

DIRIS A40/A41

RS485 – PROFIBUS® DP

Operating instructions

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PRELIMINARY OPERATIONS

For personnel and product safety please read the contents of these operating instructions carefully before connecting.

Check the following points as soon as you receive the **DIRIS A40/A41** package:

- the packing is in good condition,
- the product has not been damaged during transit,

- the product reference number conforms to your order,
- the package contains the product,
- a CD-Rom.

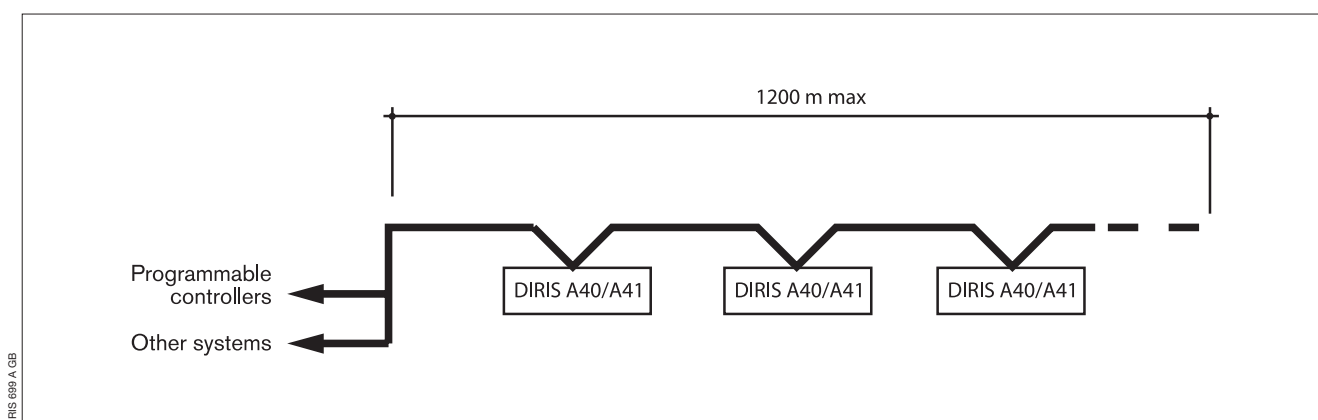
GENERAL INFORMATION

Functions

This optional module must be connected to the **DIRIS A40/A41** (ref. 4825 0A40, 4825 0A41, 4825 1A40, 4825 1A41). It provides an RS485 serial link (2 or 3 wires) with PROFIBUS® DP protocol for the use of **DIRIS A40/A41** from a PC or PLC.

General points

In a standard configuration, an RS485 link allows 1 to 32 **DIRIS A40/A41** to be linked to 1 to 32 pieces of equipment using the PROFIBUS®-DP protocol. The maximum communication speed is 1.5 Mbauds over 200 m. This distance can be increased if the speed is reduced (Standards: EN50170).



Recommendations:

You should use a guaranteed cable PROFIBUS.

NB :

An active termination must be fitted at both ends of the connection, which can be found either on the RS485 module (attached by moving the 2 switches to ON), or directly on the PROFIBUS-DP connector (D-Sub 9-pin).

INSTALLATION

CONNECTION

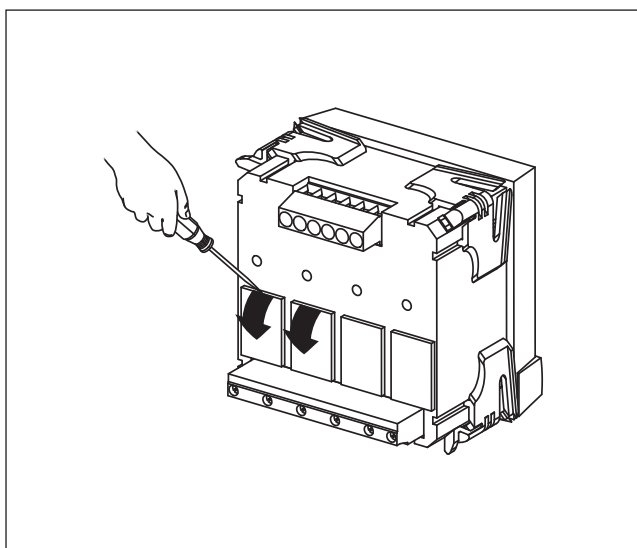
The option modules are installed on the rear panel of the **DIRIS A40/A41** in one of the four positions provided.



The **DIRIS A40/A41** must be switched off

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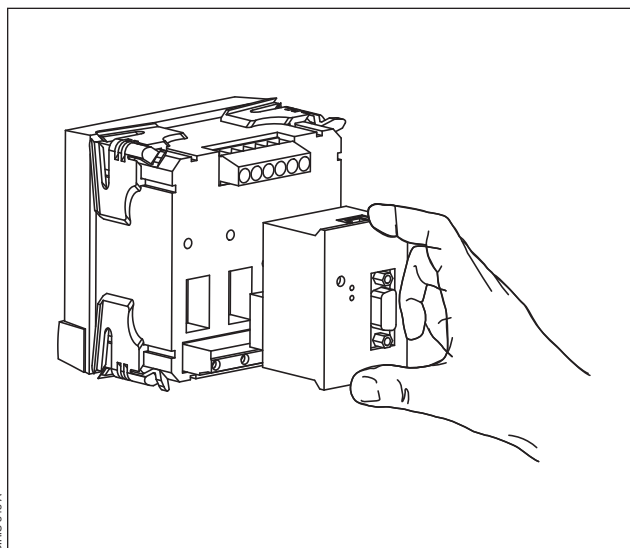
①



