# DIRIS A40/A41

## Multifunction meters - PMD

### multi-measurement meter - dimensions 96 x 96 mm



*DIRIS A41*

### The solution for

> Industry
> Data centres
> Infrastructures



## Function

**DIRIS A40** and **A41** are panel mounted measurement units which ensure the user has access to all the measurements required for successfully carrying out energy efficiency projects and ensuring the electrical distribution is monitored.

All this information can be analysed remotely using an energy management software solution.

The DIRIS A41 has a CT current input for measuring the neutral current.

## Advantages

### Easy to use

Thanks to its large backlit LCD display and its multiple viewing screens with direct pushbutton access, DIRIS A4x provide clear readings and are easy to use.

They directly display a number of multi-measurement and metering values : +/- kWh, +/- kvarh, kVAh, I, U, V, F, P, Q, S, PF, etc.

### Detects wiring errors

An integrated test function can be utilised to detect incorrect wiring and to automatically correct CT installation errors.

### Customisable

Thanks to the wide range of optional modules, the product can be customised or upgraded after installation.

## Principle diagram



### Webserver function

Optional Ethernet communication modules include a Webserver function for monitoring and exploiting data remotely without additional software.

### Compliant with IEC 61557-12

IEC 61557-12 is a high-level standard for all PMDs (Performance Monitoring Devices) that are designed to measure and monitor electrical parameters in distribution networks.

Compliance with IEC 61557-12 ensures a high level of equipment performance, in terms of metrology, and the mechanical and environmental aspects (EMC, temperature, etc.).

### Strong points

> Easy to use
> Detects wiring errors
> Customisable
> Webserver function
> Compliant with IEC 61557-12

### Conformity to standards

> IEC 61557-12
> IEC 62053-22 class 0.5S
> IEC 62053-23 class 2

> UL

## Functions

### Multi-measurement

- Currents
  - instantaneous: I1, I2, I3, In, Isystem
  - average/maximum average: I1, I2, I3, In
- Voltages & frequency
  - instantaneous: V1, V2, V3, U12, U23, U31, F, Vsystem, Usystem
  - average/maximum average: V1, V2, V3, U12, U23, U31, F
- Power
  - instantaneous: 3P, ΣP, 3Q, ΣQ, 3S, ΣS
  - maximum average: ΣP, ΣQ, ΣS
  - predictive: (ΣP), (ΣQ), (ΣS)
- Power factors
  - instantaneous: 3PF, ΣPF
  - average/maximum average: ΣPF

- Temperatures[1]
  - internal
  - external via 3 PT100 sensors

### Metering

- Active energy: +/- kWh
- Reactive energy: +/- kvarh
- Apparent power: kVAh
- Hours: ☉

### Harmonic analysis

- Total harmonic distortion
  - Currents: thd I1, thd I2, thd I3, thd In
  - Phase-to-neutral voltage: thd V1, thd V2, thd V3
  - Phase-to-phase voltage: thd U12, thd U23, thd U31

- Individual up to level 63
  - Currents: HI1, HI2, HI3, HIn
  - Phase-to-neutral voltage: HV1, HV2, HV3,
  - Phase-to-phase voltage: HU12, HU23, HU31

### Load curves[1]

- Active and reactive power: ΣP+/- ; ΣQ+/-
- Voltages & frequency: V1, V2, V3, U12, U23, U31, F

### Events [1]

- Alarms on all electrical values.

### Communications[1]

- RS485 MODBUS RTU & PROFIBUS DP
- Ethernet (MODBUS TCP or RTU over TCP and Web server)
- Ethernet with RS485 gateway MODBUS RTU over TCP

### Inputs / Outputs [1]

- Pulse metering
- Remote control/command
- Alarm report
- Pulse report

### Analogue output

- 0/4- 20 mA analogue output

*(1) Available as an option (see the following pages).*

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## Front panel

1. Backlit LCD display.
2. Direct access key for currents and test function.
3. Direct access key for voltages and frequency.
4. Direct access key for active, reactive, and apparent powers and power factor.
5. Direct access key for maximum and average current and power values.
6. Direct access key for harmonic values.
7. Direct access key for energies, hour meter and programming menu.

## Plug-in modules

**DIRIS® A40**
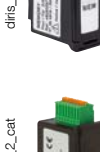
**DIRIS® A41***

*\* with a factory fitted neutral CT module.*

### Pulse outputs

2 configurable pulse outputs (type, weight and duration)
on ± kWh, ±kvarh and kVAh.

