> Bit 0: Digital Input 1 (Native) Bit 1: Digital Input 2 (Native) Bit 2: Digital Input 1 (optional module 1) Bit 3: Digital Input 2 (optional module 1) Bit 4: Digital Input 1 (optional module 2) Bit 5: Digital Input 2 (optional module 2) Bit 6: Digital Input 1 (optional module 3) Bit 7: Digital Input 2 (optional module 3) Bit 8: Digital Input 1 (optional module 4) Bit 9: Digital Input 2 (optional module 4) Bit 10: Voltage Detection iTR1 Bit 11: Voltage Detection iTR2 Bit 12: Voltage Detection iTR3 Bit 13: Voltage Detection iTR4
Temperature Input 1 (optional module)	1	0.01 degC (symbole degres)	S16	Signed
Temperature Input 2 (optional module)	1	0.01 degC (symbole degres)	S16	Signed
Temperature Input 3 (optional module)	1	0.01 degC (symbole degres)	S16	Signed
Status change counter	2	-	4 bits field	Half byte field: <ul style="list-style-type: none"> 4 bits: status change counter - Native Input 1 4 bits: status change counter - Native Input 2 4 bits: status change counter - Digital Input 1 (optional module 1) 4 bits: status change counter - Digital Input 2 (optional module 1) 4 bits: status change counter - VirtualMonitor iTR 1 4 bits: status change counter - VirtualMonitor iTR 2 4 bits: status change counter - VirtualMonitor iTR 3 4 bits: status change counter - VirtualMonitor iTR 4
TOTAL	25 (50 bytes)			

Profile 5: Multi-load – Monitoring

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 5 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date/Time of the average value	2	s	U32	<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot average – Load 1	2	W	S32	Signed
Qtot average – Load 1	2	Var	S32	Signed
Ptot average – Load 2	2	W	S32	Signed
Qtot average – Load 2	2	Var	S32	Signed
Ptot average – Load 3	2	W	S32	Signed
Qtot average – Load 3	2	Var	S32	Signed
Ptot average – Load 4	2	W	S32	Signed
Qtot average – Load 4	2	Var	S32	Signed
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> Bit 0: Digital Input 1 (Native) Bit 1: Digital Input 2 (Native) Bit 2: Digital Input 1 (optional module 1) Bit 3: Digital Input 2 (optional module 1) Bit 4: Digital Input 1 (optional module 2) Bit 5: Digital Input 2 (optional module 2) Bit 6: Digital Input 1 (optional module 3) Bit 7: Digital Input 2 (optional module 3) Bit 8: Digital Input 1 (optional module 4) Bit 9: Digital Input 2 (optional module 4) Bit 10: Voltage Detection iTR1 Bit 11: Voltage Detection iTR2 Bit 12: Voltage Detection iTR3 Bit 13: Voltage Detection iTR4
Status change counter	1	-	4 bits field	Half byte field: <ul style="list-style-type: none"> 4 bits: status change counter - Native Input 1 4 bits: status change counter - Native Input 2 4 bits: status change counter - Digital Input 1 (optional module 1) 4 bits: status change counter - Digital Input 2 (optional module 1) 4 bits: status change counter - VirtualMonitor iTR 1 4 bits: status change counter - VirtualMonitor iTR 2 4 bits: status change counter - VirtualMonitor iTR 3 4 bits: status change counter - VirtualMonitor iTR 4
TOTAL	25 (50 bytes)			

Profile 6: Single-load – Load curves

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 6 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date and Time of the last point	2	s	U32	<ul style="list-style-type: none"> • Number of seconds elapsed since 01/01/2000 00:00. • Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot (+) – last point	2	W	U32	Unsigned
Ptot (-) – last point	2	W	U32	Unsigned
Qtot (+) – last point	2	Var	U32	Unsigned
Qtot (-) – last point	2	Var	U32	Unsigned
Flag – last point	1	-	U16	<ul style="list-style-type: none"> • 0: Complete period and date configured • 1: Incomplete period and date configured • 2: Complete period and date not configured • 3: Incomplete period and date not configured
Date and Time of the point before last	2	s		<ul style="list-style-type: none"> • Number of seconds elapsed since 01/01/2000 00:00. • Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot (+) – point before last	2	W	U32	Unsigned
Ptot (-) – point before last	2	W	U32	Unsigned
Qtot (+) – point before last	2	W	U32	Unsigned
Qtot (-) – point before last	2	W	U32	Unsigned
Flag – point before last			U16	<ul style="list-style-type: none"> • 0: Complete period and date configured • 1: Incomplete period and date configured • 2: Complete period and date not configured • 3: Incomplete period and date not configured
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> • Bit 0: Digital Input 1 (Native) • Bit 1: Digital Input 2 (Native) • Bit 2: Digital Input 1 (optional module 1) • Bit 3: Digital Input 2 (optional module 1) • Bit 4: Digital Input 1 (optional module 2) • Bit 5: Digital Input 2 (optional module 2) • Bit 6: Digital Input 1 (optional module 3) • Bit 7: Digital Input 2 (optional module 3) • Bit 8: Digital Input 1 (optional module 4) • Bit 9: Digital Input 2 (optional module 4) • Bit 10: Voltage Detection iTR1 • Bit 11: Voltage Detection iTR2 • Bit 12: Voltage Detection iTR3 • Bit 13: Voltage Detection iTR4
Status change counter	1	-	4 bits field	Half byte field: <ul style="list-style-type: none"> • 4 bits: status change counter - Native Input 1 • 4 bits: status change counter - Native Input 2 • 4 bits: status change counter - Digital Input 1 (optional module 1) • 4 bits: status change counter - Digital Input 2 (optional module 1) • 4 bits: status change counter - VirtualMonitor iTR 1 • 4 bits: status change counter - VirtualMonitor iTR 2 • 4 bits: status change counter - VirtualMonitor iTR 3 • 4 bits: status change counter - VirtualMonitor iTR 4
TOTAL	25 (50 bytes)			

Profile 7: Multi-load - Load curves

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	Always 7 for this profile
Profile version	0.25	-	U8	Always 1 for this profile
Date and Time of the last point	2	s	U32	<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot (+) – Load 1 (last point)	2	W	U32	Unsigned
Ptot (+) – Load 2 (last point)	2	W	U32	Unsigned
Ptot (+) – Load 3 (last point)	2	W	U32	Unsigned
Ptot (+) – Load 4 (last point)	2	W	U32	Unsigned
Flag – last point	1	-	U16	<ul style="list-style-type: none"> 0: Complete period and date configured 1: Incomplete period and date configured 2: Complete period and date not configured 3: Incomplete period and date not configured
Date and Time of the point before last	2	s		<ul style="list-style-type: none"> Number of seconds elapsed since 01/01/2000 00:00. Remains at 0 as long as the date and time has not been written via the LoRa network.
Ptot (+) – Load 1 (point before last)	2	W	U32	Unsigned
Ptot (+) – Load 2 (point before last)	2	W	U32	Unsigned
Ptot (+) – Load 3 (point before last)	2	W	U32	Unsigned
Ptot (+) – Load 4 (point before last)	2	W	U32	Unsigned
Flag – point before last	1	-	U16	<ul style="list-style-type: none"> 0: Complete period and date configured 1: Incomplete period and date configured 2: Complete period and date not configured 3: Incomplete period and date not configured
Digital Inputs and VirtualMonitor (iTR)	1	-	BitField	Bit field <ul style="list-style-type: none"> Bit 0: Digital Input 1 (Native) Bit 1: Digital Input 2 (Native) Bit 2: Digital Input 1 (optional module 1) Bit 3: Digital Input 2 (optional module 1) Bit 4: Digital Input 1 (optional module 2) Bit 5: Digital Input 2 (optional module 2) Bit 6: Digital Input 1 (optional module 3) Bit 7: Digital Input 2 (optional module 3) Bit 8: Digital Input 1 (optional module 4) Bit 9: Digital Input 2 (optional module 4) Bit 10: Voltage Detection iTR1 Bit 11: Voltage Detection iTR2 Bit 12: Voltage Detection iTR3 Bit 13: Voltage Detection iTR4
Status change counter	1	-	4 bits field	Half byte field: <ul style="list-style-type: none"> 4 bits: status change counter - Native Input 1 4 bits: status change counter - Native Input 2 4 bits: status change counter - Digital Input 1 (optional module 1) 4 bits: status change counter - Digital Input 2 (optional module 1)
TOTAL	25 (50 bytes)			