DIRIS 342 A

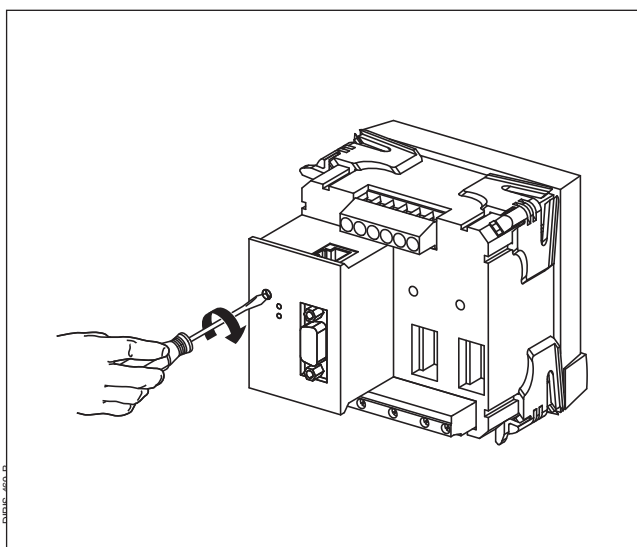
②

Fix the option modules next to each other



DIRIS 343 A

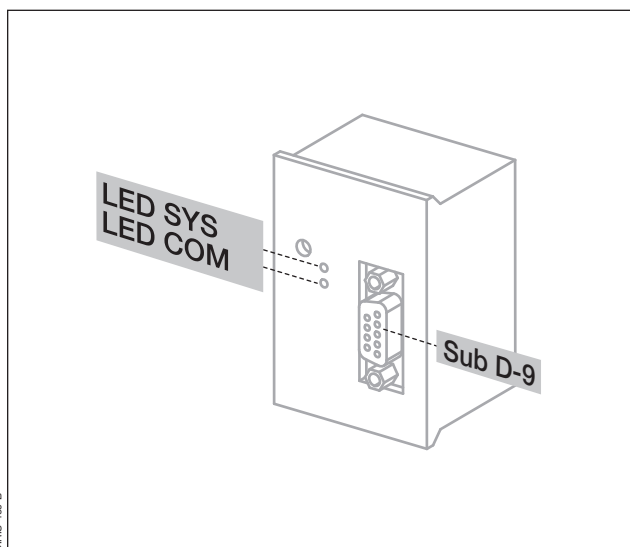
③



DIRIS 469 B

④

Follow indications when connecting the terminal Switch on voltage supply



DIRIS 469 B

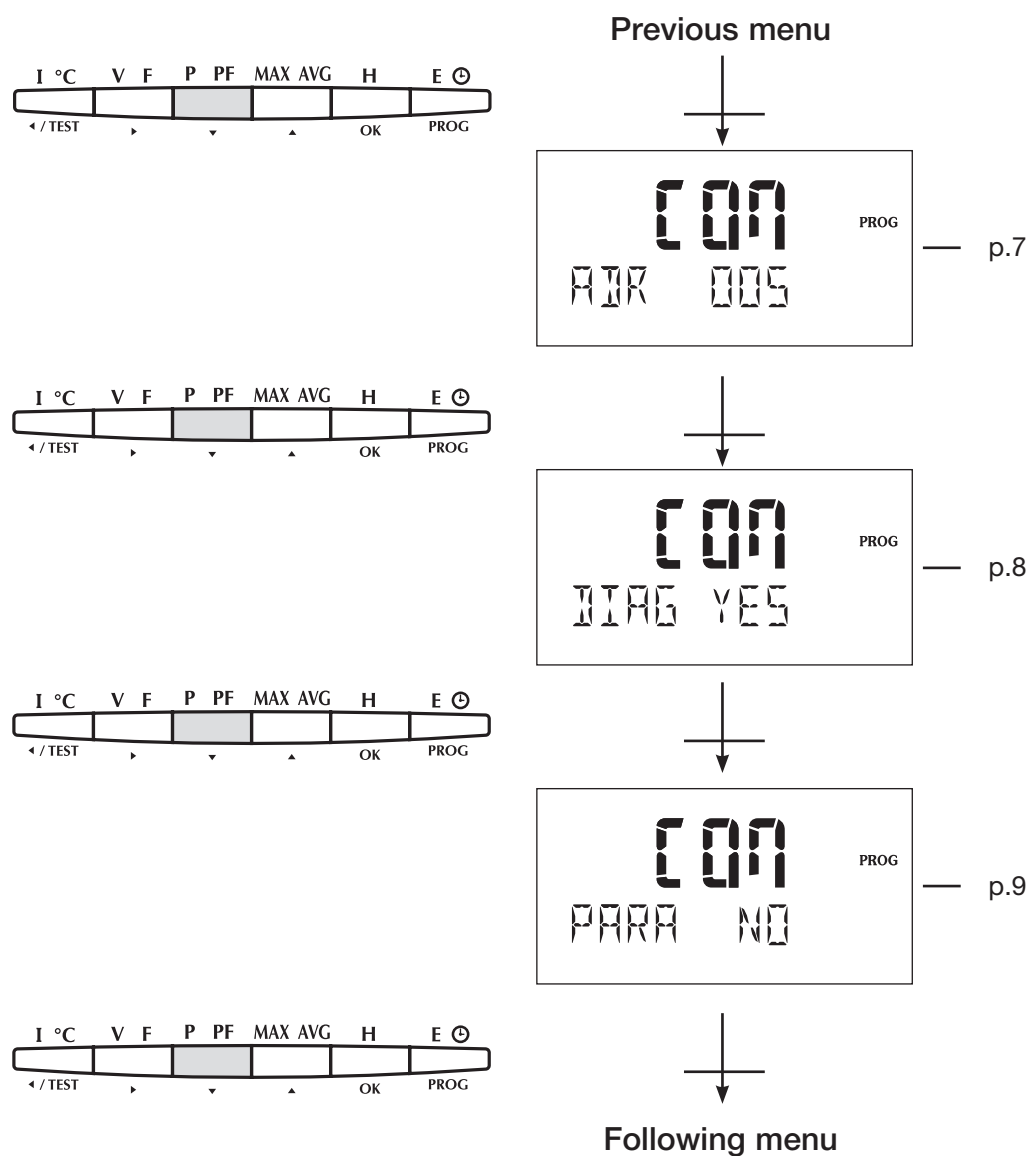
Note :