### Communication MODBUS®

RS485 link with MODBUS® protocol
(speed up to 38400 bauds).

### PROFIBUS® DP communication

SUB-D9 link with PROFIBUS® DP protocol (speed up to 12 Mbauds).

### Ethernet communication

- Ethernet connection with MODBUS TCP or MODBUS RTU over TCP protocol.
- Embedded Webserver function [1].

### Ethernet communication with RS485 MODBUS gateway

- Ethernet connection with MODBUS TCP or MODBUS RTU over TCP protocol.
- Connection of 1 to 247 RS485 MODBUS slaves.
- Embedded Webserver function [1].

### Analogue outputs

A maximum of 2 modules may be connected, providing up to 4 analogue outputs.
Per module 2 outputs assignable to:
3I, In, 3V, 3U, F, ± ΣP, ± ΣQ, ΣS, ΣPFL/C, I sys, Vsys, Usys, Ppred, Q pred, Spred, T°C internal, T°C 1, T°C 2, T°C3 and to 30 VDC power supply.

### 2 inputs - 2 outputs

A maximum of 3 modules may be connected, providing up to 6 inputs and 6 outputs.
Per module 2 outputs assignable to:
- monitoring: 3I, In, 3V, 3U, F, ±ΣP, ±ΣQ, SS, ΣPFL/C, THD 3I, THD In, THD 3V, THD 3U, Ppred, Qpred, Spred, internal T°C, T°C 1, T°C2, T°C3 and hour meter,
- remote control,
- timed remote control.
- 2 inputs for pulse metering.

### Memory

- Storing up to a maximum of 62 days of P+, P-, Q+, Q- with an internal or external synchronisation signal of 5, 8, 10, 15, 20, 30 and 60 minutes.
- Storing of 10 hour-dated last alarms.
- Storing of the last minimum and maximum instantaneous values for 3U, 3V, 3I, In, F, ΣP±, ΣQ±, ΣS, THD 3U, THD 3V, THD, 3U, THD, 3V, THD, 3I, THD In.
- Storing of 3U, 3V and F average values based on synchronisation function (maximum 60 days).

### Temperature[2]

Temperature indication:
- internal,
- external sensor PT 100 (T°C 1),
- external sensor PT 100 (T°C 2),
- external sensor PT 100 (T°C 3),.

*(1) See "Management software for DIRIS" page 618.*

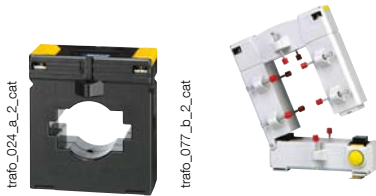*(2) See "external sensor PT 100" page 600.*

# DIRIS *A40/A41*

Multifunction meters - PMD

multi-measurement meter - dimensions 96 x 96 mm

## Accessories

### Current transformers
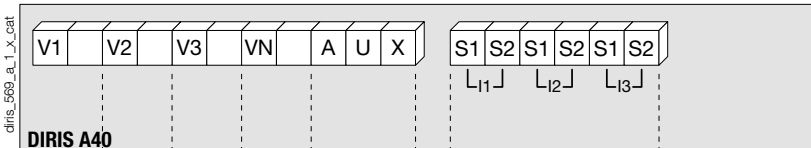(see page 584)



### IP65 protection
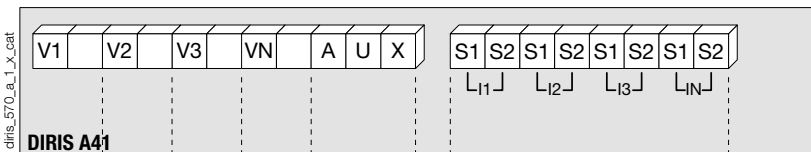


### Panel mounting kit for a 144 x 96 mm cut-out



## Terminals

### DIRIS A40



| V1 | V2 | V3 | VN | A U X | S1 S2 S1 S2 S1 S2 |

**DIRIS A40**

**S1 - S2:** current inputs

**AUX:** auxiliary power supplies $U_s$
**V1 - V2 - V3 - VN:** voltage inputs

### DIRIS A41



| V1 | V2 | V3 | VN | A U X | S1 S2 S1 S2 S1 S2 S1 S2 |

**DIRIS A41**

**S1 - S2:** current inputs

**AUX:** auxiliary power supplies $U_s$
**V1 - V2 - V3 - VN:** voltage inputs

### Communication module



| 0 V | - | + | 1 |
RS485 | 0n R = 120Ω
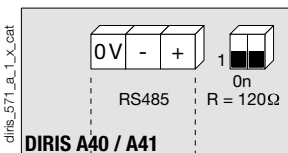
**DIRIS A40 / A41**

RS485 link.