8.4. Alarms

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 11 for this profile
Date/Time	2	s	U32	<ul style="list-style-type: none"> • Number of seconds elapsed since 01/01/2000 00:00. • Remains at 0 as long as the date and time has not been written via the LoRa network.
Logical and combination alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> • Bit 0: Logical#1 • Bit 1: Logical#2 • Bit 2: Logical#3 • Bit 3: Logical#4 • Bit 4: Combi#1 • Bit 5: Combi#2 • Bit 6: Combi#3 • Bit 7: Combi#4
Analogical alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> • Bit 0: Analogical#1 • Bit 1: Analogical#2 • Bit 2: Analogical#3 • Bit 3: Analogical#4 • Bit 4: Analogical#5 • Bit 5: Analogical#6 • Bit 6: Analogical#7 • Bit 7: Analogical#8
System alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> • Bit 0: System#1(Net rotation) • Bit 1: System#2(V/I association) • Bit 2: System#3(CT disconnected) • Bit 3: System#4(Bad CT primary)
Protection alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> • Bit 0: Protection#1 • Bit 1: Protection #2 • Bit 2: Protection #3 • Bit 3: Protection #4 • Bit 4: Protection#5 • Bit 5: Protection#6
TOTAL	4.5 (9 bytes)			

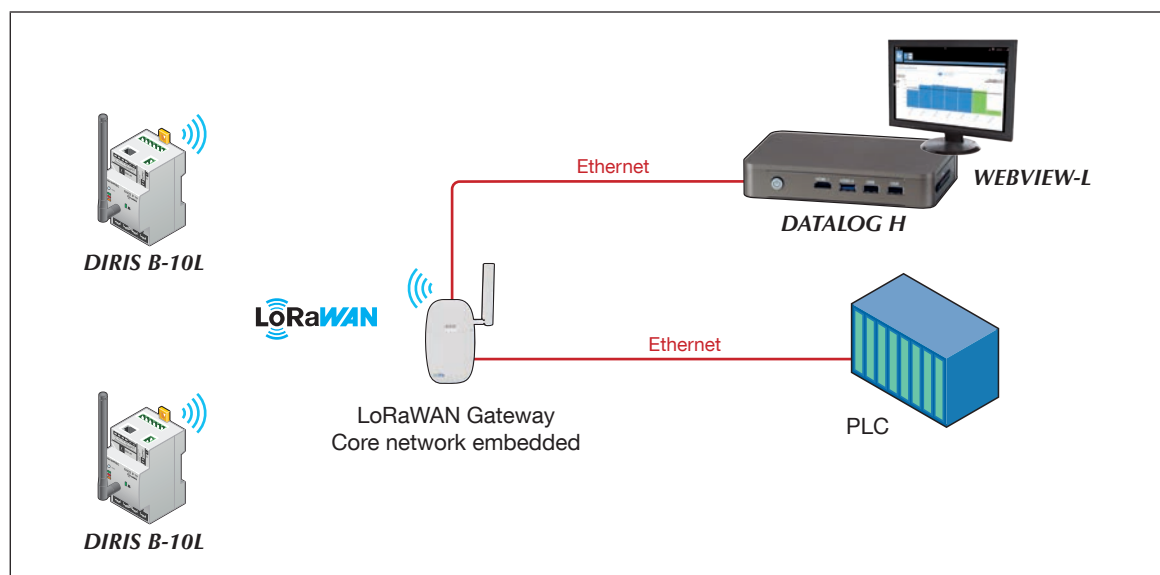
8.5. Custom Profile

The Custom Profile needs to be configured using the Easy Config System software in Parameters → Communication → Profile.

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 2 for this profile
Profile number	0.25	-	U8	• Always 0 for this profile
Profile version	0.25	-	U8	• Always 1 for this profile
Concatenation of read Modbus registers	24	-	Byte field	• 1-48 bytes
TOTAL	25 (50 bytes)			

8.6. LoRaWAN to Ethernet Modbus TCP gateway

A LoRaWAN gateway allows you to format LoRaWAN measurement data and to communicate via Modbus TCP on an Ethernet output.



Modbus registers

The LoRaWAN gateway re-creates a Modbus table containing the different measurements from the DIRIS B-10L. Modbus reading is in BigEndian format.

General information

Dec address	Hex address	Words count	description	Data Type
1	1	4	DevEUI	U64
5	5	1	Device reference ID	U16
6	6	2	Last uplink	U32
14	E	1	SF (Spreading Factor)	U16
15	F	1	RSSI	S16
16	10	1	SNR	S16
20	14	1	Profile number	U16

Energy meters – Load 1

- Profile 1 (Single-load – Energies)
- Profile 2 (Multi-load – Energies)
- Profile 3 (Multi-load – Energies production)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profile
4096	0x1000	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	1/2/3
4097	0x1001	2	Date of last instance	s	DATETIME	READ	1/2/3
4099	0x1003	4	Ea+	Wh 10 ⁻¹	U64	READ	1/2/3
4103	0x1007	4	Ea-	Wh 10 ⁻¹	U64	READ	1/3
4107	0x100B	4	Er+	varh 10 ⁻¹	U64	READ	1/2
4111	0x100F	4	Er-	varh 10 ⁻¹	U64	READ	1
4115	0x1013	4	Reserved	-	-	-	-

Energy meters – Load 2

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 2 (Multi-load – Energies consumption)
- Profile 3 (Multi-load – Energies production)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profile
4160	0x1040	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	2/3
4161	0x1041	2	Date of last instance	s	DATETIME	READ	2/3
4163	0x1043	4	Ea+	Wh 10 ⁻¹	U64	READ	2/3
4167	0x1047	4	Ea-	Wh 10 ⁻¹	U64	READ	3
4171	0x104B	4	Er+	varh 10 ⁻¹	U64	READ	2
4175	0x104F	4	Er-	varh 10 ⁻¹	U64	READ	-
4179	0x1053	4	Reserved	-	-	-	-

Energy meters – Load 3

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 2 (Multi-load – Energies consumption)
- Profile 3 (Multi-load – Energies production)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profile
4224	0x1080	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	2/3
4225	0x1081	2	Date of last instance	s	DATETIME	READ	2/3
4227	0x1083	4	Ea+	Wh 10 ⁻¹	U64	READ	2/3
4231	0x1087	4	Ea-	Wh 10 ⁻¹	U64	READ	3
4235	0x108B	4	Er+	varh 10 ⁻¹	U64	READ	2
4239	0x108F	4	Er-	varh 10 ⁻¹	U64	READ	-
4243	0x1093	4	Reserved	-	-	-	-

