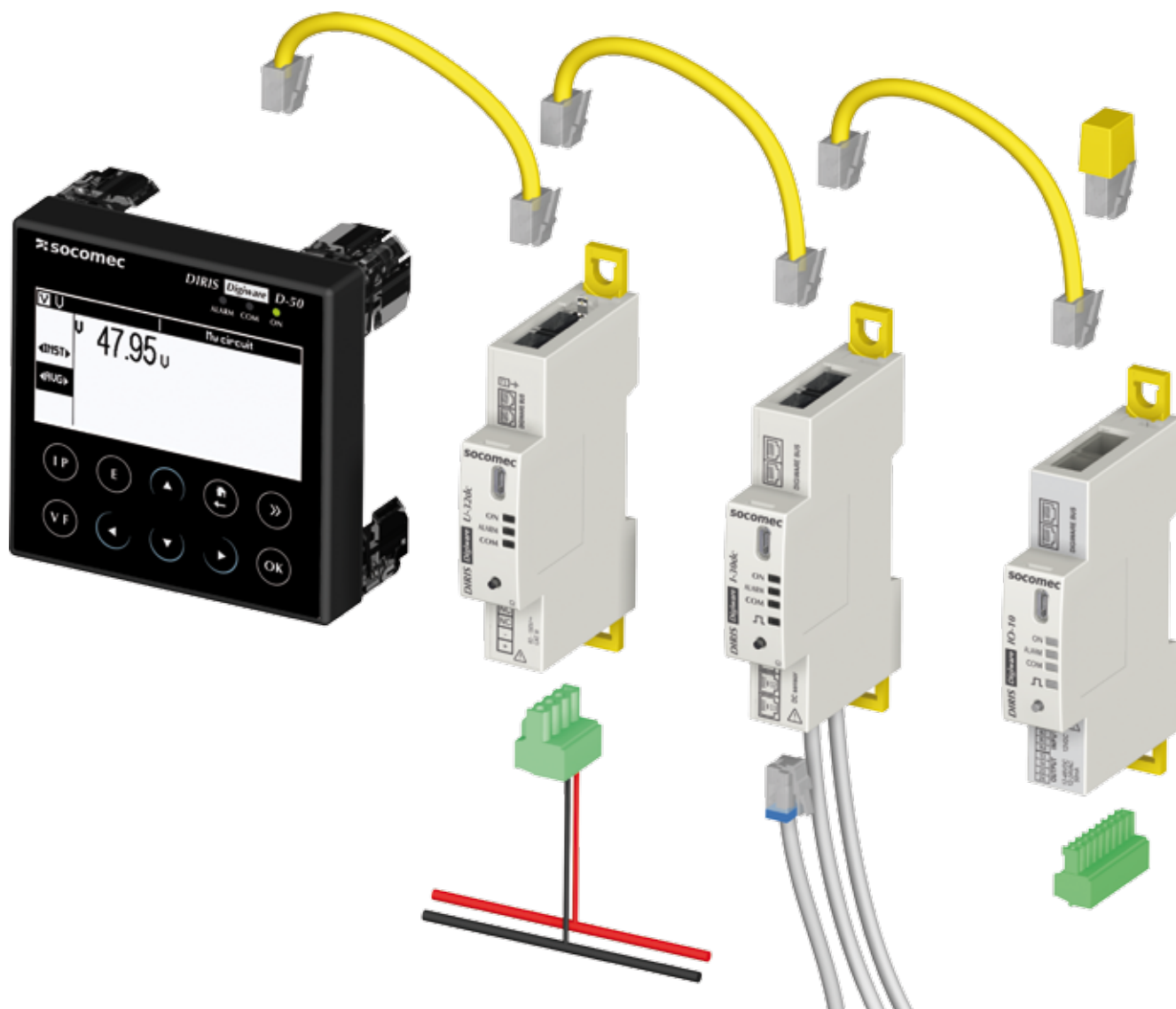


INSTRUCTION MANUAL

DIRIS Digiware DC

Measurement and monitoring system
for DC electrical installations

EN



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

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Innovative Power Solutions

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1. DOCUMENTATION

All documentation on DIRIS Digiware DC is available on the SOCOMEC website at the following address:

www.socomec.com/en/diris-digiware



2. HAZARDS AND WARNINGS

The term “device” used in this document covers DIRIS Digiware DC.

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

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

2.1. Risk of electrocution, burns or explosion

	Caution: risk of electric shock	Ref. ISO 7000-0434B (2004-01)
	Caution: refer to the accompanying documentation each time this symbol is shown	Ref. ISO 7010-W001 (2011-05)

- Only duly authorised and qualified personnel may work or install/uninstall the device.
- The instructions are valid together with the specific instructions for the device.
- The device is designed only for its intended purpose as set out in the instructions.
- Only accessories authorised or recommended by SOCOMEK may be used in association with the device.
- Before starting operations of setting up, assembly, putting into service, configuration, cleaning, taking out of service, disassembly, wiring or maintenance, shut down the power supply to the device and the installation. However, in certain conditions, with certain means and subject to certain qualifications and authorisations, working on a live device may be prescribed by specific instructions.
- This device is not designed to be repaired by the user.
- For any questions related to the disposal of the device, please contact SOCOMEK.
- Failure to comply with the instructions of the device and this safety information can cause bodily injury, electric shock, burns, death or damage to property.

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

2.2. Risk of damaging the unit

	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 7010-W001 (2011-05)

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 $\pm$ 10%.
- Use 230 VAC / 24 VDC SOCOMEK or use a 1 A 24 VDC safety fuse.
- the maximum voltage authorised on the voltage input terminals.
- the obligatory connection to the DC current sensors using the recommended connection cables and observing the maximum prescribed currents.
- Only use RJ45 SOCOMEK cables to interconnect the modules via the Digiware bus. When the ambient temperature exceeds +50°C, the minimum temperature rating of the copper cable to be connected to terminal must be +85°C.

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

2.3. Responsibility

- 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 the rules given in this manual.
- Failure to observe the rules for installing this unit may compromise the device'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.
- Despite constantly striving for quality in preparing this manual, errors or omissions are always a possibility and are not the responsibility of SOCOMEC.

3. PRELIMINARY OPERATIONS

To ensure the safety of personnel and the 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 device reference number conforms to your order,
- The packaging includes the unit fitted with removable terminal blocks and a Quick start guide.

4. INTRODUCTION

4.1. Introduction to DIRIS Digiware DC

DIRIS Digiware DC is a measuring system (PMD*) with modular format. It is designed for measuring and monitoring continuous electrical energy (DC). DIRIS Digiware DC offers a range of functions for measuring voltage, current, power, energy and quality. It can be used to jointly analyse DC loads.

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

Cabling is made simple by a single voltage measurement connection. The connection mode for the current sensors also allows quick and easy installation.

The DIRIS Digiware DC system is configured from its remote display or via the Easy Config software. The measurements can be accessed via the WEBVIEW web server integrating the monitoring function for electrical values (Power Monitoring version) and reporting function for energy data (Power & Energy Monitoring version). WEBVIEW is available on DIRIS G communication gateways and the DIRIS Digiware D-70 display.

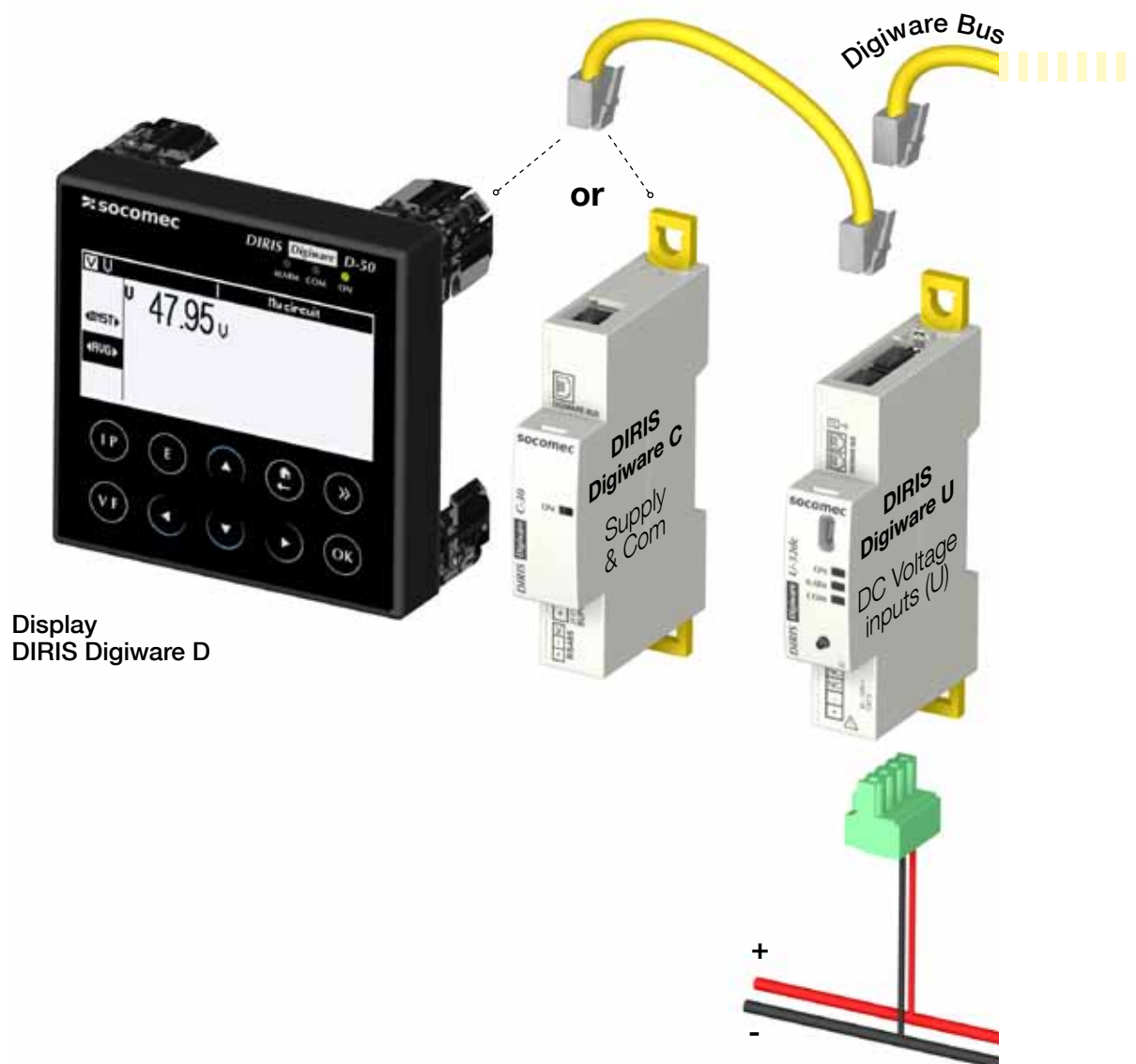
Thanks to its architecture, DIRIS Digiware DC can be easily integrated into an energy management system which requires a large number of loads to be monitored.

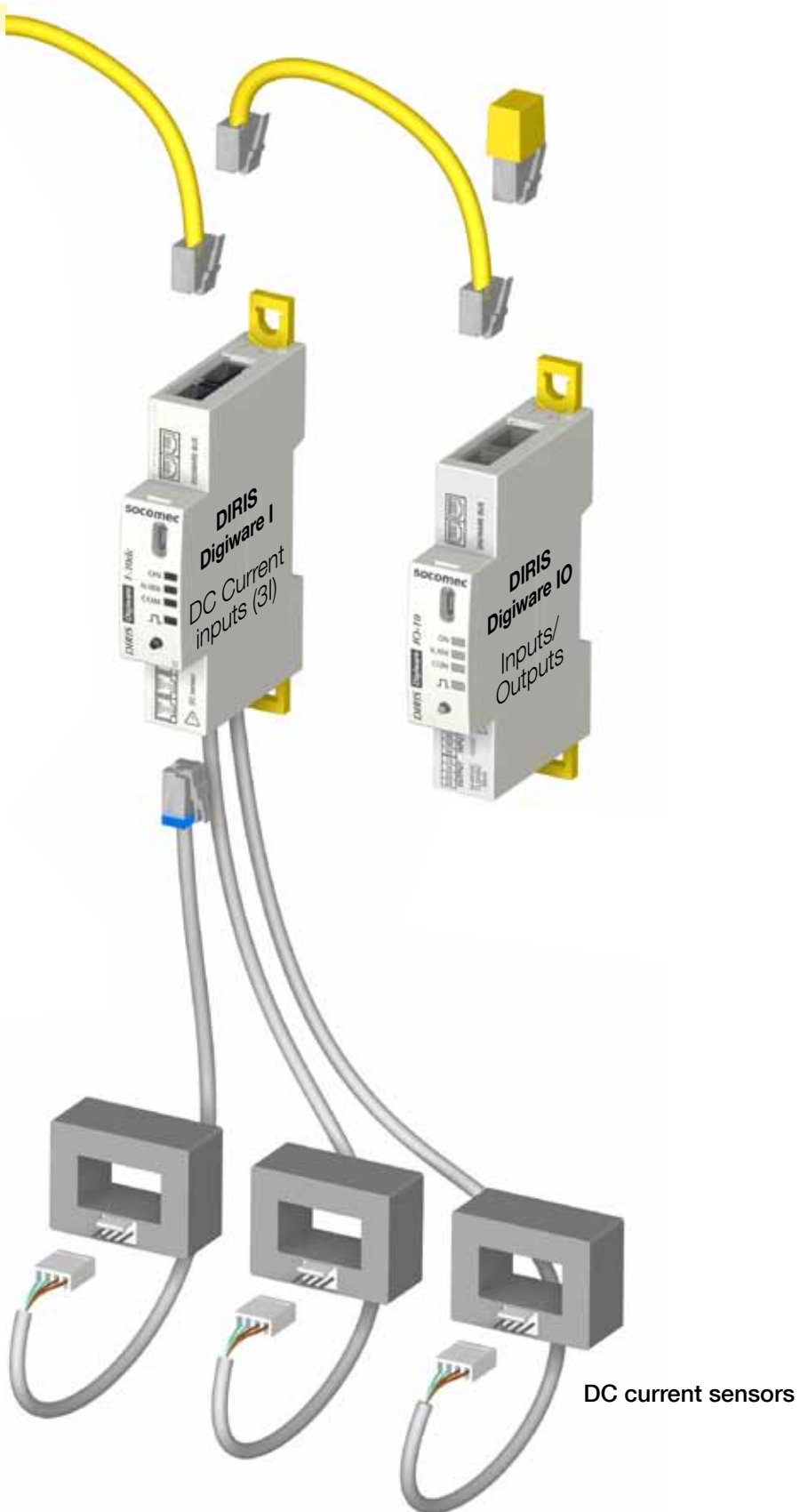
**PMD: Performance Measuring and Monitoring Device in accordance with IEC 61557-12.*

4.1.1. Range

Control and power supply interface (24 VDC)		
		
DIRIS Digiware D Multipoint display DIRIS Digiware D-40 Ref. 4829 0199 DIRIS Digiware D-50 Ref. 4829 0201 DIRIS Digiware D-70 Ref. 4829 0202	DIRIS Digiware C System interface* DIRIS Digiware C-31 Ref. 4829 0101 <i>* if there is no multipoint display</i>	
Voltage measurement module	Voltage adapter	Current measurement module
		
DIRIS Digiware U-3xdc Voltage measurement DIRIS Digiware U-31dc Ref. 4829 0150 DIRIS Digiware U-32dc Ref. 4829 0151	DIRIS Digiware Voltage adapter DIRIS Digiware U500dc Ref. 4829 0153 DIRIS Digiware U1000dc Ref. 4829 0154 DIRIS Digiware U1500dc Ref. 4829 0155	DIRIS Digiware I-3xdc 3 current measurement inputs DIRIS Digiware I-30dc Ref. 4829 0156 DIRIS Digiware I-35dc Ref. 4829 0157
IO input/output modules		
		
DIRIS Digiware IO-10 Digital inputs/outputs DIRIS Digiware IO-10 Ref. 4829 0140	DIRIS Digiware IO-20 Analogue inputs DIRIS Digiware IO-20 Ref. 4829 0145	

4.1.2. Principle





4.1.3. Functions

DIRIS Digiware DC boasts numerous functions, including:

- **General measurements**

- Voltage
- Multi-load current
- Power

- **Quality**

- RMS voltage and current
- Ripple voltage and current

- **Data-logging**

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

- **Metering**

- Energies
- Load curves / demand profiles

- **Alarm**

- Timestamped alarms with boolean combination

- **Current inputs**

- Measurement of 3 currents per module
- Current inputs with quick connection of the current sensors
- Monitoring of several loads simultaneously
- Connection of solid-core and split-core sensors

- **Communication**

- RS485 communication
- Works with the DIRIS Digiware D multi-product remote display
- Measurements available in the (WEBVIEW) web server of the DIRIS G gateway and the DIRIS Digiware D-70 display
- Schedule synchronisation on the DIRIS G gateway or the DIRIS Digiware D-70 display
- Auto-addressing with the gateway or the remote display.