Correspondence with a HAN BRID connector

+ = B (red)

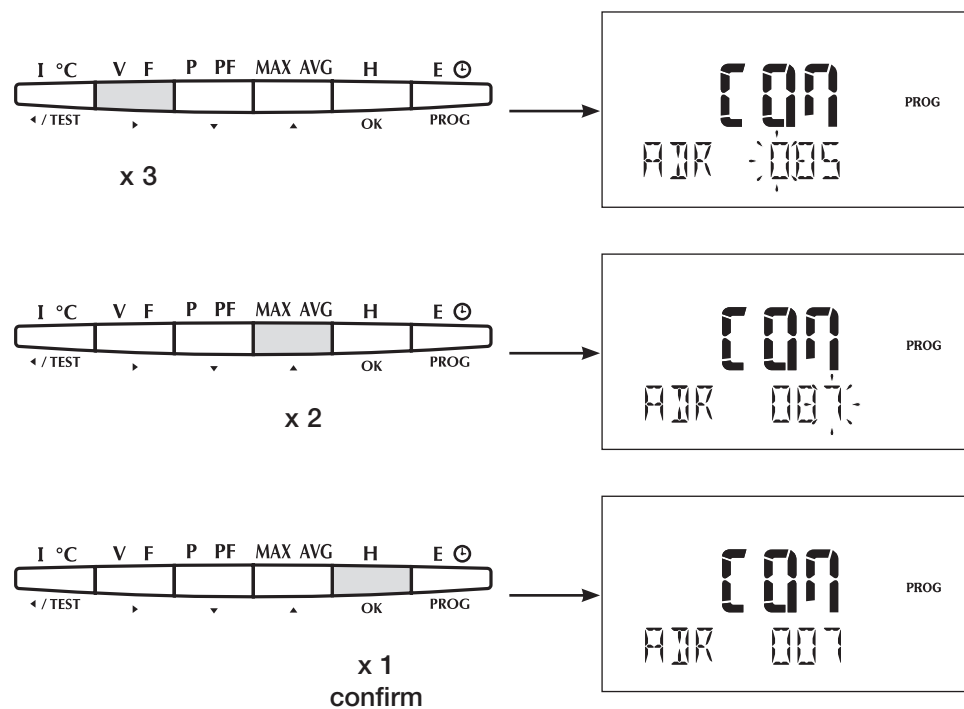
- = A (green)