Energy meters – Load 4

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 2 (Multi-load – Energies consumption)
- Profile 3 (Multi-load – Energies production)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profile
4288	0x10C0	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	2/3
4289	0x10C1	2	Date of last instance	s	DATETIME	READ	2/3
4291	0x10C3	4	Ea+	Wh 10 ⁻¹	U64	READ	2/3
4295	0x10C7	4	Ea-	Wh 10 ⁻¹	U64	READ	3
4299	0x10CB	4	Er+	varh 10 ⁻¹	U64	READ	2
4303	0x10CF	4	Er-	varh 10 ⁻¹	U64	READ	-
4307	0x10D3	4	Reserved	-	-	-	-

Average measurements – Load 1

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 4 (Single-load Monitoring)
- Profile 5 (Multi-load Monitoring)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
8192	0x2000	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	4/5
8193	0x2001	2	Date of last instance	s	DATETIME	READ	4/5
8195	0x2003	2	Average Total Active Power	W	S32	READ	4/5
8197	0x2005	2	Average Total Reactive Power	var	S32	READ	4/5
8199	0x2007	2	Average Total Apparent Power	VA	S32	READ	4
8201	0x2009	1	Average Total Power Factor	-	S16	READ	4
8202	0x200A	1	Average Power Factor Type 0 : N/A 1 : Lagging 2 : Leading	-	U16	READ	4
8203	0x200B	2	Average Current phase 1	mA	S32	READ	4
8205	0x200D	2	Average Current phase 2	mA	S32	READ	4
8207	0x200F	2	Average Current phase 3	mA	S32	READ	4
8209	0x2011	2	Average Frequency	mHz	S32	READ	4

Average measurements – Load 2

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 5 (Multi-load Monitoring)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
8256	0x2040	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	4/5
8257	0x2041	2	Date of last instance	s	DATETIME	READ	4/5
8259	0x2043	2	Average Total Active Power	W	S32	READ	4/5
8261	0x2045	2	Average Total Reactive Power	var	S32	READ	4/5
8263	0x2047	2	Average Total Apparent Power	VA	S32	READ	4
8265	0x2049	1	Average Total Power Factor	-	S16	READ	4
8266	0x204A	1	Average Power Factor Type 0 : N/A 1 : Lagging 2 : Leading	-	U16	READ	4
8267	0x204B	2	Average Current phase 1	mA	S32	READ	4
8269	0x204D	2	Average Current phase 2	mA	S32	READ	4
8271	0x204F	2	Average Current phase 3	mA	S32	READ	4
8273	0x2051	2	Average Frequency	mHz	S32	READ	4

Average measurements – Load 3

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 5 (Multi-load Monitoring)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
8320	0x2080	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	4/5
8321	0x2081	2	Date of last instance	s	DATETIME	READ	4/5
8323	0x2083	2	Average Total Active Power	W	S32	READ	4/5
8325	0x2085	2	Average Total Reactive Power	var	S32	READ	4/5
8327	0x2087	2	Average Total Apparent Power	VA	S32	READ	4
8329	0x2089	1	Average Total Power Factor	-	S16	READ	4
8330	0x208A	1	Average Power Factor Type 0 : N/A 1 : Lagging 2 : Leading	-	U16	READ	4
8331	0x208B	2	Average Current phase 1	mA	S32	READ	4
8333	0x208D	2	Average Current phase 2	mA	S32	READ	4
8335	0x208F	2	Average Current phase 3	mA	S32	READ	4
8337	0x2091	2	Average Frequency	mHz	S32	READ	4

Average measurements – Load 4

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 5 (Multi-load Monitoring)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
8384	0x20C0	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	4/5
8385	0x20C1	2	Date of last instance	s	DATETIME	READ	4/5
8387	0x20C3	2	Average Total Active Power	W	S32	READ	4/5
8389	0x20C5	2	Average Total Reactive Power	var	S32	READ	4/5
8391	0x20C7	2	Average Total Apparent Power	VA	S32	READ	4
8393	0x20C9	1	Average Total Power Factor	-	S16	READ	4
8394	0x20CA	1	Average Power Factor Type 0 : N/A 1 : Lagging 2 : Leading	-	U16	READ	4
8395	0x20CB	2	Average Current phase 1	mA	S32	READ	4
8397	0x20CD	2	Average Current phase 2	mA	S32	READ	4
8399	0x20CF	2	Average Current phase 3	mA	S32	READ	4
8401	0x20D1	2	Average Frequency	mHz	S32	READ	4

Temperature probes 1, 2, 3

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 4 (Single-load Monitoring)

Probe 1:

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
9472	0x2500	1	Sensor status 0 : Disabled 1 : Enabled	-	U16	READ	4
9473	0x2501	2	Date of last instance	s	DATETIME	READ	4
9475	0x2503	1	Average temperature	°C 10 ⁻²	S16	READ	4

Probe 2:

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
9536	0x2540	1	Sensor status 0 : Disabled 1 : Enabled	-	U16	READ	4
9537	0x2541	2	Date of last instance	s	DATETIME	READ	4
9539	0x2543	1	Average temperature	°C 10 ⁻²	S16	READ	4

Probe 3:

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
9600	0x2580	1	Sensor status 0 : Disabled 1 : Enabled	-	U16	READ	4
9601	0x2581	2	Date of last instance	s	DATETIME	READ	4
9603	0x2583	1	Average temperature	°C 10 ⁻²	S16	READ	4

Multi-utility pulse metering

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 1 (Single-load Energies)
- Profile 2 (Multi-load Energies Consumption)
- Profile 3 (Multi-load Energies Production)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
12288	0x3000	1	Sensor status 0 : Disabled 1 : Enabled	-	U16	READ	1/2/3
12289	0x3001	2	Date of last instance	s	DATETIME	READ	1/2/3
12291	0x3003	4	Total	-	S64		1/2/3

Load curves – Load 1

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 6 (Single-load Load curves)
- Profile 7 (Multi-load Load curves)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
16384	0x4000	1	Load status 0: Disabled 1: Enabled	-	U16	READ	6/7
16385	0x4001	2	Date (last point)	s	DATETIME	READ	6/7
16387	0x4003	2	Total Positive Active Power - last point	W	U32	READ	6/7
16389	0x4005	2	Total Negative Active Power - last point	W	U32	READ	6
16391	0x4007	2	Total Positive Reactive Power - last point	var	U32	READ	6
16393	0x4009	2	Total Negative Reactive Power - last point	var	U32	READ	6
16395	0x400B	1	Flag - last point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7
16396	0x400C	2	Date (previous point)	s	DATETIME	READ	6/7
16398	0x400E	2	Total Positive Active Power - previous point	W	U32	READ	6/7
16400	0x4010	2	Total Negative Active Power - previous point	W	U32	READ	6
16402	0x4012	2	Total Positive Reactive Power - previous point	var	U32	READ	6
16404	0x4014	2	Total Negative Reactive Power - previous point	var	U32	READ	6
16406	0x4016	1	Flag - previous point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7

Load curves – Load 2

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 7 (Multi-load Load curves)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
16448	0x4040	1	Load status 0: Disabled 1: Enabled	-	U16	READ	6/7
16449	0x4041	2	Date (last point)	s	DATETIME	READ	6/7
16451	0x4043	2	Total Positive Active Power - last point	W	U32	READ	6/7
16453	0x4045	2	Total Negative Active Power - last point	W	U32	READ	6
16455	0x4047	2	Total Positive Reactive Power - last point	var	U32	READ	6
16457	0x4049	2	Total Negative Reactive Power - last point	var	U32	READ	6
16459	0x404B	1	Flag - last point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7
16460	0x404C	2	Date (previous point)	s	DATETIME	READ	6/7
16462	0x404E	2	Total Positive Active Power - previous point	W	U32	READ	6/7
16464	0x4050	2	Total Negative Active Power - previous point	W	U32	READ	6
16466	0x4052	2	Total Positive Reactive Power - previous point	var	U32	READ	6
16468	0x4054	2	Total Negative Reactive Power - previous point	var	U32	READ	6
16470	0x4056	1	Flag - previous point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7

