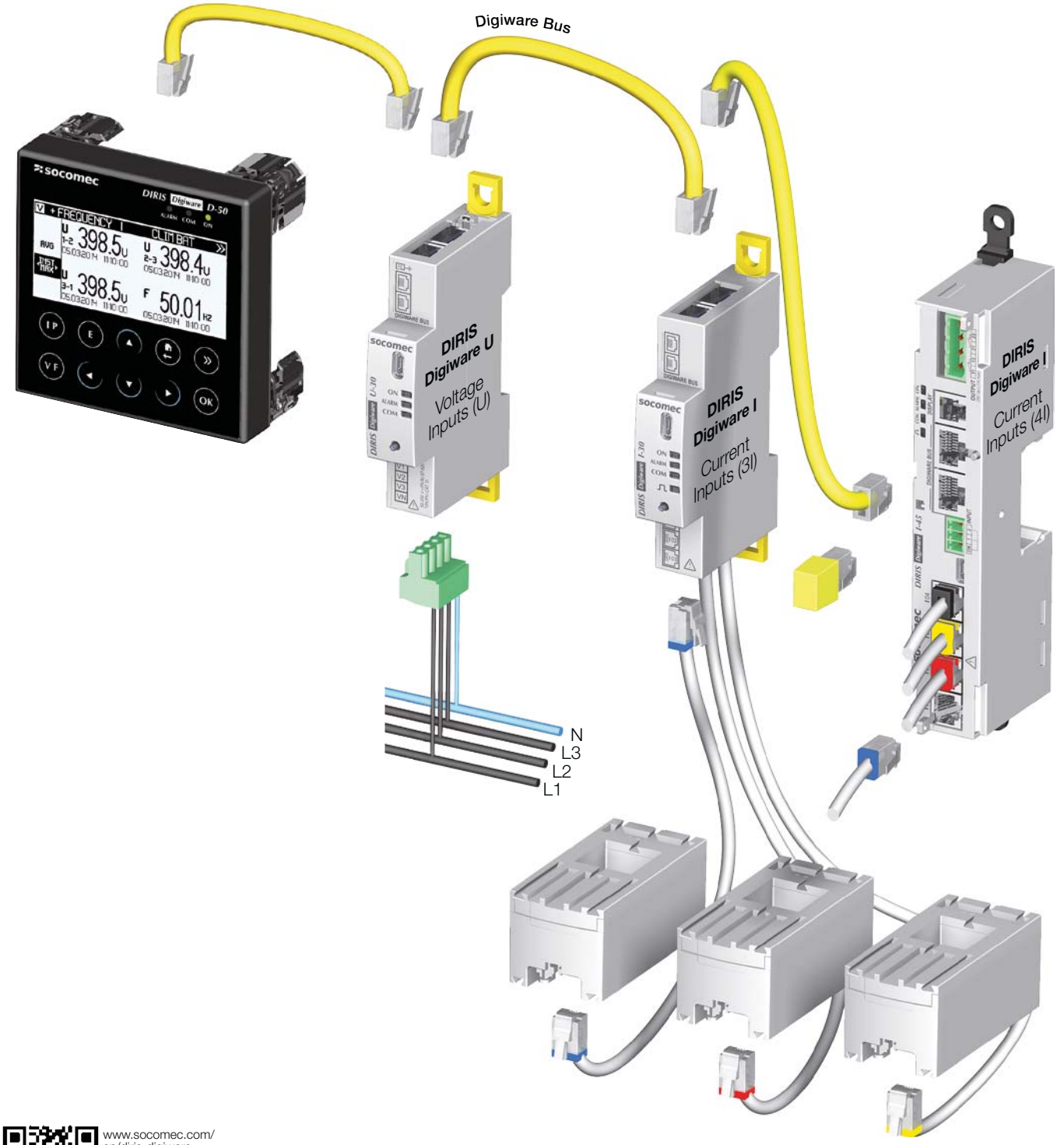
USER MANUAL

DIRIS Digiware

Measurement and monitoring system for electrical installations

EN



www.socomec.com/en/diris-digiware

www.socomec.com

socomec
Innovative Power Solutions

EN CONTENTS

1. DOCUMENTATION

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

2. DANGER AND WARNING

The term "unit" used in the following paragraphs encompasses the DIRIS Digiware and their associated current sensors (TE, TR or TF).

The assembly, use, servicing and maintenance of this equipment must only be carried out by trained, qualified professionals.

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

2.1. Risk of electrocution, burns or explosion

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

- The assembly and servicing of this unit must only be carried out by qualified personnel with thorough knowledge of how to assemble, commission and operate the unit, who have completed the appropriate training. He or she should have read and understood the various safety measures and warnings stated in the instructions.
- Prior to any work on or in the unit, isolate the unit's voltage inputs and auxiliary power supplies.
- 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.
- Always connect the TE, TR or TF current sensors using the recommended connection cables and observing the maximum prescribed currents.

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

Failure to take these precautions could cause death or serious injuries.

2.2. Risk of damaging the unit

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

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

- the unit is correctly installed.
- the auxiliary power supply voltage indicated on the product is observed: 24 VDC ± 20%.
- the network frequency indicated on the product is observed: 50 or 60 Hz.
- a maximum voltage at the voltage input terminals of 520 VAC phase/phase or 300 VAC phase/neutral must be observed.
- Always connect the TE, TR 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 unit.

2.3. Liability

- Assembly, connection and use must be carried out in accordance with the installation standards currently in force.
- The unit must be installed in accordance with rules given in this manual.
- Failure to observe the rules for installing this unit may compromise the product's intrinsic protection.
- The unit must be positioned within an installation which complies with the standards currently in force.
- Any cable which needs to be replaced may only be replaced with a cable having the correct rating.

3. PRELIMINARY OPERATIONS

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

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

- The packaging is in good condition,
- The unit has not been damaged during transportation,
- The product reference number conforms to your order,
- The packaging includes the unit fitted with removable terminal blocks and a Quick start guide.

4. INTRODUCTION

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

The DIRIS Digiware is an innovative concept based on centralising the voltage measurement and distributing the current measurement close to the loads. The voltage is measured by a dedicated DIRIS Digiware U module and the current by dedicated DIRIS Digiware I modules. The voltage and current measurements are interconnected by the DIRIS Digiware Bus. On DIRIS Digiware I modules, three or four current inputs are available, depending on the model, enabling one or several loads to be characterised simultaneously. Several modules may be connected to the Digiware bus. This approach offers the possibility of characterising a high number of loads from a single voltage tap.

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

The DIRIS Digiware is configured from its remote display or via the Easy Config software. The measurements can be accessed via the WEBVIEW web server integrating the monitoring function for electrical values (Power Monitoring version) and reporting function for energy data (Power & Energy Monitoring version). WEBVIEW is available on the DIRIS G communication gateways. The consumption data can also be accessed from the energy management software HYPERVIEW.

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

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

4.1. Range

	
Remote display	**System interface modules***
DIRIS Digiware D-50	DIRIS Digiware C
	C-30 / C-31
Ref. 4829 0201	Ref. 4829 0100 / Ref. 4829 0101

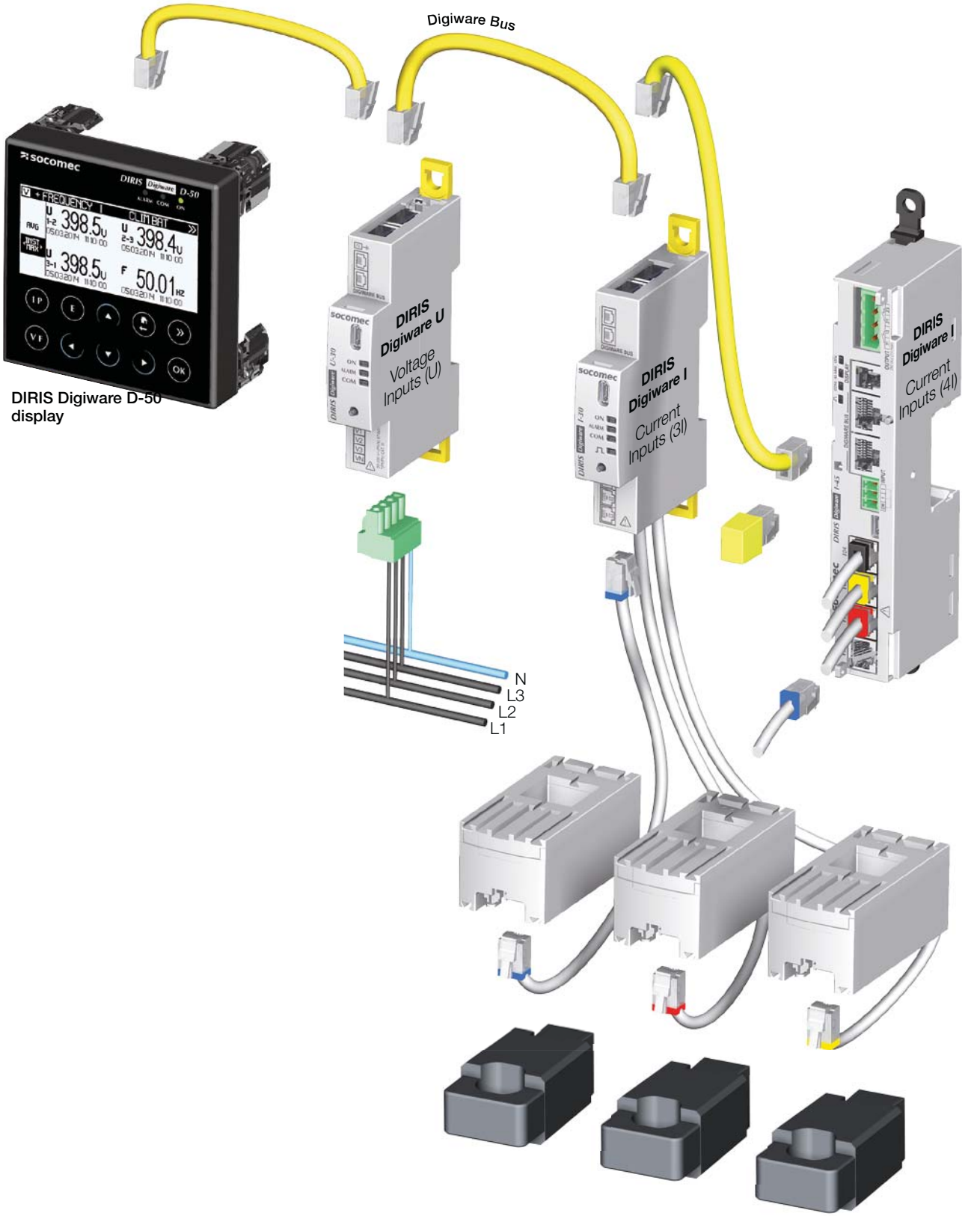
		
Voltage measurement modules		
DIRIS Digiware U		
U-10	U-20	U-30
Ref. 4829 0105	Ref. 4829 0106	Ref. 4829 0102

				
3x current measurement modules				**4x current measurement modules**
DIRIS Digiware I				DIRIS Digiware I
I-30	I-31	I-33	I-35	I-45
Ref. 4829 0110	Ref. 4829 0111	Ref. 4829 0128	Ref. 4829 0130	Ref. 4829 0131

** if there is no remote display*

The differences between the modules are explained in the following sections.

4.2. General principal



4.3. General functions

The DIRIS Digiware boasts numerous functions, including:

- **General measurements**
  - Voltage measurement
  - Multi-load current measurement
  - Power, power factor, phi, cos phi and tan phi
  - Operation across 4 quadrants
  - Predictive power
  - Guarantees the overall accuracy of the DIRIS Digiware + Sensor measurement chain in terms of power and active energy up to class 0.5, as per IEC standard 61557-12
- **Quality**
  - Direct, inverse and homopolar voltages
  - THD and harmonics up to order 63 for voltage and current
  - Current and voltage unbalance
  - EN50160 events (Uswl, Udip, Uint) and current overloads
- **Logging**
  - Recording of average electrical values
  - Recording and timestamping of min/max electrical values
- **Metering**
  - Partial and total apparent, reactive and active energies
  - Load curves
- **Alarm**
  - Timestamped alarms with boolean combination
- **Current inputs**
  - Measurement of 3 or 4 currents per current measurement module
  - Current inputs with quick connection and automatic recognition of the current sensors
  - Simultaneous management of several single-phase, two-phase and three-phase loads
  - Connection of solid-core, split-core and flexible sensors
  - Checking of the connection, detection of the CT and auto-configuration of the networks
  - Guarantees the overall accuracy of the DIRIS Digiware + Sensor measurement chain at Class 0.5 in terms of power and energy as per IEC standard 61557-12
- **Communication**
  - RS485 communication
  - Association with the DIRIS Digiware D-50 multi-product remote display
  - Measurements available in the WEBVIEW web server of the DIRIS G gateway
  - Time synchronisation by the DIRIS G gateway
  - Auto-addressing in association with the gateway or the remote display.

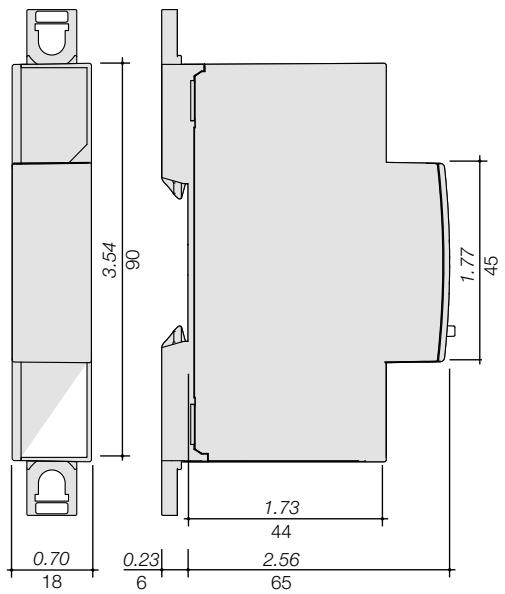
4.4. Electrical values measured

	DIRIS Digiware U		
	U-10	**U-20**	**U-30**
Multi-measurement			
U12, U23, U31, V1, V2, V3, Vn, F	x	x	x
U system, V system			x
Ph/N unbalance (Vnb, Vnba, Vdir, Vinv, Vhom)			x
Ph/Ph unbalance (Unb, Unba, Udir, Uinv)			x
Power quality			
THD U, THD V		x	x
Individual U & V harmonics (up to order 63)			x
Voltage dips, outages and cut-offs (according to EN50160)			x
Alarms (threshold)			x
Logs of average values			x
Format	1 x 18mm module	1 x 18mm module	1 x 18mm module
Reference	4829 0105	4829 0106	4829 0102

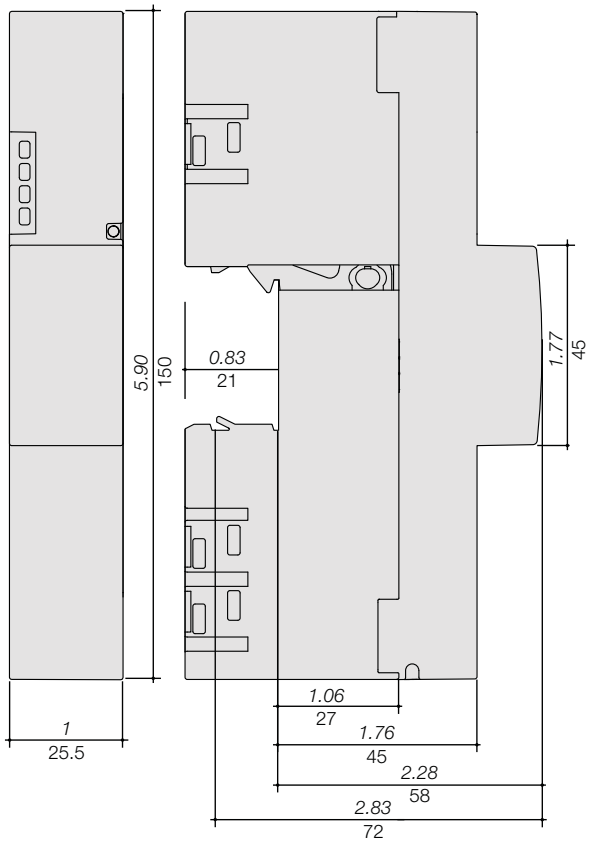
	DIRIS Digiware I				
	I-30	**I-31**	**I-33**	**I-35**	**I-45**
Number of current channels	3	3	3	3	4
Multi-measurement					
I1, I2, I3, In, ΣP, ΣQ, ΣS, ΣPF	x	x	x	x	x
P, Q, S, PF per phase			x	x	x
Predictive power				x	x
I System				x	x
Current unbalance (Inba, Idir, Iinv, Ihom, Iunb)				x	x
Phi, cos Phi, tan Phi				x	x
Metering					
± kWh, ± kvarh, kVAh	x	x	x	x	x
Power management					
Load curves		x		x	x
Power quality					
THDI			x	x	x
Individual harmonics (up to order 63)				x	x
Overcurrent				x	x
Alarms				x	x
Inputs/Outputs					2/2
Thresholds				x	x
Logs of average values				x	x
Format	1 x 18mm module	1 x 18mm module	1 x 18mm module	1 x 18mm module	1.5 x 27mm module
Reference	4829 0110	4829 0111	4829 0128	4829 0130	4829 0131