PROGRAMMATION



COMMUNICATION ADDRESS

> Example : COM ADR = 7

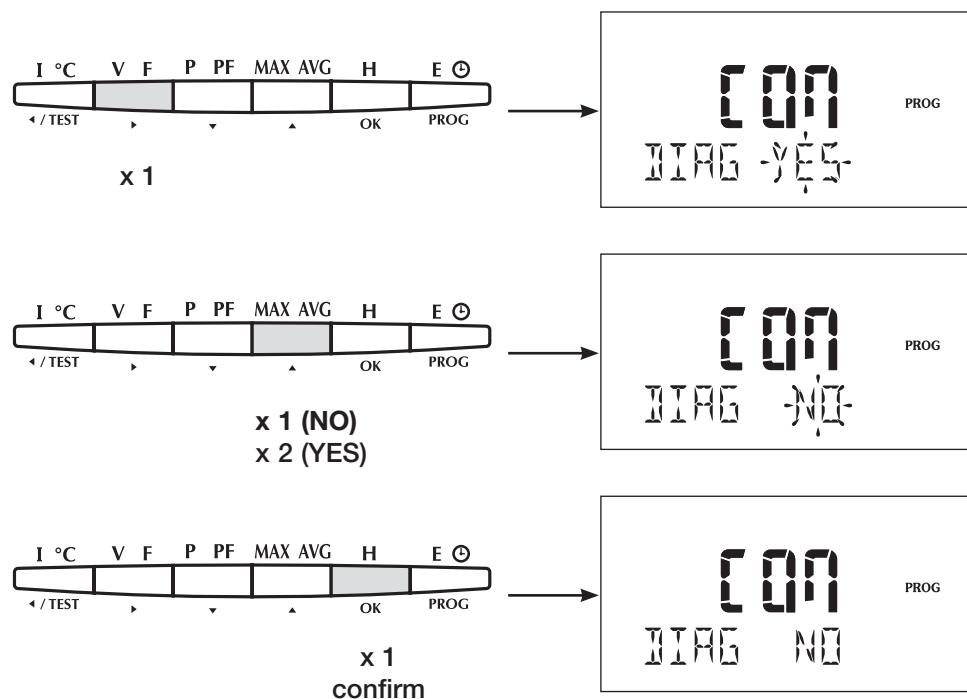


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PROGRAMMATION

DIAGNOSTIQUE

► Example : COM DIAG = NO

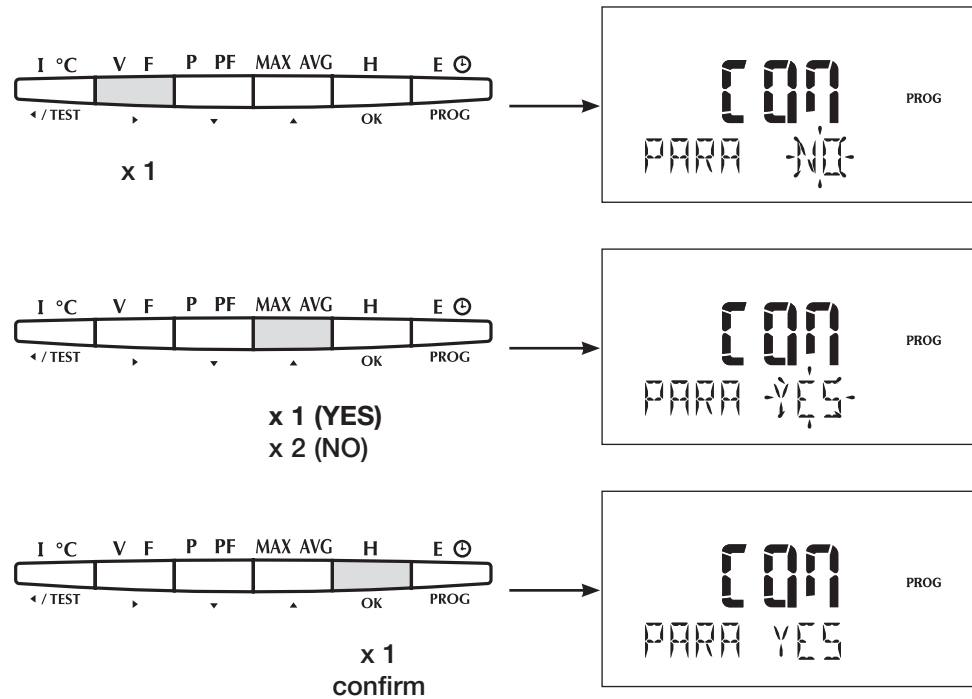


NB :

This function allows switching the diagnosis function or off. (see p. 37)

ACTIVATION OF THE PROGRAMME VIA THE PROFIBUS MASTER

> Example : COM PARA = YES

**Nb :**

This function allows activating or deactivation of the DIRIS programming by the PROFIBUS DP master. If this function is deactivated please note that in case of loss of the slave (**DIRIS**) the master will not send the GSD file parameters and thus won't re-programme the **DIRIS A** with the factory parameters.

CONFIGURATION

The table below gives the configuration of the *DIRIS A40/A41* used when starting a PROFIBUS®-DP cycle.

| Name | Size (bytes) |
|--|--------------|
| Manufacturer parameter ⚠ Always equal to zero | 1 |
| Network type 0 : 1 BL 1 : 2 BL 2 : 3 BL 3 : 3 NBL 4 : 4 BL 5 : 4 NBL | 1 |
| CT secondary (A) 1 : 1 A 5 : 5 A | 1 |
| CT primary (A) | 2 |
| Voltage input on PT 0 : No 1 : Yes | 1 |
| PT primary (V) | 4 |
| PT secondary (V) 60 : 60 V 100 : 100 V 110 : 110 V 115 : 115 V 120 : 120 V 173 : 173 V 190 : 190 V | 1 |
| Synchronisation of I AVG / MAX 5 : 5 mn 8 : 8 mn 10 : 10 mn 15 : 15 mn 20 : 20 mn 30 : 30 mn 60 : 60 mn | 1 |
| Synchronisation of P / Q / S AVG / MAX 5 : 5 mn 8 : 8 mn 10 : 10 mn 15 : 15 mn 20 : 20 mn 30 : 30 mn 60 : 60 mn | 1 |
| OUT 1 allocation 0 : kWh+ 1 : kvarh+ 2 : kVAh 3 : kWh- 4 : kvarh- | 1 |
| OUT 1 impulse value (kWh / kvarh / kVAh) 0 : 0,1 1 : 1 2 : 10 | 1 |

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| Name | Size (bytes) |
|---|-----------------|
| 3 : 100 4 : 1000 5 : 10000 | |
| OUT 1 impulse duration (ms) 1 : 100 2 : 200 3 : 300 4 : 400 5 : 500 6 : 600 7 : 700 8 : 800 9 : 900 | 1 |
| OUT 2 allocation 0 : kWh+ 1 : kvarh+ 2 : kVAh 3 : kWh- 4 : kvarh- | 1 |
| OUT 2 impulse value (kWh / kvarh / kVAh) 0 : 0,1 1 : 1 2 : 10 3 : 100 4 : 1000 5 : 10000 | 1 |
| OUT 2 impulse duration (ms) 1 : 100 2 : 200 3 : 300 4 : 400 5 : 500 6 : 600 7 : 700 8 : 800 9 : 900 | 1 |
| Analog output type OUT 1 0 : 0 / 20 mA 1 : 4 / 20 mA 2 : Alim | 1 |
| Allocation of analog output OUT 1 0 : I1 1 : I2 2 : I3 3 : In 4 : U12 5 : U23 6 : U31 7 : P 8 : Q 9 : S | 1 |

CONFIGURATION

| Name | Size (bytes) |
|---|-----------------|
| 10 : PF 11 : V1 12 : V2 13 : V3 14 : F | |
| Value at 0 or 4 mA from analog output OUT 1 | 2 |
| Unit at 0 or 4 mA from analog output OUT 1 0 : / 1 : k 2 : M | 1 |
| Value at 20 mA from analog output OUT 1 | 2 |
| Unit at 20 mA from analog output OUT 1 0 : / 1 : k 2 : M | 1 |
| Analog output type OUT 2 0 : 0 / 20 mA 1 : 4 / 20 mA 2 : Alim | 1 |
| Allocation of analog output OUT 2 0 : I1 1 : I2 2 : I3 3 : In 4 : U12 5 : U23 6 : U31 7 : P 8 : Q 9 : S 10 : PF 11 : V1 12 : V2 13 : V3 14 : F | 1 |
| Value at 0 or 4 mA from analog output OUT 2 | 2 |
| Unit at 0 or 4 mA from analog output OUT 2 0 : / 1 : k 2 : M | 1 |
| Value at 20 mA from analog output OUT 2 | 2 |
| Unit at 20 mA from analog output OUT 2 0 : / 1 : k 2 : M | 1 |
| Analog output type OUT 3 0 : 0 / 20 mA 1 : 4 / 20 mA 2 : Supply | 1 |