**R = 120 Ω:** selectable internal resistance for RS485 end of line termination.

### Pulse output module



| 1 | 2 | 3 | 4 |
OUT 1 | OUT 2
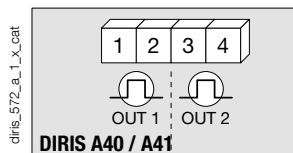
**DIRIS A40 / A41**

**1 - 2:** pulse output n°1.
**3 - 4:** pulse output n°2.

### Analogue output module



| 5 | 6 | 7 | 8 |
+ - + -
0/4-20 mA | 0/4-20 mA
OUT 1 | OUT 2
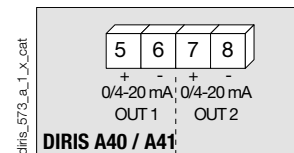
**DIRIS A40 / A41**

**5 - 6:** analogue output n°1.
**7 - 8:** analogue output n°2.

### 2 inputs / 2 outputs module



| 9 | 10 | 11 | 12 |
OUT 1 | OUT 2
A-Cd | A-Cd

| 13 | 14 | 15 | 16 |
- + | - +
IN 1 | IN 2
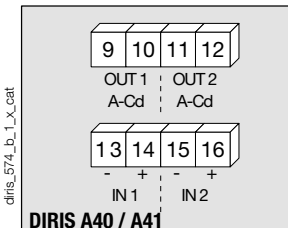
**DIRIS A40 / A41**

**9 - 10:** relay output n°1.
**11 - 12:** relay output n°2.
**13 - 14:** opto input n°1.
**15 - 16:** opto input n°2.

### Memory module
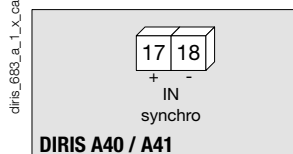


| 17 | 18 |
+ -
IN
synchro

**DIRIS A40 / A41**

**17 - 18:** synchronisation input.

### Temperature module



| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
sensor 1 | sensor 2

| 27 | 28 | 29 | 30 |
sensor 3
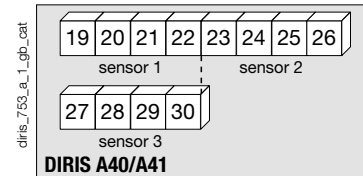
**DIRIS A40/A41**

| Sensor 1 | Sensor 2 | Sensor 3 |
|---|---|---|
| **19:** red | **23:** red | **27:** red |
| **20:** red | **24:** red | **28:** red |
| **21:** white | **25:** white | **29:** white |
| **22:** white | **26:** white | **30:** white |

### Ethernet Module



10 BASE T
100 BASE T
RJ45
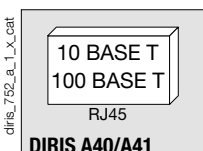
**DIRIS A40/A41**

### Ethernet module + RS485 MODBUS gateway



10 BASE T
100 BASE T
RJ45

| 0 V | - | + | 1 |
RS485 gateway | 0n R = 120Ω

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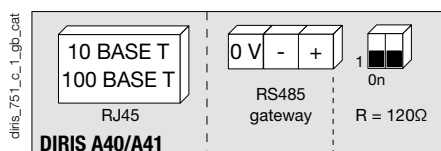
## Electrical characteristics