Load curves – Load 3

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 7 (Multi-load Load curves)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
16512	0x4080	1	Load status 0: Disabled 1: Enabled	-	U16	READ	6/7
16513	0x4081	2	Date (last point)	s	DATETIME	READ	6/7
16515	0x4083	2	Total Positive Active Power - last point	W	U32	READ	6/7
16517	0x4085	2	Total Negative Active Power - last point	W	U32	READ	6
16519	0x4087	2	Total Positive Reactive Power - last point	var	U32	READ	6
16521	0x4089	2	Total Negative Reactive Power - last point	var	U32	READ	6
16523	0x408B	1	Flag - last point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7
16524	0x408C	2	Date (previous point)	s	DATETIME	READ	6/7
16526	0x408E	2	Total Positive Active Power - previous point	W	U32	READ	6/7
16528	0x4090	2	Total Negative Active Power - previous point	W	U32	READ	6
16530	0x4092	2	Total Positive Reactive Power - previous point	var	U32	READ	6
16532	0x4094	2	Total Negative Reactive Power - previous point	var	U32	READ	6
16534	0x4096	1	Flag - previous point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7

Load curves – Load 4

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 7 (Multi-load Load curves)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
16576	0x40C0	1	Load status 0: Disabled 1: Enabled	-	U16	READ	6/7
16577	0x40C1	2	Date (last point)	s	DATETIME	READ	6/7
16579	0x40C3	2	Total Positive Active Power - last point	W	U32	READ	6/7
16581	0x40C5	2	Total Negative Active Power - last point	W	U32	READ	6
16583	0x40C7	2	Total Positive Reactive Power - last point	var	U32	READ	6
16585	0x40C9	2	Total Negative Reactive Power - last point	var	U32	READ	6
16587	0x40CB	1	Flag - last point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7
16588	0x40CC	2	Date (previous point)	s	DATETIME	READ	6/7
16590	0x40CE	2	Total Positive Active Power - previous point	W	U32	READ	6/7
16592	0x40D0	2	Total Negative Active Power - previous point	W	U32	READ	6
16594	0x40D2	2	Total Positive Reactive Power - previous point	var	U32	READ	6
16596	0x40D4	2	Total Negative Reactive Power - previous point	var	U32	READ	6
16598	0x40D6	1	Flag - previous point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7

Status

The following Modbus table can be used only if one of the following profiles is selected:

- Profile 1 (Single-load – Energies)
- Profile 2 (Multi-load – Energies Consumption)
- Profile 3 (Multi-load – Energies Production)
- Profile 4 (Single-load – Monitoring)
- Profile 5 (Multi-load – Monitoring)
- Profile 6 (Single-load – Load curves)
- Profile 7 (Multi-load – Load curves)

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
20480	0x5000	1	VirtualMonitor : iTR 1 0 : Open 1 : Closed	-	U16	READ	1/2/3/4/5/6/7
20481	0x5001	1	VirtualMonitor : iTR 2 0 : Open 1 : Closed	-	U16	READ	1/2/3/4/5/6/7
20482	0x5002	1	VirtualMonitor : iTR 3 0 : Open 1 : Closed	-	U16	READ	1/2/3/4/5/6/7
20483	0x5003	1	VirtualMonitor : iTR 4 0 : Open 1 : Closed	-	U16	READ	1/2/3/4/5/6/7
20484	0x5004	1	Digital Input 1 DIRIS B-10L 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
20485	0x5005	1	Digital Input 2 DIRIS B-10L 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20486	0x5006	1	Digital Input 1 – Optional module 1 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20487	0x5007	1	Digital Input 2 – Optional module 1 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20488	0x5008	1	Digital Input 1 – Optional module 2 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20489	0x5009	1	Digital Input 2 – Optional module 2 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20490	0x500A	1	Digital Input 1 – Optional module 3 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20491	0x500B	1	Digital Input 2 – Optional module 3 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20492	0x500C	1	Digital Input 1 – Optional module 4 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7
20493	0x500D	1	Digital Input 2 – Optional module 4 0 : N/A 1 : Active	-	U16	READ	1/2/3/4/5/6/7

Alarms

The following Modbus table can be used for all profiles.

Dec address	Hex address	Words count	Description	Unit	Function	Data type
28672	0x7000	2	Date of last change	s	READ	DATETIME
28674	0x7002	1	Combi #1 0 : N/A 1 : Active	-	READ	U16
28675	0x7003	1	Combi #2 0 : N/A 1 : Active	-	READ	U16
28676	0x7004	1	Combi #3 0 : N/A 1 : Active	-	READ	U16
28677	0x7005	1	Combi #4 0 : N/A 1 : Active	-	READ	U16
28678	0x7006	1	Logical Alarm #1 0 : N/A 1 : Active	-	READ	U16
28679	0x7007	1	Logical Alarm #2 0 : N/A 1 : Active	-	READ	U16
28680	0x7008	1	Logical Alarm #3 0 : N/A 1 : Active	-	READ	U16

Dec address	Hex address	Words count	Description	Unit	Function	Data type
28681	0x7009	1	Logical Alarm #4 0 : N/A 1 : Active	-	READ	U16
28682	0x700A	1	Measurement Alarm #1 0 : N/A 1 : Active	-	READ	U16
28683	0x700B	1	Measurement Alarm #2 0 : N/A 1 : Active	-	READ	U16
28684	0x700C	1	Measurement Alarm #3 0 : N/A 1 : Active	-	READ	U16
28685	0x700D	1	Measurement Alarm #4 0 : N/A 1 : Active	-	READ	U16
28686	0x700E	1	Measurement Alarm #5 0 : N/A 1 : Active	-	READ	U16
28687	0x700F	1	Measurement Alarm #6 0 : N/A 1 : Active	-	READ	U16
28688	0x7010	1	Measurement Alarm #7 0 : N/A 1 : Active	-	READ	U16
28689	0x7011	1	Measurement Alarm #8 0 : N/A 1 : Active	-	READ	U16
28690	0x7012	1	Protection Alarm #1 0 : N/A 1 : Active	-	READ	U16
28691	0x7013	1	Protection Alarm #2 0 : N/A 1 : Active	-	READ	U16
28692	0x7014	1	Protection Alarm #3 0 : N/A 1 : Active	-	READ	U16
28693	0x7015	1	Protection Alarm #4 0 : N/A 1 : Active	-	READ	U16
28694	0x7016	1	Protection Alarm #5 0 : N/A 1 : Active	-	READ	U16
28695	0x7017	1	Protection Alarm #6 0 : N/A 1 : Active	-	READ	U16
28696	0x7018	1	System Alarm #1 (Network rotation) 0 : N/A 1 : Active	-	READ	U16
28697	0x7019	1	System Alarm #2 (V/I association) 0 : N/A 1 : Active	-	READ	U16
28698	0x701A	1	System Alarm #3 (CT disconnected) 0 : N/A 1 : Active	-	READ	U16
28699	0x701B	1	System Alarm #4 (Bad CT primary) 0 : N/A 1 : Active	-	READ	U16