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| Name | Size (bytes) |
|---|-----------------|
| Allocation of analog output OUT 3 0 : I1 1 : I2 2 : I3 3 : In 4 : U12 5 : U23 6 : U31 7 : P 8 : Q 9 : S 10 : PF 11 : V1 12 : V2 13 : V3 14 : F | 1 |
| Value at 0 or 4 mA from analog output OUT 3 | 2 |
| Unit at 0 or 4 mA from analog output OUT 3 0 : / 1 : k 2 : M | 1 |
| Value at 20 mA from analog output OUT 3 | 2 |
| Unit at 20 mA from analog output OUT 3 0 : / 1 : k 2 : M | 1 |
| Analog output type OUT 4 0 : 0 / 20 mA 1 : 4 / 20 mA 2 : Supply | 1 |
| Allocation of analog output OUT 4 0 : I1 1 : I2 2 : I3 3 : In 4 : U12 5 : U23 6 : U31 7 : P 8 : Q 9 : S 10 : PF 11 : V1 12 : V2 13 : V3 14 : F | 1 |
| Value at 0 or 4 mA from analog output OUT 4 | 2 |
| Unit at 0 or 4 mA from analog output OUT 4 0 : / 1 : k 2 : M | 1 |

CONFIGURATION

| Name | Size (bytes) |
|---|--------------|
| Value at 20 mA from analog output OUT 4 | 2 |
| Unit at 20 mA from analog output OUT 4 0 : / 1 : k 2 : M | 1 |
| CT In secondary (A) 1 : 1 A 5 : 5 A | 1 |
| CT In primary (A) | 2 |

Length: 54 bytes

NB:

All this information is integrated in the GSD file (User-Prm-Data).



Check that the parameterisation data are identical to the data programmed in the device.

When the PROFIBUS® master loses a slave, it re-injects the parameters from the GSD file which will re set the factory configuration.

There are two solutions to inhibit this function:

- Deactivate the master's DIRIS A programming (see also page 9)
- Configure the *DIRIS A* through the master, then open and close the *DIRIS A* programming menu directly by the keypad (code =100).

USE OF THE PROFIBUS®-DP MODULES

The modules contain the inputs (display) and outputs (configuration).

MODULE 1: MAIN MEASUREMENTS

This module contains the currents, powers, frequencies, power factor, positive energies and hour meter.

Example:

Modification of relay 1:

- set bit 4 (relay configuration change),
- set bit 0 (relay 1 to 1),
- modify the status byte on relay 1 break (next byte).

Output frame

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| Name | Size (bytes) |
|---|--------------|
| Change of relay status if bit on 1, then taken into account, otherwise bit on 0 bit 0: Relay 1 bit 1: Relay 2 bit 2: Relay 3 (second option relay 1) bit 3: Relay 4 (second option relay 2) bit 4: Change in relay configuration bit 5: Resetting of one measurement bit 6: not used bit 7: not used | 1 |
| Relay 1 on break 0: open 1: closed | 1 |
| Relay 2 on break 0: open 1: closed | 1 |
| Relay 3 on break 0: open 1: closed | 1 |
| Relay 4 on break 0: open 1: closed | 1 |
| Allocation OUT 1 0: Cde 1: I 2: U 3: P+ 4: Q+ 5: S 6: F 7: PFL 8: Thd 3I 9: Thd 3U 10: In 11: time 12: V 13: Thd In 14: Thd 3V 15: P- 16: Q- 17: PFC | 1 |
| Lower threshold OUT 1 | 2 |
| Lower threshold unit OUT 1 0: / 1: k 2: M | 1 |
| Upper threshold OUT 1 | 2 |

USE OF THE PROFIBUS®-DP MODULES

MODULE 1: MAIN MEASUREMENTS

Output frame

| Name | Size (bytes) |
|---|--------------|
| Upper threshold unit OUT 1 0: / 1: k 2: M | 1 |
| Hysteresis 0 to 99 OUT 1 (%) | 1 |
| Time delay OUT 1 (s) | 2 |
| Allocation OUT 2 0: Cde 1: I 2: U 3: P+ 4: Q+ 5: S 6: F 7: PFL 8: Thd 3I 9: Thd 3U 10: In 11: time 12: V 13: Thd In 14: Thd 3V 15: P- 16: Q- 17: PFC | 1 |
| Lower threshold OUT 2 | 2 |
| Lower threshold unit OUT 2 0: / 1: k 2: M | 1 |
| Upper threshold OUT 2 | 2 |
| Upper threshold unit OUT 2 0: / 1: k 2: M | 1 |
| Hysteresis 0 to 99 OUT 2 (%) | 1 |
| Time delay OUT 2 (s) | 2 |
| Zero reset bit 0: Max 3I bit 1: Max P+ bit 2: Max P- bit 3: Max Q+ bit 4: Max Q- bit 5: Max S bit 6: hour meter bit 7: kWh+ bit 8: kvarh+ bit 9: kVA bit 10: kWh- bit 11: kvarh- bit 12: all the parameters bit 13: Input 1 bit 14: Input2 bit 15: not used | 2 |

MODULE 1: MAIN MEASUREMENTS

Output frame

| Name | Size (bytes) |
|--|-----------------|
| Zero reset, supplementary options bit 0: Input 1 bit 1: Input 2 bit 2: Input 3 bit 3: Input 4 bit 4: Not used bit 5: Not used bit 6: Min Max I bit 7: Min Max In bit 8: Min Max U bit 9: Min Max Frequency bit 10: Min Max PF bit 11: Min Max P bit 12: Min Max Q bit 13: Min Max Thd I bit 14: Min Max Thd In bit 15: Min Max Thd U | 2 |

Length: 29 bytes

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USE OF THE PROFIBUS®-DP MODULES