4.1.4. Electrical readings

	DIRIS Digiware			
	D-40	D-50	D-70	C-31
Function				
Centralisation of measurement points	•	•	•	•
High-resolution LCD display (configuration, selection and visualisation of multiple circuits)	•	•	•	
Power supply				
24 VDC	•	•	•	•
Communication				
Slave RS485 modbus	•			•
Master RS485 modbus		•	•	
Digiware bus	•	•	•	•
Ethernet Modbus TCP		•	•	
BACnet IP Ethernet			•	
SNMP Ethernet v1, v2, v3			•	
Webview embedded web server			•	
Format				
Width/Number of modules	97x97 mm	97x97 mm	97x97 mm	18 mm / 1
Part number	4829 0199	4829 0201	4829 0202	4829 0101

	DIRIS Digiware U	
	U-31dc	U-32dc
Measured voltages		
Nominal voltages	24VDC - 48VDC	60VDC - 150VDC
Admissible min/max voltages	19.2VDC - 60VDC	48VDC - 180VDC
Multi-measurement		
Vdc		•
Quality analysis*		
Vripple (Voltage ripple)		•
Vrms		•
Alarms		
In the event of overloads		•
History of average values		
		•
Format		
Width/Number of modules	18 mm / 1	
Part number	4829 0150	4829 0151

* $V_{rms}^2 = V_{dc}^2 + V_{ripple}^2$

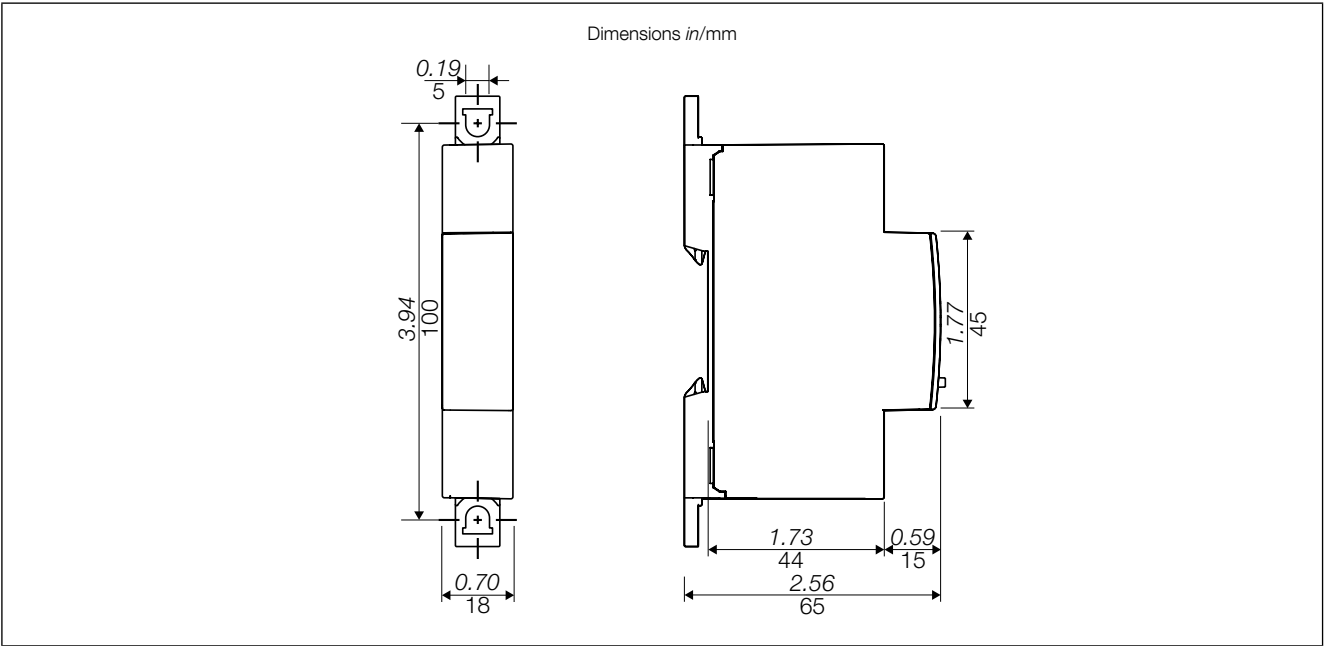
	Voltage adapter		
	U500dc	U1000dc	U1500dc
Measured voltages			
Nominal voltage	500VDC	1000VDC	1500VDC
Admissible min/max voltages	200VDC - 600VDC	400VDC - 1200VDC	1200VDC - 1500Vdc +10%
Association			
U-32dc		•	
Format			
Width/Number of modules		54 mm / 3	
Part number	4829 0153	4829 0154	4829 0155

DIRIS Digiware I		
	I-30dc	I-35dc
Application	Metering	Analysis
Number of current inputs	3	
Metering		
± kWh	•	•
Load curves		•
Multi-measurement		
I DC	•	•
P	•	•
Predictive power		•
Quality		
Iripple (Current ripple)		•
I _{RMS}		•
Alarms		
Thresholds and combination		•
Trends		
Average values		•
Format		
Width	18 mm	
Number of modules	1	
Part number	4829 0156	4829 0157

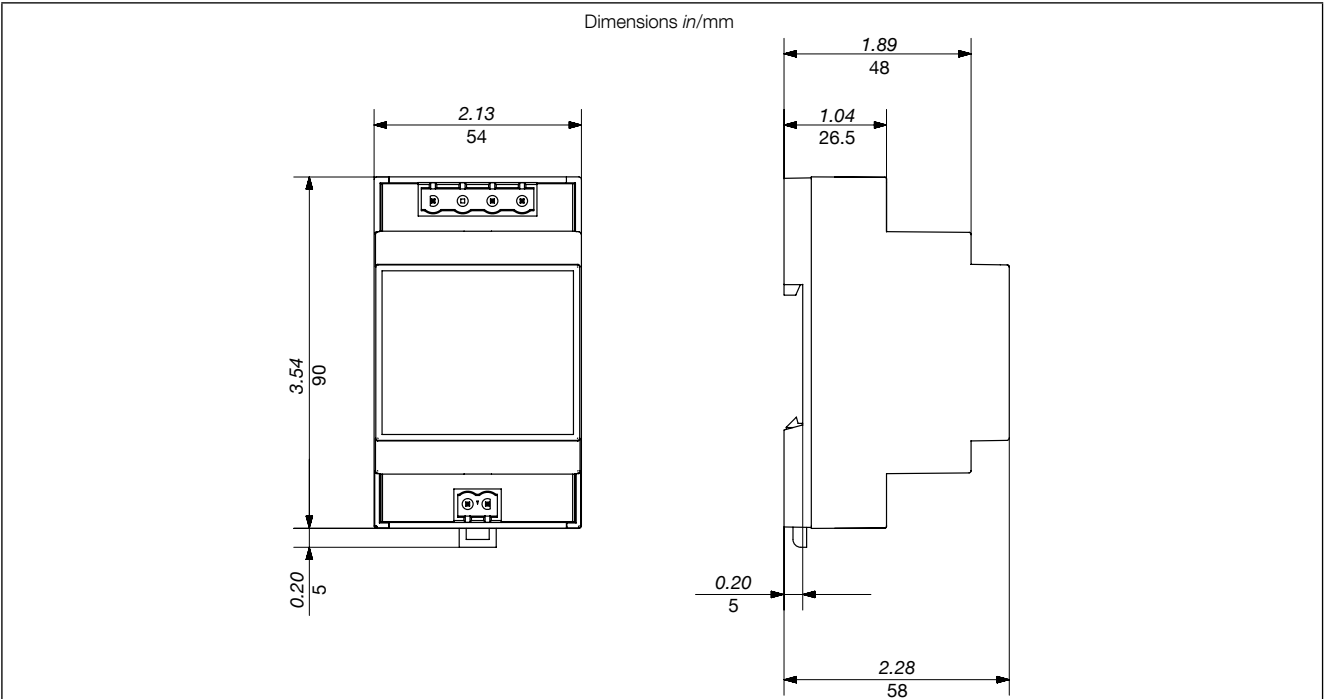
DIRIS Digiware IO		
	IO-10	IO-20
Application	Measuring / Monitoring / Analysis	
Number of digital inputs/ outputs	4/2	-
Number of analogue inputs	-	2
Format		
Width	18 mm	
Number of modules	1	
Part number	4829 0140	4829 0145

4.1.5. Dimensions

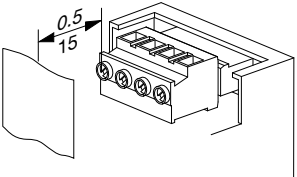
4.1.5.1. DIRIS Digiware C, U-3xdc & I-3xdc, IO-x



4.1.5.2. Voltage adapters U500dc, U1000dc and U1500dc with DIRIS Digiware U-32dc



A safety distance of 30mm must be guaranteed all around the adapters U500dc, U1000dc and U1500dc. Modular products must not be installed directly next to an adapter.



Dimensions in/mm



A minimum distance between the metallic front face connected to protective earth and the screw terminal must be respected for the adapter U1500dc

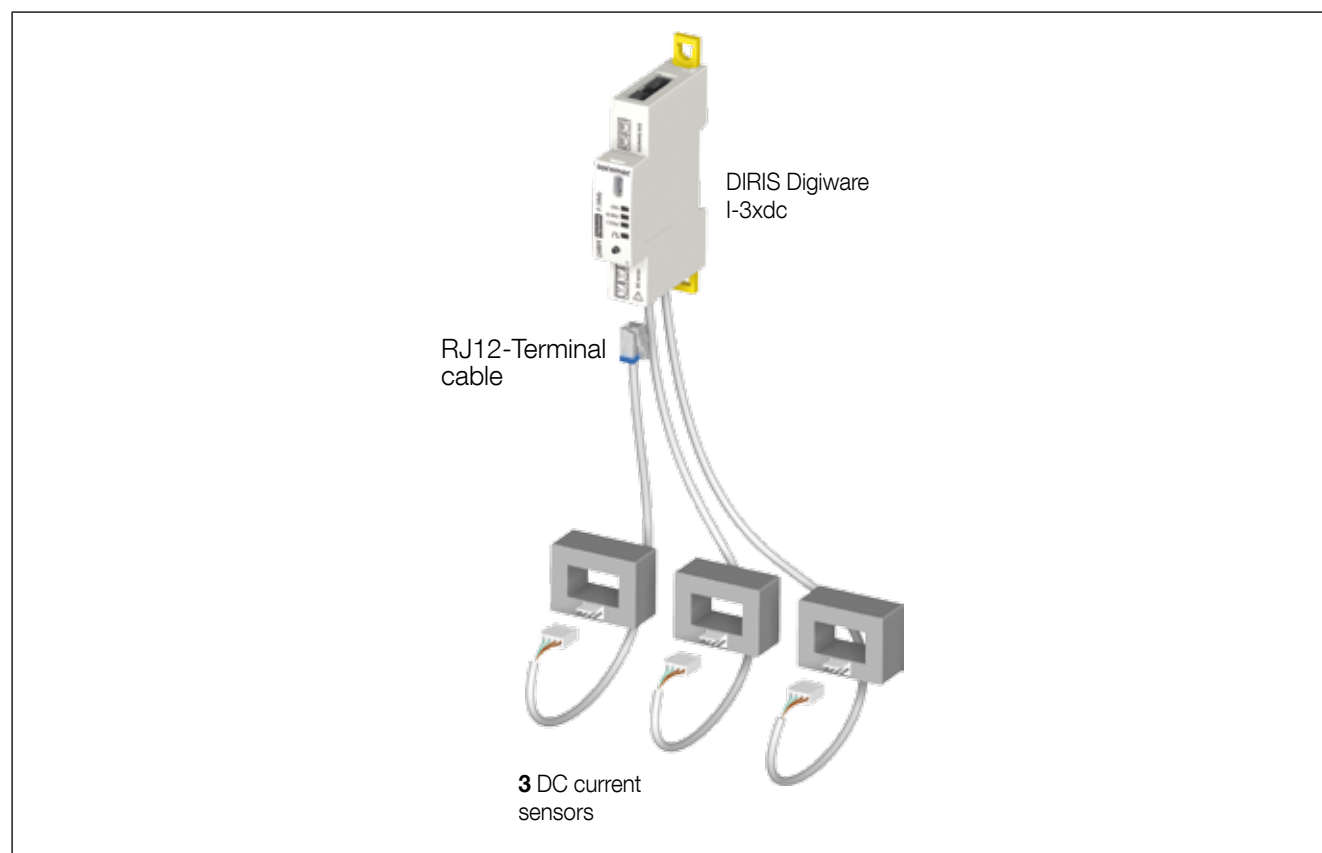
4.2. Current sensors

4.2.1. Current sensors interface

Different types of solid-core and split-core current sensors can be connected to the DIRIS Digiware I-3xdc. They must comply with the following characteristics:

- Open-loop Hall-effect sensors
- Solid-core or split-core
- Power supply voltage: ± 15 V SELV (Safety Extra Low Voltage)
- Power supply current: ± 25 mA depending on the sensor
- Output voltage: ± 4 V SELV ($\pm 100\%$ current sensors caliber)
- Molex 4-point male terminal
- Measurement range: 16 to 6000 A

The sensors used must ensure the necessary insulation with respect to the electrical network. The signals of the I3xdc are of the SELV type.



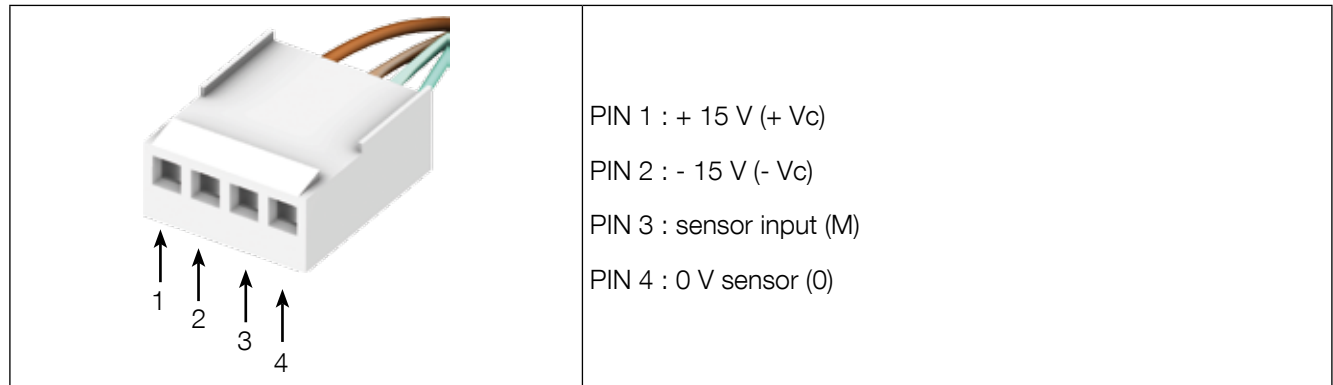
- Use only DC current sensors complying with the above characteristics.
- Do not use AC current sensor for DIRIS Digiware type TE, TR and TF.



- For connecting the current sensors, use SOCOMEC cables or equivalent only, RJ12-Terminal straight cables, twisted pair, unshielded, 600 V, -10°C / $+70^{\circ}\text{C}$.
- It is recommended that all the current sensors are installed in the same direction.
- Always connect input IO1 first.

4.2.2. Connection cables for current sensors

RJ12-Terminal connection cables	Cable length (m)				
	0.3	0.5	1	2	5
Number of cables	Part number	Part number	Part number	Part number	Part number
1					4829 0786
3	4829 0782	4829 0783	4829 0784	4829 0785	



4.2.3. Current sensors

The DC range of sensors compatible with the electrical and mechanical interface of the I-3xdc modules is the following :

Nominal current (A)	SOCOMEK reference
DC Solid-core sensors	
50	48290700
100	48290701
200	48290702
300	48290703
400	48290704
500	48290705
600	48290706
850	48290707
1000	48290708
1500	48290709
2000	48290710
2500	48290711
5000	48290712
DC Split-core sensors	
50	48290750
100	48290751
200	48290752
300	48290753
400	48290754
500	48290755
800	48290756
1000	48290757
1500	48290758
2000	48290759

Other DC sensors can also be chosen providing their electrical and mechanical interface is compatible with I-3xdc modules.

5. MOUNTING

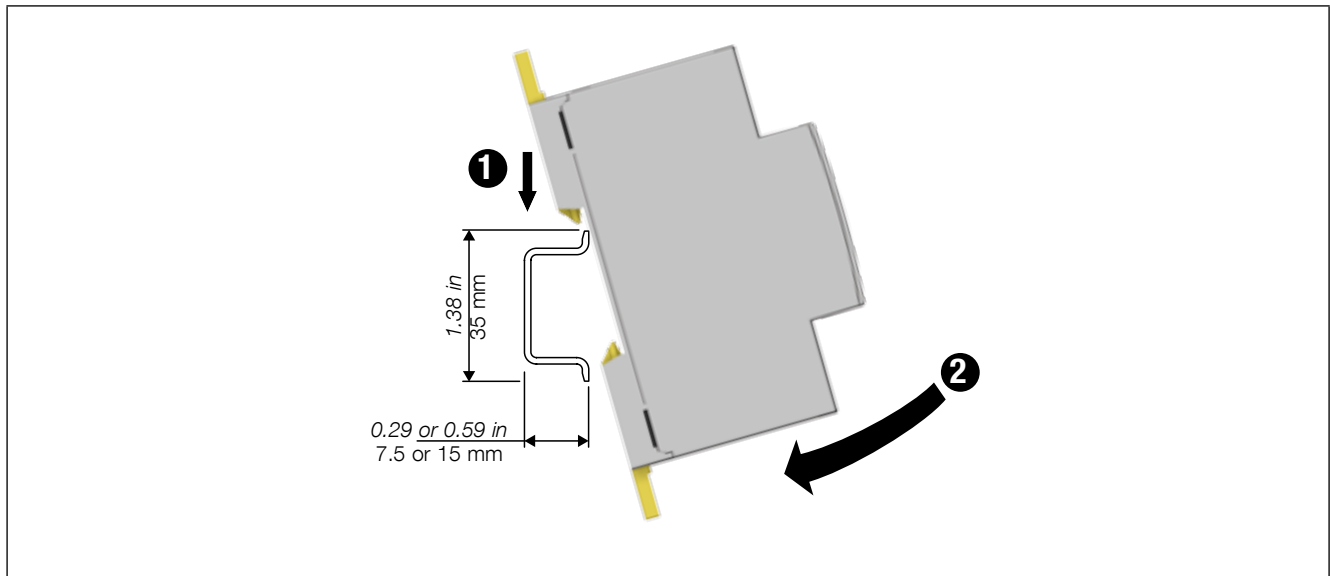
The following paragraphs describe the installation of DIRIS Digiware DC.