Custom Profile

Dec address	Hex address	Words count	Description	Unit	Function	Data type
61442	0xF002	2	Custom Profile : Register #1	-	READ	U32
61444	0xF004	2	Custom Profile : Register #2	-	READ	U32
61446	0xF006	2	Custom Profile : Register #3	-	READ	U32
61448	0xF008	2	Custom Profile : Register #4	-	READ	U32
61450	0xF00A	2	Custom Profile : Register #5	-	READ	U32
61452	0xF00C	2	Custom Profile : Register #6	-	READ	U32
61454	0xF00E	2	Custom Profile : Register #7	-	READ	U32
61456	0xF010	2	Custom Profile : Register #8	-	READ	U32
61458	0xF012	2	Custom Profile : Register #9	-	READ	U32
61460	0xF014	2	Custom Profile : Register #10	-	READ	U32
61462	0xF016	2	Custom Profile : Register #11	-	READ	U32
61464	0xF018	2	Custom Profile : Register #12	-	READ	U32

8.7. EU Declaration of Conformity

The EU Declaration of Conformity for the DIRIS B-10L is available here:

www.socomec.com/en/diris-b

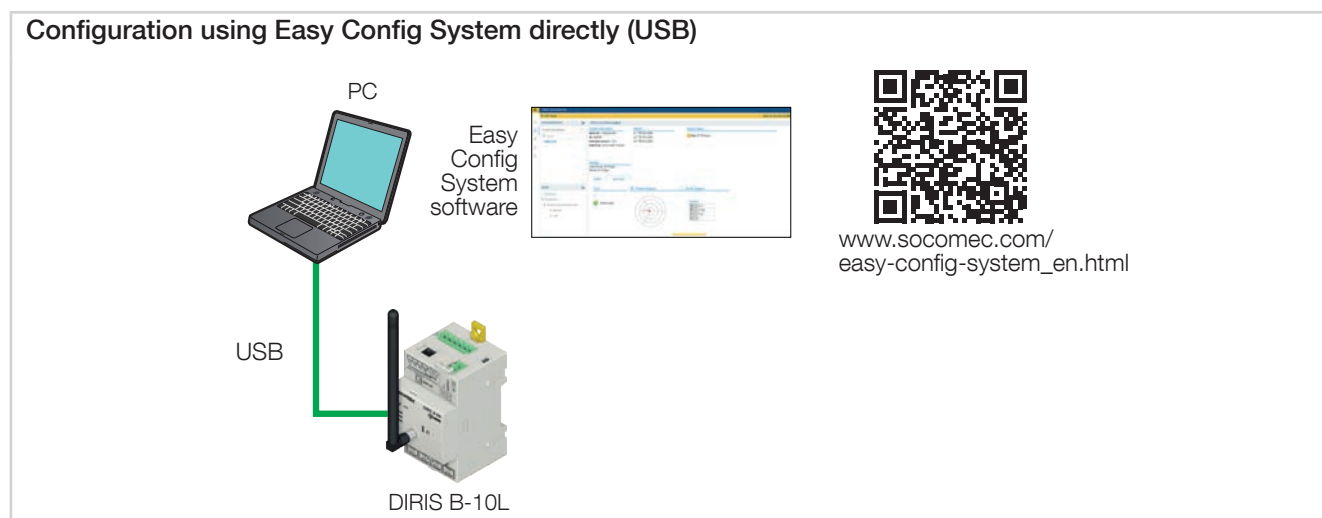


9. CONFIGURATION

9.1. Configuration using Easy Config System

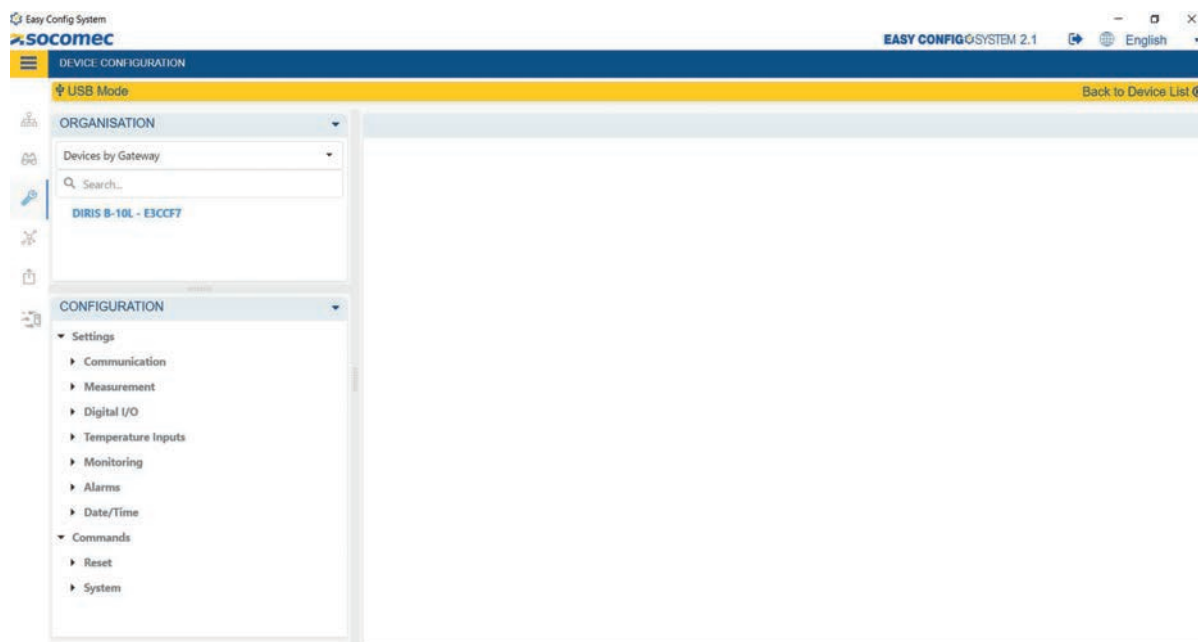
9.1.1. Connection modes

Configuration using Easy Config System directly (USB)



9.1.2. Configuring the DIRIS B-10L using Easy Config System

- Open the Easy Config System software and connect as Admin (default password is “Admin”).
- Click on “New Configuration”, then enter a name and icon.
- Click on the newly created configuration.
- Click on “USB mode” on the right top corner to connect to the DIRIS B-10L via a USB cable.
- Go to the “PARAMETERS” part to configure the different menus:



• Communication

- LoRa: to configure the LoRaWAN communication
 - Profile: choose the LoRa profile depending on which measurements you need to collect
 - Uplink Period: enter the uplink period depending on how often you need to retrieve data. The uplink period determines the integration period of load curves and trends of average values.
 - Acknowledgement

• Measurement

- The uplink period determines the integration period of load curves and trends of average values.
- Electrical network: configure the electrical network type (three-phase, with or without neutral, etc.), the nominal voltage and frequency, and the phase rotation.
- Load:
 - Activate: activate a load and name it.
 - Type: enter the load type (single-phase, three-phase with or without neutral etc.), and the nominal current.
 - Phase association to current inputs: indication only, shows the association of RJ12 current inputs to phase conductors.
- Current sensors: for each current input (I01 - I04), you can configure the following fields:
 - Rating: the rating of current sensors is automatically detected
 - CT way (for current sensors only): positive (P1 -> P2) or negative (P2 -> P1).
 - Associated voltage: voltage associated to the current measurement.
- Calculations:
 - Integration periods: enter the integration period of instantaneous values.
 - THD: you can configure the THD calculation method
 - Other: you can configure the calculation method for powers and energies (vector or arithmetic) and the power factor convention.