| Current measurement on insulated inputs (TRMS) | |
|---|---|
| Via CT primary | 9 999 A |
| Via CT secondary | 1 or 5 A |
| Measurement range | 0 … 11 kA |
| Input consumption | ≤ 0.1 VA |
| Measurement updating period | 1 s |
| Accuracy | 0.2 % |
| Permanent overload | 6 A |
| Intermittent overload | 10 $I_n$ for 1 s |
| **Voltage measurements (TRMS)** | |
| Direct measurement between phases | 50 … 700 VAC |
| Direct measurement between phase and neutral | 28 … 404 VAC |
| VT primary | 500 000 VAC |
| VT secondary | 60, 100, 110, 173, 190 VAC |
| Frequency | 50 / 60 Hz |
| Input consumption | ≤ 0.1 VA |
| Measurement updating period | 1 s |
| Accuracy | 0.2 % |
| Permanent overload | 800 VAC |
| **Current-voltage product** | |
| Limitation for 1A CT | 10 000 000 |
| Limitation for 5A CT | 10 000 000 |
| **Power measurement** | |
| Measurement updating period | 1 s |
| Accuracy | 0.5 % |
| **Power factor measurement** | |
| Measurement updating period | 1 s |
| Accuracy | 0.5 % |
| **Frequency measurement** | |
| Measurement range | 45 … 65 Hz |
| Measurement updating period | 1 s |
| Accuracy | 0.1 % |
| **Energy accuracy** | |
| Active (according to IEC 62053-22) | Class 0.5 S |
| Reactive (according to IEC 62053-23) | Class 2 |
| **Auxiliary power supply** | |
| Alternating voltage | 110 … 400 VAC |
| AC tolerance | ± 10 % |
| Direct voltage | 120 … 350 VDC / 12 … 48 VDC |
| DC tolerance | ± 20 % / - 6 … + 20 % |
| Frequency | 50 / 60 Hz |
| Consumption | ≤ 10 VA |

| 2 inputs / 2 outputs module: Outputs (alarms / control) | |
|---|---|
| Number of relays | 2[1] |
| Type | 250 VAC - 5 A - 1150 VA |
| **2 inputs / 2 outputs module: Phototransistor inputs** | |
| Number | 2[1] |
| Power supply | 10 … 30 VDC |
| Minimum signal width | 10 ms |
| Minimum duration between 2 pulses | 18 ms |
| Type | phototransistors |
| **Pulse output module** | |
| Number of relays | 2 |
| Type | 100 VDC - 0.5 A - 10 VA |
| Max. number of operations | ≤ 10[8] |
| **Analogue output module** | |
| Number of outputs | 2[2] |
| Type | insulated |
| Range | 0 / 4 … 20 mA |
| Load resistance | 600 Ω |
| Maximum current | 30 mA |
| **MODBUS communication module** | |
| Link | RS485 |
| Type | 2 … 3 half duplex wires |
| Protocol | MODBUS RTU |
| MODBUS® speed | 4800 … 38400 bauds |
| **PROFIBUS-DP communication module** | |
| Link | SUB-D9 |
| Protocol | PROFIBUS® DP |
| PROFIBUS® speed | 9.8 kbauds … 12 Mbauds |
| **Ethernet communication module** | |
| Connection | RJ45 |
| Speed | 10 base T / 100 base T |
| Protocol | MODBUS TCP or MODBUS RTU over TCP |
| **Temperature module (inputs)** | |
| Type | PT100 |
| Connection | 2, 3 or 4 wires |
| Dynamic | - 20  … 150 °C |
| Accuracy | ±1 digit |
| Maximum length | 300 cm |
| **Operating conditions** | |
| Operating temperature | - 10 … + 55 °C |
| Storage temperature | - 20 … + 85 °C |
| Relative humidity | 95 % |

*(1) Max. 3 modules / DIRIS.*
*(2) Max. 2 modules / DIRIS.*

## Case



92 $^{+0.8}_{-0.0}$

92 $^{+0.8}_{-0.0}$

96

96

35

45

15

diris_582_e_1_x_cat
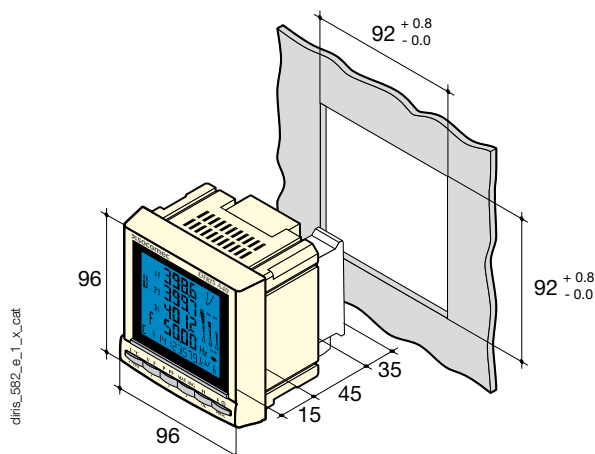
| Type | panel mounting |
|---|---|
| Dimensions W x H x D | 96 x 96 x 60 mm |
| Case degree of protection | IP30 |
| Front degree of protection | IP52 |
| Display type | backlit LCD display |
| Terminal blocks type | fixed or plug-in |
| Voltage and other connection cross-section | 0.2 … 2.5 mm² |
| Current connection cross-section | 0.5 … 6 mm² |
| Weight | 400 g |