4.5. Dimensions

Dimensions *in*/mm



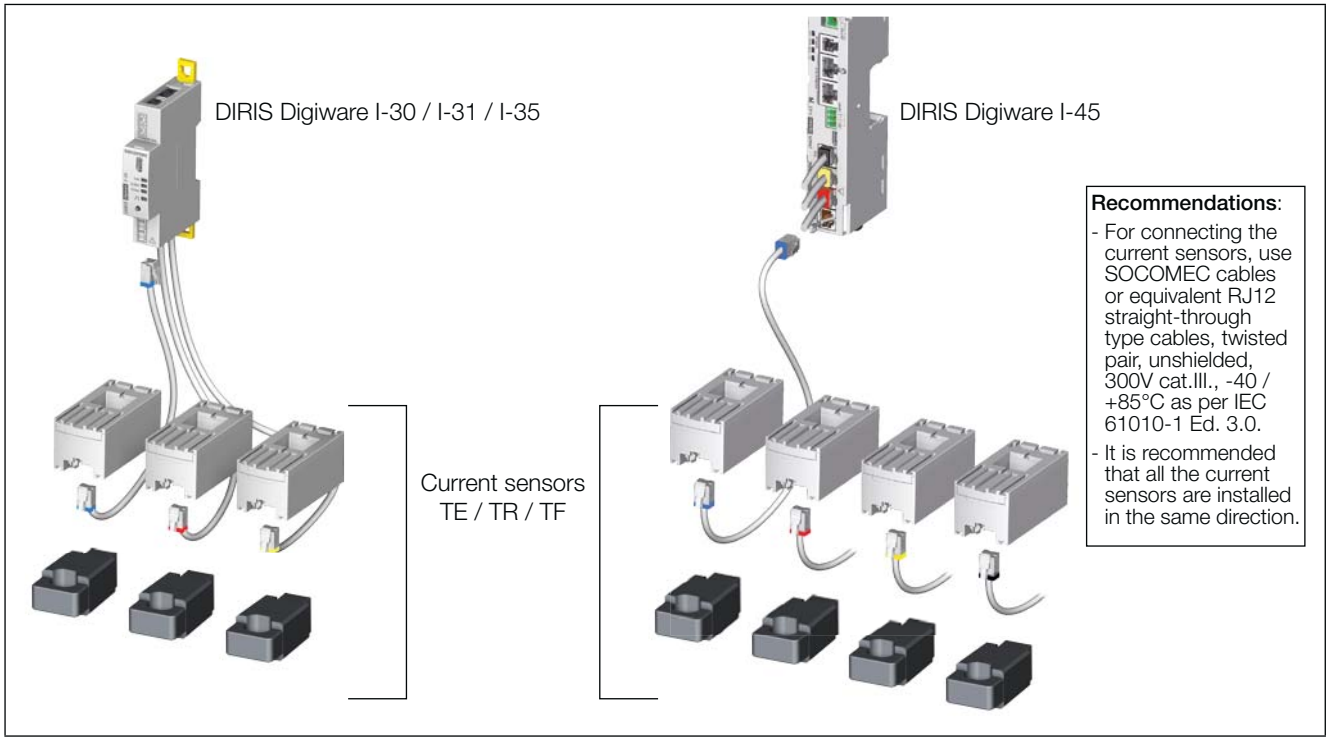
DIRIS Digiware C, U & I-3x



DIRIS Digiware I-45

4.6. Associated current sensors

Different types of current sensor can be combined with the DIRIS Digiware: solid-core (TE), split-core (TR) or flexible (TF). The difference between these sensors means they can be adapted to any type of new, existing or high-current existing installation. They use a special link with the DIRIS Digiware I current measurement module. This link provides a quick connection, with no cabling errors. The rating and type of sensor is recognised by DIRIS Digiware. In addition, combining them means the overall accuracy of the DIRIS Digiware + Current sensor measurement chain can be guaranteed over a large measurement range.



Connection cables for current sensors:

Length (m)	Quantity	Reference
0.1	3	4829 0580
	4	4829 0585
	6	4829 0590
0.2	3	4829 0581
	4	4829 0586
	6	4829 0591
0.3	3	4829 0582
	4	4829 0587
	6	4829 0592
0.5	3	4829 0595
	4	4829 0596
	6	4829 0597
1	3	4829 0583
	4	4829 0588
	6	4829 0593
2	3	4829 0584
	4	4829 0589
	6	4829 0594

If the cables used are equivalent to SOCOMEC cables, ensure the specifications given in the recommendations are observed, and that they are a maximum of 10 metres in length.

4.6.1. TE solid-core current sensors

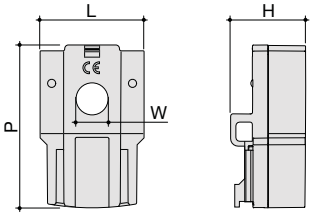
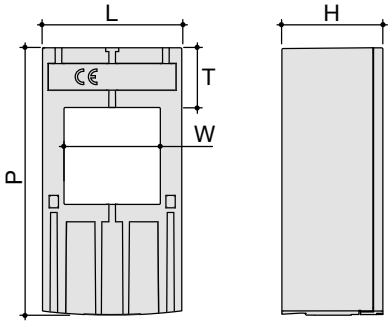
The solid-core current sensors TE are used to set up measurement points in a new or existing installation. They are easy to integrate as they are compact and respect the pitch of the circuit breakers. A wide range of accessories are also available for direct fitting on all type of cabling (cable, flexible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

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

4.6.1.1. Range

						
	TE-18	**TE-18**	**TE-25**	**TE-35**	**TE-45**	**TE-55**
Pitch	18mm	18mm	25mm	35mm	45mm	55mm
I nominal	20A	63A	160A	250A	630A	1000A
Maximum I	24A	75.6A	192A	300 A	756A	1200 A
Reference	4829 0500	4829 0501	4829 0502	4829 0503	4829 0504	4829 0505

4.6.1.2. Dimensions

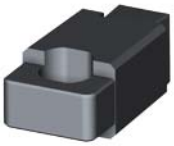
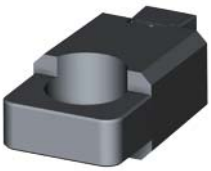
					
Dimensions *in*/mm	**TE-18**	**TE-25**	**TE-35**	**TE-45**	**TE-55**
Pitch	*0.71* 18 (five-point fitting)	*0.98* 25	*1.37* 35	*1.77* 45	*2.16* 55
LxHxD	*1.10 x 0.79 x 1.77* 28 x 20 x 45	*0.98 x 1.28 x 2.56* 25 x 32.5 x 65	*1.37 x 1.28 x 2.79* 35 x 32.5 x 71	*1.77 x 1.28 x 3.38* 45 x 32.5 x 86	*2.16 x 1.28 x 3.93* 55 x 32.5 x 100
Window (W)	*ø 0.33* ø 8.4	*0.53 x 0.53* 13.5 x 13.5	*0.82 x 0.82* 21 x 21	*1.22 x 1.22* 31 x 31	*1.61 x 1.61* 41 x 41
(T)	-	*0.69* 17.5	*0.69* 17.5	*0.77* 19.5	*0.85* 21.5

4.6.2. TR split-core current sensors

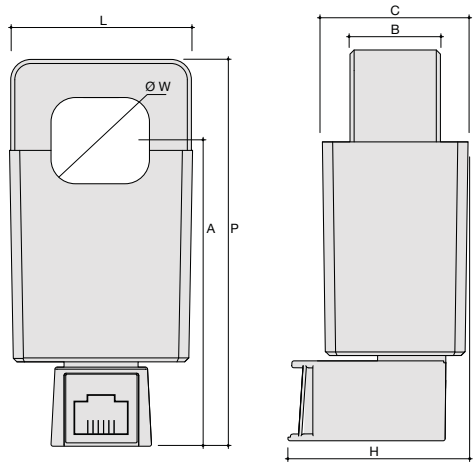
The split-core current sensors TR are used to set up measurement points in a new or existing installation without interfering with its cabling. Thanks to the specific link, they are recognised by the DIRIS Digiware and the overall accuracy of the measurement chain is guaranteed.

4.6.2.1. Range

Four models are available from 75A to 600A to analyse several types of loads.

				
	TR-10	**TR-16**	**TR-24**	**TR-36**
Cable passage diameter	ø10mm	ø16mm	ø24mm	ø36mm
I nominal	75A	100 A	200A	600A
Maximum I	90A	120A	240A	720A
Reference	4829 0551	4829 0552	4829 0553	4829 0554

4.6.2.2. Dimensions



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

4.6.3. TF flexible current sensors

The current sensors TF use the Rogowski principle which enables a large current range to be covered without saturation. Thanks to their stranded construction and their easy opening system, they are simple to install in electrical enclosures. They are particularly suitable for adding measuring points in existing installations and for test campaigns.

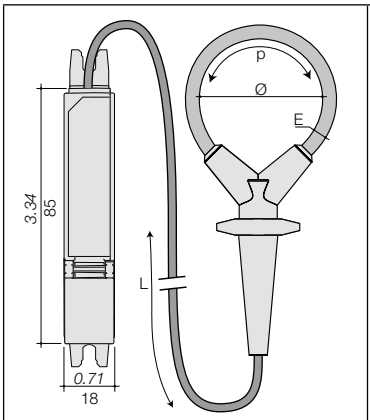
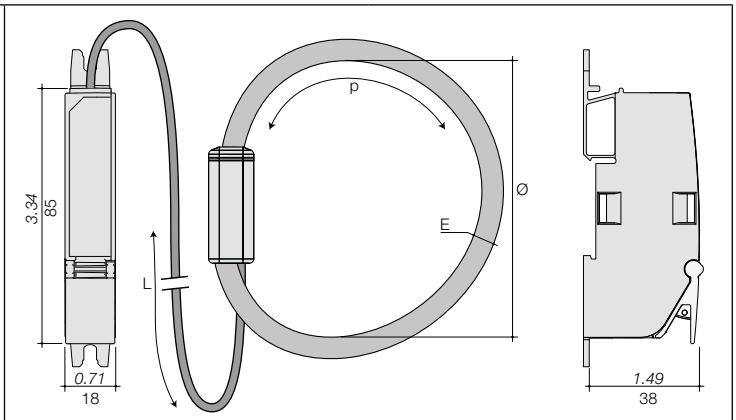
4.6.3.1. Range

Three models are available, covering a large current range up to 6000 A with different size and shape openings.

An integrator will be required to shape the current signal. The specific link allows it to be directly connected to the DIRIS Digiware, which can identify it.

			
	TF-55	**TF-120**	**TF-300**
Loop length	55mm	120mm	300mm
I nominal	600A	2000A	6000A
Reference	4829 0570	4829 0571	4829 0572

4.6.3.2. Dimensions

			
Dimensions *in*/mm	**TR-55**	**TR-120**	**TR-300**
Diameter	*2.16* 55	*4.72* 120	*11.81* 300
p	*6.77* 172	*14.80* 376	*37.08* 942
E	*0.23* 6	*0.43* 11	*0.43* 11
L	*59.05* 1500		

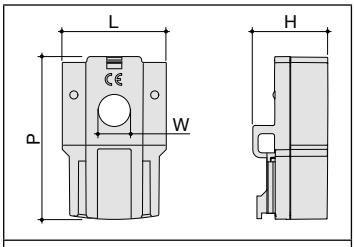
4.6.4. Adapters for 5A sensors

An adapter allows a standard sensor supplying a 5A current to the secondary to be used. When this kind of sensor is used, the overall accuracy of the DIRIS Digiware + sensor is not guaranteed and will depend on the accuracy of the associated sensor (see standard "IEC 61557-12 annex D" for more information).

4.6.4.1. Range

	
	5A adapter
Nom. I	5A
Max. I	6A
Reference	4829 0599

4.6.4.2. Dimensions

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

5. INSTALLATION

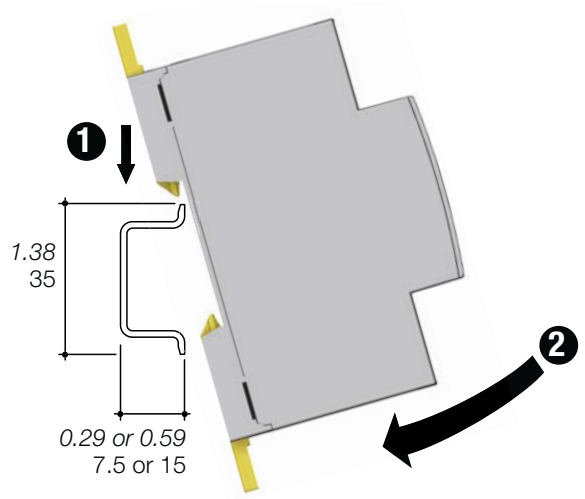
The following paragraphs describe the installation of the DIRIS Digiware and associated sensors.

5.1. Recommendations and safety

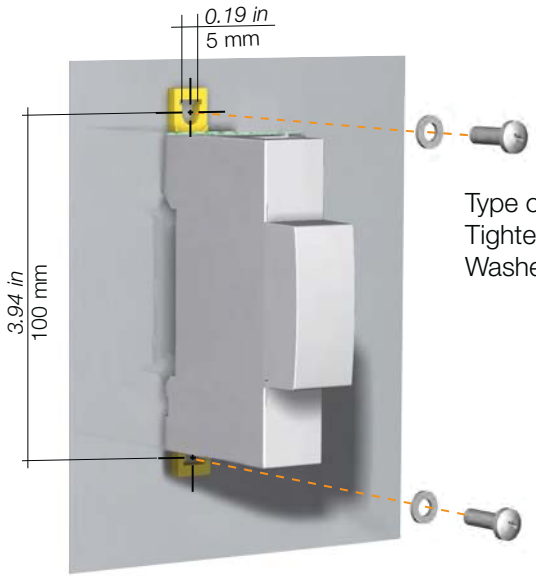
Refer to the safety instructions (section 2. Danger and warning, page 5)

5.2. DIRIS Digiware mounting

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



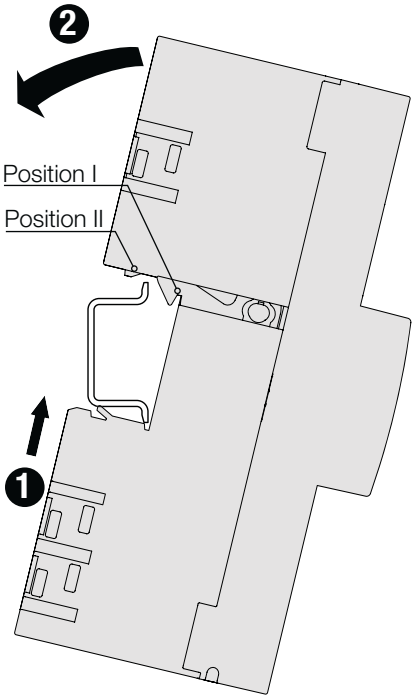
5.2.2. DIRIS Digiware C, U, I-3x - plate mounting

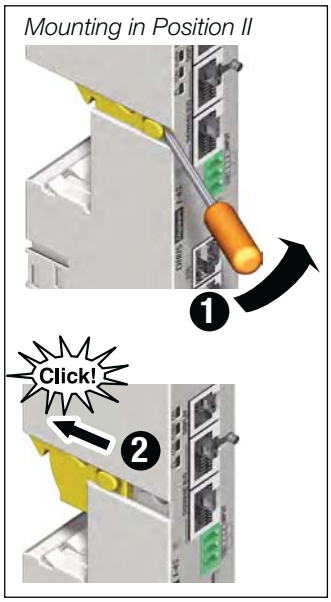


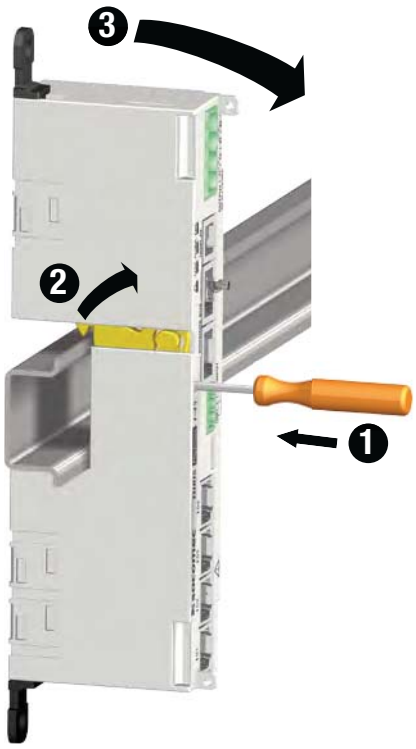
Type of screw: M4
Tightening torque: 0.5 Nm
Washer: maximum Ø *0.47in*/12mm

5.2.3. DIRIS Digiware I-45 - DIN rail mounting

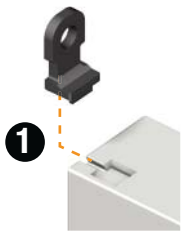
DIRIS Digiware I-45 mounting	DIRIS Digiware I-45 dismounting
Two mounting positions are possible: Position I (factory mounting) : for rail 15mm. Position II : for rail 7.5 mm	