• Digital I/O

- Digital Input:
 - Mode: configure the digital input mode.
 - Binary state & Pulse meter.
 - Synch.signal (for the native input no 1 of the B-10L only).
 - Type: normally open or normally closed.
 - Name: you can name the digital input. The name will be shown on the D-50/D-70 display and on WEBVIEW.
 - Pulse meter: if the digital input "Mode" is set to "Bin. State & Pulse meter", you must enable the "Pulse Meter" function if you want collect pulses from utility meters.
- Digital Output: the digital outputs can be used for alarm reporting purposes.
 - Type: normally open or normally closed.
 - Name: you can name the digital output. The name will be shown on the D-50/D-70 display and on WEBVIEW.

• Temperature Inputs

- Temperature input names: name the different temperature inputs. The name will be shown on WEBVIEW.

• Monitoring

- Load Curves
 - Integration period: the integration period of load curves is displayed (it is equal to the uplink period configured in the "LoRa" menu).
 - Metrological LED: choose the energy type and the load associated to the metrological pulse LED on the front of the DIRIS B-10L.
- Load shedding: It allows to trigger an output command if the predictive power value exceeds a pre-determined threshold.
 - State: enable or disable the Load shedding function.
 - Output: choose the digital output associated to the load shedding function.
 - Associated predictive power: choose the associated predictive power.
 - Threshold: enter the threshold from which the load shedding function will be triggered.
- Protection
 - Protective device: select the protective device type (breaker, fusible switch, switch, fuse.)
 - Sources: select the source for the position and trip information. When iTR sensors are used, the VirtualMonitor technology is used.
 - Thresholds: used to differentiate between no-load, on-load and overload manual openings and trips.

- **Alarms**

- Measurement alarm: you can configure up to 8 measurement alarms each based on high and low thresholds.
- Protection alarm: you can configure up to 6 protection alarms to alert in case the protective device is opened, has tripped or is defective.
- Logical alarm: you can configure up to 4 logical alarms to alert when there is a change of digital input status.
- System alarm: you can configure up to 4 system alarms to alert if there is a commissioning error.

- **Date/time**

- Date/time: to manually synchronise the date/time of the DIRIS B-10L with the computer's date and time.

- **Commands**

- Reset: to reboot the DIRIS B-10L, reset alarm logs, Min/Max values, partial meters or restore the device to its factory default settings.

9.2. Downlink

9.2.1. Downlink frames

LoRaWAN technology allows information to be transmitted to the product from the network (downlink).

Class C of the LoRaWAN specification allows the product to receive information as soon as the network transmit it.

B-10L receives downlink frames on port 2.

There are several functions available for downlink, listed in the table below and detailed next.

Type	Content
0x01	Datetime setup
0x02	Profile and UL frequency selection

- Datetime setup frame (0x01)

Byte number	0	1	2-5
Size	1	1	4
Content	Frame type : 1	Datetime base : 0 for second since 01/01/2000	Timestamp in seconds
Example	01	00	274FCCC6

Example :

0x274FCCC6 → 659541190 seconds since 01/01/2000 → 24/11/2020 at 13:53:10.

- Profile and UL frequency selection setup frame (0x02)

Byte number	0	1	2
Size	1	1	-
Content	Frame type : 2	Profile	Frequency in minutes (minimum 10 minutes)
Example	02	04	0A

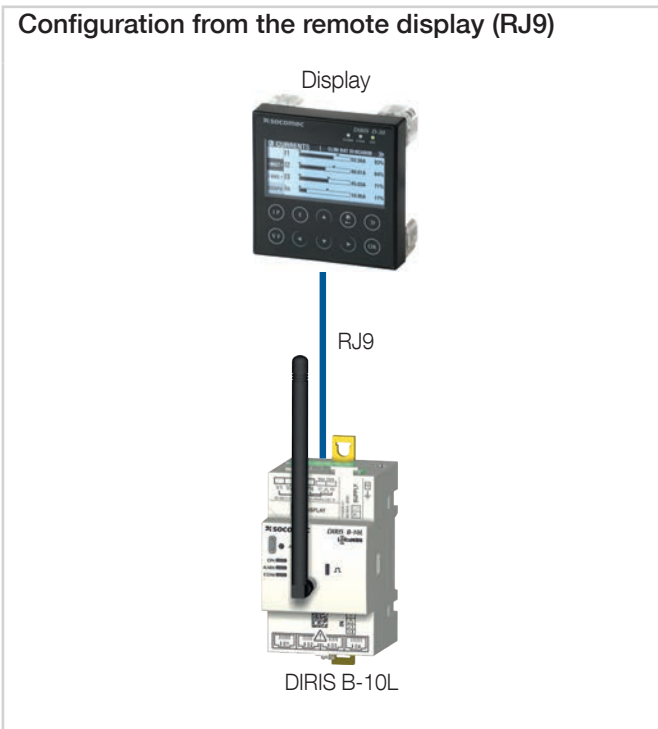
Example :

0x02 04 0A → Profile 4 every 10 minutes.

0x02 06 14 → Profile 6 every 20 minutes.

9.3. Configuration from the DIRIS D-30 remote display

9.3.1. Connection mode



Refer to the manual for the DIRIS D-30 display for more details.

Connection cables for the remote display (RJ9):

Length (m)	Quantity	Reference
1.5	1	4829 0280
3	1	4829 0281

10. ALARMS

10.1. System alarms

If an installation error is detected during commissioning, a system alarm will be automatically activated.

10.1.1. Phase rotation (three-phase network)

A "Phase rotation" system alarm is activated upon identification of an incorrect phase rotation direction (for example 3-2-1 instead of 1-2-3).

10.1.2. V/I association

A "V/I association" alarm is activated when there is a wrong association between the current inputs and the voltage inputs of the DIRIS B-10L.

- If TE/TR/TF current sensors are used, this feature requires a power factor $0.6 < PF < 1$ and a minimum load level $I > 2\%$ In
- If iTR current sensors are used, this feature also works off-load (AUTOCORRECT technology)

10.1.3. CT disconnected

A "CT disconnected" system alarm is activated if a current sensor (TE/TR/iTR/TF) is disconnected.

A digital output can be associated to each system alarm to report the alarm on an output.

A time delay at the start and end of the alarm can be set for each system alarm.

10.2. Measurement alarms

Up to 8 "Measurement alarms" can be configured when a threshold is exceeded for the electrical measurements, consumption, variations in level.

The "Measurement alarms" are based on electrical parameters measured in the devices (both instantaneous and average measurements):

- Currents, voltages, frequency
- Powers, power factors, Cos phi
- THD U, THD V, THD I
- Partial energies Ea+, Ea-, Er+, Er-, Eap
- Unbalance for voltage and current

You can choose to activate the alarm on a single-phase parameter (V1, I1, etc.) or only if a multi-phase Boolean condition is fulfilled:

- On all the phases simultaneously: Phase1 AND Phase2 AND Phase3
- On one phase of the three phases: Phase1 OR Phase2 OR Phase3

A low and high threshold, as well as a hysteresis can be configured for each alarm.

A time delay at the start and end of the alarm can be set for each alarm.

A digital output can be associated to each alarm to report the alarm on an output.

The alarm can be acknowledged automatically or using a digital input.

10.3. Protection alarms

The DIRIS B-10L includes 6 protection alarms alerting the user of an event on a protective device.