MODULE 1: MAIN MEASUREMENTS

Frame of inputs not allocated for current and voltage transformation ratios

| Name | Size (bytes) |
|--|-----------------|
| Phase 1 current (mA) | 2 |
| Phase 2 current (mA) | 2 |
| Phase 3 current (mA) | 2 |
| Neutral current (mA) | 2 |
| Phase to phase voltage U12 (V / 10) | 2 |
| Phase to phase voltage U23 (V / 10) | 2 |
| Phase to phase voltage U31 (V / 10) | 2 |
| Phase to neutral voltage phase 1 (V / 10) | 2 |
| Phase to neutral voltage phase 2 (V / 10) | 2 |
| Phase to neutral voltage phase 3 (V / 10) | 2 |
| Frequency (Hz / 100) | 2 |
| Σ Active power + /- (kW / 10) | 2 |
| Σ Reactive power + /- (kvar / 10) | 2 |
| Σ Apparent power + /- (kVa / 10) | 2 |
| Σ Power factor L / C -: capacitive and +: inductive (0.001) | 2 |
| I1 max (mA) | 2 |
| I2 max (mA) | 2 |
| I3 max (mA) | 2 |
| Maximum value active power + (W) | 2 |
| Maximum value active power - (W) | 2 |
| Maximum value reactive power + (var) | 2 |
| Maximum value reactive power - (var) | 2 |
| Maximum apparent power (VA) | 2 |
| Active energy + < 10000 (kWh) | 2 |
| Active energy + > 10000 (kWh) | 2 |
| Reactive energy + < 10000 (kvarh) | 2 |
| Reactive energy + > 10000 (kvarh) | 2 |
| Apparent energy < 10000 (kVAh) | 2 |
| Apparent energy > 10000 (kVAh) | 2 |
| System I (mA) | 2 |
| System U (V / 10) | 2 |
| System V (V / 10) | 2 |
| Hour meter < 10000 (H / 100) | 2 |
| Hour meter >10000 (H / 100) | 2 |

Length: 68 bytes

Calculation of the values allocated:

The currents must be multiplied by the CT ratio, the voltages by the PT ratio (in HV) and the powers by the ratio $CT \times PT$.

Example:

$$CT = \frac{100}{5} = 20 \quad VT = \frac{20000}{100} = 200$$

$$CT \times VT = 20 \times 200 \\ = 4000$$

Powers will be multiplied by 4000 (if there is no VT, then $VT = 1$), currents by 20 and voltages by 200.

NB :

$$I_{\text{system}} = \frac{I_1 + I_2 + I_3}{3}$$

$$U_{\text{system}} = \frac{U_{12} + U_{21} + U_{31}}{3}$$

$$V_{\text{system}} = \frac{V_1 + V_2 + V_3}{3}$$

Transformation of signed values into unsigned values

If the currents, voltages or energies are negative, the following rule must be applied:

- take the opposite bit by bit of the datum
- add 1 to this opposite

Example:

- negative datum - 28864mv
or in binary : 0111 0000 1100 0000
- opposite is equal to : 1000 1111 0011 1111
- opposite + 1 is equal to : 1000 1111 0100 0000
or in decimal 366,72.

USE OF THE PROFIBUS®-DP MODULES

MODULE 2: SUPPLEMENTARY MEASUREMENTS

This module contains the measurements by phase, average values, negative energies, impulse meters (on / off inputs) and statuses (on / off inputs).

The output frame is identical to module 1.

Input frame

| Name | Size (bytes) |
|--|--------------|
| Active power phase 1 + /- (kW/10) | 2 |
| Active power phase 2 + /- (kW/10) | 2 |
| Active power phase 3 + /- (kW/10) | 2 |
| Reactive power phase 1 + /- (kvar/10) | 2 |
| Reactive power phase 2 + /- (kvar/10) | 2 |
| Reactive power phase 3 + /- (kvar/10) | 2 |
| Apparent power phase 1 (kVA/10) | 2 |
| Apparent power phase 2 (kVA/10) | 2 |
| Apparent power phase 3 (kVA/10) | 2 |
| Power factor phase 1 (0.001) -: capacitive and +: inductive | 2 |
| Power factor phase 2 (0.001) -: capacitive and +: inductive | 2 |
| Power factor phase 3 (0.001) -: capacitive and +: inductive | 2 |
| Average value I1 (mA) | 2 |
| Average value I2 (mA) | 2 |
| Average value I3 (mA) | 2 |
| Average value active power + (W) | 2 |
| Average value active power - (W) | 2 |
| Average value reactive power + (var) | 2 |
| Average value reactive power - (var) | 2 |
| Average value apparent power (VA) | 2 |
| Active energy - < 10000 (kWh) | 2 |
| Active energy - >10000 (kWh) | 2 |
| Reactive energy - < 10000 (kvarh) | 2 |
| Reactive energy - > 10000 (kvarh) | 2 |
| Input pulse meter 1 < 10000 | 2 |
| Input pulse meter 1 > 10000 | 2 |
| Input pulse meter 2 < 10000 | 2 |
| Input pulse meter 2 > 10000 | 2 |
| Input pulse meter 3 < 10000 | 2 |
| Input pulse meter 3 > 10000 | 2 |
| Input pulse meter 4 < 10000 | 2 |
| Input pulse meter 4 > 10000 | 2 |
| Status inputs 1, 2, 3, 4. | 2 |

Length: 66 bytes

Calculation of the values allocated:

The currents must be multiplied by the CT ratio, the voltages by the PT ratio (in HV) and the powers by the CT x PT ratio.

Example:

$$CT = \frac{100}{5} = 20 \quad VT = \frac{20000}{100} = 200$$

$$CT \times VT = 20 \times 200 \\ = 4000$$

Powers will be multiplied by 4000 (if there is no VT, then VT = 1), currents by 20 and voltages by 200.

Status of the inputs :

input 1 = bit 0

input 2 = bit 1

input 3 = bit 2

input 4 = bit 4

If active the bit is on 1.

If inactive the bit is on 0.

Transformation of signed values into unsigned values

If the currents, voltages or energies are negative, the following rule must be applied:

- take the opposite bit by bit of the datum
- add 1 to this opposite

Example:

- negative datum - 28864mv
or in binary : 0111 0000 1100 0000
- opposite is equal to : 1000 1111 0011 1111
- opposite + 1 is equal to : 1000 1111 0100 0000
or in decimal 366,72 V.