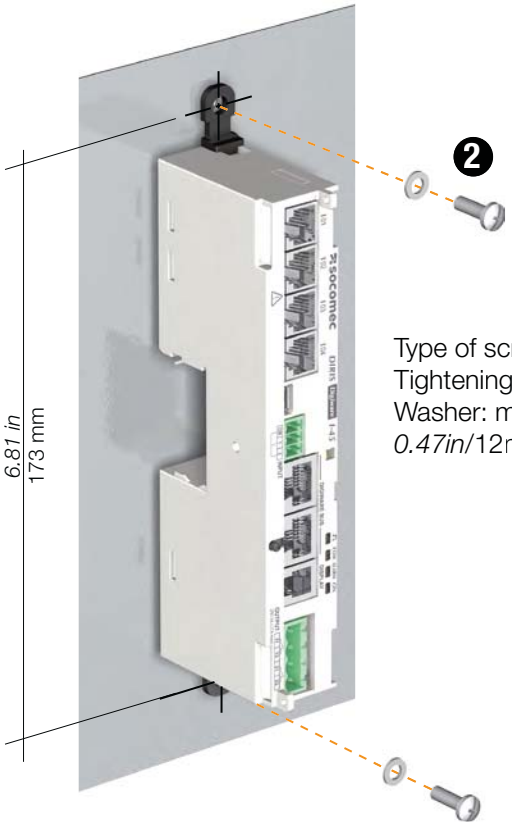




5.2.4. DIRIS Digiware I-45 - DIN rail mounting



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



Type of screw: M4
Tightening torque: 0.5 Nm
Washer: maximum Ø *0.47in*/12mm

5.3. Installing TE solid-core sensors

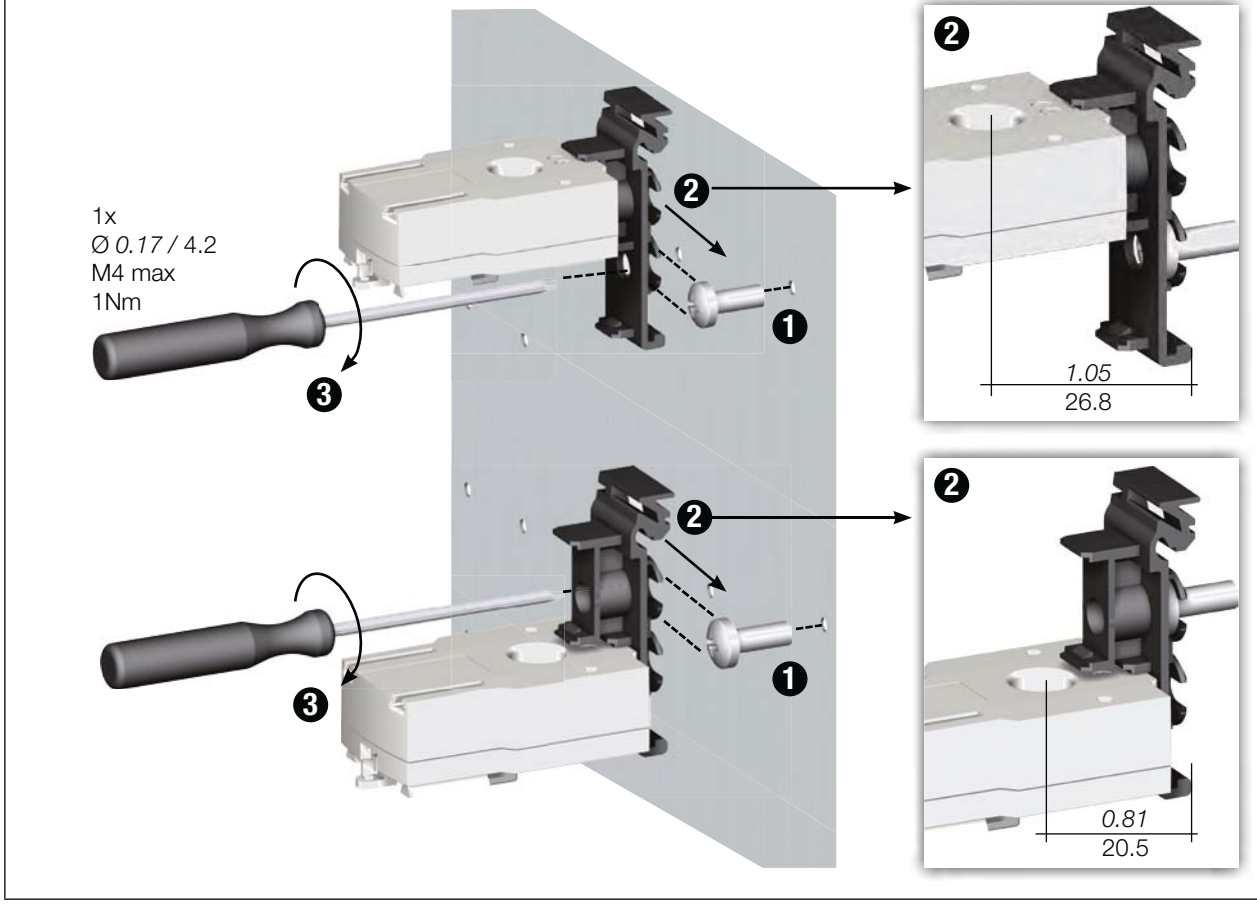
5.3.1. Mounting accessories

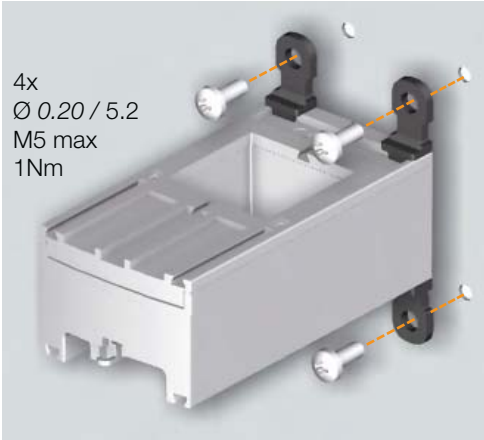
The list of mounting accessories supplied with the sensors are listed below:

						
Reference		**Pitch**	DIN rail and base plate mounting	DIN rail mounting	Base plate mounting	Busbar mounting
4829 0500 4829 0501	**TE-18**	**18 mm**	x 1			
4829 0502	**TE-25**	**25 mm**		x 2	x 4	
4829 0503	**TE-35**	**35 mm**		x 2	x 4	x 2
4829 0504	**TE-45**	**45 mm**		x 2	x 4	x 2
4829 0505	**TE-55**	**55 mm**		x 2	x 4	x 2

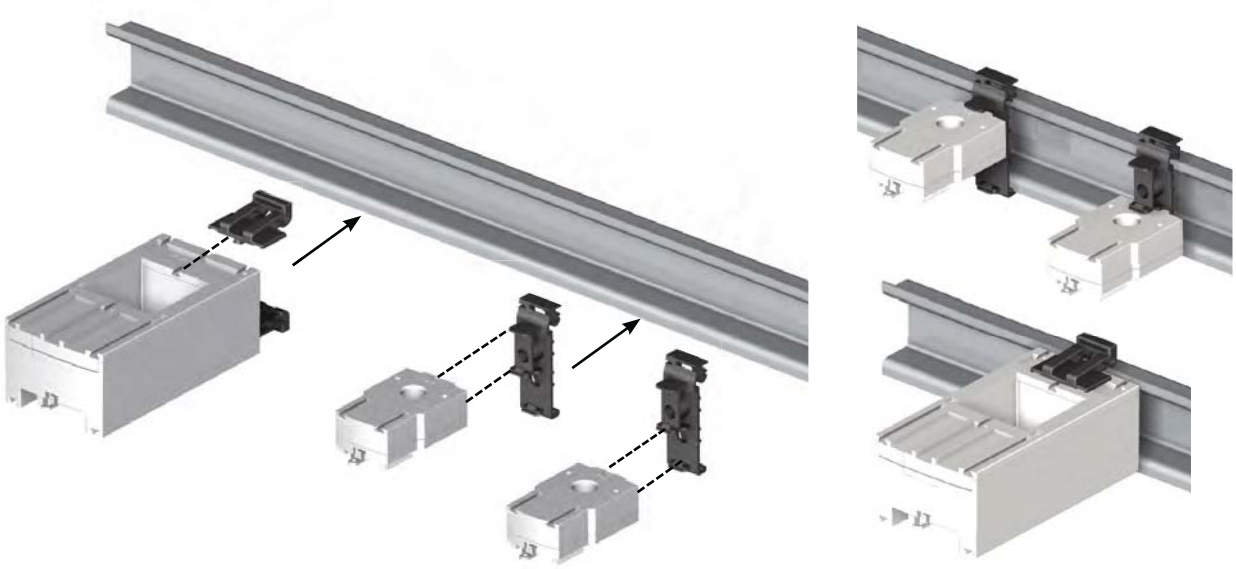
5.3.2. Base-mounting

TE-18

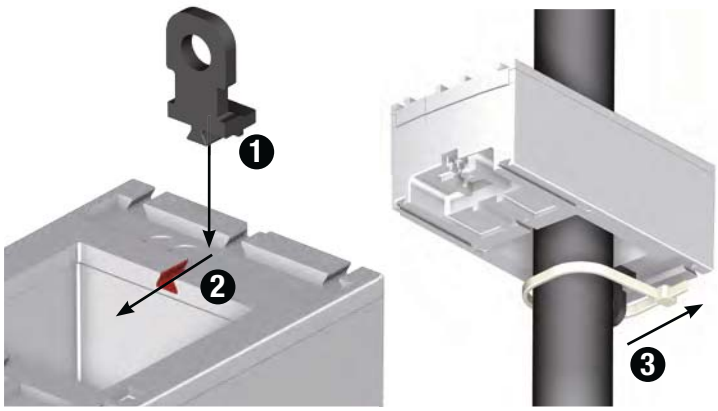


TE-25 - > TE-55


5.3.3. DIN rail mounting

TE-18 - > TE-55


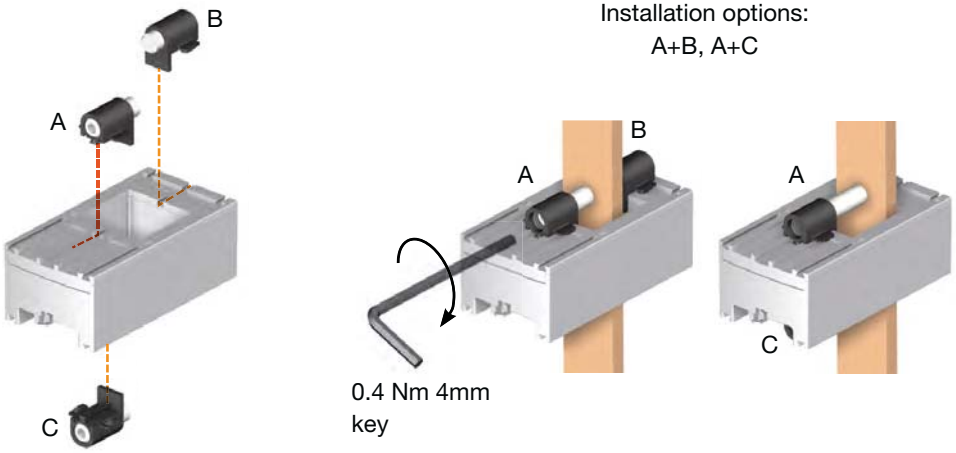
5.3.4. Cable mounting

TE-18	TE-25 - > TE-55
	

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

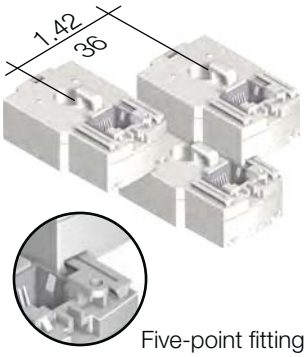
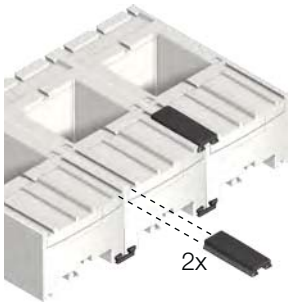
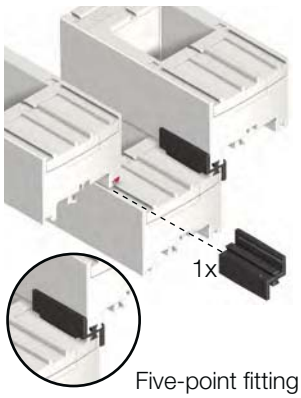
5.3.5. Busbar mounting

TE-35 - > TE-55



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

5.3.6. Grouping the sensors

TE-18	**TE-25 - > TE-55**	**TE-35 - > TE-55**
 Five-point fitting	 In-line fitting	 Five-point fitting

5.3.7. Sensors accessories

Mounting accessories for sensor combination:

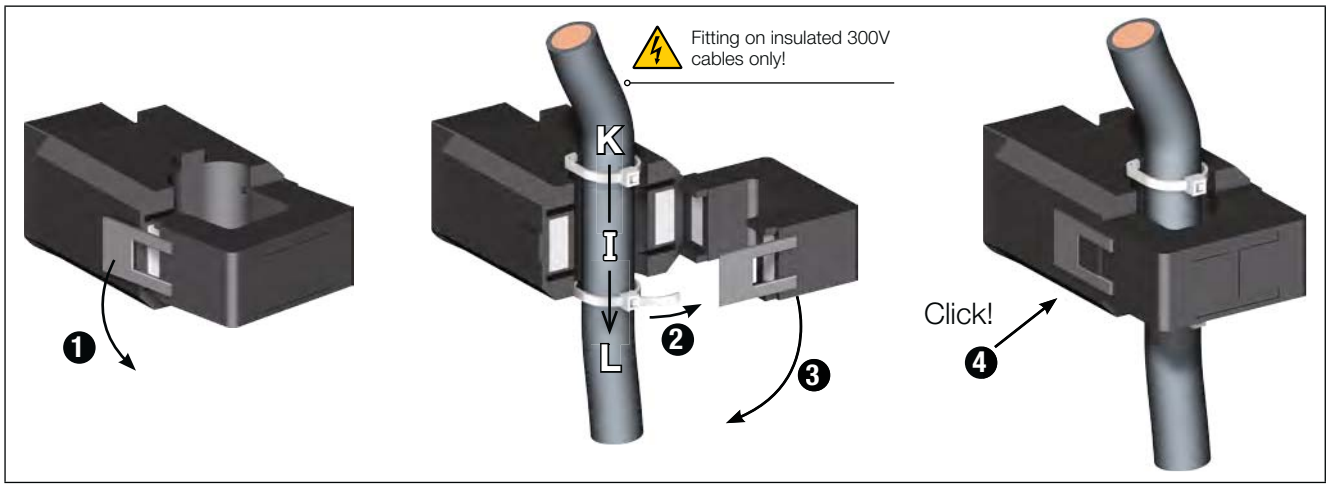
		
Reference	Splice plate for aligned mounting	Mounting in quincunx
4829 0598	x30	

Sealing accessories for sensors:

Reference	Sealing case for terminal
4829 0600	x20

5.4. Installing TR split-core sensors

5.4.1. Cable

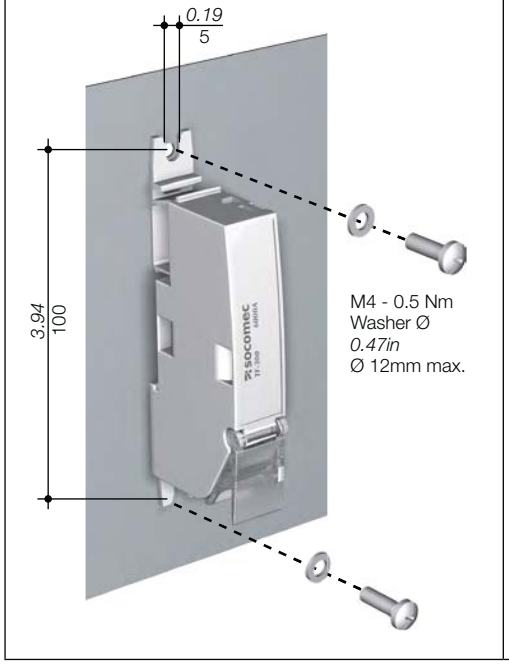
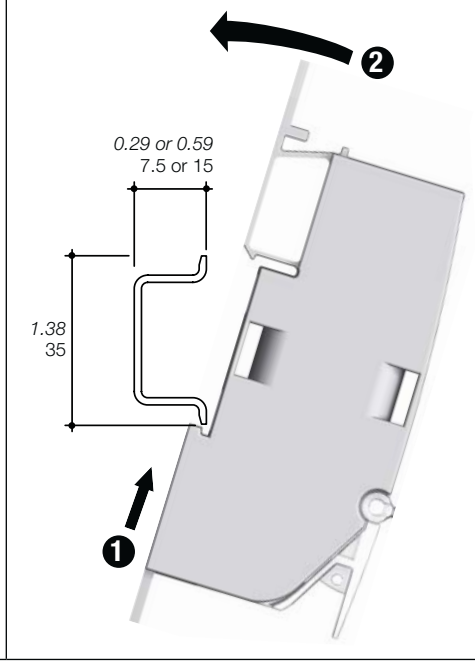


	Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash. Ref. IEC 61010-2-032

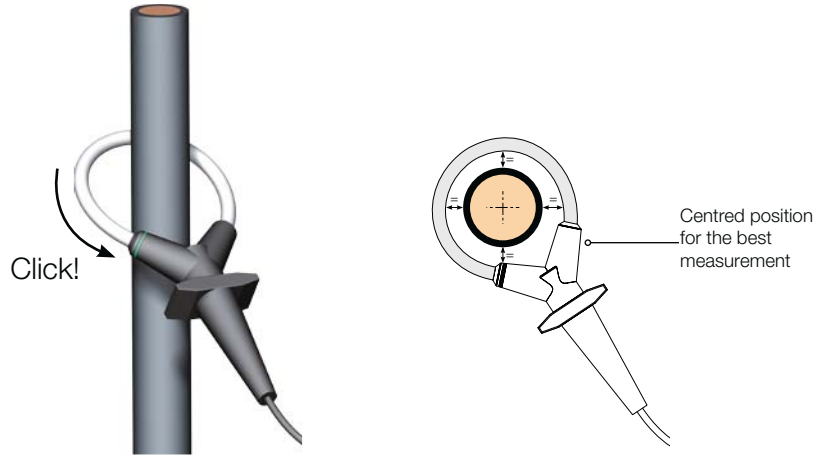
	Before closing the TR sensor, check that the air gap is clean (no contamination or corrosion)