# DIRIS *A40/A41*
Multifunction meters - PMD

multi-measurement meter - dimensions 96 x 96 mm

## Connections

**Recommendation:** When disconnecting the DIRIS, the secondary of each current transformer must be short-circuited. This operation can be carried out automatically by a SOCOMEC PTI, an accessory which is included in this catalogue. Please consult us.
In TNC neutral systems it is recommended to use the functional earth module.
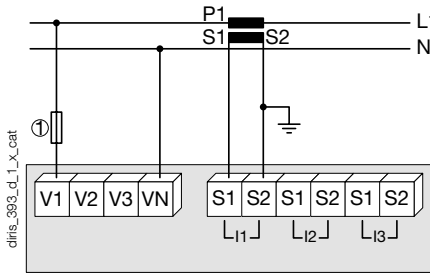
### Low voltage balanced network for DIRIS A40

**3/4 wires with 1 CT**
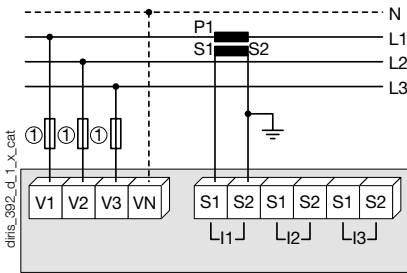
Use of 1 CT reduces by 0.5% the accuracy of the phases, the current of which is worked out by vector calculation.
*1. Fuses 0.5 A gG / 0.5 A class CC.*

**Single-phase**

*1. Fuses 0.5 A gG / 0.5 A class CC.*

**Two-phase**
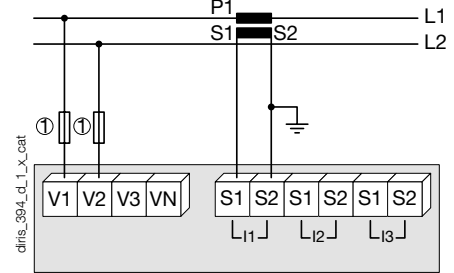
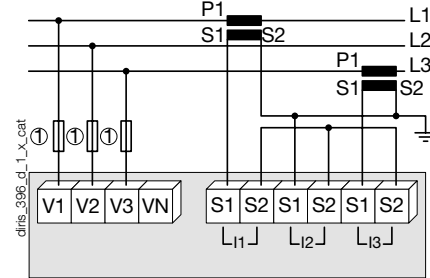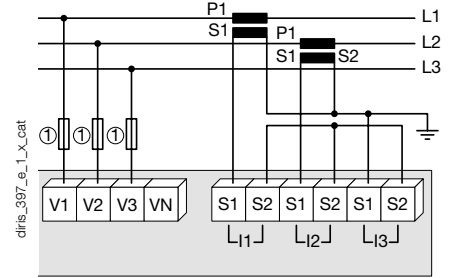*1. Fuses 0.5 A gG / 0.5 A class CC.*

### Low voltage unbalanced network for DIRIS A40

**3/4 wires with 3 CTs**
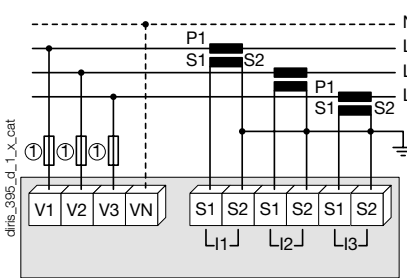
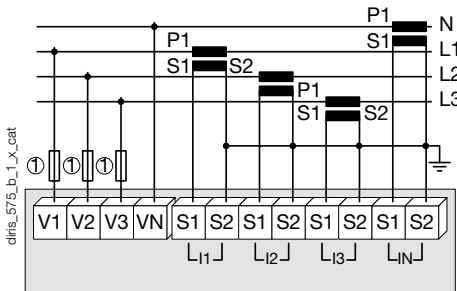*1. Fuses 0.5 A gG / 0.5 A class CC.*

**3 wires with 2 CTs**

Use of 2 CTs reduces by 0.5% the accuracy of the phases, the current of which is worked out by vector calculation.
*1. Fuses 0.5 A gG / 0.5 A class CC.*

**3 wires with 2 CTs**

Use of 2 CTs reduces by 0.5% the accuracy of the phases, the current of which is worked out by vector calculation.
*1. Fuses 0.5 A gG / 0.5 A class CC.*