USE OF THE PROFIBUS®-DP MODULES

MODULE 3: DIPS/INTERRUPTION/TREND POWERS AND FREQUENCY

| Name | Size (bytes) |
|--|-----------------|
| Last voltage dips | |
| Residual phase to phase voltage involved: 0: none, 5: U12, 6: U23, 7: U31 | 1 |
| Value (V/100) | 4 |
| Residual phase to neutral voltage involved: 0: none, 22 : V1, 23: V2, 24: V3 | 1 |
| Value (V/100) | 4 |
| Length (ms) | 4 |
| Month | 1 |
| Day | 1 |
| Year | 1 |
| Hour | 1 |
| Minute | 1 |
| Second | 1 |
| Last power interruption | |
| Month | 1 |
| Day | 1 |
| Year | 1 |
| Hour | 1 |
| Minute | 1 |
| Second | 1 |
| Last average power | |
| Last P+ value (kW/10) | 2 |
| Last P- value (kW/10) | 2 |
| Last Q+ value (kvar/10) | 2 |
| Last Q- value (kvar/10) | 2 |
| Last average frequency | |
| Last frequency value (Hz/100) | 2 |

Length: 36 bytes

MODULE 4: SWELL/TREND VOLTAGES/IN MAXIMUM AND AVERAGE

| Name | Size (bytes) |
|---|--------------|
| Last swell | |
| Maximum phase to phase voltage involved: 0: none, 5: U12, 6: U23, 7: U31 | 1 |
| Value (V/100) | 4 |
| Maximum phase to neutral voltage involved: 0: none, 22 : V1, 23: V2, 24: V3 | 1 |
| Value (V/100) | 4 |
| Length (ms) | 4 |
| Month | 1 |
| Day | 1 |
| Year | 1 |
| Hour | 1 |
| Minute | 1 |
| Second | 1 |
| Average voltage | |
| Last phase to phase voltage value U12 (V/10) | 2 |
| Last phase to phase voltage value U23 (V/10) | 2 |
| Last phase to phase voltage value U31 (V/10) | 2 |
| Last phase to neutral voltage value V1 (V/10) | 2 |
| Last phase to neutral voltage value V2 (V/10) | 2 |
| Last phase to neutral voltage value V3 (V/10) | 2 |
| Average and maximum neutral current | |
| Average In (mA) | 2 |
| Average maximum In (mA) | 2 |

Length: 36 bytes

USE OF THE PROFIBUS®-DP MODULES

MODULE 5: CURRENT HARMONICS

This module contains the thd Is, the thd INs and the individual harmonics up to number 15.

The output frame is identical to module 1.

Input frame

| Name | Size (bytes) |
|----------------------------|--------------|
| Thd I1 (0.1 %) | 2 |
| Thd I2 (0.1 %) | 2 |
| Thd I3 (0.1 %) | 2 |
| Thd In (0.1 %) | 2 |
| Harmonic I1 row 3 (0.1 %) | 2 |
| Harmonic I2 row 3 (0.1 %) | 2 |
| Harmonic I3 row 3 (0.1 %) | 2 |
| Harmonic In row 3 (0.1 %) | 2 |
| Harmonic I1 row 5 (0.1 %) | 2 |
| Harmonic I2 row 5 (0.1 %) | 2 |
| Harmonic I3 row 5 (0.1 %) | 2 |
| Harmonic In row 5 (0.1 %) | 2 |
| Harmonic I1 row 7 (0.1 %) | 2 |
| Harmonic I2 row 7 (0.1 %) | 2 |
| Harmonic I3 row 7 (0.1 %) | 2 |
| Harmonic In row 7 (0.1 %) | 2 |
| Harmonic I1 row 9 (0.1 %) | 2 |
| Harmonic I2 row 9 (0.1 %) | 2 |
| Harmonic I3 row 9 (0.1 %) | 2 |
| Harmonic In row 9 (0.1 %) | 2 |
| Harmonic I1 row 11 (0.1 %) | 2 |
| Harmonic I2 row 11 (0.1 %) | 2 |
| Harmonic I3 row 11 (0.1 %) | 2 |
| Harmonic In row 11 (0.1 %) | 2 |
| Harmonic I1 row 13 (0.1 %) | 2 |
| Harmonic I2 row 13 (0.1 %) | 2 |
| Harmonic I3 row 13 (0.1 %) | 2 |
| Harmonic In row 13 (0.1 %) | 2 |
| Harmonic I1 row 15 (0.1 %) | 2 |
| Harmonic I2 row 15 (0.1 %) | 2 |
| Harmonic I3 row 15 (0.1 %) | 2 |
| Harmonic In row 15 (0.1 %) | 2 |

Length: 64 bytes

NB:

The individual harmonics are available if the harmonic module is connected.

MODULE 6: PHASE TO PHASE VOLTAGE HARMONICS

This module contains the thd 3U and the individual harmonics up to number 15.

The output frame is identical to module 1.

Input frame

| Name | Size (bytes) |
|-----------------------------|--------------|
| Thd U12 (0.1 %) | 2 |
| Thd U23 (0.1 %) | 2 |
| Thd U31 (0.1 %) | 2 |
| Harmonic U12 row 3 (0.1 %) | 2 |
| Harmonic U23 row 3 (0.1 %) | 2 |
| Harmonic U31 row 3 (0.1 %) | 2 |
| Harmonic U12 row 5 (0.1 %) | 2 |
| Harmonic U23 row 5 (0.1 %) | 2 |
| Harmonic U31 row 5 (0.1 %) | 2 |
| Harmonic U12 row 7 (0.1 %) | 2 |
| Harmonic U23 row 7 (0.1 %) | 2 |
| Harmonic U31 row 7 (0.1 %) | 2 |
| Harmonic U12 row 9 (0.1 %) | 2 |
| Harmonic U23 row 9 (0.1 %) | 2 |
| Harmonic U31 row 9 (0.1 %) | 2 |
| Harmonic U12 row 11 (0.1 %) | 2 |
| Harmonic U23 row 11 (0.1 %) | 2 |
| Harmonic U31 row 11 (0.1 %) | 2 |
| Harmonic U12 row 13 (0.1 %) | 2 |
| Harmonic U23 row 13 (0.1 %) | 2 |
| Harmonic U31 row 13 (0.1 %) | 2 |
| Harmonic U12 row 15 (0.1 %) | 2 |
| Harmonic U23 row 15 (0.1 %) | 2 |
| Harmonic U31 row 15 (0.1 %) | 2 |

Length: 48 bytes

NB:

The individual harmonics are available if the harmonic module is connected.