5.5. Installing TF Rogowski stranded sensors

5.5.1. Installing the integrator

Plate	DIN rail	Frame
		

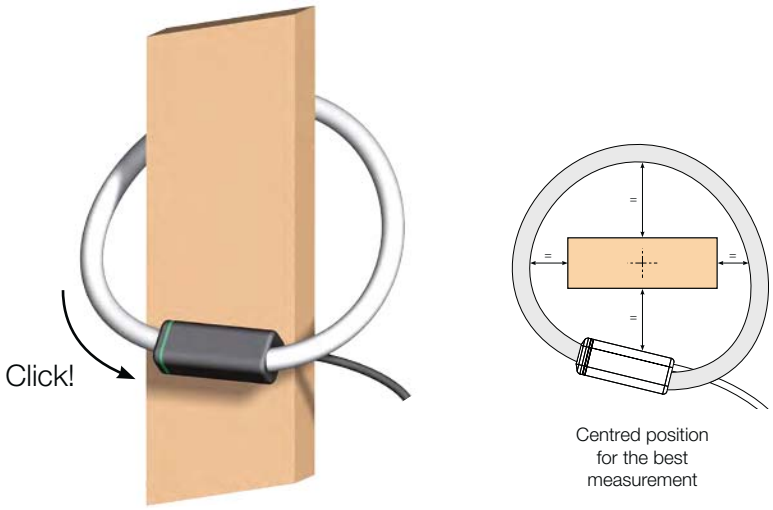
5.5.2. Cable



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

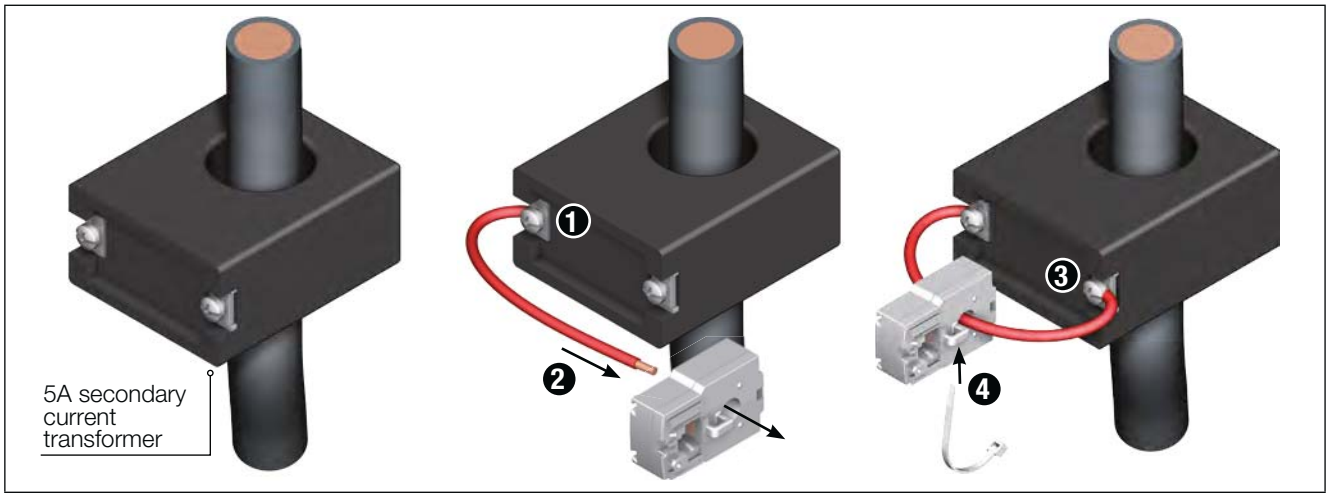
5.5.3. Busbar



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

Ref. IEC 61010-2-032

5.6. Installing the 5A adapter

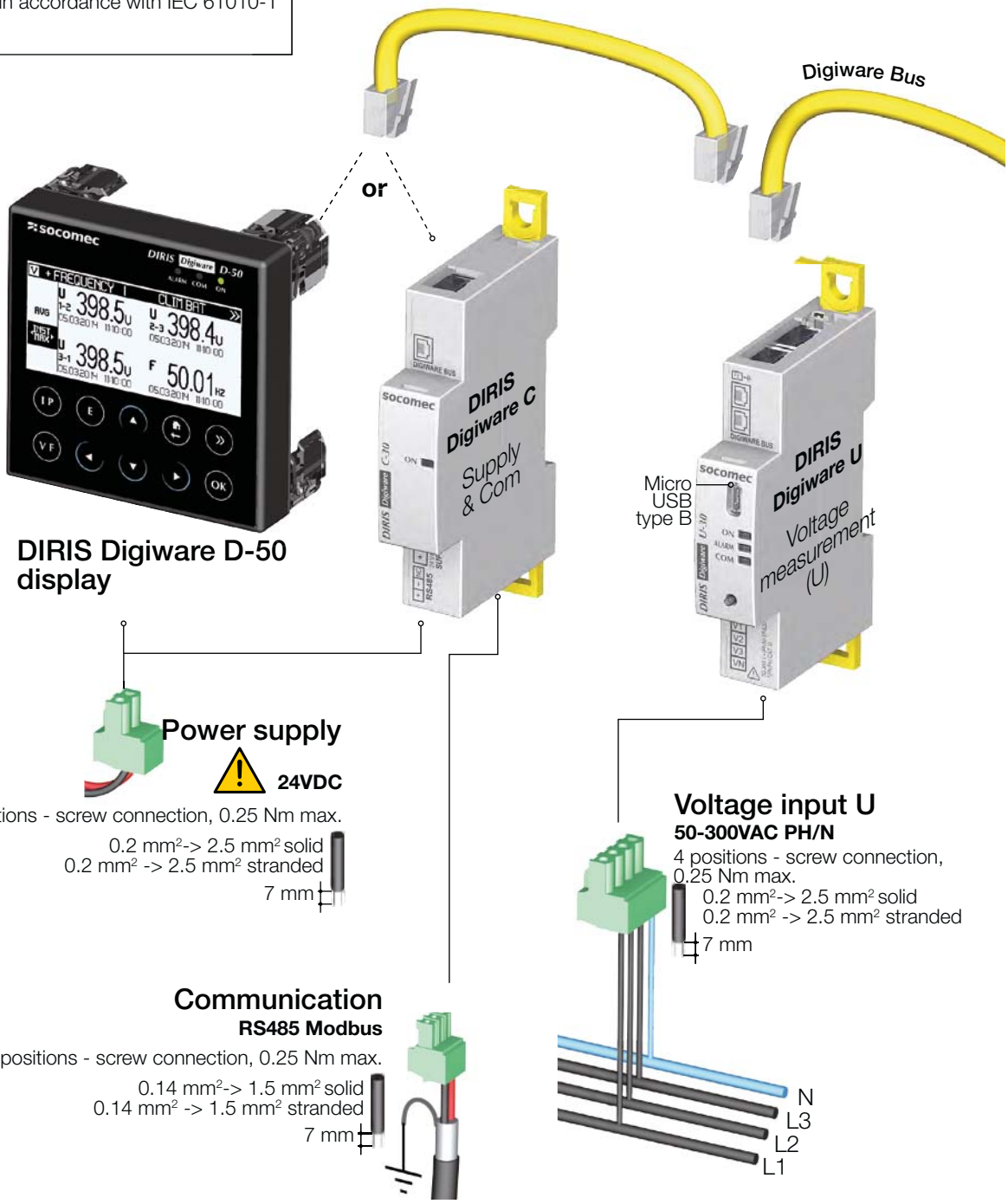


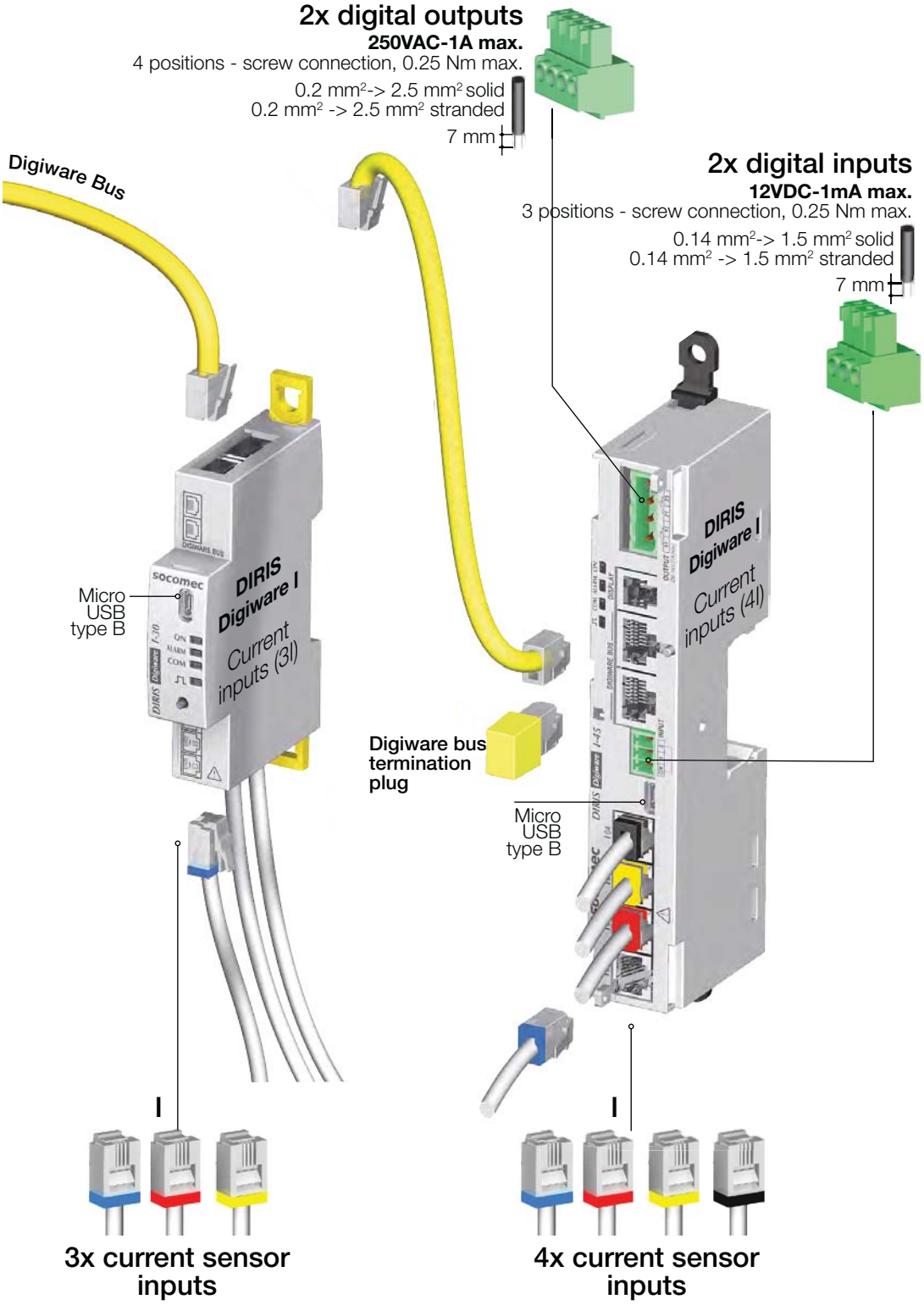
Do NOT clamp or pull out NON-INSULATED conductors carrying DANGEROUS VOLTAGE which could cause an electric shock, burn or arc flash.
Ref. IEC 61010-2-032

6. CONNECTION

6.1. Description of the terminals

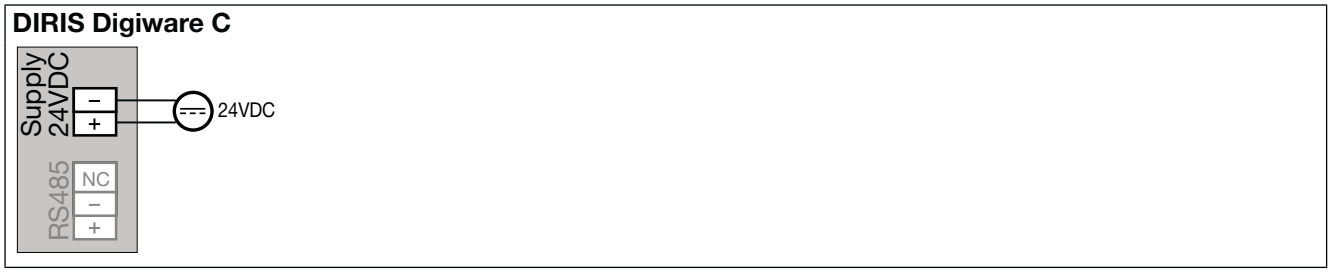
Recommandation: Use a SOCOMEC Digiware Bus cable or equivalent RJ45 straight-through type, twisted pair, unshielded, AWG24, 300V cat. III., -40 / +85°C in accordance with IEC 61010-1 Ed. 3.0.




2x digital outputs
250VAC-1A max.
4 positions - screw connection, 0.25 Nm max.
0.2 mm²-> 2.5 mm² solid
0.2 mm² -> 2.5 mm² stranded
7 mm
Digiware Bus
2x digital inputs
12VDC-1mA max.
3 positions - screw connection, 0.25 Nm max.
0.14 mm²-> 1.5 mm² solid
0.14 mm² -> 1.5 mm² stranded
7 mm
Micro USB type B
DIRIS Digiware I
Current inputs (3I)
Digiware bus termination plug
Micro USB type B
DIRIS Digiware I
Current inputs (4I)
I
I
3x current sensor inputs
4x current sensor inputs

6.2. Connecting and sizing the power supply

The DIRIS DIGIWARE are supplied by a single 24V power point via the DIRIS Digiware C system interface module.



A 230V/24V power supply is available: in a 15 W version.

Sizing of the power supply

Product	Power supplied (W)	Power consumed (W)
Power supply		
P15 230V/24V Reference: 48290120	15	
Cables		
50-metre package		1.5
System interface		
DIRIS Digiware C-31		0.8
Display		
DIRIS Digiware D-50		2
Voltage acquisition module		
DIRIS Digiware U-10		0.72
DIRIS Digiware U-30		0.72
Current acquisition module		
DIRIS Digiware I-30		0.52
DIRIS Digiware I-31		0.52
DIRIS Digiware I-35		0.52
DIRIS Digiware I-45		1.125

For example, it is possible to use a P15 230V/24 transformer:

- With 1x DIRIS Digiware D-50 display, 1x U-10 / U-30 voltage acquisition module and 50 metres of cables

and

- 20x DIRIS Digiware I-30 / I-31/ I-35 modules

or

- 8x DIRIS Digiware I-45 modules

It is also possible to use a P15 230V/24 transformer:

- Without a DIRIS Digiware D-50 display, 1x C-31 system interface, 1x U-10 / U-30 voltage acquisition module and 50 metres of cables

and

- 22x DIRIS Digiware I-30 / I-31/ I-35 modules

or

- 9x DIRIS Digiware I-45 modules

6.3. Loads and network connection

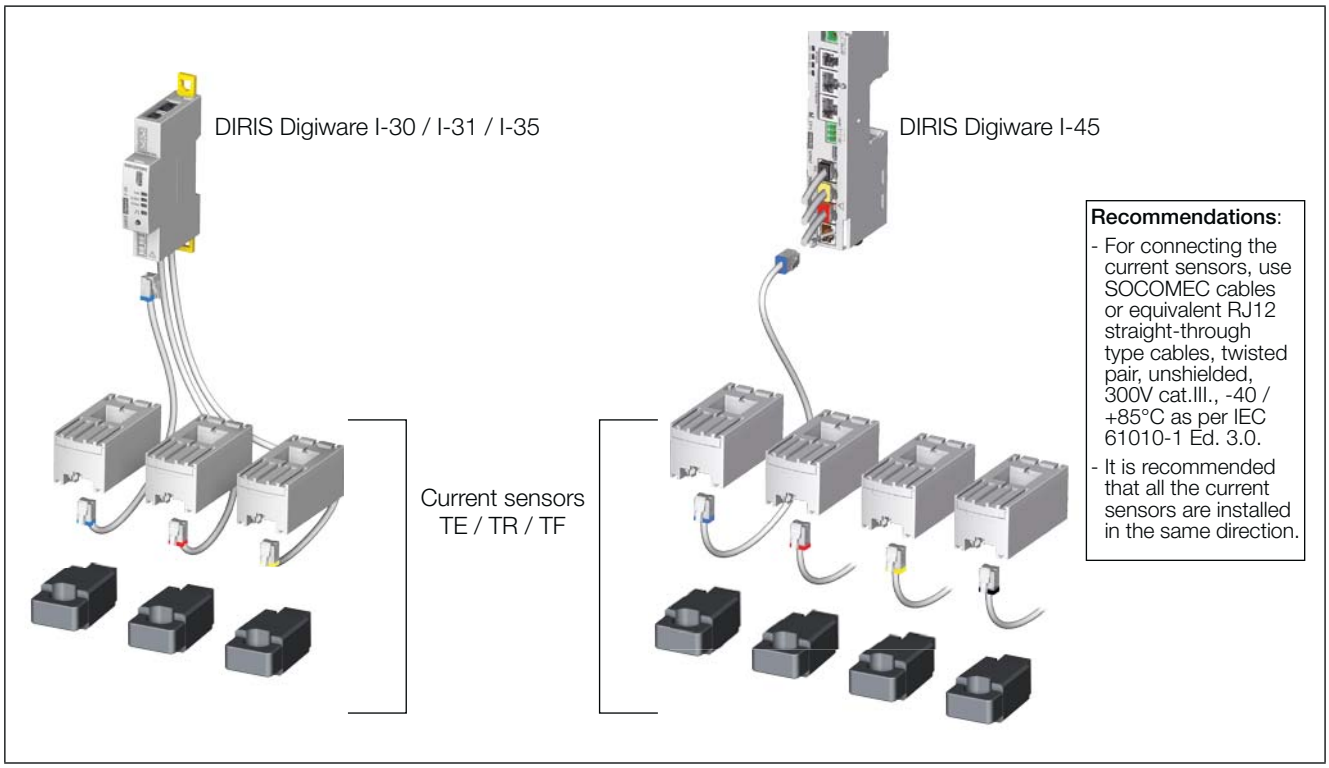
The DIRIS Digiware can be used on single-phase, two-phase or three-phase networks.

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

The loads are measured using several types of current sensor (solid-core, split-core, Rogowski) selected depending on the new, existing or high-current existing application. The link between each DIRIS Digiware I current acquisition module and its associated sensors is made using specific cables. This connection enables rapid, tool-free installation, with no risk of a cabling error, in complete safety, and also offer automatic detection of the connected sensor.