5.1. Recommendations and safety

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

5.2. DIRIS Digiware mounting

5.2.1. DIRIS Digiware C, U-3xdc, I-3xdc, IO-x - DIN rail-mounted



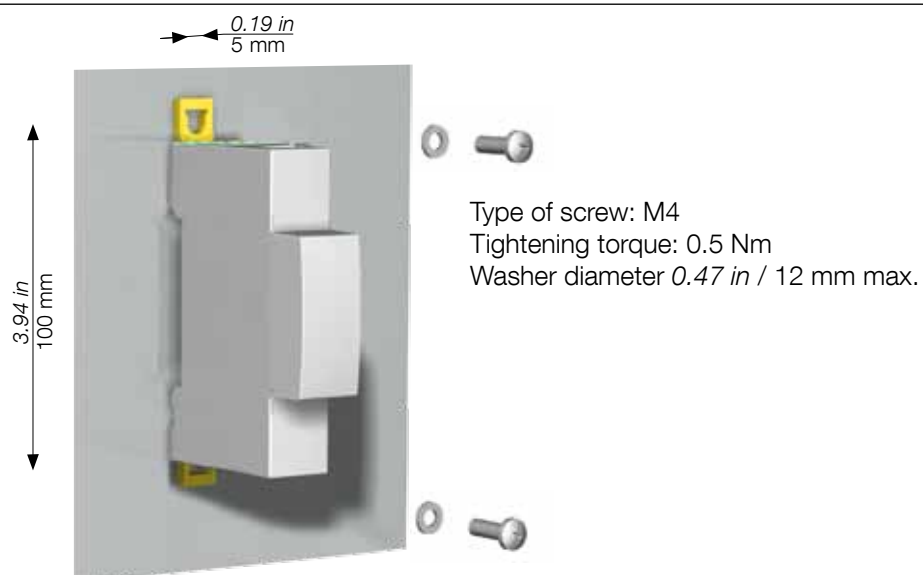
The devices are intended to be built into a box under a faceplate or into a closed box in order to ensure protection against electric shock and insulation against fire.

The DIN rail must have an earth connection. If an earth connection is not available, an insulated DIN rail must be used.



For U500dc, U1000dc and U1500dc adapters the instructions concerning the safety distances of the assembly given on page 15 must be respected.

5.2.2. DIRIS Digiware C, U-3xdc, I-3xdc, IO-x - backplate-mounted

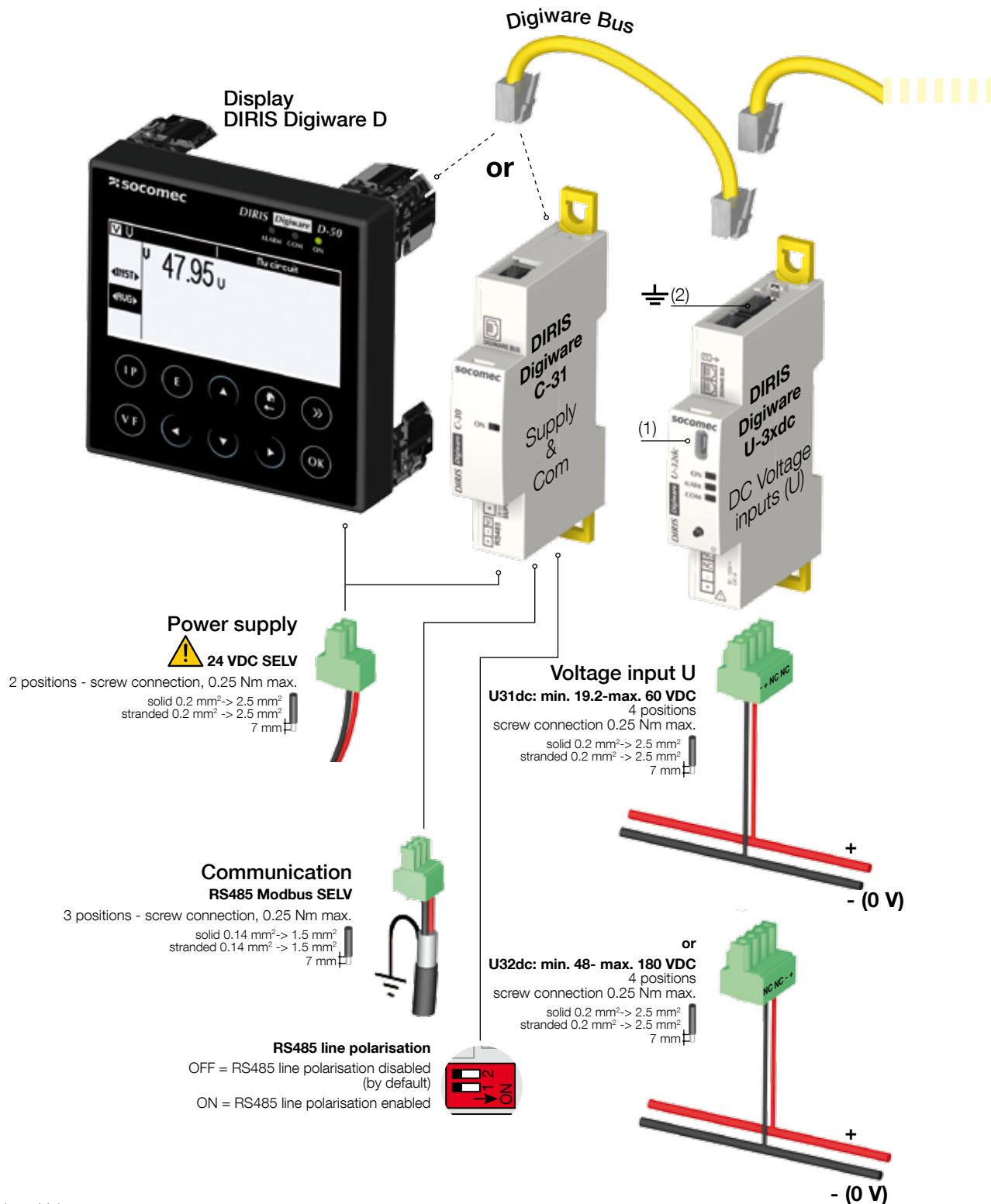


6. CONNECTION

6.1. DIRIS Digiware connection without voltage adapter



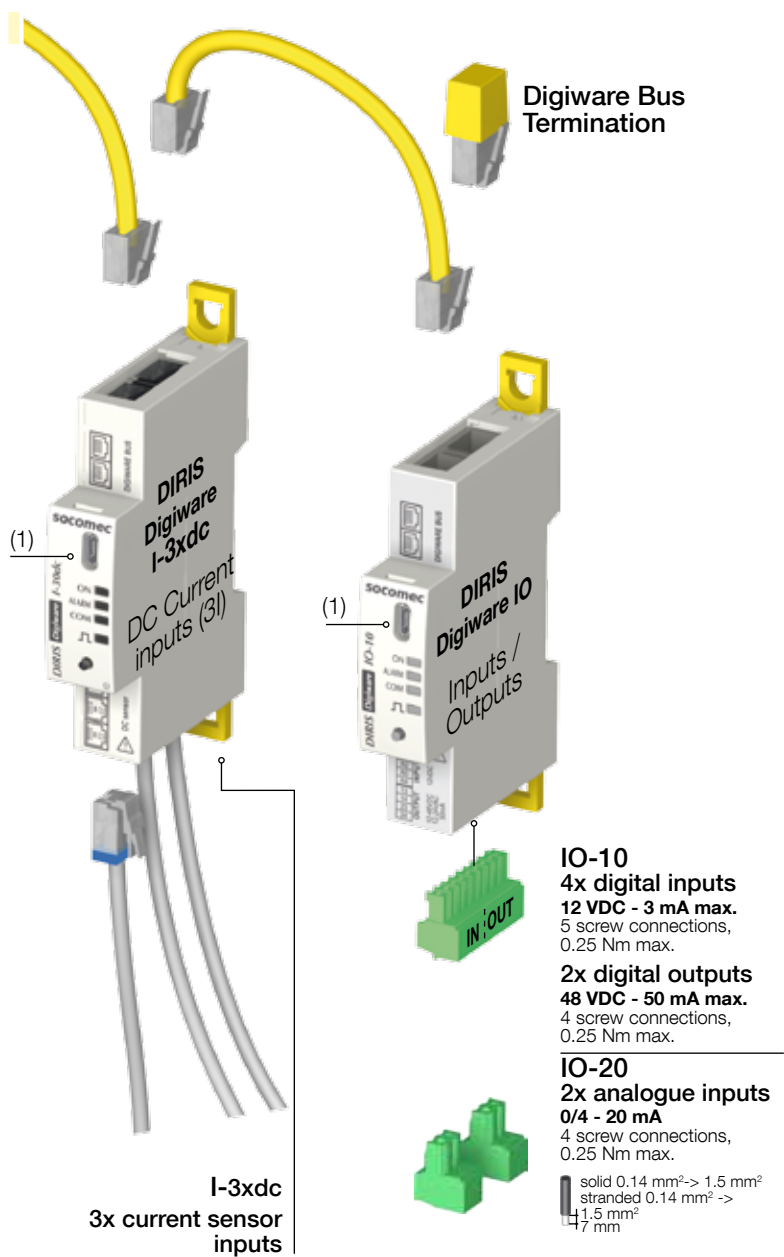
- Only use a SOCOMEC Digiware bus cable (UTP RJ45 straight, twisted pair, unshielded, AWG24, 600V Cat 5, -10 / +70°C).
- When wiring, make sure you separate the low voltage (LV) section and the safety extra low voltage (SELV) section to prevent any risk of electric shock.



SELV: Safety Extra Low Voltage

(1) Micro USB - type B

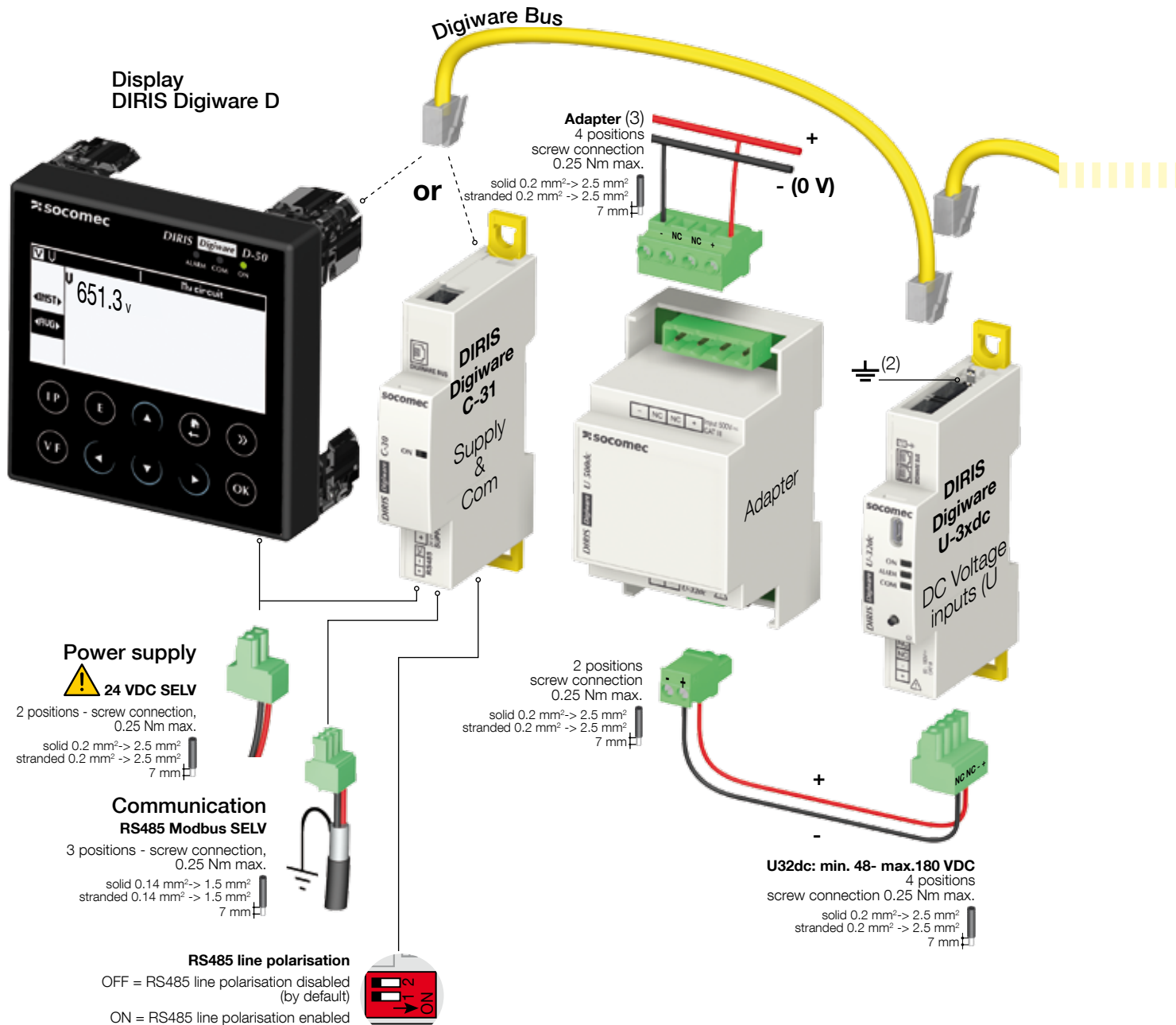
(2) Earth must not be used in a neutral system not connected to earth



6.2. DIRIS Digiware connection with voltage adapter



Only use a SOCOMEC Digiware bus cable (UTP RJ45 straight, twisted pair, unshielded, AWG24, 600V Cat 5 -10 / +70°C).
When wiring, make sure you separate the low voltage (LV) section and the safety extra low voltage (SELV) section to prevent any risk of electric shock.