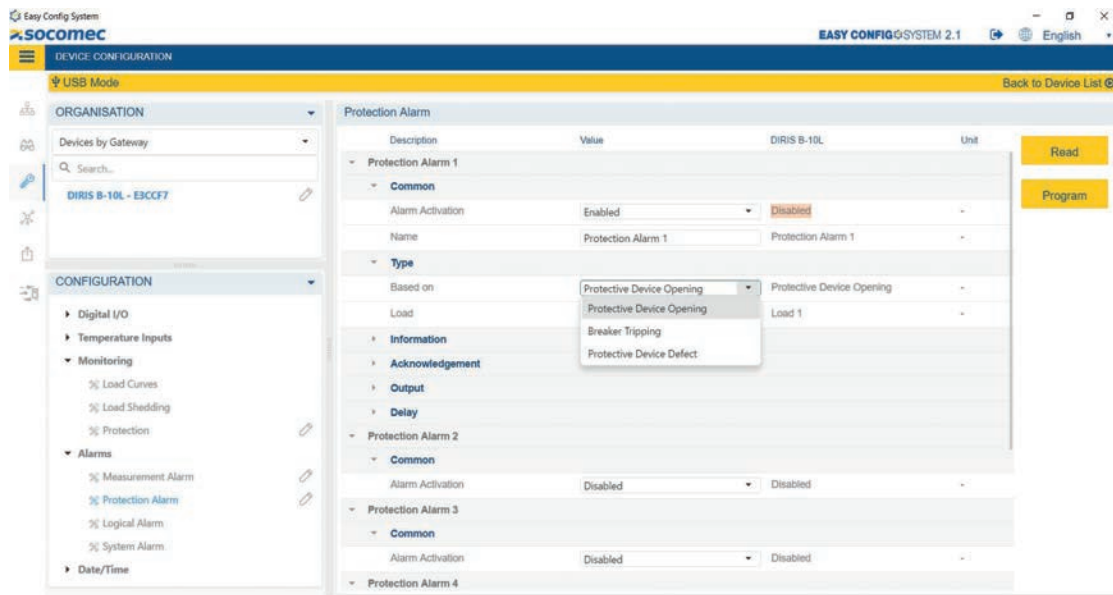
Make sure you have configured the protective device type used in the "Protection" menu in order to use the Protection alarms

Protection alarms can be configured in case of:

- An opening of the protective device.
- A trip of the protective device (only available for circuit breakers).
- A defect of the protective device: if one pole is in a different position from the other poles (abnormal for a multi-phase protective device).

A time delay at the start and end of the alarm can be set for each alarm.

A digital output can be associated to each alarm to report the alarm on an output.

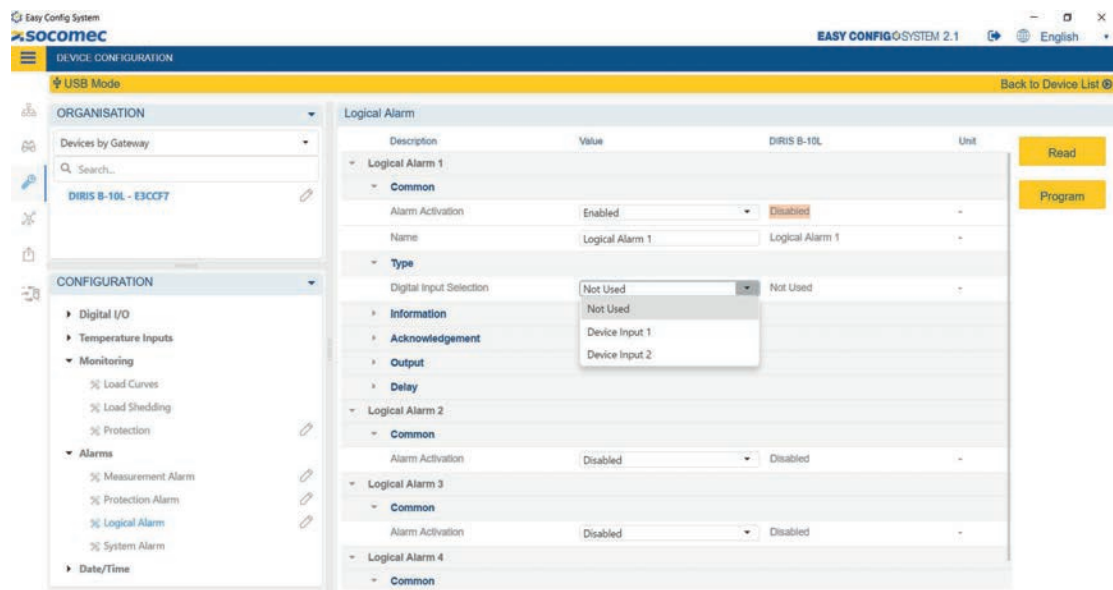


10.4. Logical alarms

Up to 4 "Logical alarms" can be configured to alert upon the change of status of a digital input.

A time delay at the start and end of the alarm can be set for each logical alarm.

A digital output can be associated to each logical alarm to report the alarm on an output.



11. TECHNICAL CHARACTERISTICS

11.1. DIRIS B-10L characteristics

11.1.1. Mechanical characteristics

Casing type	DIN-rail mounting module and base
Casing protection index	IP20 / IK06
Index of protection of front side	IP40 on the nose in modular assembly / IK08
Sealing for the voltage and current connections	Sealable enclosure option for DIRIS B-10L and sensors: ref: 4829 0597
Weight	DIRIS B-10L: 195 g

11.1.2. Electrical characteristics

Auxiliary power supply	
Alternative voltage	110-230 VAC $\pm 15\%$ (Ph/N or Ph/Ph) Cat III
Frequency	50/60 Hz
Power consumption	< 2 VA without display, < 6.3 VA with DIRIS D-30 display
Connection	Removable spring-cage terminal block, 2x 2 positions, 0.5 - 2.5 mm ² solid cable or 0.25 - 1.5 mm ² stranded cable with ferrule

11.1.3. Input characteristics

Input	
Number	2
Type / Power supply	Optocoupler internal (12 VDC $\pm 10\%$) or external (10-30 VDC $\pm 10\%$) polarisation
Input function	Logical status, pulse meter or synchronisation pulse status (input 1)
Connection	Removable screw terminal block, 4 positions, stranded or solid 0.14 - 1.5 mm ² cable

11.1.4. Measuring characteristics

Measurement accuracy	
Accuracy	According to IEC 61557-12 PMD DD classification in association with specified current sensors (TE, TR / iTR, TF)
Measuring energy and power	
Active energy and active power accuracy	Class 0.2 DIRIS B-10L alone Class 0.5 with TE, iTR and TF sensors Class 1 with TR sensors
Accuracy of reactive energy	Class 2 with TE, TR/iTR and TF sensors
Power factor measurement	
Accuracy	Class 0.5 with TE, iTR and TF sensors Class 1 with TR sensors
Voltage measurement	
Characteristics of the network measured	50-300 VAC (Ph/N) - 87-520 VAC (Ph/Ph) - CAT III
Frequency range	45 - 65Hz
Frequency accuracy	Class 0.02
Network type	Single-phase/ Two-phase / Two-phase with neutral / Three-phase / Three-phase with neutral
Measurement by voltage transformer	Primary: 400 000 VAC Secondary: 60, 100, 110, 173, 190 VAC
Input consumption	≤ 0,1 VA
Permanent overload	300 VAC Ph/N
Accuracy of voltage measurement	Class 0.2
Connection	Removable spring-cage terminal block, 2 x 6 positions, 0.5 - 2.5 mm ² solid cable or 0.25 - 1.5 mm ² stranded cable with ferrule
Measurement of currents	
Number of current inputs	4
Associated current sensors	Solid TE, split-core TR /iTR, flexible TF current sensors
Accuracy	Class 0.2 DIRIS B-10L alone Class 0.5 with TE, iTR and TF sensors Class 1 with TR sensors
Connection	Specific Socomec cable with RJ12 connectors