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

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



6.3.1. Configurable loads based on the type of network

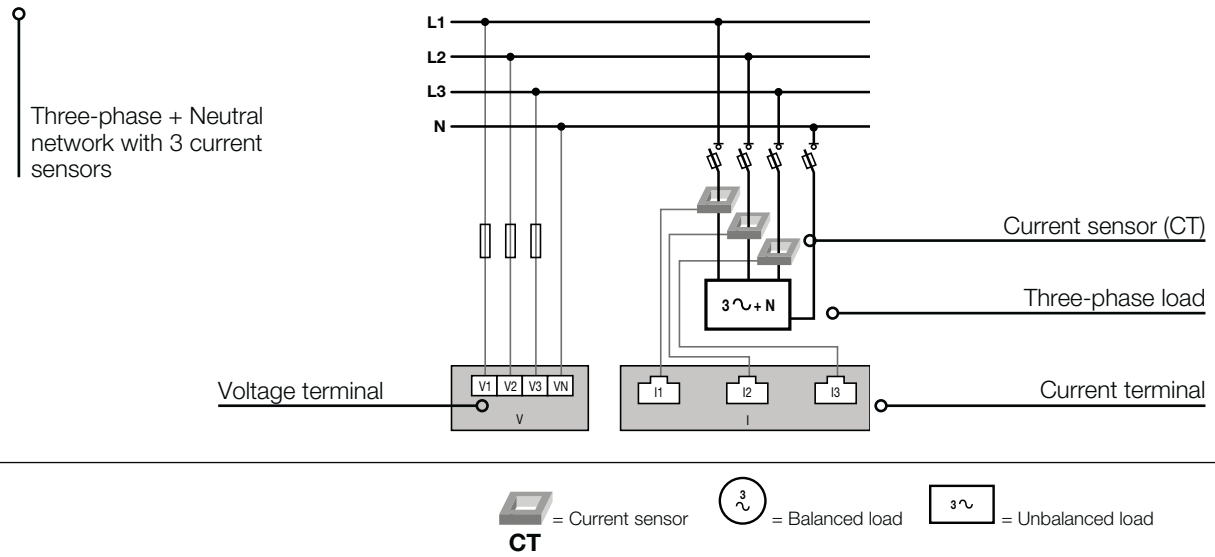
The following table summarises the loads which can be configured based on the installation's type of network

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

6.3.2. Description of the main network and load combinations

Key:

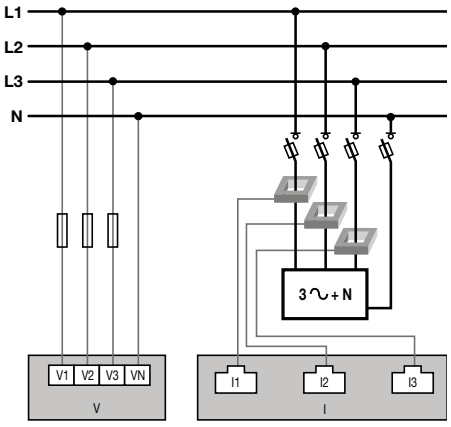
3P+N – 3CT



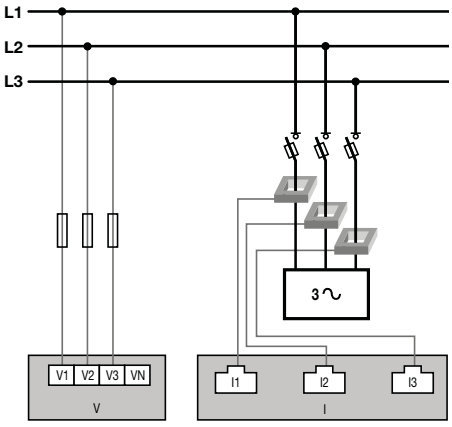
Each current input is individual; see below for some examples of connections:

6.3.2.1. DIRIS Digiware I-30 / I-31 / I-35

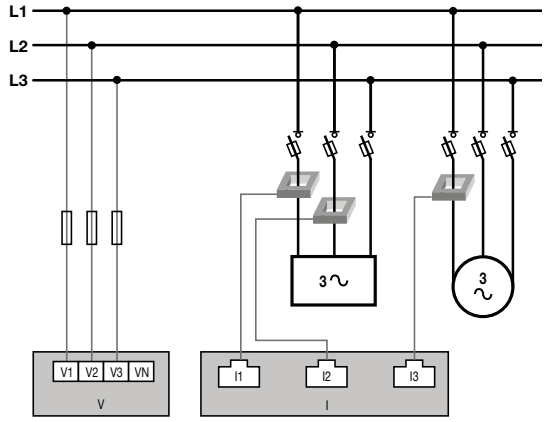
Three-phase + Neutral
3P+N - 3CT (1 three-phase load + measured Neutral)



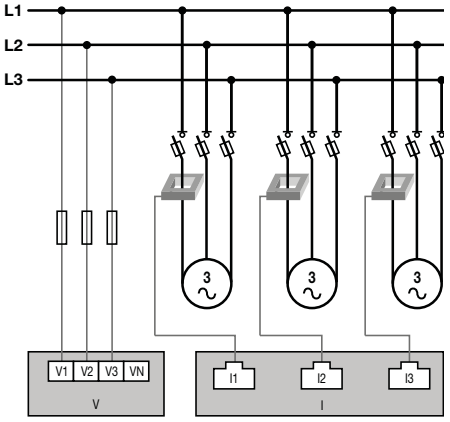
Three-phase
3P – 3CT (1 three-phase load)



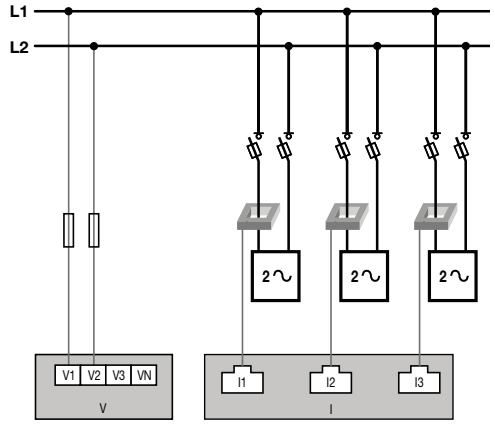
Three-phase
3P – 2CT & 3P – 1CT
(1 three-phase load and 1 three-phase balanced load)



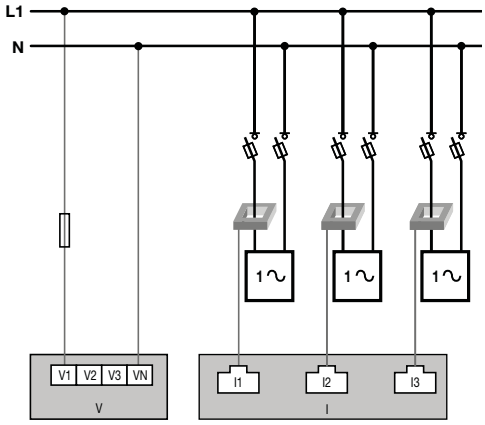
Three-phase
3P – 1CT (x3)
(3 three-phase balanced loads)



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



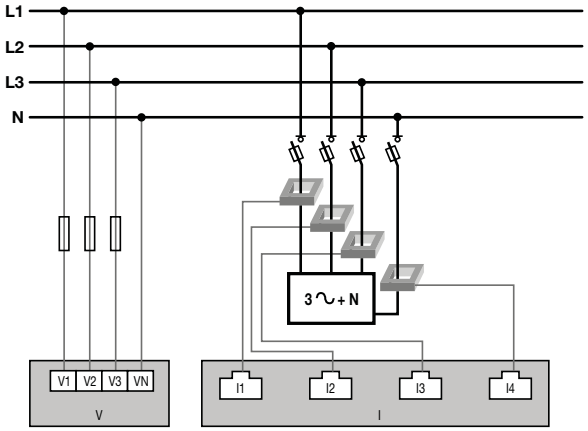
Single-phase
1P+N – 1CT (x3)
(3 single-phase loads)



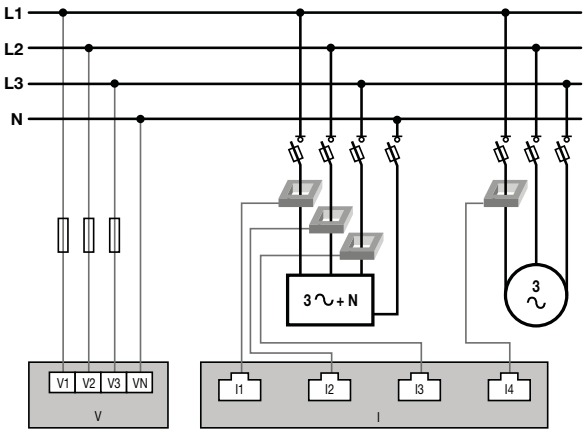
Fuse: 0.5 A gG / BS 88 2A gG / 0.5 A class CC

6.3.2.2. DIRIS Digiware I-45

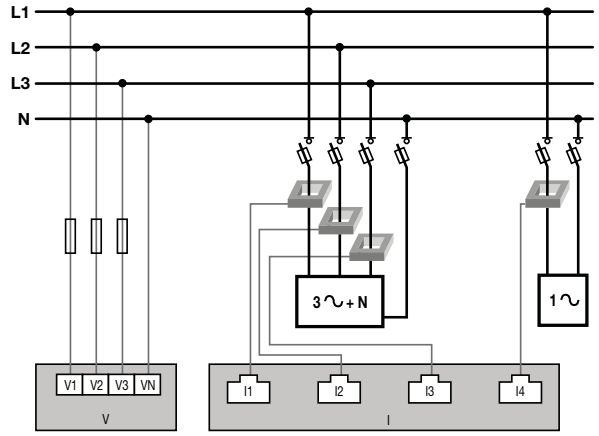
Three-phase + Neutral
3P+N – 4CT (1 three-phase load + measured Neutral)



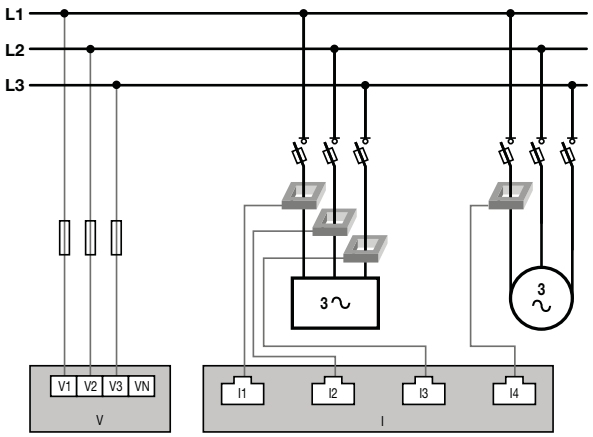
Three-phase + Neutral
3P+N – 3CT & 3P – 1CT
(1 three-phase load + calculated Neutral
+ 1 three-phase balanced load)



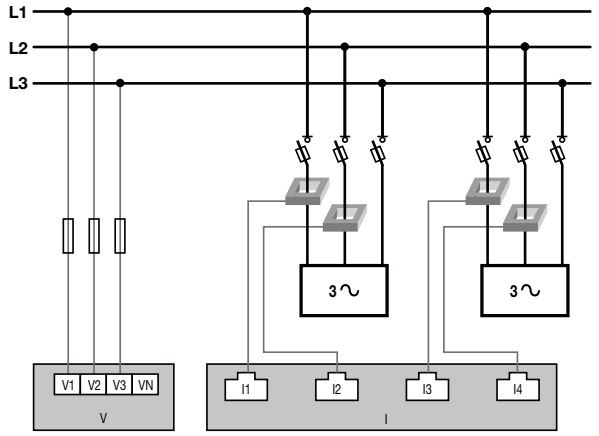
Three-phase + Neutral
3P+N – 3CT & 1P+N – 1CT
(1 three-phase load + calculated Neutral
+ 1 single-phase load)



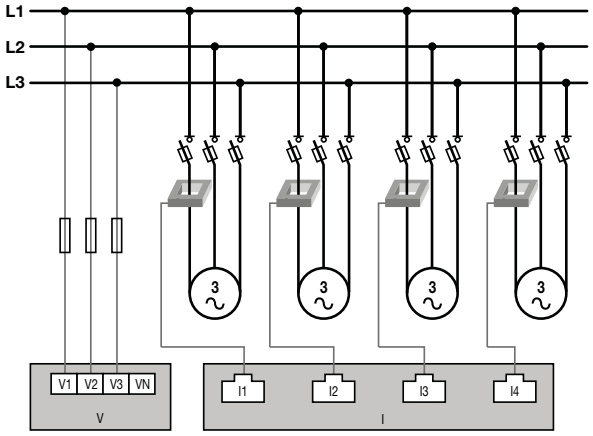
Three-phase
3P – 3CT & 3P – 1CT
(1 three-phase load + 1 three-phase balanced load)



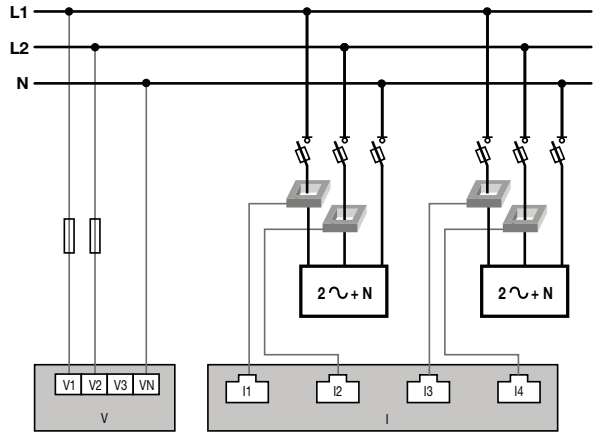
Three-phase
3P – 2CT (x2)
(2 three-phase loads)



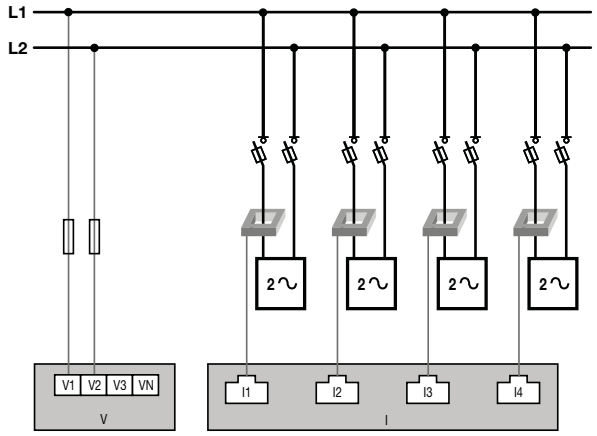
Three-phase
3P – 1CT (x4)
(4 three-phase balanced loads)



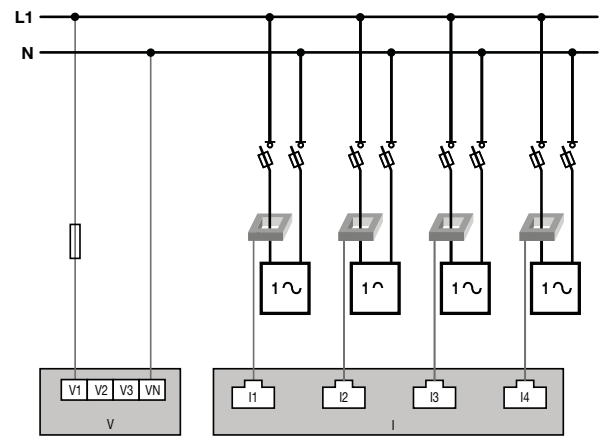
Two-phase + Neutral
2P+N – 2CT (x2)
(2 two-phase loads)



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



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



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

Notes relating to connections:

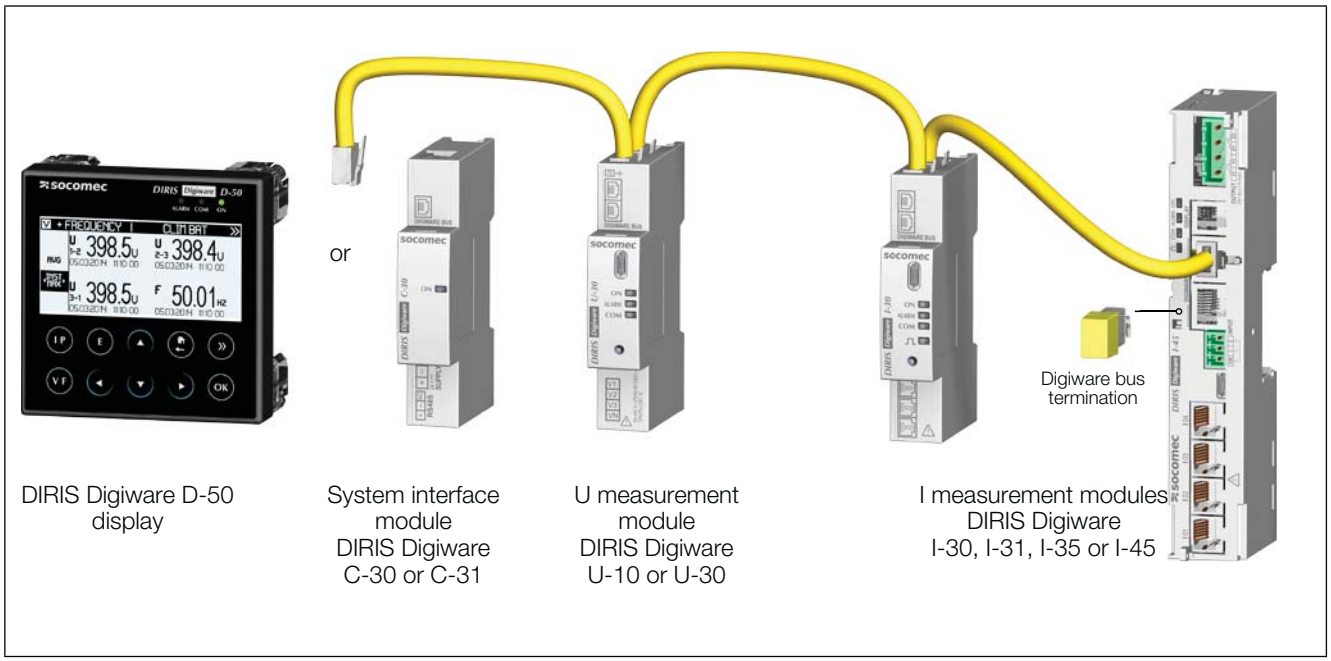
*In three-phase, this connection reduces the accuracy of the phases, the current for which is worked out by vector calculation, by 0.5%.

**3P+N – 1CT or 3P – 1CT: these connections require a three-phase network that is perfectly balanced.

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

6.4. Digiware Bus connection

6.4.1. Connection concept



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

- One DIRIS Digiware D-50 remote display or one DIRIS Digiware C-30 or C-31 system interface module
- One DIRIS Digiware U-10 or U-30 voltage measurement module
- One or several DIRIS Digiware I-30, I-31, I-35 or I-45 current measurement modules
- One Digiware Bus termination (ref. 4829 0180) plugged on the last current module. It's provided with the DIRIS Digiware D-50 display and the DIRIS Digiware C-30 or C-31 systeme interface module

6.4.2. Digiware Bus connection cables

Length (m)	Quantity	reference
0.1	1	4829 0181
0.5	1	4829 0182
1	1	4829 0183
2	1	4829 0184

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

If the cables used are equivalent to SOCOMEC cables, ensure the specifications given in the recommendations in section "6.1. Description of the terminals, page 26) are observed, and that they are a maximum of 100 metres in length.