SELV: Safety Extra Low Voltage

(1) Micro USB - type B

(2) Earth must not be used in a neutral system not connected to earth

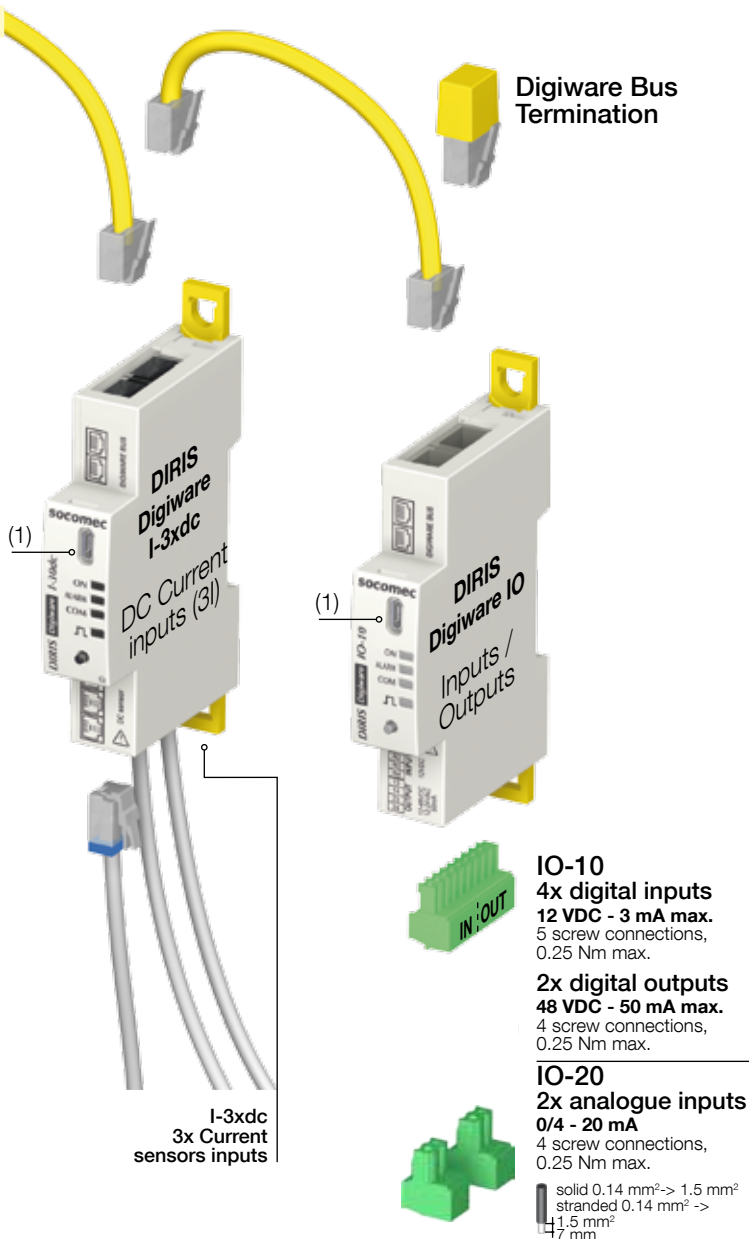
(3) Adapter: U500dc, U1000dc or U1500dc



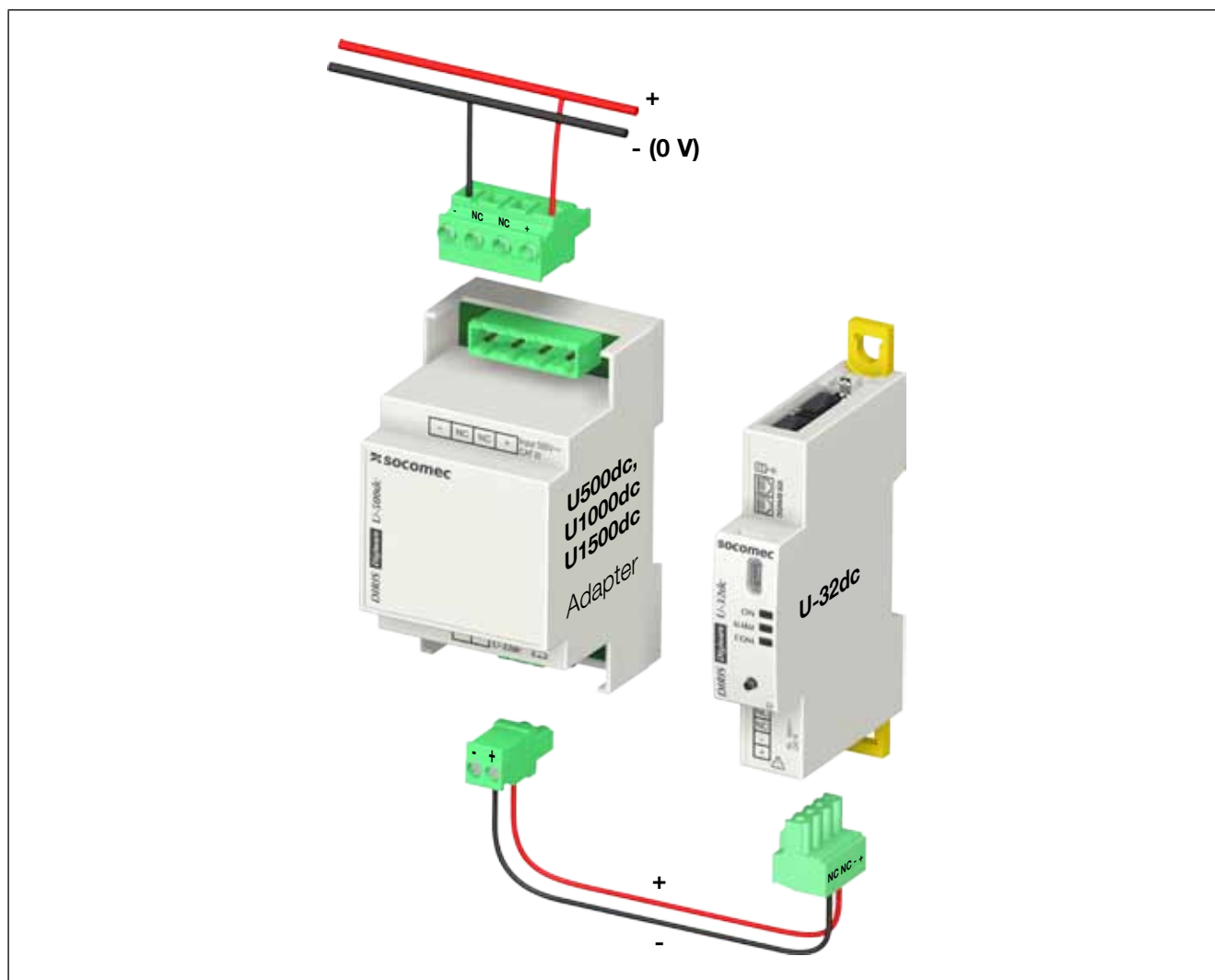
The U500dc, U1000dc, U1500dc voltage adapters must be connected only to a U-32dc module.



Do not connect RJ12 sensor cable to Digiware Bus connector to avoid any risk of mechanical damage of this connector.



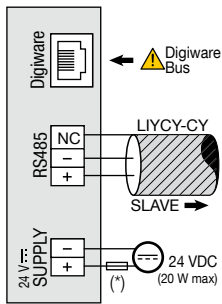
Voltage adapters connection principle



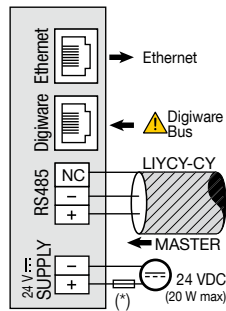
The U500dc, U1000dc, U1500dc voltage adapters only be connected to a U-32dc module.

6.3. Description of the terminals

DIRIS Digiware D-40



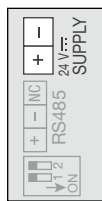
DIRIS Digiware D-50 / D-70



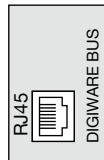
(*) 1 A gG/Am fuse if using a non-SOCOMECC supply

DIRIS Digiware C-31

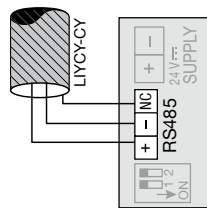
Power supply



Digiware BUS



Communication

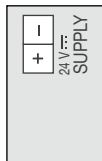


Line polarisation

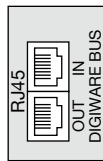


DIRIS Digiware C-32

Power supply

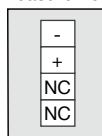


Digiware BUS

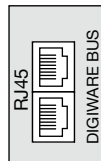


DIRIS Digiware U-31dc

Voltage measurement

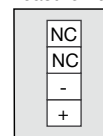


Digiware BUS

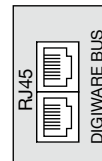


DIRIS Digiware U-32dc

Voltage measurement

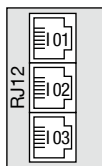


Digiware BUS

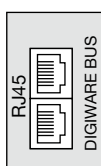


DIRIS Digiware I-3xdc

Current measurement(**)

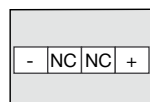


Digiware BUS



Voltage adapters U500dc, U1000dc and U1500dc

Input



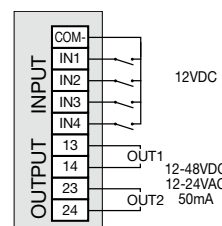
Output to U-32dc



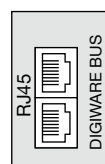
(**) Always connect input I01 first.

DIRIS Digiware IO-10

Inputs/outputs

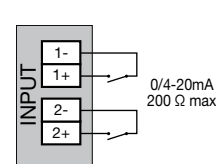


Digiware BUS

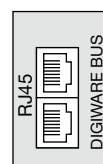


DIRIS Digiware IO-20

Inputs

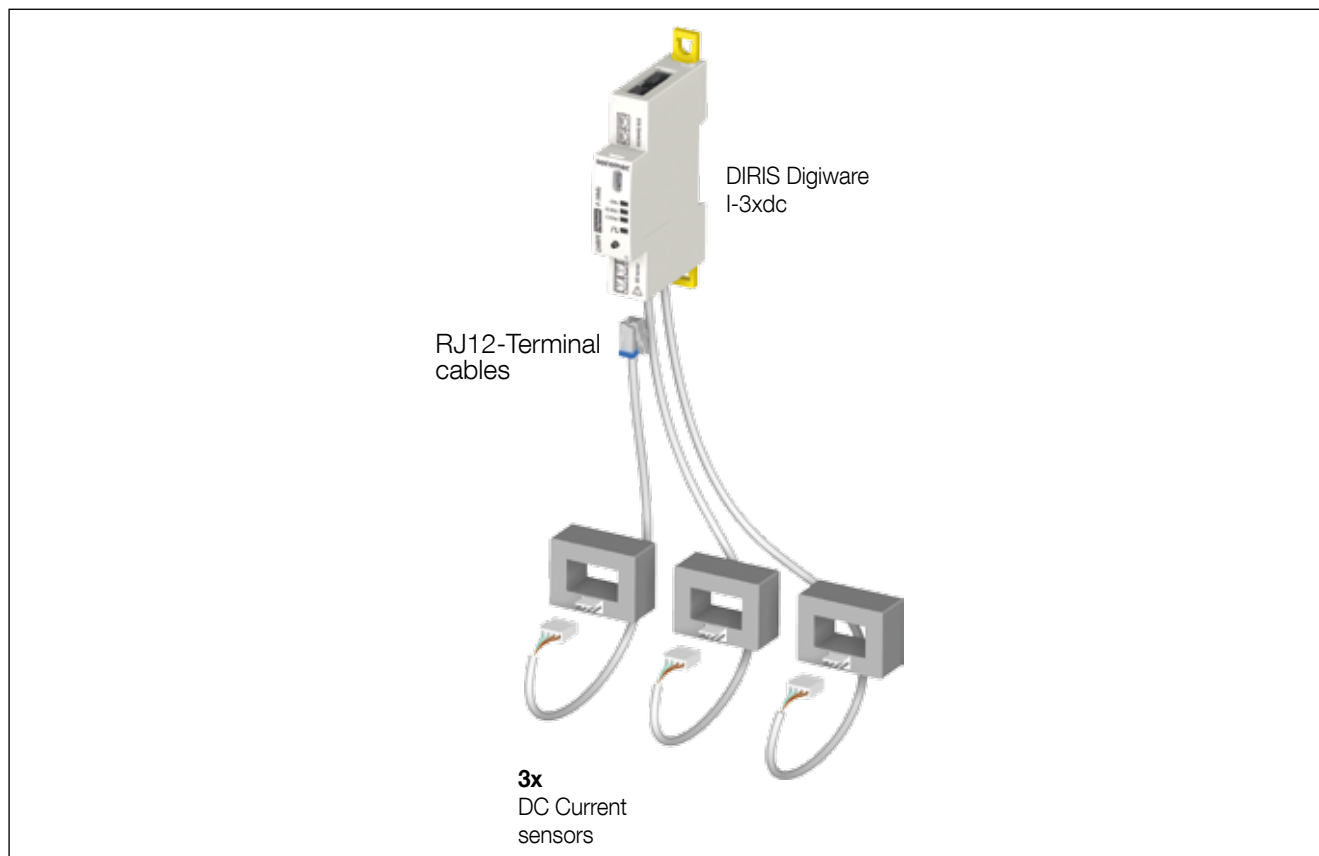


Digiware BUS



6.4. Connecting the current sensors

6.4.1. Connection concept



- Use only DC current sensors complying with the characteristics (see "4.2. Current sensors", page 16).
- Do not use AC current sensor for DIRIS Digiware type TE, TR and TF.



- For connecting the current sensors, use SOCOMEC cables or equivalent only, RJ12-Terminal straight cables, twisted pair, unshielded, 600 V, -10°C / +70°C.
- Ensure that the connection of the cable to the sensor is correctly maintained.
- It is recommended that all the current sensors are installed in the same direction.
- Always connect input I01 first.

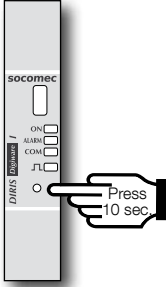
6.4.2. Calibrating the current sensors



Current sensors must be calibrated without load.

Calibration must always be carried out with the sensors connected to the Digiware I-3xdc without load flowing through the sensors.

There are three ways to perform this calibration:

	
Press and hold (> 10 seconds) the button of the DIRIS Digiware I-3xdc	The ON LED blinks rapidly during 10 sec to indicate that calibration was successful.

Current sensors can also be calibrated using the Easy Config configuration software or a DIRIS Digiware D screen.

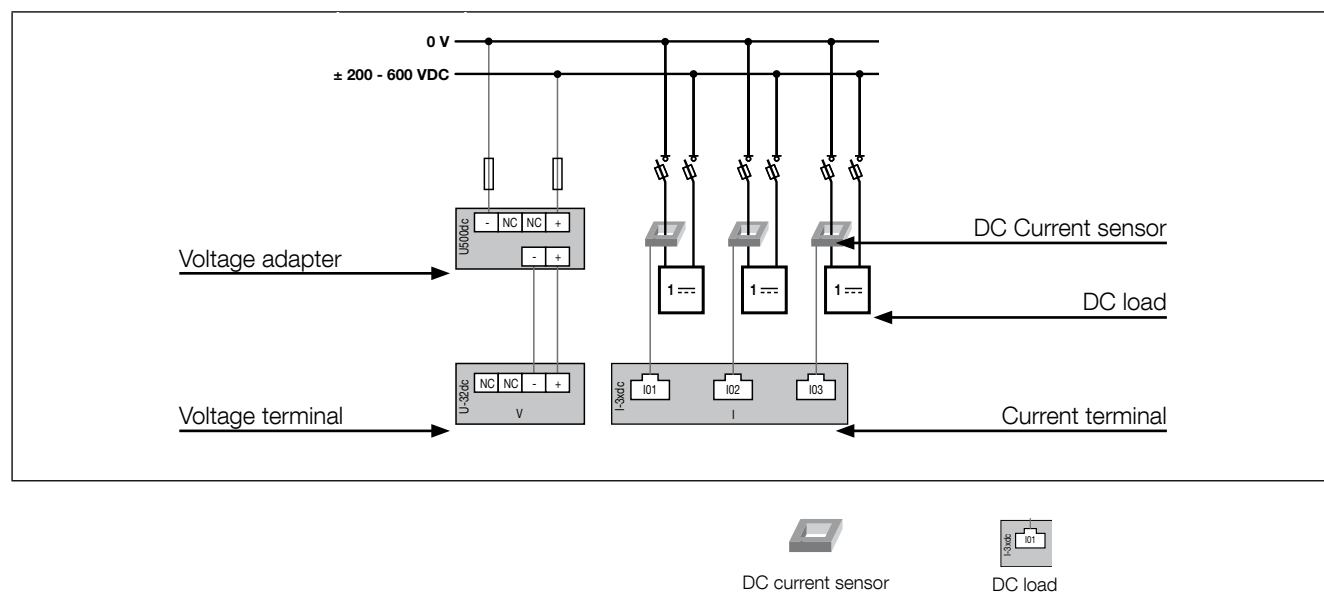
6.5. Connection to the electrical network and to the loads

Each DIRIS Digiware I current measurement module can measure several loads simultaneously. 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 or split-core) for new or existing installation. The link between each DIRIS Digiware I current measurement module and its connected sensors is made using specific cables. This connector allows rapid assembly without tools, without risk of wiring error.

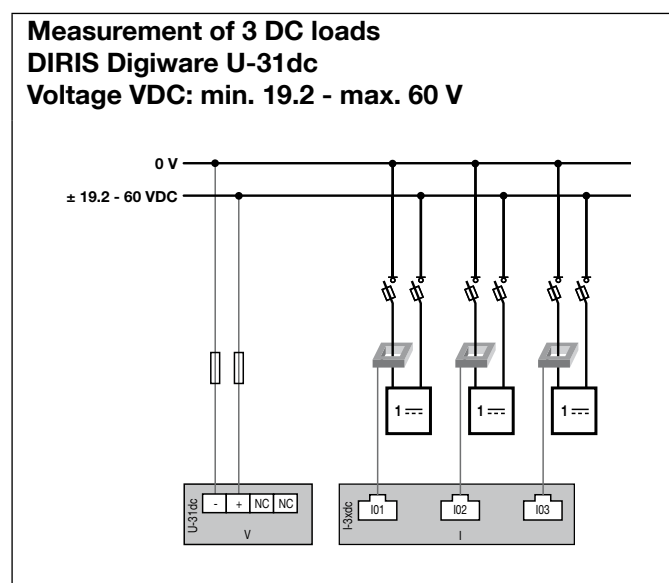
6.5.1. Description of the association of DC network and loads

Legend:



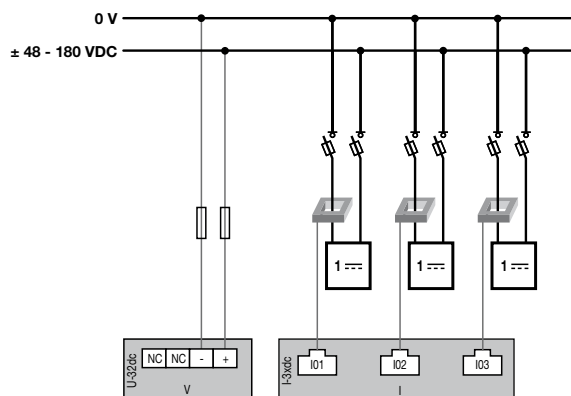
Each current input is individual; see below for connection examples:

6.5.1.1. DIRIS Digiware U-31dc

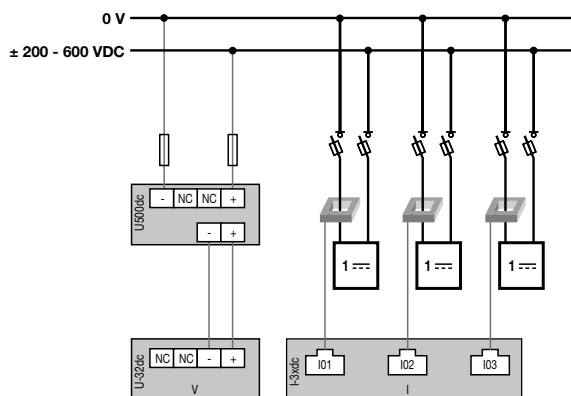


Fuse: 2 A gPV

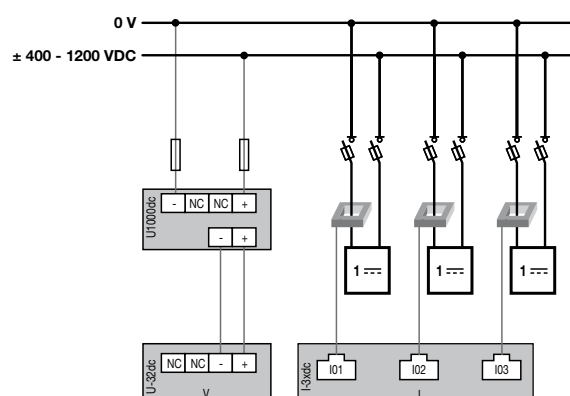
Measurement of 3 DC loads
DIRIS Digiware U-32dc
Voltage VDC: min. 48 - max. 180 V



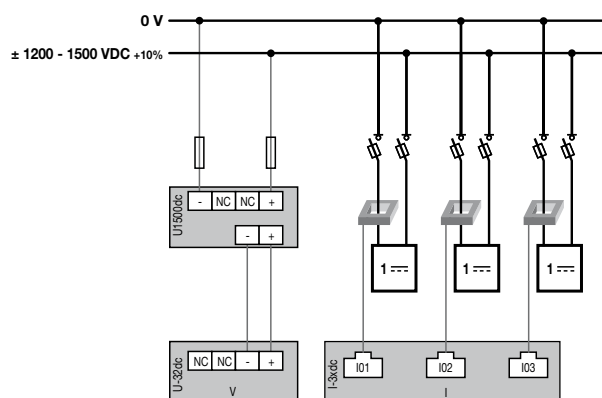
Measurement of 3 DC loads
DIRIS Digiware U-32dc + adapter U500dc
Voltage VDC: min. 200 - max. 600 V