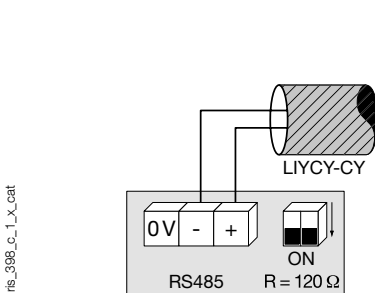### Low voltage unbalanced network for DIRIS A41
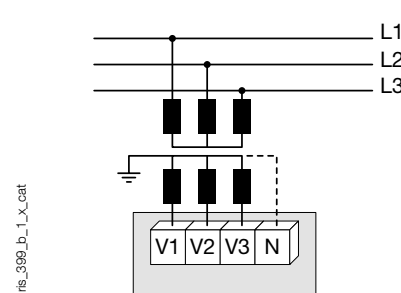
**4 wires with 4 CTs**

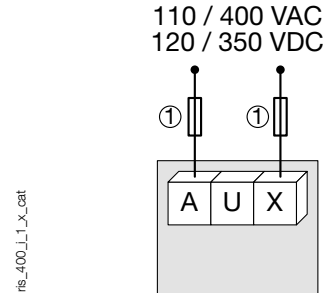*1. Fuses 0.5 A gG / 0.5 A class CC.*

### Additional information

**Communication via RS485 link**

**Connection of voltage transformer for HV networks**

**AC & DC auxiliary power supply**

110 / 400 VAC
120 / 350 VDC

*1. Fuses 0.5 A gG / 0.5 A class CC.*

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## References

| Basic device<br><br>Auxiliary power supply U$_s$ | DIRIS A40<br><br><br>Reference | | DIRIS A41<br>with CT on the<br>neutral<br>Reference |
|---|---|---|---|
| 110 ... 400 VAC / 120 ... 350 VDC | 4825 **0201** | | 4825 **0202** |
| 12 ... 48 VDC | 4825 **1201** | | 4825 **1202** |

| Options<br>Plug-in modules[1] | Reference | | Reference |
|---|---|---|---|
| Pulse outputs | 4825 **0090** | | 4825 **0090** |
| RS485 MODBUS® communication | 4825 **0092** | | 4825 **0092** |
| Analogue outputs | 4825 **0093** | | 4825 **0093** |
| 2 inputs / 2 outputs | 4825 **0094** | | 4825 **0094** |
| Communication Sub D9 PROFIBUS®DP[2] | 4825 **0205** | | 4825 **0205** |
| Memory | 4825 **0097** | | 4825 **0097** |
| Embedded Webserver function [2]. | 4825 **0203** | | 4825 **0203** |
| Ethernet communication + RS485 MODBUS gateway (Embedded Webserver function)[2] | 4825 **0204** | | 4825 **0204** |
| Temperature inputs | 4825 **0206** | | 4825 **0206** |

*(1) Ease of integration for additional functions (maximum 4 slots on A40 and 3 on A41).*
*(2) Dimension of the plug-in module: 2 slots.*

| Accessories<br>Description of accessories | To be ordered<br>in multiples of | Reference | To be ordered<br>in multiples of | Reference |
|---|---|---|---|---|
| IP65 protection | 1 | 4825 **0089** | 1 | 4825 **0089** |
| Panel mounting kit for a 144 x 96 mm cut-out | 1 | 4825 **0088** | 1 | 4825 **0088** |
| Fuse disconnect switches for the protection of voltage inputs (type RM) 3 poles | 4 | 5601 **0018** | 4 | 5601 **0018** |
| Fuse disconnect switches for the protection of the auxiliary supply (type RM) 1 pole + neutral | 6 | 5601 **0017** | 6 | 5601 **0017** |
| Fuse type gG 10 x 38   0.5 A | 10 | 6012 **0000** | 10 | 6012 **0000** |
| Current transformer range | 1 | see page 584 | 1 | see page 584 |
| Ferrite to be associated with communication modules | 1 | 4899 **0011** | | 4899 **0011** |
| Temperature sensor PT100 - M6 screw type | 1 | 4825 **0208** | 1 | 4825 **0208** |
| Temperature sensor PT100 - M6 eyelet type | 1 | 4825 **0209** | 1 | 4825 **0209** |
| Management software for DIRIS | | | | see page 618 |

## Expert Services

> Study, definition, advice, implementation, maintenance and training…
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> of your project.