6.4.3. Digiware bus termination

	Quantity	reference
	1	4829 0180

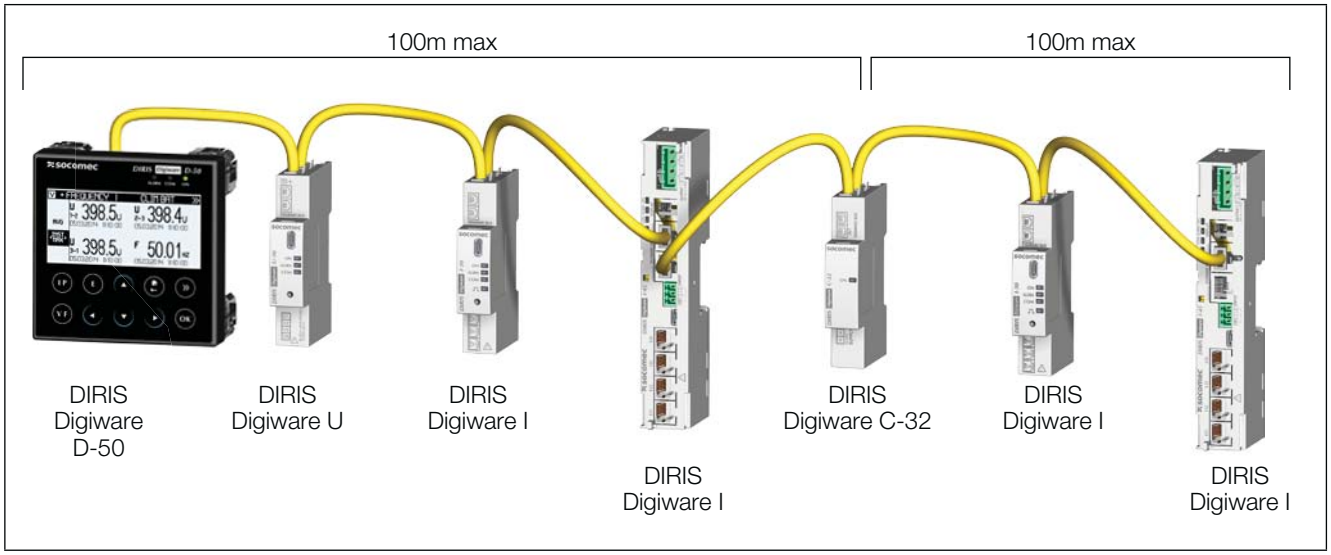
6.4.4. Using a Digiware bus repeater

A repeater must be used when the installation requires a long Digiware bus length (> 100 m) to connect one or several current measurement modules at a distance from the module measuring the voltage or if the power of the supply is not sufficient for the number of current modules connected. (see section "6.2. Connecting and sizing the power supply, page 28). Up to 2 DIRIS Digiware C-32 repeaters can be used.

Example: > 32 DIRIS Digiware I-3x or > 16 DIRIS Digiware I-45.

	
	DIRIS Digiware C-32 Repeater
Reference	4829 0103

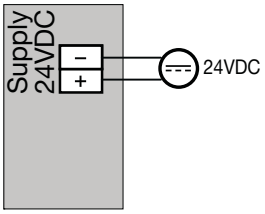
Configuration example:



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

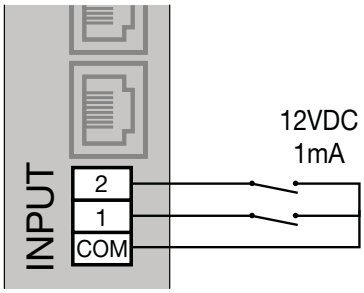
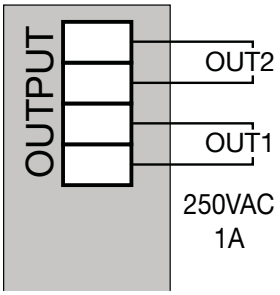
The repeater has a 24VDC power supply.

DIRIS Digiware C-32



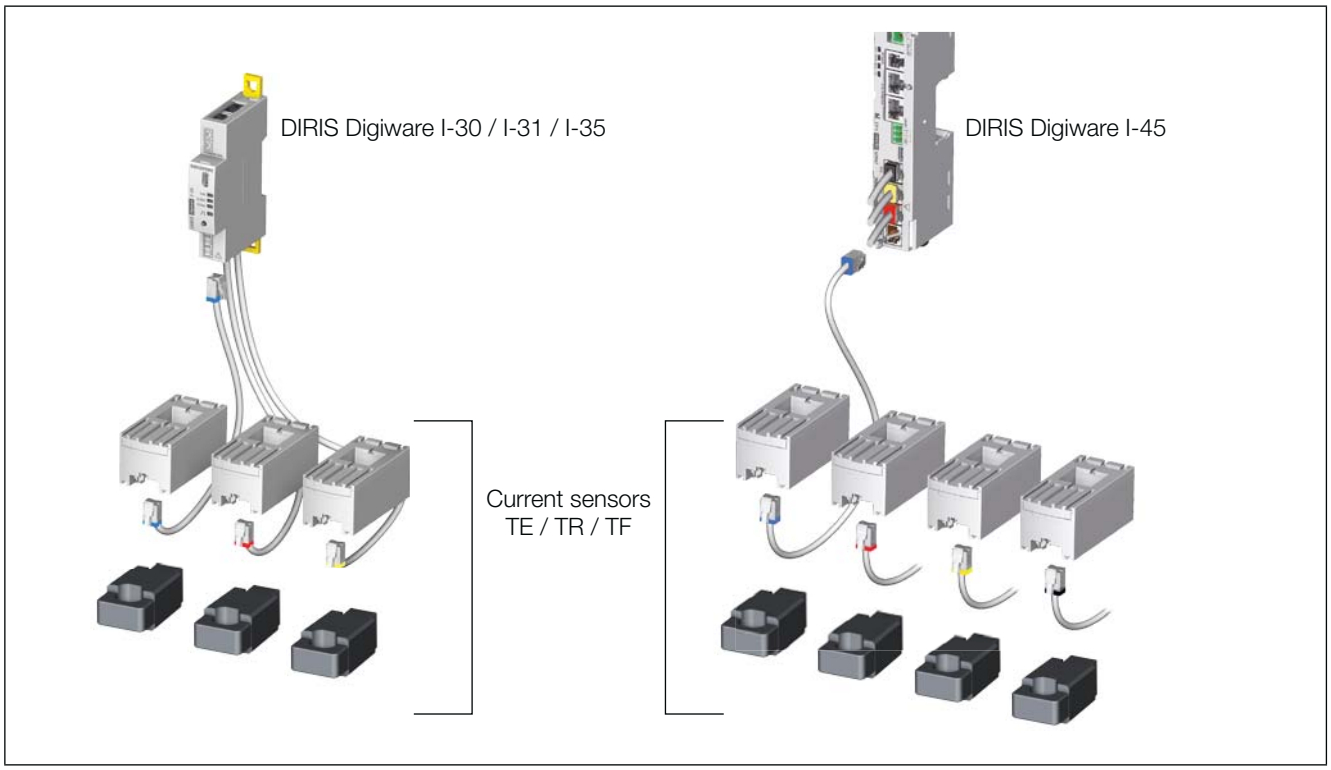
6.5. Connecting the inputs/outputs

2 logic inputs/outputs are available on the DIRIS Digiware I-45.

Inputs	Outputs
	

6.6. Connecting the current sensors

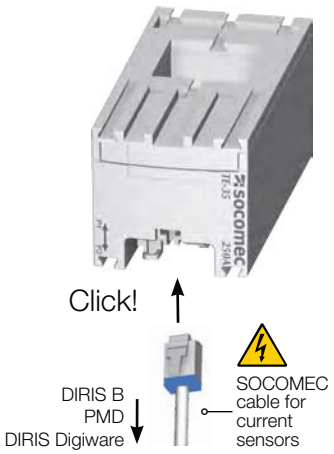
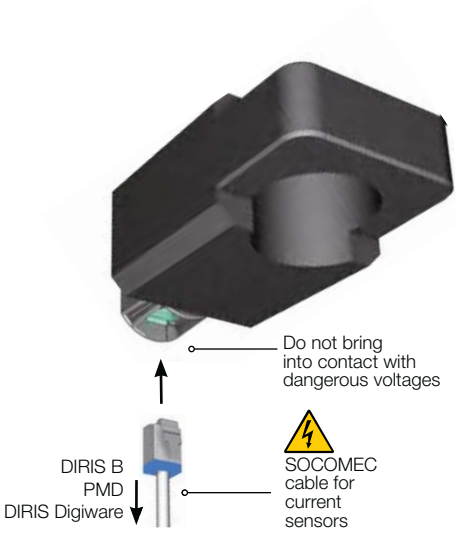
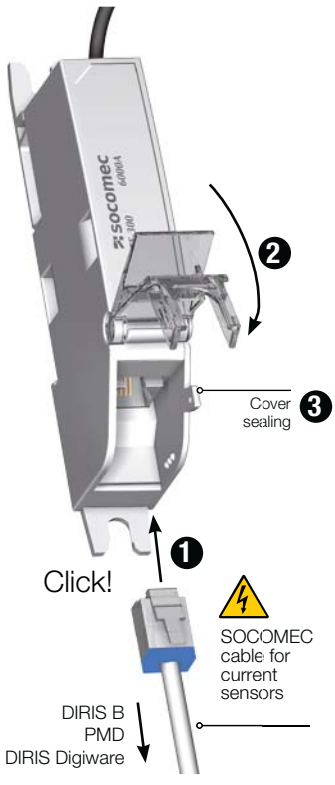
6.6.1. Connection concept



Recommendations:

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

6.6.2. Detail of the connections for each current sensor

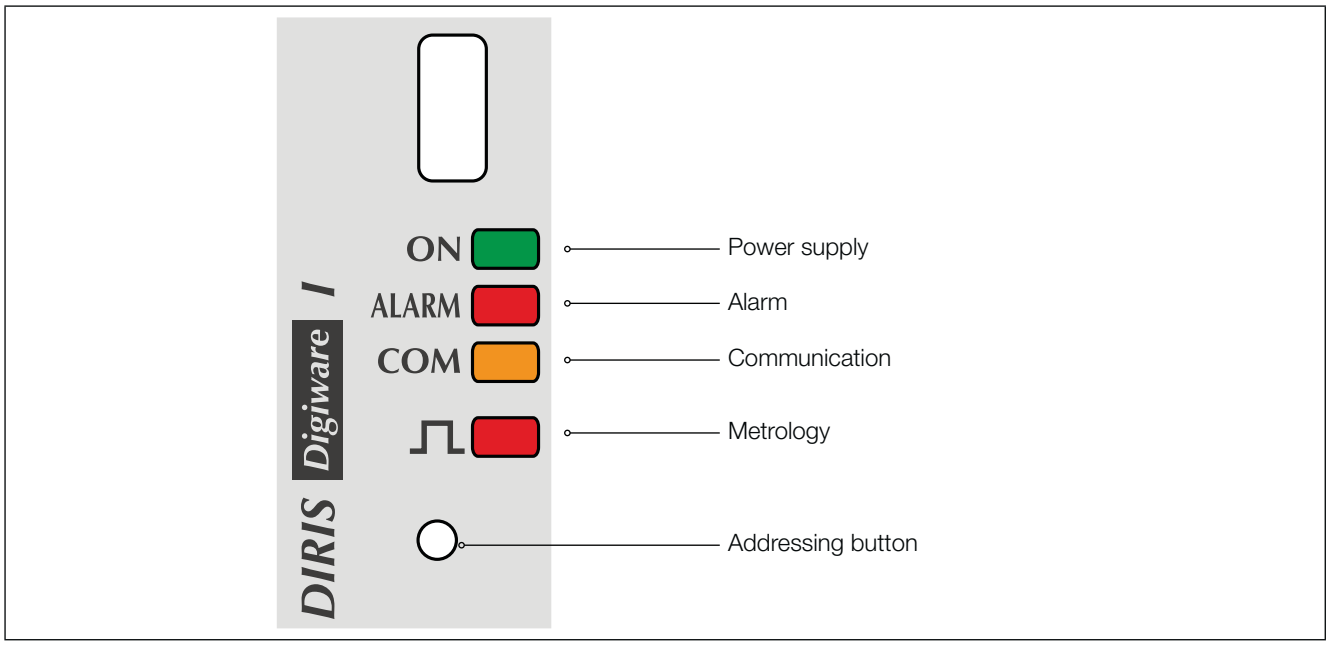
TE	TR	TF
		

7. STATUS AND AUTO-ADDRESSING LEDS

7.1. Status LEDs

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

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



LED status	Fixed	Blinking	Pulse
ON	In operation	10 seconds - On request via a Modbus control to identify the device (remote screen, ...)	1 second to start-up
ALARM	An alarm (logic/analogue…) is active (takes priority if there is a set-up alarm at the same time)	At least one set-up alarm is active (current sensor disconnected, V/I not compatible, …)	1 second to start-up
COM	Addressing problem.	Address OK	1 second to start-up and when a frame received is processed
⎍	-	-	Corresponds to the metrological pulse weight

7.2. Auto-addressing

The auto-addressing mode is used to automatically allocate the addresses to the products connected to the DIRIS G-30, G-40, G-50 and G-60 gateways and to the DIRIS Digiware D-50 remote display. This mode is only compatible with DIRIS B-30 and DIRIS Digiware type PMDs. The addresses will be allocated manually on the other PMD (DIRIS A) and meters (COUNTIS).

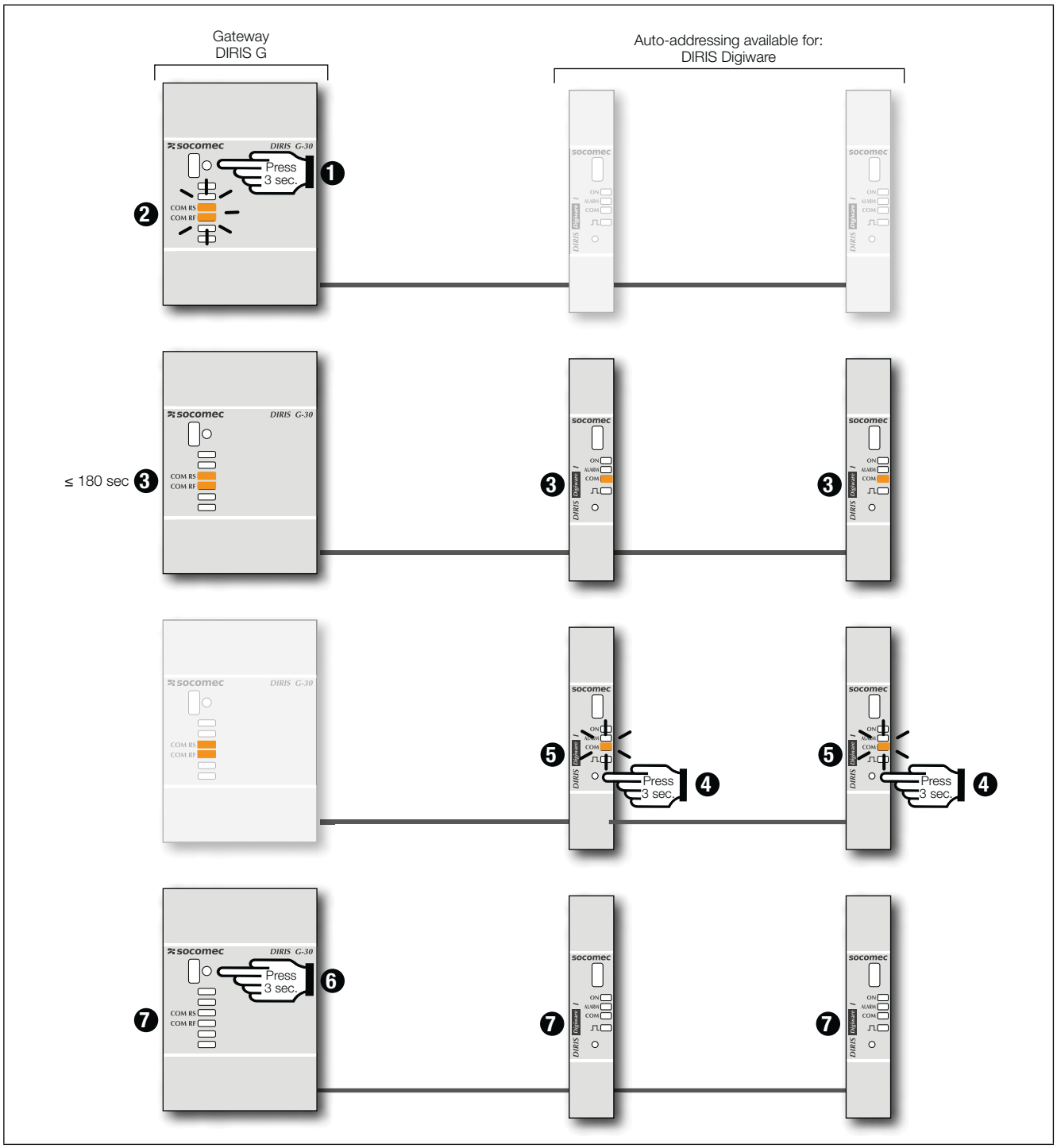
Three modes are available:

- Mode 1 - Auto-detection and automatic addressing
- Mode 2 - Auto-detection and choices of addresses
- Mode 3 - Auto-detection and choices of addresses based on the serial number

Mode 1 is manual (see description below).

Modes 2 and 3 are carried out from a PC equipped with Easy Config. These 2 modes are described in the Easy Config manual.

Description of mode 1



⚠	The DIRIS Digiware U and DIRIS Digiware I modules benefit from auto-addressing mode. They are always connected to the DIRIS G gateway via a DIRIS Digiware C module. When a DIRIS Digiware D-50 remote display is used, it replaces the DIRIS G gateway for auto-addressing.