Measurement of 3 DC loads
DIRIS Digiware U-32dc + adapter U1000dc
Voltage VDC: min. 400 - max. 1200 V



Measurement of 3 DC loads
DIRIS Digiware U-32dc + adapter U1500dc
Voltage VDC: min. 1200 - max. 1500V +10%



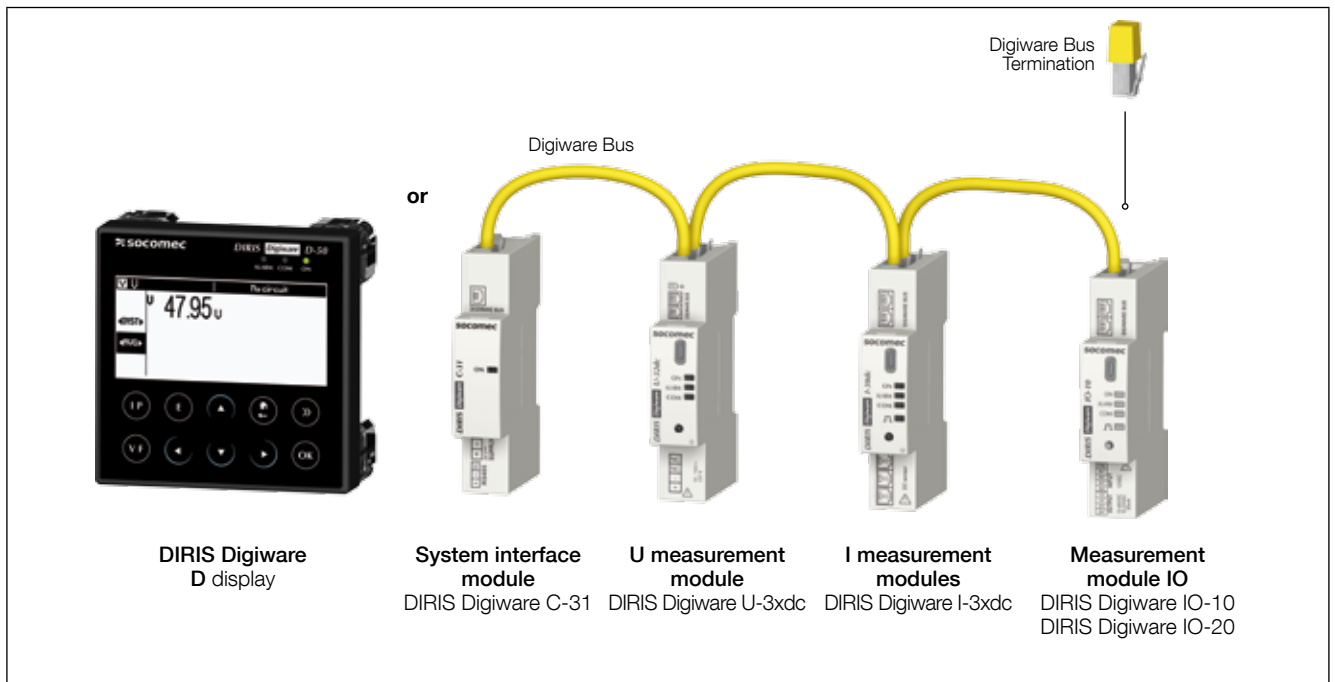
 Fuse: 2 A gPV

6.5.2. Connection of the functional earth

It is recommended to connect the functional earth to guarantee optimal metrological precision.

7. DIGIWARE BUS

7.1. Principle



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

- One DIRIS Digiware D remote display or one DIRIS Digiware C-31 system interface module
- One DIRIS Digiware U-3xdc voltage measurement module
- One or more DIRIS Digiware I-3xdc current measurement modules
- One or more DIRIS Digiware IO-xx input/output modules
- A Digiware bus termination (ref. 4829 0180) positioned on the last module. It is provided with the DIRIS Digiware D display and the DIRIS Digiware C-31 system interface module.

7.1.1. Digiware Bus connection cables

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

Use the shortest possible cables to optimise the electromagnetic emissions.

The total max. length must not exceed 100 metres.



Use only SOCOMEC cables for the Digiware bus.

7.1.2. Digiware Bus Termination

	Quantity	Part number
	1	4829 0180

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

7.2. Sizing of the power supply

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



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

Specifications:

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

7.2.1. Equipment consumption

Product	Power supplied (W)	Power consumed (W)
Power supply		
P15 230 V / 24 V	15	
Cables		
50 metre package		1.5
System interface		
DIRIS Digiware D-40		2
DIRIS Digiware D-50 / D-70		2 / 2.5
DIRIS Digiware C-31		0.8
Module voltage		
DIRIS Digiware U-3xdc		0.6
Module current		
DIRIS Digiware I-3xdc with 3 DC current sensors		2
DIRIS Digiware IO-10		0.5
DIRIS Digiware IO-20		0.5
Repeater		
DIRIS Digiware C-32		1.5

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

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

Power supply must not exceed 20 W.

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

For example, it is possible to use

- 1 DIRIS Digiware C-31 interface system (0.8 W)
 - 1 DIRIS Digiware U-3xdc (0.6 W) voltage module
 - 50 metres of cable (1.5 W)
 - 6 DIRIS Digiware I-3xdc current modules ($6 \times 2 = 12$ W)
- ⇒ **Total power = 15 W**

Size with a 24 VDC power supply delivering a maximum of 20 W

For example, it is possible to use

- 1 DIRIS Digiware C-31 interface system (0.8 W)
 - 1 DIRIS Digiware U-3xdc (0.6 W) voltage module
 - 50 metres of cable (1.5 W)
 - 8 DIRIS Digiware I-3x current modules ($8 \times 2 = 16$ W)
- ⇒ **Total power = 19 W**

or

- 1 DIRIS Digiware D-50 (2 W) display
 - 1 DIRIS Digiware U-3xdc (0.6 W) voltage module
 - 50 metres of cable (1.5 W)
 - 8 DIRIS Digiware I-3x current modules ($8 \times 2 = 16$ W)
- ⇒ **Total power = 20 W**

7.2.3. Digiware bus repeater

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

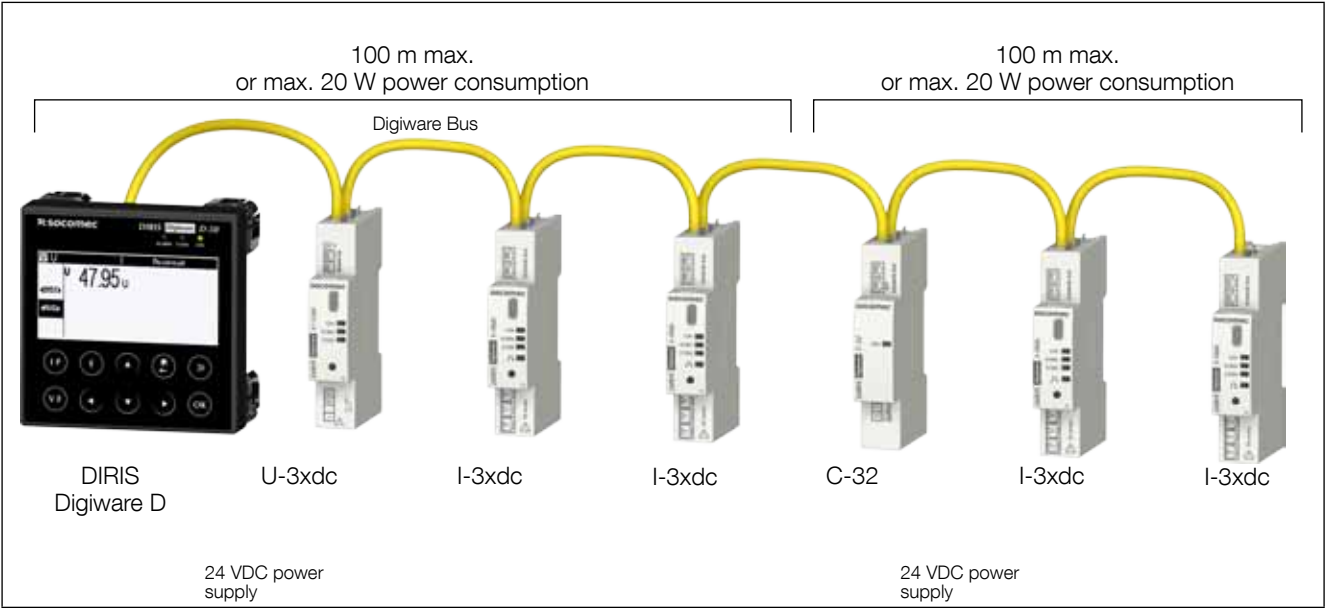
In a DIRIS Digiware system, a maximum of 2 repeaters may be used.



**DIRIS Digiware C-32
repeater**

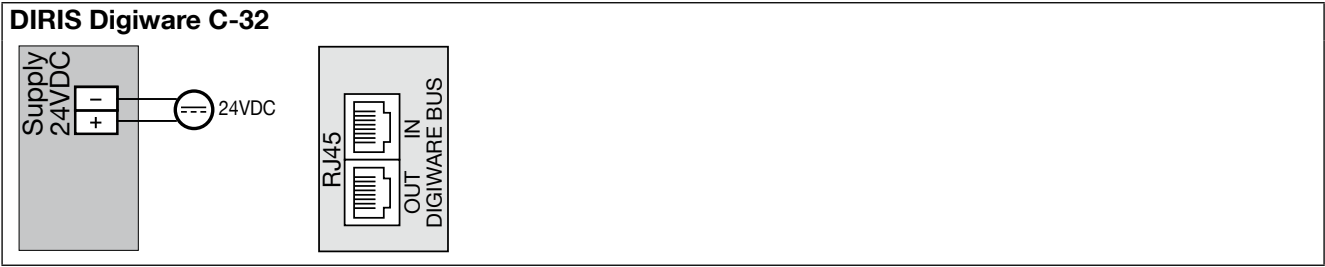
Part number	4829 0103
--------------------	-----------

Configuration example:



The DIRIS Digiware U-3xdc voltage module must be located upstream of the repeater.

The repeater has a 24VDC power supply.

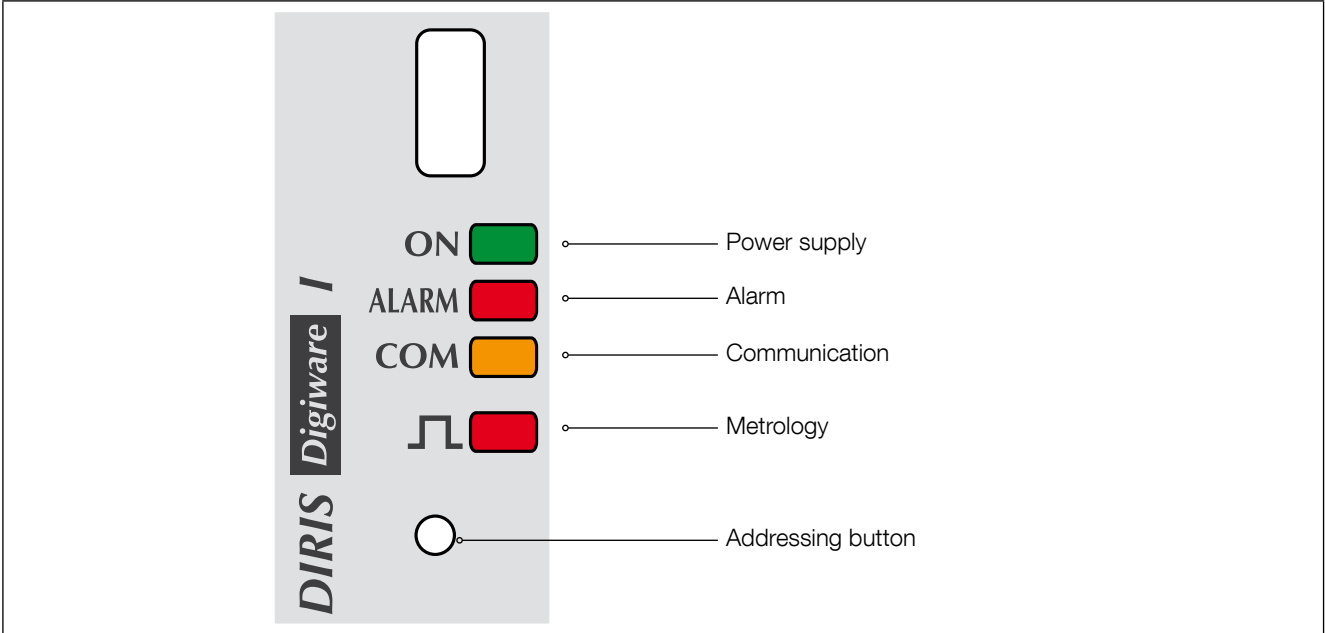


8. STATUS AND AUTO-ADDRESSING LEDS

8.1. Status LEDs

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

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



LED state	Fixed	Blinking	Pulse
ON	In operation	10 seconds - on request via a Modbus control to identify the device (remote screen, etc.)	1 second to start-up
ALARM	An alarm (logical/analogue, etc.) is active (doesn't take priority if there is a system alarm at the same time)	An alarm system indicating the saturation of a voltage input on the voltage measurement module U-3xdc is enabled. (possible presence of too high a common mode voltage)	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 (pulse weight: 0.1Wh)

8.2. Auto-addressing

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

Two modes are available:

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

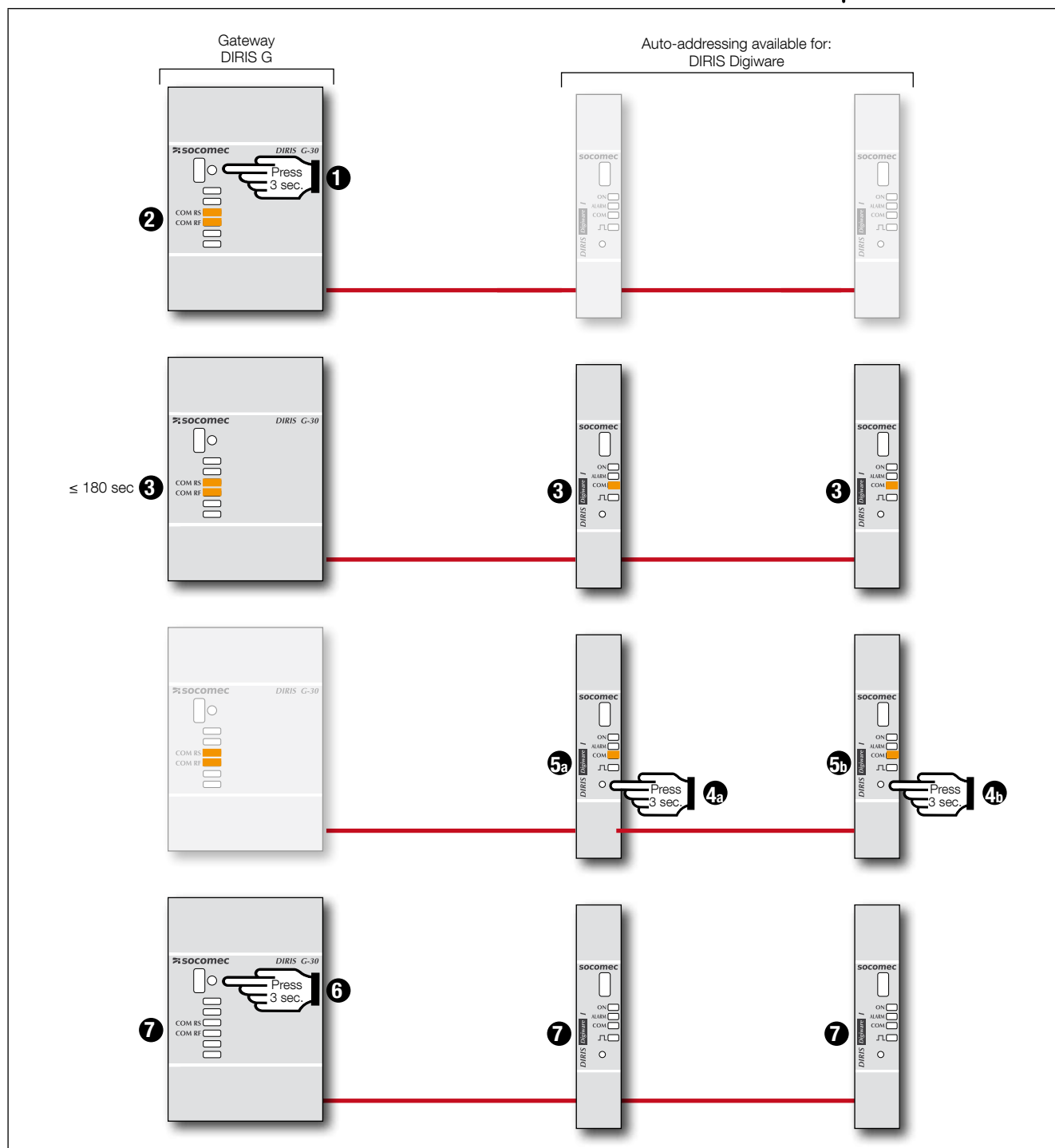
Mode 1 is without external equipment (see description below).

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

Description of mode 1



LED continuously on



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

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

The modules are always connected to the DIRIS G gateway via a DIRIS Digiware C-31 interface or via a DIRIS Digiware D-40 display.