11.1.5. Communication characteristics

Link	Wireless
Protocol	LoRaWAN
Bandwidth	863 - 870 MHz
Use	Europe
Port for Downlink	2
Class	Class C
Power Level	14 dBm
Version	1.0.3
Spreading Factor	SF7 to SF12
Activation Method	OTAA

11.1.6. Environmental characteristics

Operating temperature	-10 ... +70°C (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature range	-25 ... +85°C (IEC 60068-2-1/IEC 60068-2-2)
Operating humidity	97% RH (IEC 60068-2-30)
Operating altitude	< 2,000 m
Vibration	1G from 10 to 100Hz
Rated impulse voltage	IEC 60947-1 V. IMP: 6.4kV
Impact resistance	Front panel: 5J - casing: 1J (IEC 61010-1 Ed 3.0)

11.1.7. Electromagnetic compatibility

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

11.1.8. Safety

Safety	Compliance with Low Voltage Directive 2014/35/EU of 26 February 2014 (IEC EN61010-1 & IEC EN61010-2- 030)
Insulation	Installation category III (300 VAC Ph/N), degree of pollution 2

11.1.9. Service life

MTTF (mean time to failure)	> 100 years
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11.2. DIRIS O optional modules characteristics

Mechanical characteristics	
Casing type	Modular for DIN rail mounting
Power supply⁽¹⁾	
Alternative voltage	110-230 VAC $\pm 15\%$
Frequency	50/60 Hz
Connection	Removable spring-cage terminal block, 2x 2 positions, 0.5 - 2.5 mm ² solid cable or 0.25 - 1.5 mm ² stranded cable with ferrule
(1) No power supply to DIRIS O-it.	
DIRIS O-iod - 2 digital inputs/2 digital outputs	
Number of inputs	2 per optional module - 4 optional modules max.
Type	Optocoupler internal (12 VDC $\pm 10\%$) or external (10-30 VDC $\pm 10\%$) polarisation
Function	Logical status or pulse meter
Input connection	Removable screw terminal block, 4 positions, stranded or solid 0.14 - 1.5 mm ² cable (length max. 1000 m)
Number of outputs	2 per optional module - 4 optional modules max.
Type	Relay / 230 V $\pm 15\%$ - 1A
Function	Configurable alarm (current, power, etc.) on threshold overruns or remote controlled status
Output connections	2 removable screw terminal blocks, 2 x 2 positions, stranded or solid 0.14 - 1.5 mm ² cable
DIRIS O-it - 3 temperature inputs	
Number of inputs	3 external inputs + 1 ambient measurement Max 1 optional module
Dynamic	-20 °C to 150 °C
Type	PT100 or PT1000
Function of inputs 1, 2 and 3	Temperature measurement
Connection	3 removable screw terminal blocks, 3 x 4 positions, stranded or solid 0.14 - 1.5 mm ² cable (length max. 3 m)

11.3. DIRIS D-30 display characteristics

11.3.1. Mechanical characteristics

Type of screen	Capacitive touch-screen technology, 10 keys
Screen resolution	350 x 160 pixels
Weight (g)	160

11.3.2. Single device connection

RJ9	Self-powered and data
Micro-USB	Upgrade
Protection Index	IP65*

* Front face only. The use of a silicone seal may be required to ensure sufficient sealing of the junction between DIRIS D-30 display and panel door.

11.3.3. Electrical characteristics

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

11.3.4. Environmental characteristics

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

11.4. TE, TR /iTR and TF sensors - characteristics

TE - solid-core current 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) > 1000A with 5A TC adapter.

TE - solid-core current sensor TE-90	
Model	TE-90
Nominal current range I_n	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 I_n 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/iTR - Split-core sensor				
Model	TR-10 / iTR-10	TR-14 / iTR-14	TR-21 / iTR-21	TR-32 / iTR-32
Weight (g)	26 - 63	40 - 160	63 - 250	160 - 600
Nominal current range In (A)	75.6	192	300	720
Max. voltage (AC)	74	117	211	311
Measurement category	300 V			
Frequency	3 kV			
Power ratings (d.c.)	50/60 Hz			
Accuracy	10x In in 1 second			
Intermittent overload	CAT III			
Rated withstand voltage	IP20 / IK06			
Protection degree	-10 - +70°C			
Operating temperature	-25 - +85°C			
Storage temperature	95% RH without condensation			
Relative humidity	< 2,000 m			
Pollution degree	TR sensors: SOCO-2014-04-v1-fr, SOCO-2014-04-v1-en			
Connection	SOCOMEK RJ12 cable, straight, twisted pair, unshielded, 300 V cat.III. -40/+85°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)					
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.					

12. PERFORMANCE CLASSES

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

Classification of the DIRIS B-10L	DD in combination with specified sensors (TE, TR /iTR, TF)
Temperature	K55
Overall operating performance class for active power or active energy	0.5 in combination with TE, iTR and TF sensors 1 in combination with TR sensors

12.1. Specification of the characteristics

Symbol	Function	Overall operating performance class of DIRIS B-10L + dedicated sensors * (TE, TR /iTR, TF) compliant with IEC 61557-12	Measurement range
P_a	Total active power	0.2 DIRIS B-10L alone 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, iTR or TF sensors 2 with TR 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
E_a	Total active energy	0.2 DIRIS B-10L alone 0.5 with TE, iTR or TF sensors 1 with TR sensors	10% - 120% In 2% - 120% In 2% - 120% In
Er_A, Er_V	Total reactive energy (arithmetic, vectorial)	2 with TE, TR/iTR or TF sensors	5% - 120% In
Eap_A, Eap_V	Total apparent energy (arithmetic, vectorial)	0.5 with TE/iTR or TF sensors 1 with TR sensors	10% - 120% In
f	Frequency	0.02	45 - 65 Hz
I, IN	Phase current, measured neutral current	0.2 DIRIS B-10L alone 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 inductive to 0.8 capacitive

*With SOCOMEC RJ12 connection cables.

12.2. Evaluation of the power supply quality

Symbol	Function	Overall operating performance class for DIRIS B-10L + associated sensors (TE, TR / iTR, TF) in compliance with IEC 61557-12	Measurement range
f	Frequency	0.02	45 - 65 Hz
I, I _N	Phase current, measured neutral current	0.2 DIRIS B-10L alone 0.5 with TE, iTR or TF sensors 1 with TR sensors	5% - 120% I _n 10% - 120% I _n 10% - 120% I _n
I _{Nc}	Calculated neutral current	1 with TE, iTR or TF sensors 2 with TR sensors	10% - 120% I _n
U	Voltage (Lp-Lg or Lp-N)	0.2	50 - 300 VAC Ph/N
Pst, Plt	Flicker (short-term, long-term)	-	-
U _{dip}	Voltage dip (Lp-Lg or Lp-N)	0.5	-
U _{swl}	Temporary overvoltages (Lp-Lg or Lp-N)	0.5	-
U _{int}	Voltage outage (Lp-Lg or Lp-N)	0.2	-
U _{nba}	Voltage amplitude unbalance (Lp-N)	0.5	-
U _{nb}	Voltage phase and amplitude unbalance (Lp-Lg or Lp-N)	0.2	-
U _h	Voltage harmonics	1	-
I _h	Current harmonics	1 with TE, TR /iTR or TF sensors	-
Msv	Centralised remote control signals	-	-

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