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

8. COMMUNICATION

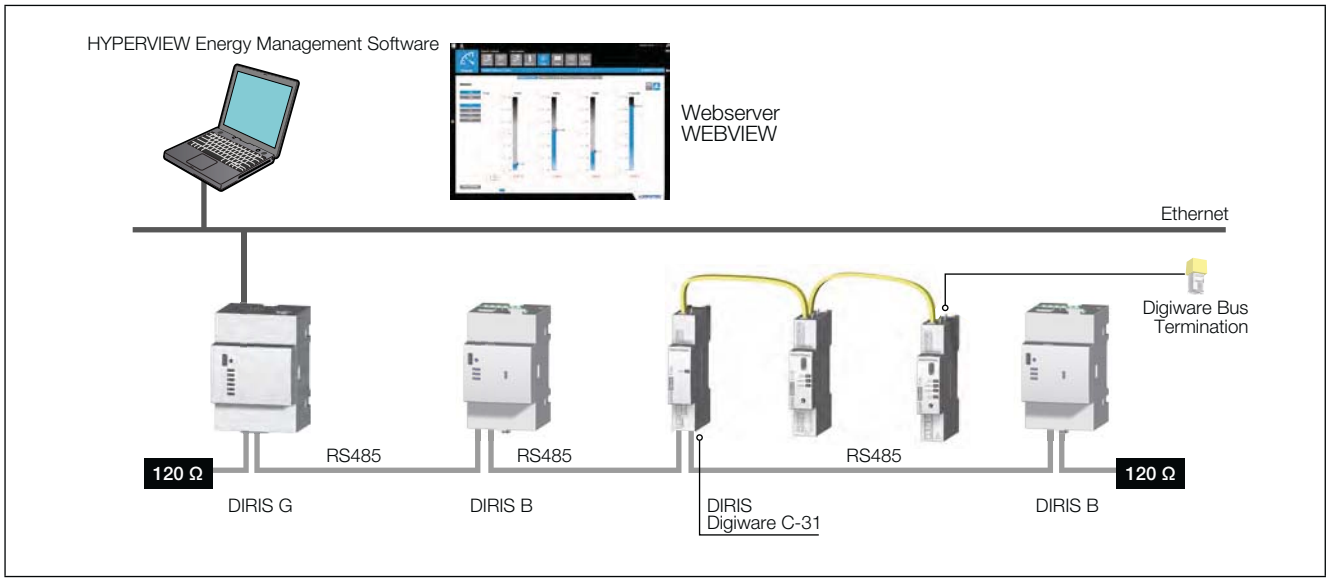
8.1. General information

The DIRIS Digiware communicates via RS485 using the Modbus protocol. RS485 communication is available at a single point either on the DIRIS Digiware D-50 display or on the DIRIS Digiware C-30 or C-31 system interface module. It takes place via an RS485 serial link (2- or 3-wire) in accordance with the Modbus RTU protocol.

With the RS485 link, the DIRIS Digiware can be directly connected to a PC, a PLC or to the G30, G40, G50 and G60 gateways (see the corresponding manual for more details) to exploit the data.

The Modbus protocol requires a dialogue with a master/slave structure. The mode of communication is the RTU (Remote Terminal Unit). In a standard configuration, an RS485 link enables the interconnection of 32 products to a PC, a PLC or the gateway over a distance of 1200 metres.

Example of architecture in combination with the DIRIS G gateway:



8.2. General rules

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

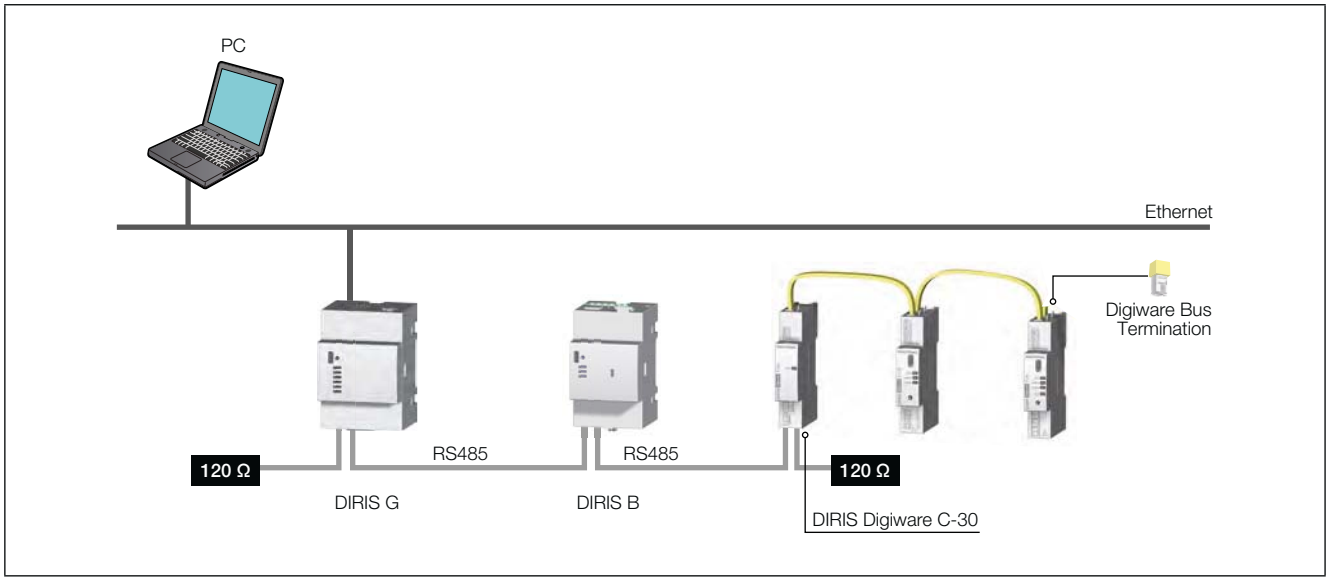
8.2.1. Connection with the DIRIS Digiware C-30 system interface module

In an RS485 link, the DIRIS Digiware C-30 system interface module will always be placed at the end of the RS485 link.

The following rules must be observed:

- A 120 Ω resistor must be added at the start of the RS485 link
- A 120 Ω resistor must be added at the end of the RS485 link
- A termination must be added at the end of the Digiware bus.

Connection example:



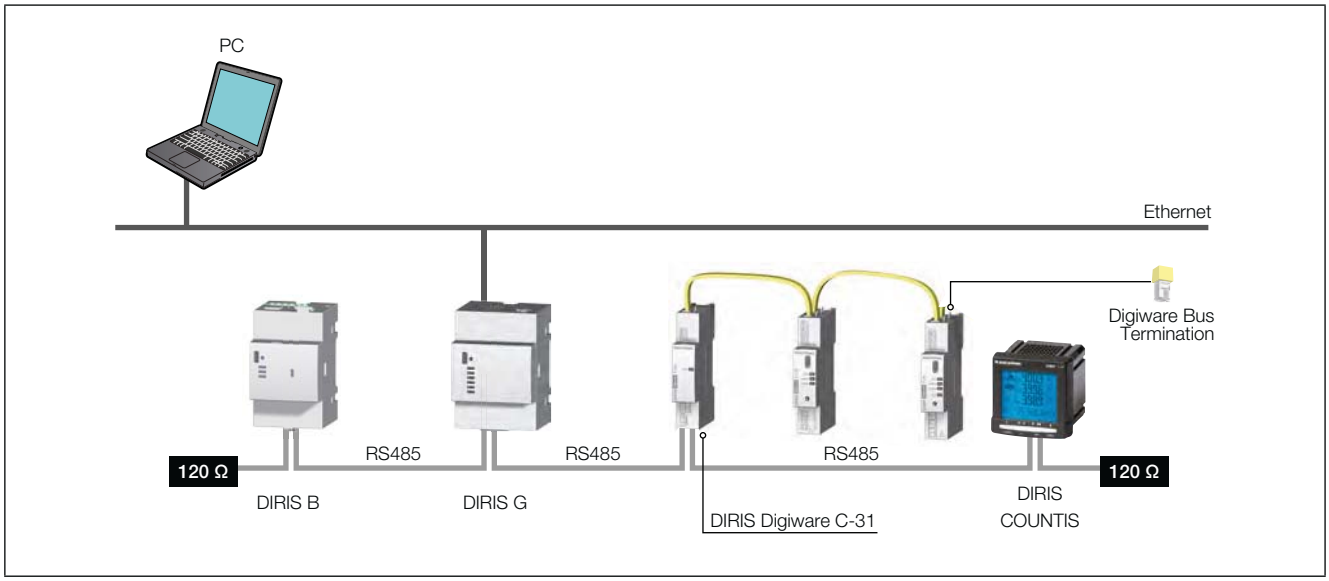
8.2.2. Connection with the DIRIS Digiware C-31 system interface module

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

The following rules must be observed:

- A 120 Ω resistor must be added at the start of the RS485 link
- A 120 Ω resistor must be added at the end of the RS485 link
- A termination must be added at the end of the Digiware bus.

Connection example:



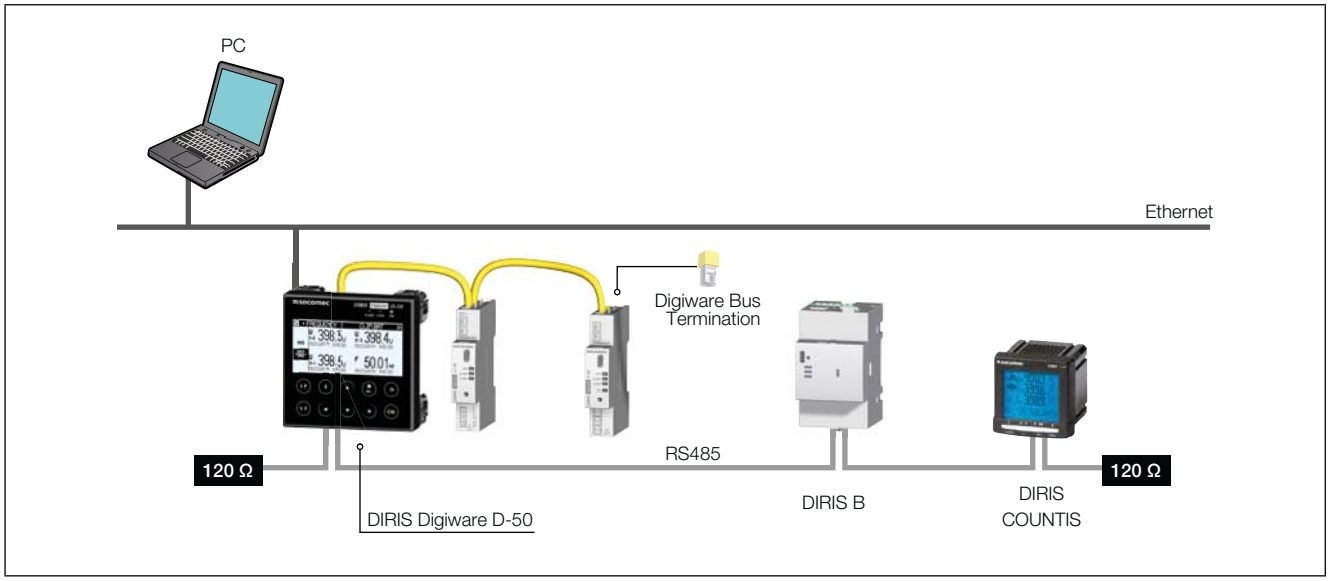
8.2.3. Connection with the DIRIS Digiware D-50 remote display

In a RS485 link, a DIRIS Digiware D-50 remote display is used as a gateway and enables a connection with the DIRIS Digiware bus and the RS485 bus.

The following rules must be observed:

- A 120 Ω resistor must be added at the start of the RS485 link
- A 120 Ω resistor must be added at the end of the RS485 link
- A termination must be added at the end of the Digiware bus.

Connection example:



8.3. Communication tables

The communication tables and associated explanations can be found on the documentations page for the DIRIS Digiware on the SOCOMEC website at the following address:
www.socomec.com/en/diris-digiware

9. CONFIGURATION

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

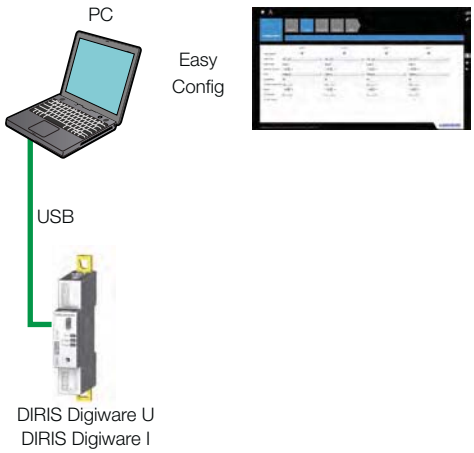
If the DIRIS Digiware is combined with the G30, G40, G50 or G60 gateway, it can be configured via this and the Ethernet port or USB.

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

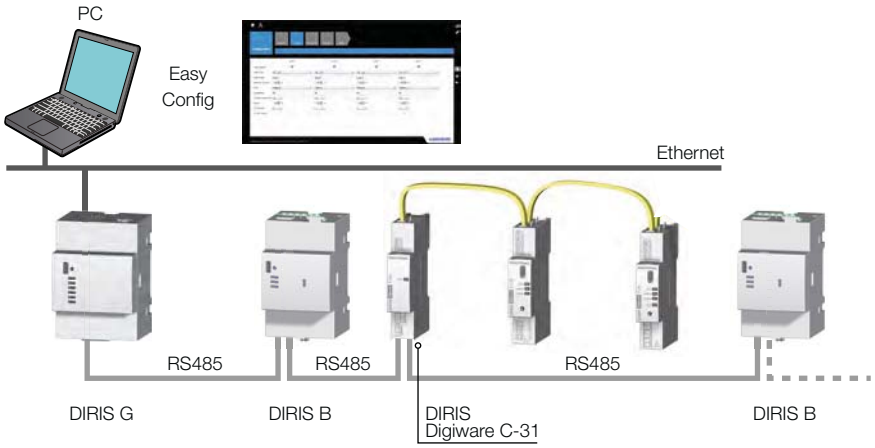
9.1. Configuration using Easy Config

9.1.1. Connection modes

Configuration using Easy Config directly (USB)



Configuration using Easy Config via the gateway (Ethernet)

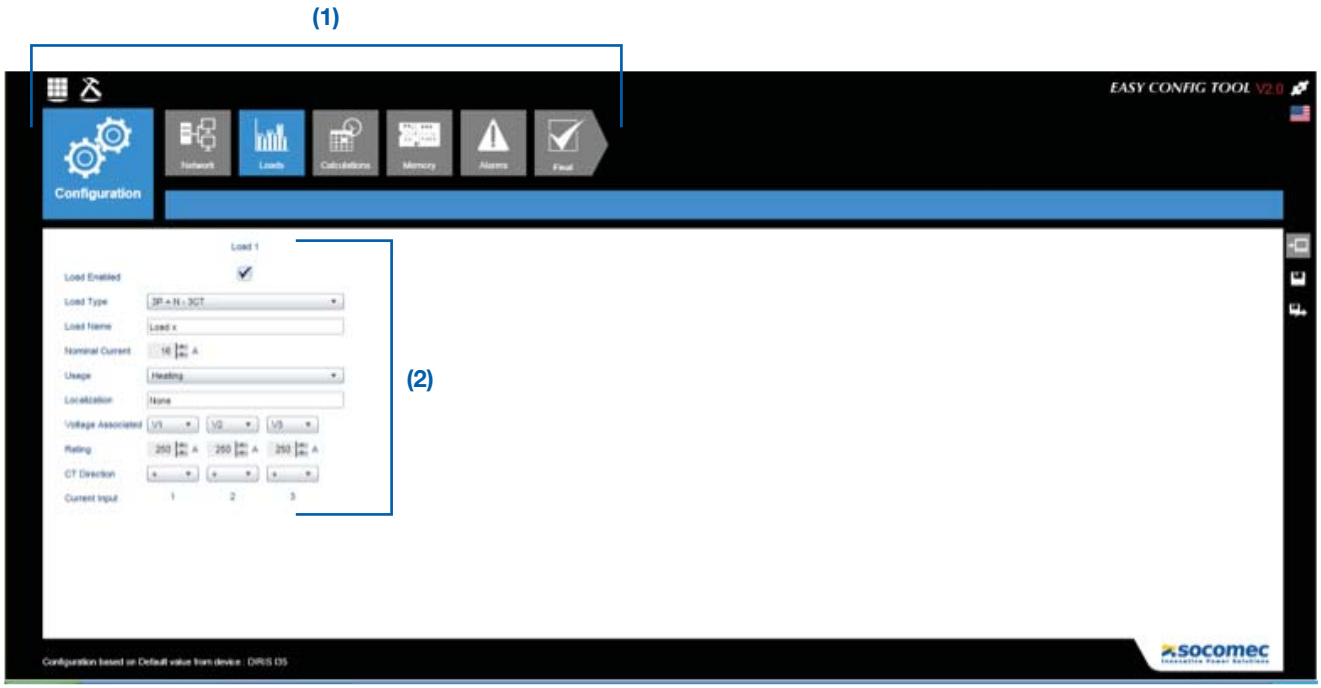


For the Bus Digiware and 120-ohm termination resistors, see section"Communication", page 40.

9.1.2. Using Easy Config

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

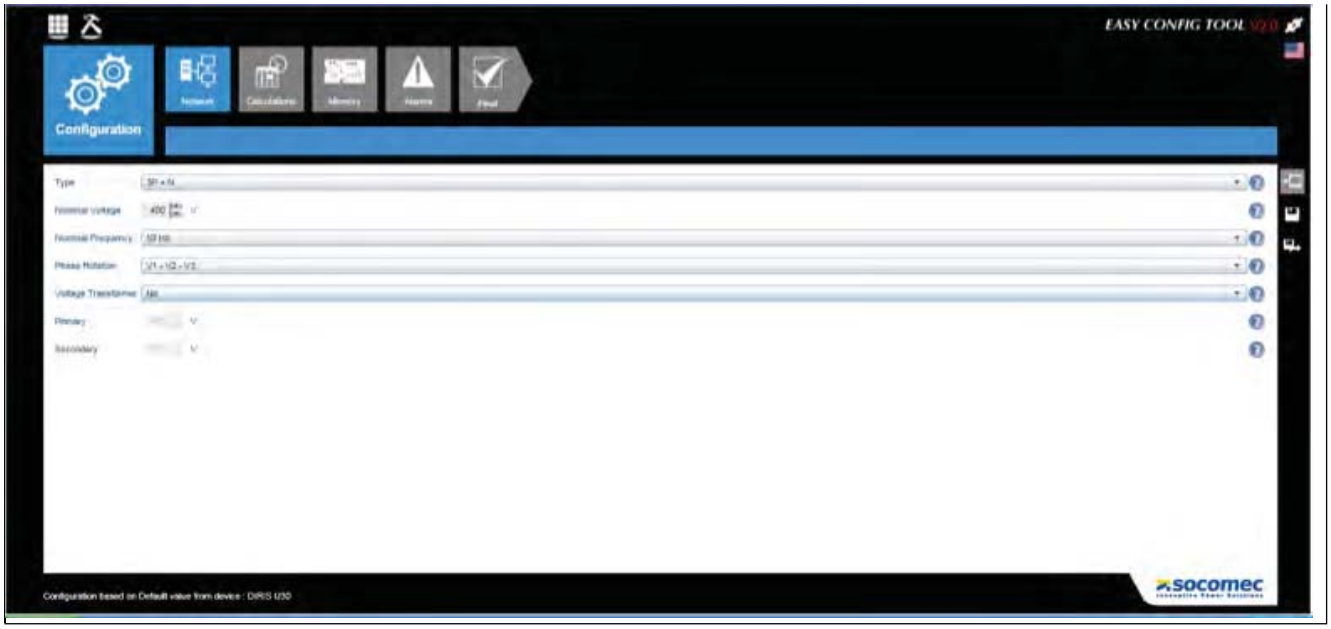
Network —> Loads —> Measurement method —> Values to be stored —> Alarms —> End of configuration



For each configuration parameter selected (1), a special custom screen appears for the connected product (2).