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

9. COMMUNICATION

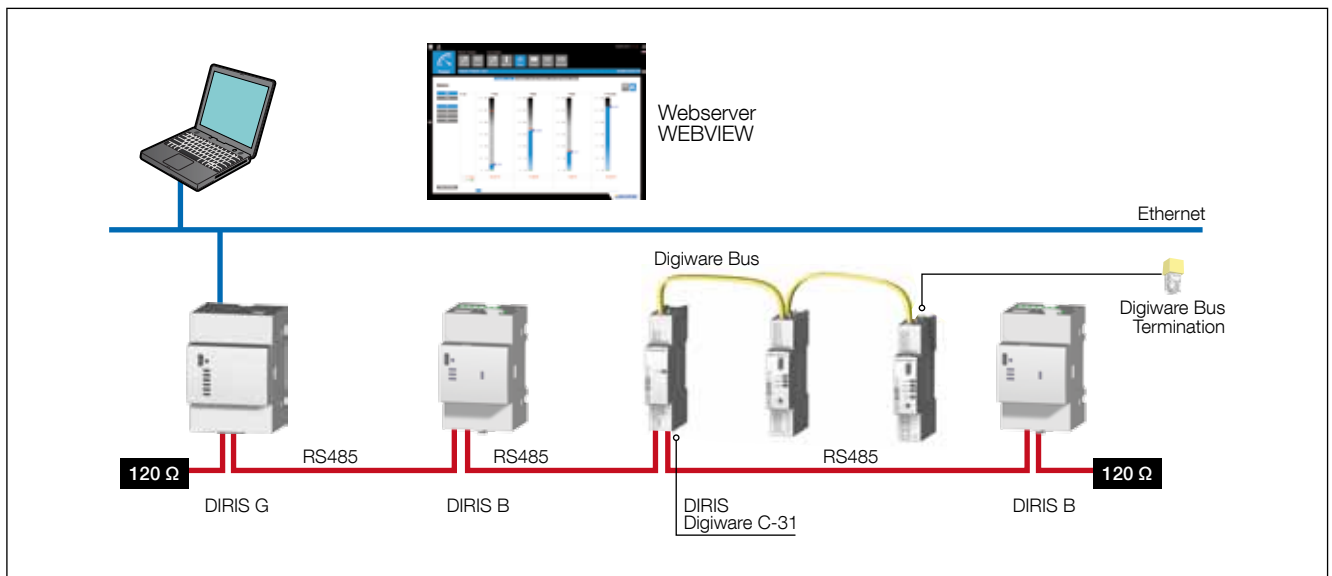
9.1. General information

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

With the RS485 link, DIRIS Digiware can be directly connected to a PC, a PLC, a DIRIS G gateway or a DIRIS Digiware D display (see the corresponding manual for more details) to exploit the data.

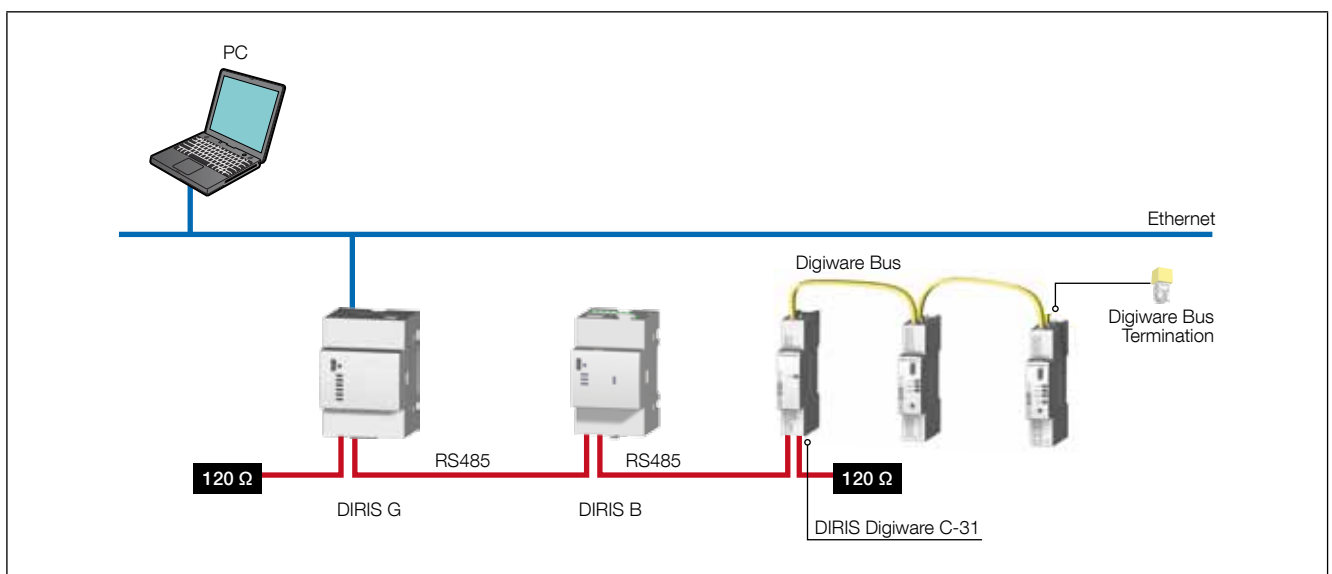
The Modbus protocol requires a dialogue with a master/slave structure. The mode of communication is the RTU (Remote Terminal Unit). In a standard setup, an RS485 link enables the interconnection of 32 RS485 devices to a PC (with DIRIS Digiware C-31 counting as one device), a PLC or the gateway over a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

Example of architecture in combination with the DIRIS G gateway:



9.2. RS485 and Digiware Bus rules

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



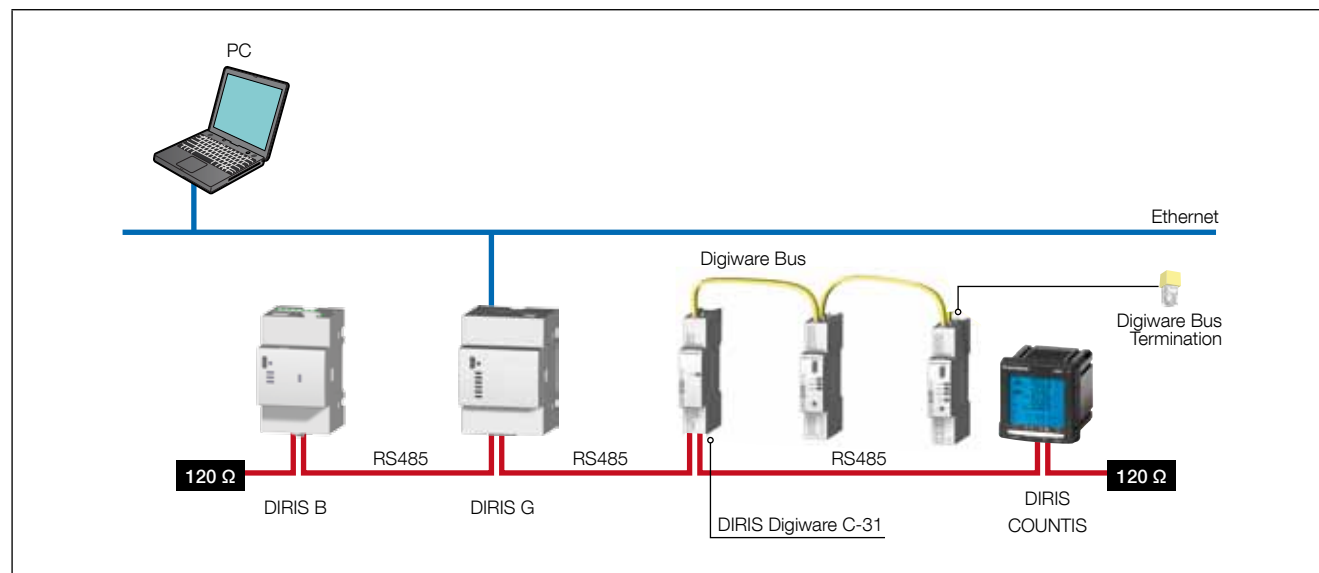
9.2.1. Connection with the DIRIS Digiware C-31 system interface module

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

The following rules must be observed:

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

Connection example:



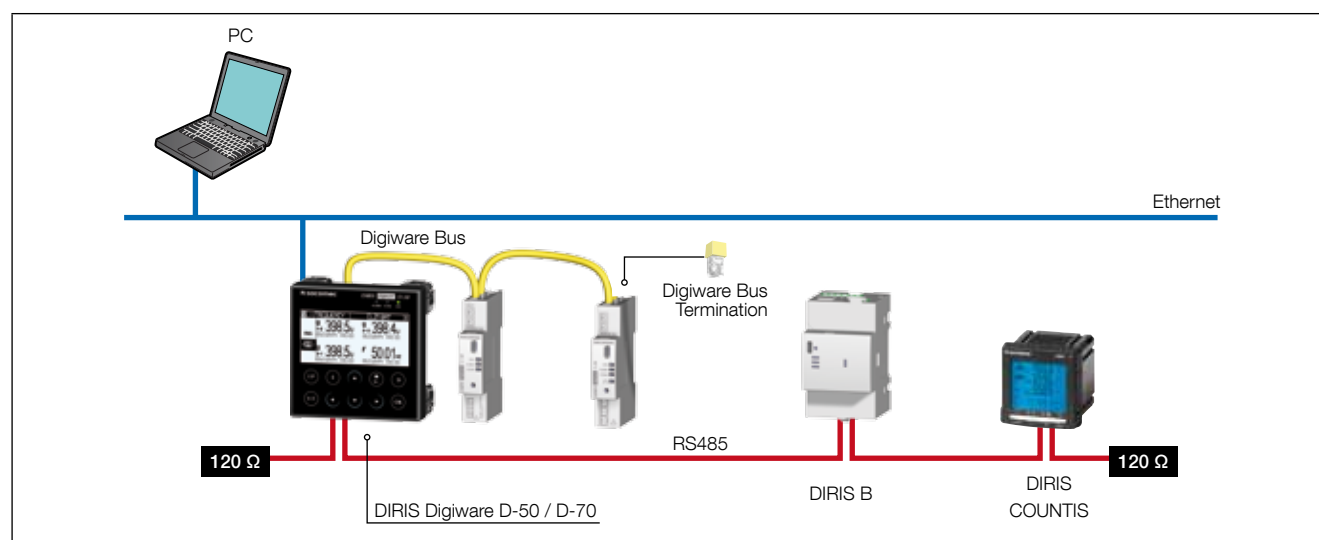
9.2.2. Connection with the DIRIS Digiware D-50/D-70 remote display

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

The following rules must be observed:

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

Connection example:



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

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

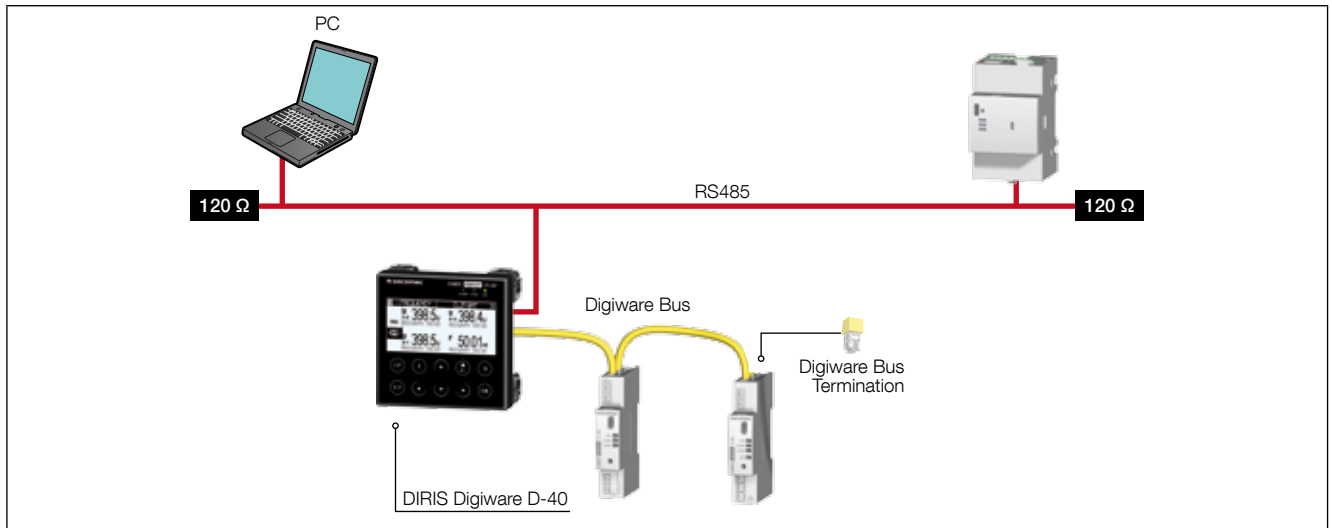
9.2.3. Connection with the DIRIS Digiware D-40 remote display

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

The following rules must be observed:

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

Connection example:



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

9.3. Communication tables

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



10. CONFIGURATION

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

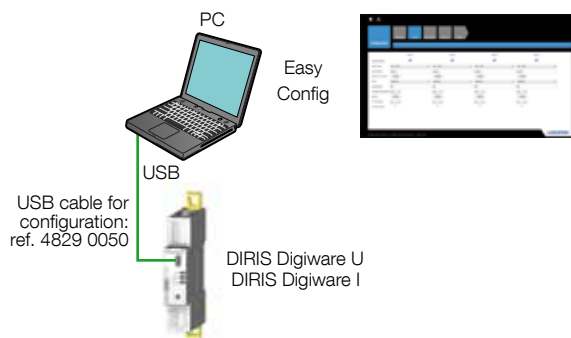
If DIRIS Digiware is combined with the G-30, G-40, G-50 or G-60 gateway, it can be configured via this and the Ethernet port or USB.

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

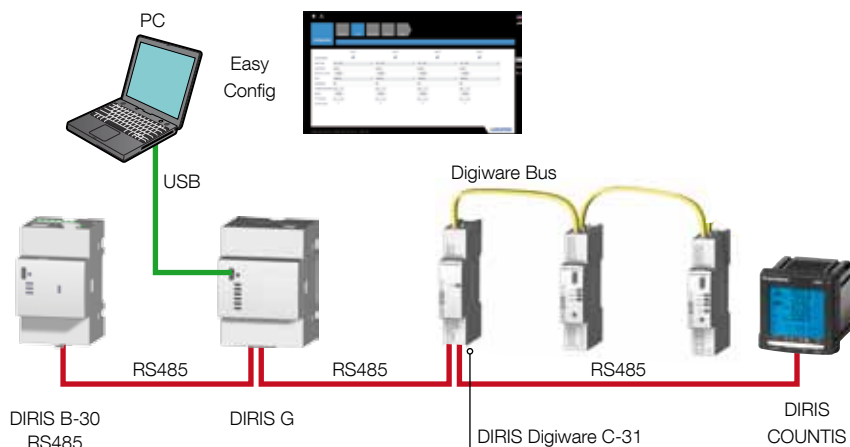
10.1. Configuration using Easy Config

10.1.1. Connection modes

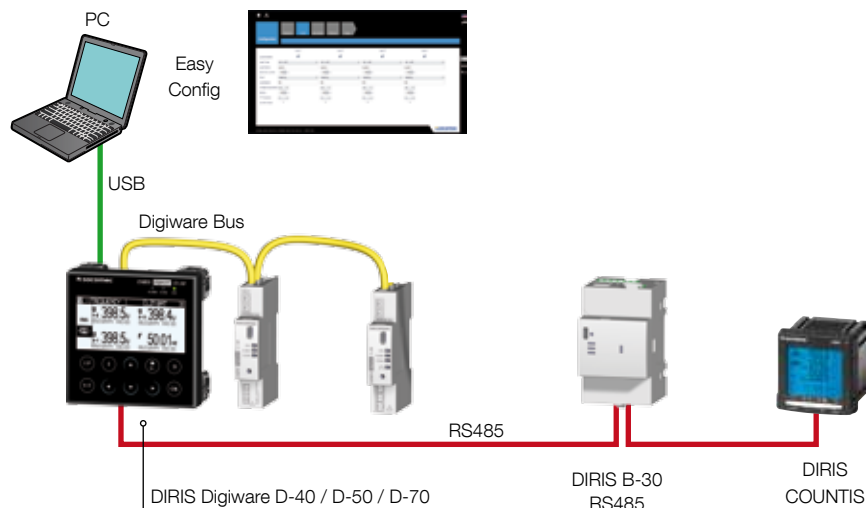
Configuration using Easy Config directly (USB)



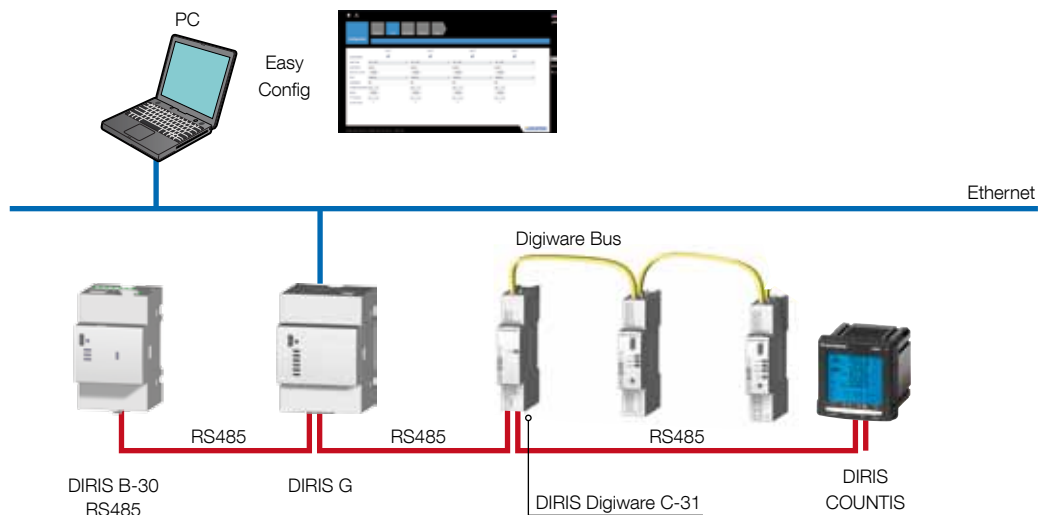
Configuration using Easy Config via a DIRIS G gateway (USB)



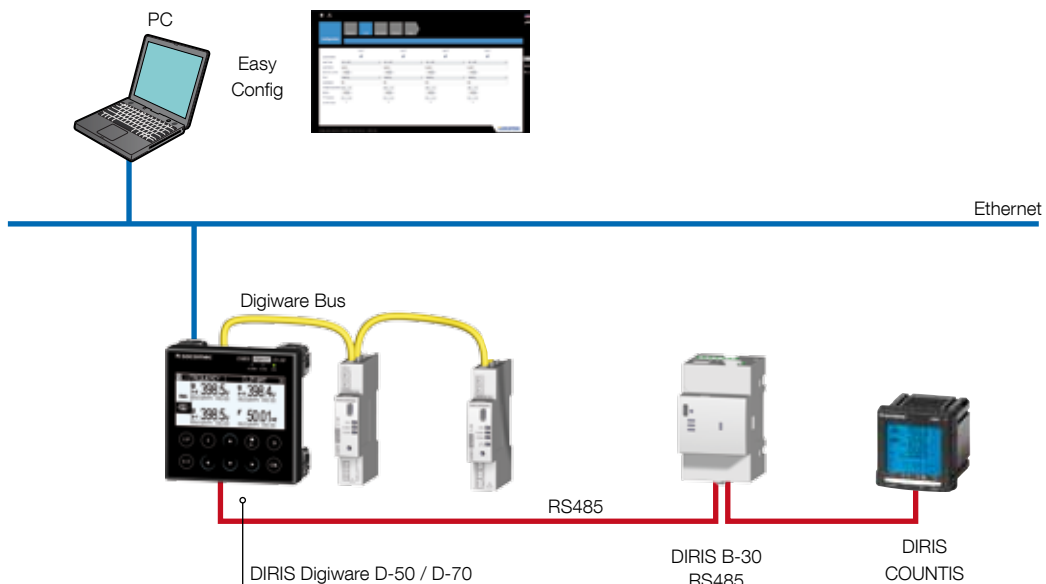
Configuration using Easy Config via a DIRIS Digiware D monitor (USB)



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



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

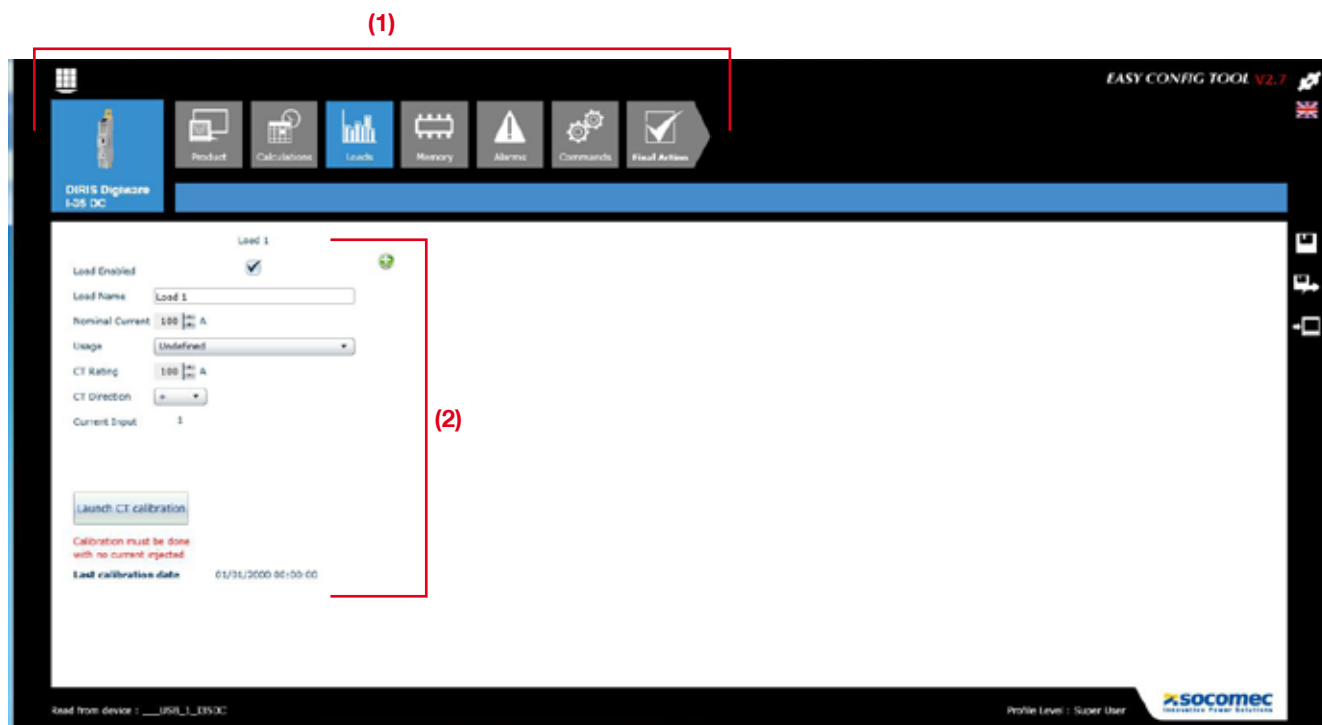


These products must be connected to the power supply before you configure them.
For the Digiware bus and 120-ohm termination resistors, see section “Communication”, page 37.

10.1.2. Using Easy Config

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

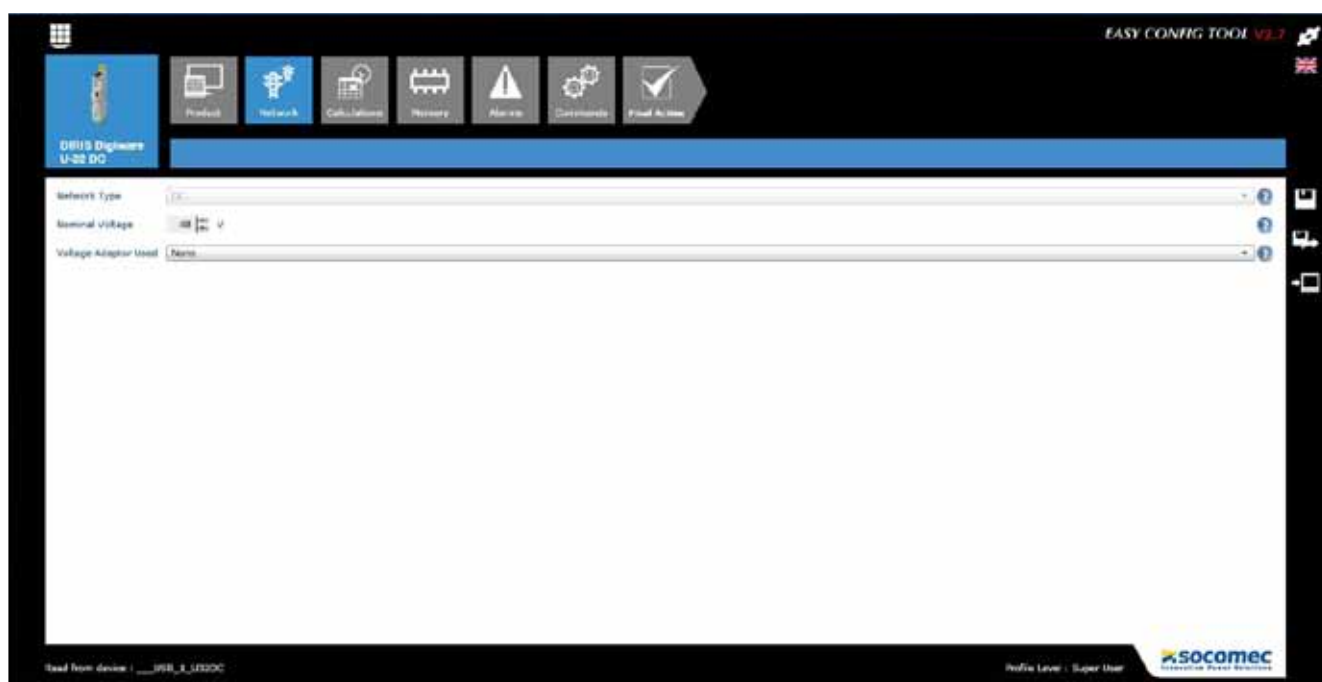
Network → Loads → Measurement method → Values to be stored → Alarms → End of configuration



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

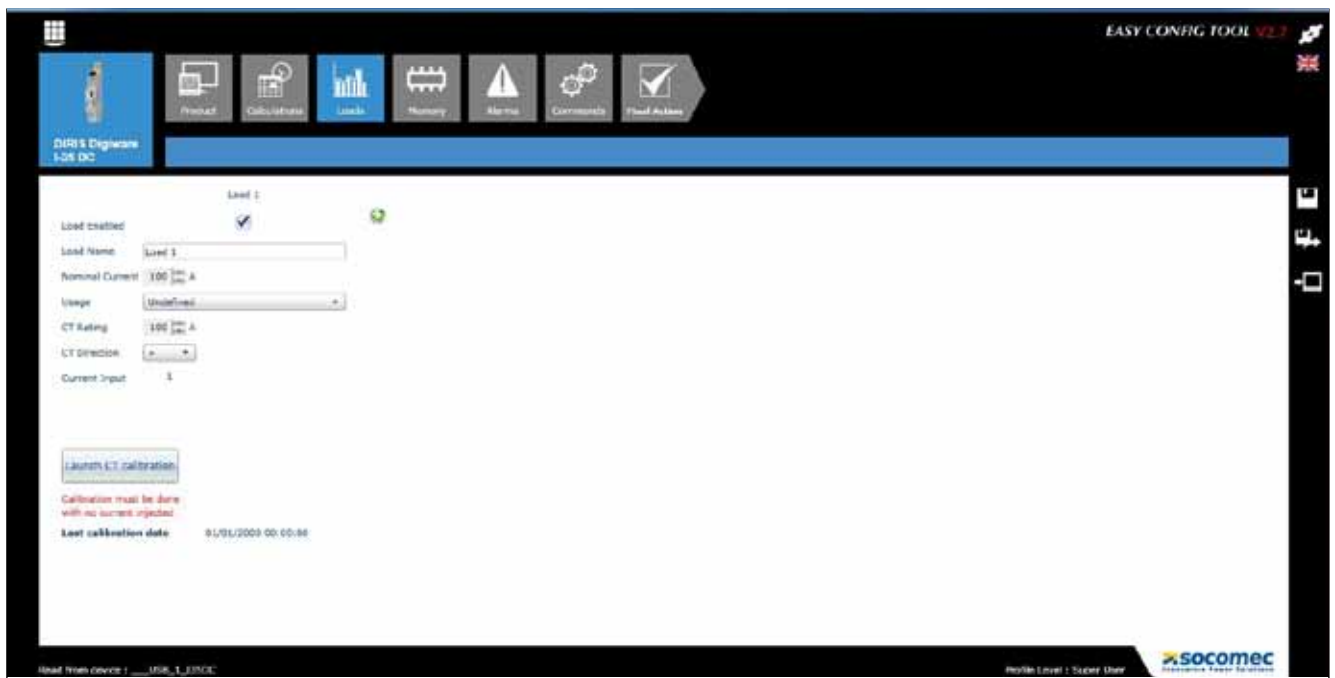
Network configuration

In the electrical network configuration menu, the user selects the type of network, the nominal voltage, and whether or not a voltage adapter is used.



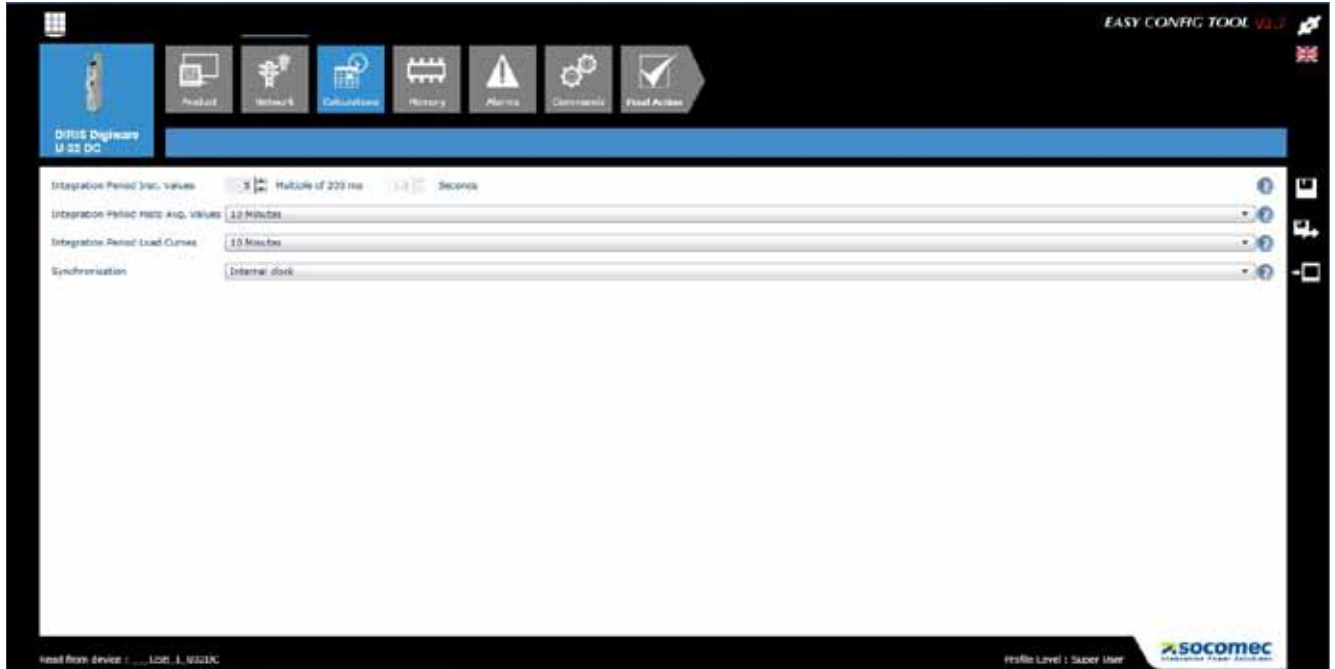
Configuring the loads

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



Calculation method

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



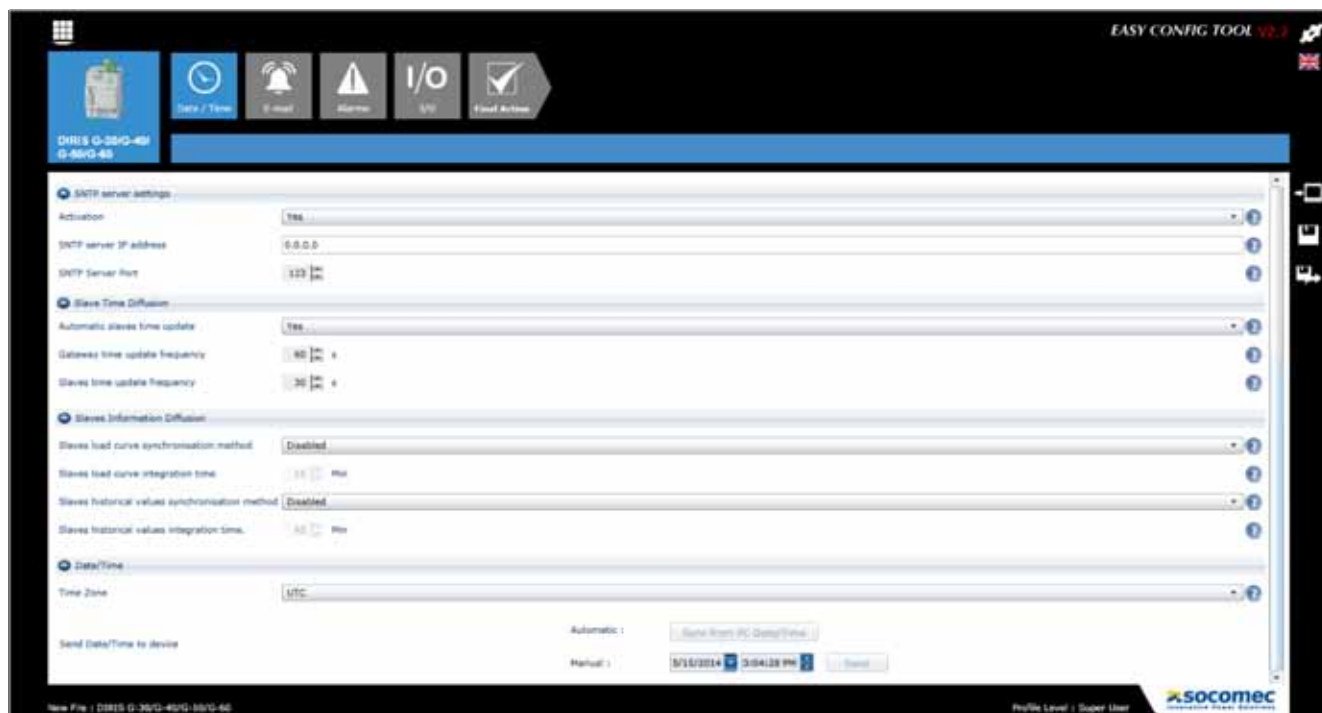
Alarms

The type of alarm and the configuration is performed via Easy Config, see section "11. ALARMS", page 45 for more details.