Network configuration

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

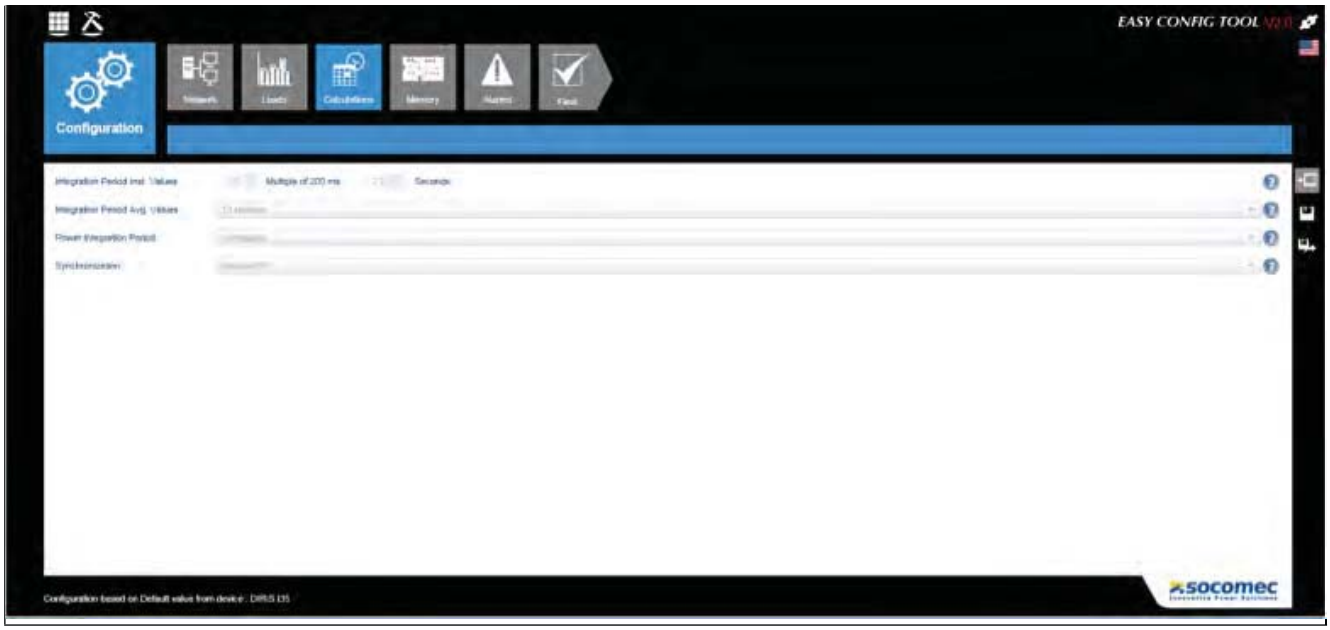


Configuring the loads

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

Calculation method

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



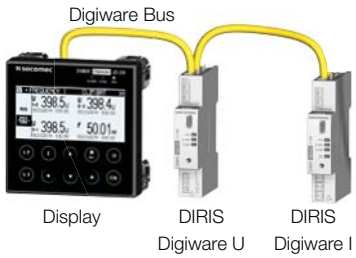
Alarms

The type of alarm and the configuration is performed via Easy Config, see section "10. ALARMS, page 47 for more details.

9.2. Configuration from the DIRIS Digiware D-50 remote display

9.2.1. Connection mode

Configuration from the remote display (Digiware Bus)



Refer to the manual for the DIRIS Digiware D-50 display for more details.

10. ALARMS

10.1. Alarms upon events

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

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

Up to 8 alarms for an electrical measurement are configured per item of equipment and 4 for changes in status of a digital input.

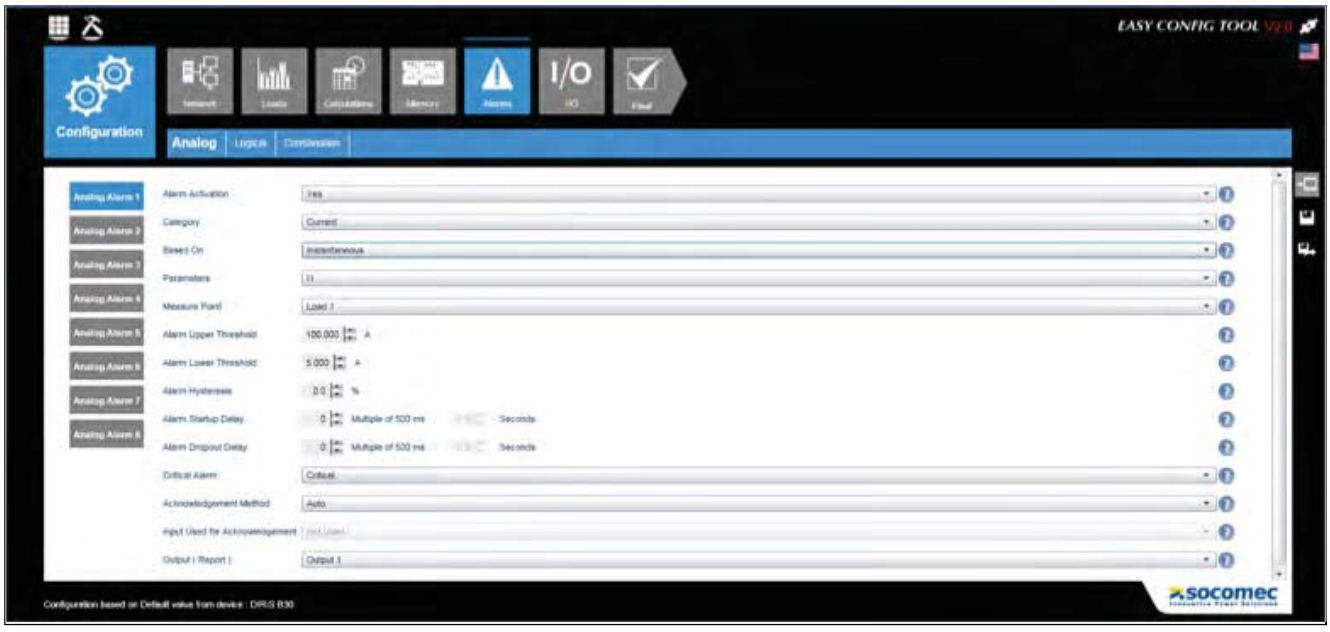
The alarms are configured via the Easy Config software.

10.1.1. Electrical measurements

10.1.1.1. Electrical parameters

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

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



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

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

10.1.1.3. EN 50160 voltage quality events

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

10.1.1.4. Consumption

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

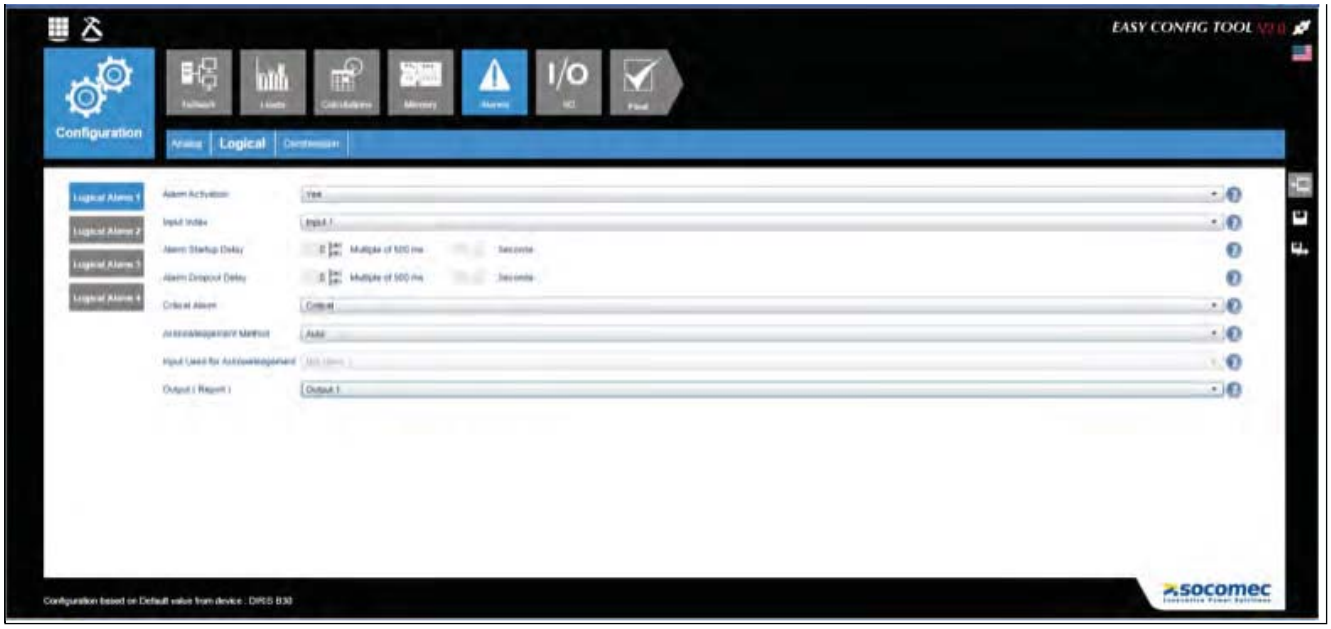
10.1.1.5. Analogue inputs

- Alarm upon variations in the temperature or analogue input
- Selection of the hysteresis and an upper/lower threshold
- Setting a time delay at the start and end of the alarm

10.1.2. Digital inputs

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

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



10.1.3. Combination of alarms

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

11. CHARACTERISTICS

Mechanical characteristics	
DIRIS Digiware C system interface module, DIRIS Digiware U voltage measurement module, DIRIS Digiware I current measurement modules	
Types of casing	Modular for DIN rail and base plate mounting
Protection index for the casings	IP20 / IK06
Protection index for the front faces	IP40 on the tip for modular mounting / IK06
Weight (g) of C-xx system interface modules	65
Weight (g) of U-xx voltage measurement modules	64
Weight (g) of I-3x current measurement modules	63
Weight (g) of I-45x current measurement modules	133

Electrical characteristics	
DIRIS Digiware C - system interface module	
Input voltage	24 VDC ± 20%
Connection	Removable screw terminal block, 2 positions, stranded or solid 0.2 … 2.5 mm² cable
Link with U-xx voltage module	Digiware Bus
DIRIS Digiware U - Voltage measurement modules	
Measured network characteristics	50-300VAC (Ph/N) - 87-520VAC (Ph/Ph) - CAT III
Frequency range	45…65Hz
Network type	Single-phase / Two-phase / Two-phase with neutral / Three-phase / Three-phase with neutral
VT primary/secondary measurement	400 000 VAC / 60, 100, 110, 173, 190 VAC
Input consumption	≤ 0.1 VA
Permanent overload	300VAC Ph/N
Rated impulse voltage	IEC 60947-1 V. IMP: 6.4kV
Connection	Removable screw terminal block, 4 positions, stranded or solid 0.2 … 2.5 mm² cable
Link with DIRIS Digiware I current module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus
DIRIS Digiware I - Current measurement modules	
Number of I-3x inputs	3
Number of I-45x inputs	4
See characteristics for associated TE, TR, TF sensors	
Connection	RJ12 connector and special cable
Link with DIRIS Digiware U voltage module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus
Link with DIRIS Digiware I current module	The DIRIS Digiware I current modules are interconnected by Digiware Bus with bus termination for the last module

DIRIS Digiware I-45 input/output characteristics	
Inputs	
Number of inputs	2
Type of power supply	Optocoupler with internal (12VDC) polarisation
Input functions	Logic state, pulse counter

Connection	Removable screw terminal block, 3 positions, stranded or solid 0.14 to 1.5 mm² cable
Outputs	
Number of outputs	2
Type	Relay / 230V ±15% - 1A
Function	Configurable alarm (current, power,…) when thresholds are exceeded or status remotely controlled
Connection	Removable screw terminal block, 4 positions, stranded or solid 0.2 to 2.5 mm² cable

Communication characteristics	
RS485	
Link	RS485
Type of link	2 … 3 half duplex wires
Protocol	Modbus RTU
Speed	1200 … 115200 bauds
Function	Configuration and reading of centralised data on the DIRIS Digiware U and all of the DIRIS Digiware I linked by the Digiware bus
Location	Single point on DIRIS Digiware C
Connection	Removable screw terminal block, 3 positions, stranded or solid 0.14 to 1.5 mm² cable
USB	
Link	USB 2
Protocol	Modbus RTU over USB
Function	Individual configuration of the U-xx voltage measurement module and the linked I-xx current measurement modules
Location	On each DIRIS Digiware U and I measurement module
Connection	By type B micro USB connector

Environmental characteristics	
Operating temperature	-10 … +70°C (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature	-25 … +70°C (IEC 60068-2-1/IEC 60068-2-2)
Humidity during operation	55°C / 97% RH (IEC 60068-2-30)
Altitude during operation	< 2000m
Vibration	0.35mm, 25 Hz (IEC 61557-12 Ed 1.0)
Impact resistance	1J (IEC 61010-1 Ed 3.0)

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	CISPR 11 Group1 - CLASS B
Radiated emissions	CISPR 11 Group1 - CLASS B
Immunity to voltage dips and short interruptions	IEC 61000-4-11 LEVEL III

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

Service life	
MTTF (mean time to failure)	> 100 years

Characteristics for the sensors						
TE - solid-core sensor						
Model	**TE-18**	**TE-18**	**TE-25**	**TE-35**	**TE-45**	**TE-55**
Nominal current (A)	20	63	160	250	630	1000
Max current (A)	24	75.6	192	300	756	1200
Weight (g)	24	24	69	89	140	187
Max voltage	300V					
Rated withstand voltage	3kV					
Frequency	50/60 Hz					
Transient overload	10x In over 1 sec					
Measurement category	CAT III					
Degree of protection	IP30 / IK06					
Operating temperature	-10 … +70°C					
Storage temperature	-25 … +85°C					
Relative Humidity	95% RH without condensation					
Altitude	< 2000m					
Connection	SOCOMEC cable or equivalent straight-through RJ12 cable, twisted pair, unshielded, 300V cat.III. -40/+85°C.					
TR - Split-core sensor						
Model	**TR-10**	**TR-16**	**TR-24**	**TR-36**		
Nominal current (A)	75	100	200	600		
Max current (A)	90	120	240	720		
Weight (g)	74	117	211	311		
Max voltage	300V					
Rated withstand voltage	3kV					
Frequency	50/60 Hz					
Transient overload	10x In over 1s					
Measurement category	CAT III					
Degree of protection	IP20 / IK06					
Operating temperature	-10 … +70°C					
Storage temperature	-25 … +85°C					
Relative humidity	95% RH without condensation					
Altitude	< 2000m					
Connection	SOCOMEC cable or equivalent straight-through RJ12 cable, twisted pair, unshielded, 300V cat.III. -40/+85°C.					
TF - Flexible sensors						
Model	**TF-55**	**TF-120**	**TF-300**			
Nominal current (A)	600	2000	6000			

Weight (g)	114	142	220
Max voltage	600V		
Rated withstand voltage	3.6kV		
Frequency	50 / 60 Hz		
Transient overload	10x In over 1s		
Measurement category	CAT III		
Degree of protection	IP30 / IK07		
Operating temperature	-10 … +70°C		
Storage temperature	-25 … +75°C		
Relative humidity	95% RH without condensation		
Altitude	< 2000m		
Connection	SOCOMEC cable or equivalent straight-through RJ12 cable, twisted pair, unshielded, 300V cat.III. -40/+85°C.		

12. PERFORMANCE CLASSES

The performance classes are drawn up in compliance with IEC 61557-12 Edition 1 (08/2007)

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

12.1. Specification of the characteristics

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

*With SOCOMEC connection cables.

12.2. Evaluation of the power supply quality

Symbol	Function	Overall operating performance class for DIRIS Digiware + associated sensors (TE, TR, TF) in compliance with IEC 61557-12	Measurement range
f	Frequency	0.02	45 … 65 Hz
I, IN	Phase current, measured neutral current	0.2 DIRIS B-30 only 0.5 with TE solid-core sensors 1 with TR or TF split-core sensors	5% … 120% In 10% … 120% In 10% … 120% In
INc	Calculated neutral current	1 with TE solid-core sensors 2 with TR split-core or TF flexible sensors	10% … 120% In
U	Voltage (Lp-Lg or Lp-N)	0.2	50 … 300 VAC Ph/N
Pst, Plt	Flicker (short-term, long-term)	-	-
Udip	Voltage dip (Lp-Lg or Lp-N)	0.5	-
Uswl	Temporary overvoltages (Lp-Lg or Lp-N)	0.5	-
Uint	Voltage outage (Lp-Lg or Lp-N)	0.2	-
Unba	Voltage amplitude unbalance (Lp-N)	0.5	-
Unb	Voltage phase and amplitude unbalance (Lp-Lg or Lp-N)	0.2	-
Uh	Voltage harmonics	1	-
Ih	Current harmonics	1	-
Msv	Centralised remote control signals	-	-

542 875 A - EN - 05/14

socomec
Innovative Power Solutions