10.1.3. Synchronisation of products

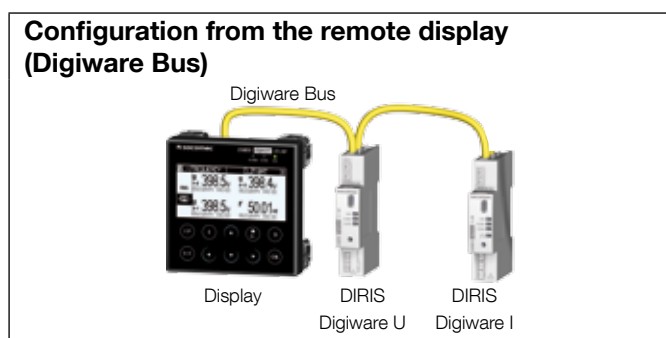
Ensure that all connected products are set to the same time, their time is controlled by an NTP server (DIRIS G, DIRIS Digiware D-50/D-70) or manually (DIRIS G, DIRIS Digiware D-40/D-50/D-70).

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



10.2. Configuration from the DIRIS Digiware D remote display

10.2.1. Connection mode



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

11. ALARMS

The threshold alarms are only available in DIRIS Digiware U-31dc, U32dc, I-35dc and IO-20.

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

11.1. Alarms upon events

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

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

Up to 8 alarms for an electrical measurement can be configured per equipment and 4 for changes in status of a digital input. The digital inputs are available only on DIRIS Digiware IO-10 modules.

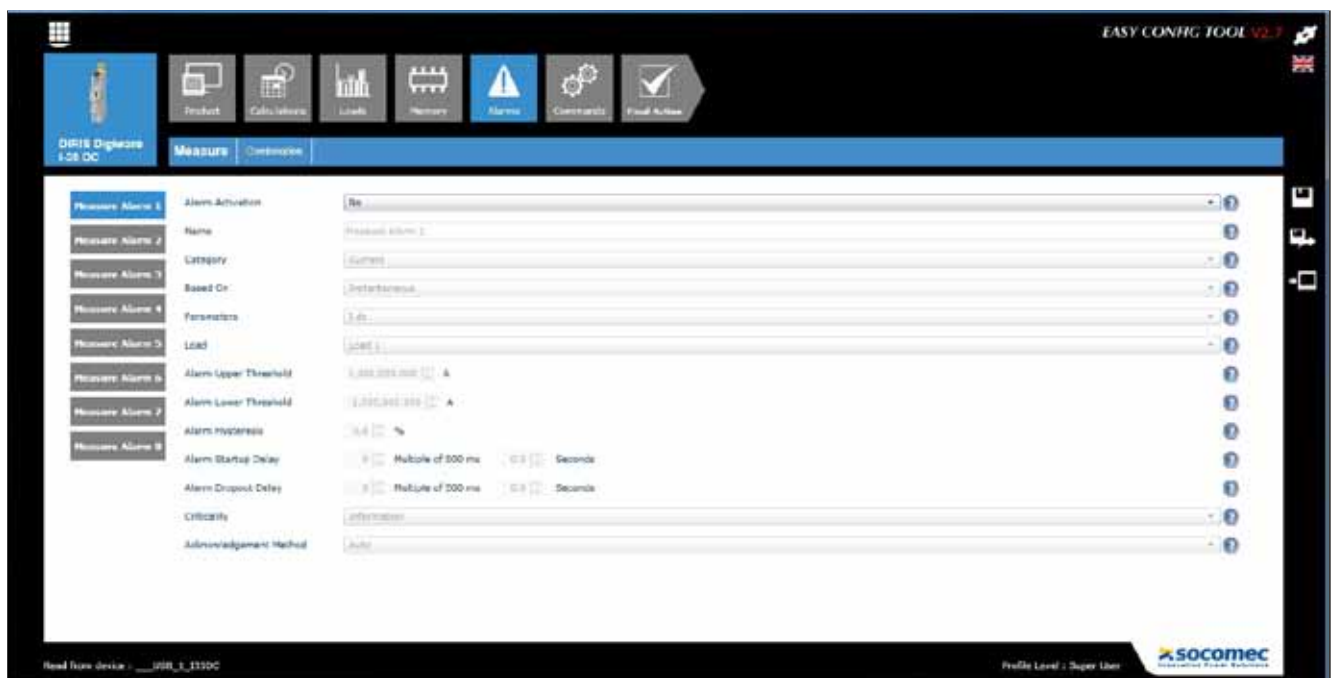
The alarms are configured via the Easy Config software.

11.1.1. Electrical parameters

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

- Alarm upon variation in the instantaneous or average value of an electrical value: Current, voltage, power or an analogue value on the DIRIS Digiware IO-20 module.
- Selection of the hysteresis and high/low threshold.
- Setting a time delay at the start and end of the alarm.

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



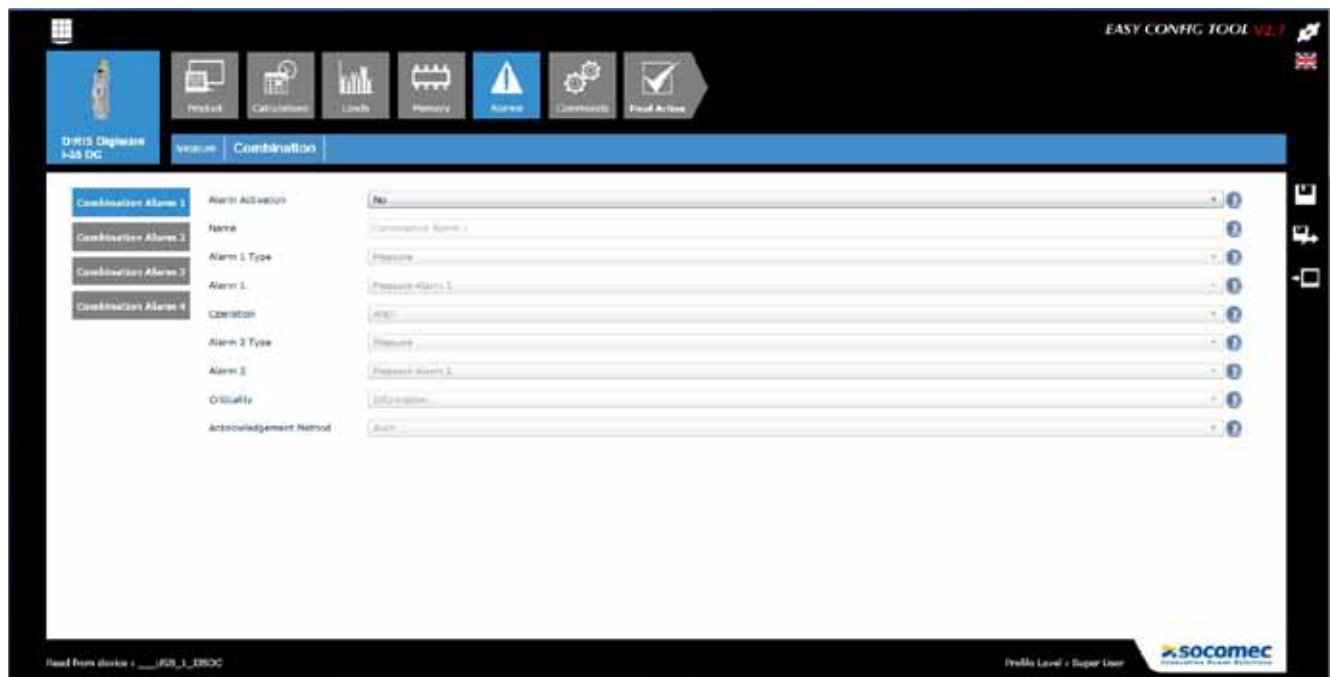
11.1.2. Consumption

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

11.1.3. Combination of alarms

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

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



11.2. System alarm

If a saturation of voltage input is detected, an alarm will be automatically generated.

11.3. Setting up alarms

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

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

11.3.1. ALARM LED on front

- Blinking: Alarm system (priority on alarm upon events)
- Fixed: Event alarm

11.3.2. Activation of an output

- On the DIRIS Digiware IO-10 an output may be enabled when an alarm is detected

11.3.3. Activation of an input

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

11.3.4. RS485 Modbus

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

11.3.5. Display and WEBVIEW

- Information on the alarms with timestamping
- Alarm acknowledgement

12. CHARACTERISTICS

12.1. DIRIS Digiware C, U, I, IO and adapters characteristics

12.1.1. Mechanical characteristics

Casing type	DIN-rail mounting module and base
Casing protection index	IP20
Front panel protection index	IP40 on the nose in modular assembly
Weight of DIRIS Digiware C-3x / U-3xdc / I-3xdc / IO-xx / Uxxxdc	65 g / 64 g / 69 g / 63 g / 72 g

12.1.2. Electrical characteristics

DIRIS Digiware C-31	
Input voltage	24 VDC $\pm$ 20 % SELV - 20 W max
Connection	Removable screw terminal block, 2 positions, stranded or solid 0.2 ... 2.5 mm ² cable
Link with DIRIS Digiware U voltage module	The DIRIS Digiware U voltage module is linked to the DIRIS Digiware C-31 by a Digiware Bus
P15 power supply	Specifications 230 VAC / 24 VDC - 0.63 A - 15 W Modular format - Dimensions (H x L): 90 x 25 mm

12.1.3. Measuring characteristics

Measurement accuracy	
Accuracy	According to IEC 61557-12 PMD SD classification
Measuring energy and power	
Active energy and active power accuracy	Class 1 without adapter / Class 2 with adapter
Voltage measurement - DIRIS Digiware U	
Characteristics of the network measured	U-31dc: Nominal: 24 - 48 VDC; Voltage range: min. 19.2 - max. 60 VDC U-32dc: Nominal: 60 - 150 VDC; Voltage range: min. 48 - max. 180 VDC U-32dc + adapter U500dc: Nominal: 500 VDC; Voltage range: min. 200 - max. 600 VDC U-32dc + adapter U1000dc: Nominal: 1000 VDC; Voltage range: min. 400 - max. 1200 VDC U-32dc + adapter U1500dc: Nominal: 1500 VDC; Voltage range: min. 1200 - max. 1500 VDC+10%
Maximum permissible common mode voltage	U-31dc: 12 VDC U-32dc: 80 VDC U-32dc + adapter U500dc: 175 VDC U-32dc + adapter U1000dc: 195 VDC U-32dc + adapter U1500dc: 240 VDC
Input consumption	$\leq$ 0.1 VA
Voltage measurement accuracy	Class 0.5 without adapter / Class 1 with adapter
Connection without adapter	Removable screw terminal block, 2 positions, stranded or solid 0.2 - 2.5 mm ² cable
Connection with adapter	Adapter input: Removable screw terminal block, 4 positions, stranded or solid 0.2 - 2.5 mm ² cable Adapter output: Removable screw terminal block, 2 positions, stranded or solid 0.2 - 2.5 mm ² cable
Link with DIRIS Digiware I current module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus

Current measurement - DIRIS Digiware I	
Number of current inputs	3
Accuracy of current measurement	Class 0.5
Characteristics of the current sensors to be connected	• Open-loop Hall-effect sensors • Solid-core or split-core • Power supply voltage: ± 15 V • Power supply current: ± 25 mA depending on the sensor • Output voltage: ± 4 V (+/- 100% nominal current of sensor) • Molex 4-point male terminal • Measurement range: 16 to 6000 A • SELV signals
Maximum current	2x nominal current
Connection	Specific Socomec cable with RJ12-Terminal connectors
Link with DIRIS Digiware U voltage module	The first DIRIS Digiware I current module is linked to the DIRIS Digiware U voltage module by a Digiware Bus
Link with DIRIS Digiware I current module	The DIRIS Digiware I current modules are interconnected by Digiware Bus with bus termination for the last module
Digital inputs/outputs- DIRIS Digiware IO-10	
Number of inputs	4
Type / Power supply	Insulated input, internal polarisation 12 VDC max., 3 mA
Input functions	Logical status State of the circuit breaker: position, trigger, drawer Pulse counter: choice of pulse weight, measurement unit, number of rates (max. 8)
Connection	Removable screw terminal block, 9 positions - 5 dedicated to inputs, stranded or solid 0.14 - 1.5 mm ² cable
Number of outputs	2
Type	Insulated output, 48 VDC max., 50 mA and 24 VAC max.
Output functions	Configurable alarm on threshold overruns Remote control
Connection	Removable screw terminal block, 9 positions - 4 dedicated to outputs, stranded or solid 0.14 - 1.5 mm ² cable
Analogue inputs - DIRIS Digiware IO-20	
Number of inputs	2
Type / Power supply	0/4-20mA, 200 Ω max - SELV
Accuracy	0.5% full scale
Function	Connection of analogue sensors (pressure, humidity, temperature...) with linear or quadratic interpolation
Connection	Removable screw terminal block, 2x2 positions, stranded or solid 0.14 - 1.5 mm ² cable

12.1.4. Communication characteristics

Digiware BUS	
Function	Connection between DIRIS Digiware - SELV modules
Cable type	Specific Socomec cable with RJ45 connections
RS485	
Connection type	2 to 3 half duplex wires - SELV
Protocol	Modbus RTU
Baudrate	1200 to 115200 bauds
Function	Configuration and reading of centralised data on the DIRIS Digiware U and all of the DIRIS Digiware I linked by the Digiware bus
Location	Single-point on DIRIS Digiware C

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

12.1.5. Environmental characteristics

Ambient operating temperature	-10 - +70°C (IEC 60068-2-1/IEC 60068-2-2)
Storage temperature	-25 - +70°C (IEC 60068-2-1/IEC 60068-2-2)
Operating humidity	55°C / 97% RH (IEC 60068-2-30)
Operating altitude	< 2000 m
Vibration	0.35 mm, 25 Hz, 20 min/axe (IEC 61557-12)
Impact resistance	Front panel: 1J - casing: 1J (IEC 61010-1 Ed 3.0)
PEP ecopassport - ISO 14025	DIRIS Digiware DC : SOCO-00008-V01.01-EN, DIRIS Digiware IO : SOCO-00001-V01.01-EN

12.1.6. Electromagnetic characteristics

Immunity to electrostatic discharges on contact	IEC 61000-4-2 LEVEL III Criterion A
Immunity to electrostatic fields in the air	IEC 61000-4-2 LEVEL III Criterion A
Immunity to radiated electromagnetic fields	80MHz to 1GHz IEC 61000-4-3 LEVEL III Criterion A
Immunity to radiated electromagnetic fields	1.4GHz to 2.7GHz IEC 61000-4-3 LEVEL III Criterion A
Immunity to electrical fast transients/bursts	IEC 61000-4-4 LEVEL IV Criterion A
Surge immunity in common mode	IEC 61000-4-5 LEVEL II Criterion B
Immunity to conducted disturbances	IEC 61000-4-6 LEVEL II Criterion A
Immunity to power frequency magnetic fields	IEC 61000-4-8 400A/m Criterion A
Radiated emissions	CISPR11 Group 1 - CLASS B
Electromagnetic environment	Basic & industrial

12.1.7. Safety

Safety	Low Voltage Directive conformity: 2014/35/EU of 26 February 2014 (IEC EN61010-1 & IEC EN61010-2-030) Electromagnetic Compatibility Directive conformity: 2014/30/EU of 26 February 2014
Insulation	Degree of pollution 2 Measurement category: CAT III
UL	UL61010-1 & UL61010-2-030 UL installation: DIRIS Digiware DC and current sensors have to be enclosed inside an NRTL certified electrical/fire enclosure, Listed Industrial Control Equipment, or similar equipment. The DC current sensors have to be compatible with the specifications provided in this manual and UL Listed with internal burden components.

12.1.8. Service life

MTTF (mean time to failure)	> 100 years
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12.2. DIRIS Digiware D-40/D-50/D-70 display characteristics

12.2.1. Mechanical characteristics

Type of screen	Capacitive touch-screen technology, 10 keys
Screen resolution	350 x 160 pixels
Front panel protection index	IP65
Weight of DIRIS Digiware D-40 / D-50 / D-70	160 g / 180 g / 185 g

12.2.2. DIRIS Digiware D-40 communication characteristics

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

12.2.3. DIRIS Digiware D-50/D-70 communication characteristics

Type of screen	Multipoint remote screen
Ethernet RJ45 10/100 Mbs	Modbus TCP gateway function
RJ45 Digiware	Control and power supply interface function
RS485 2-3 wires	Modbus RTU master communication function
USB	Upgrade and configuration via type B micro USB connector
UL	UL 61010 conformity

12.2.4. Electrical characteristics

Power supply	24Vdc +/-20% SELV - 20 W max
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12.2.5. Environmental characteristics

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

13. PERFORMANCE CLASSES

Performance classes are drawn up in compliance with IEC 61557-12

Classification of DIRIS Digiware	SD
Temperature	K55
Performance class for active power or active energy	1 without adapter / Class 2 with adapter

13.1. Specification of the characteristics

Symbol	Function	Operating performance class DIRIS Digiware DC in compliance with IEC 61557-12	Measurement range
With DIRIS Digiware U-31dc			
Pa	Total active power	1	2% ... 120% In
Ea	Total active energy	1	2% ... 120% In
U	Voltage (DC+ / DC-)	0.5	19.2 ... 60 VDC
I	Current	0.5	10% ... 120% In
With DIRIS Digiware U-32dc			
Pa	Total active power	1	2% ... 120% In
Ea	Total active energy	1	2% ... 120% In
U	Voltage (DC+ / DC-)	0.5	48 ... 180 VDC
I	Current	0.5	10% ... 120% In
With DIRIS Digiware U-32dc + adapter U500dc			
Pa	Total active power	2	2% ... 120% In
Ea	Total active energy	2	2% ... 120% In
U	Voltage (DC+ / DC-)	1	200 ... 600 VDC
I	Current	0.5	10% ... 120% In
With DIRIS Digiware U-32dc + adapter U1000dc			
Pa	Total active power	2	2% ... 120% In
Ea	Total active energy	2	2% ... 120% In
U	Voltage (DC+ / DC-)	1	400 ... 1200 VDC
I	Current	0.5	10% ... 120% In
With DIRIS Digiware U-32dc + adapter U1500dc			
Pa	Total active power	2	2% ... 120% In
Ea	Total active energy	2	2% ... 120% In
U	Voltage (DC+ / DC-)	1	1200 ... 1500 VDC +10%
I	Current	0.5	10% ... 120% In

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