USE OF THE PROFIBUS®-DP MODULES

MODULE 7: PHASE TO NEUTRAL VOLTAGE HARMONICS

This module contains the thd 3V and the individual harmonics up to number 15.

The output frame is identical to module 1.

Input frame

| Name | Size (bytes) |
|----------------------------|--------------|
| Thd V1 (0.1 %) | 2 |
| Thd V2 (0.1 %) | 2 |
| Thd V3 (0.1 %) | 2 |
| Harmonic V1 row 3 (0.1 %) | 2 |
| Harmonic V2 row 3 (0.1 %) | 2 |
| Harmonic V3 row 3 (0.1 %) | 2 |
| Harmonic V1 row 5 (0.1 %) | 2 |
| Harmonic V2 row 5 (0.1 %) | 2 |
| Harmonic V3 row 5 (0.1 %) | 2 |
| Harmonic V1 row 7 (0.1 %) | 2 |
| Harmonic V2 row 7 (0.1 %) | 2 |
| Harmonic V3 row 7 (0.1 %) | 2 |
| Harmonic V1 row 9 (0.1 %) | 2 |
| Harmonic V2 row 9 (0.1 %) | 2 |
| Harmonic V3 row 9 (0.1 %) | 2 |
| Harmonic V1 row 11 (0.1 %) | 2 |
| Harmonic V2 row 11 (0.1 %) | 2 |
| Harmonic V3 row 11 (0.1 %) | 2 |
| Harmonic V1 row 13 (0.1 %) | 2 |
| Harmonic V2 row 13 (0.1 %) | 2 |
| Harmonic V3 row 13 (0.1 %) | 2 |
| Harmonic V1 row 15 (0.1 %) | 2 |
| Harmonic V2 row 15 (0.1 %) | 2 |
| Harmonic V3 row 15 (0.1 %) | 2 |

Length: 48 bytes

NB:

The individual harmonics are available if the harmonic module is connected.

MODULE 8: MIN / MAX INSTANTS

This module contains the storage of the minimum and maximum values (if the 2 input / 2 output module is installed).

The output frame is identical to module 1.

Input frame

| Name | Size (bytes) |
|------------------------------------|--------------|
| Min. current (mA) | 2 |
| Min. neutral current (mA) | 2 |
| Min. phase to phase voltage (V/10) | 2 |
| Min. frequency (Hz/100) | 2 |
| Min. power factor (0.001) | 2 |
| Min. active power (W) | 2 |
| Min. reactive power (var) | 2 |
| Thd I min (0.1 %) | 2 |
| Thd In min (0.1 %) | 2 |
| Thd U min (0.1 %) | 2 |
| Max. current (mA) | 2 |
| Max. neutral current (mA) | 2 |
| Max. phase to phase voltage (V/10) | 2 |
| Max. frequency (Hz/100) | 2 |
| Max. power factor (0.001) | 2 |
| Max. active power (W) | 2 |
| Max. reactive power (var) | 2 |
| Thd I max (0.1 %) | 2 |
| Thd In max (0.1 %) | 2 |
| Thd U max (0.1 %) | 2 |

Length: 48 bytes

USE OF THE PROFIBUS®-DP MODULES

MODULE 9: SPECIAL FRAME

This module allows the creation of a personalised module.

Input frame

If bit 7 is on 0, then the output frame is a normal frame

| Name | Size (bytes) |
|---|--------------|
| Change of relay status if bit on 1, then taken into account, otherwise bit on 0 bit 0: Relay 1 bit 1: Relay 2 bit 2: Relay 3 (second option relay 1) bit 3: Relay 4 (second option relay 1) bit 4: change in relay configuration bit 5: resetting of one measurement bit 6: not used bit 7: 0 -> configuration frame | 1 |
| Example: <i>Modification of relay 1 :</i> <ul style="list-style-type: none"> • set bit 4 (relay configuration change), • set bit 0 (relais 1 à 1), • modify the status byte on relay 1 break (next byte). | |
| Relay 1 on break 0: open 1: closed | 1 |
| Relay 2 on break 0: open 1: closed | 1 |
| Relay 3 on break 0: open 1: closed | 1 |
| Relay 4 on break 0: open 1: closed | 1 |
| Allocation OUT 1 0: Command 1: I 2: U 3: P+ 4: Q+ 5: S 6: F 7: PFL 8: Thd 3I 9: Thd 3U 10: In 11: time 12: V 13: Thd In 14: Thd 3V 15: P- 16: Q- 17: PFC | 1 |
| Lower threshold OUT 1 | 2 |
| Lower threshold unit OUT 1 0: / 1: k 2: M | 1 |
| Upper threshold OUT 1 | 2 |

MODULE 9: SPECIAL FRAME

Input frame

| Name | Size (bytes) |
|---|--------------|
| Upper threshold unit OUT 1 0: / 1: k 2: M | 1 |
| Hysteresis 0 to 99 OUT 1 (%) | 1 |
| Time delay OUT 1 (s) | 2 |
| Allocation OUT 2: – 0: Cde 1: I 2: U 3: P+ 4: Q+ 5: S 6: F 7: PFL 8: Thd 3I 9: Thd 3U 10: In 11: time 12: V 13: Thd In 14: Thd 3V 15: P- 16: Q- 17: PFC | 1 |
| Lower threshold OUT 2 | 2 |
| Lower threshold unit OUT 2 0: / 1: k 2: M | 1 |
| Upper threshold OUT 2 | 2 |
| Upper threshold unit OUT 2 0: / 1: k 2: M | 1 |
| Hysteresis 0 to 99 OUT 2 (%) | 1 |
| Time delay OUT 2 (s) | 2 |
| Zero reset bit 0: Max 3I bit 1: Max P+ bit 2: Max P- bit 3: Max Q+ bit 4: Max Q- bit 5: Max S bit 6: hour meter bit 7: kWh+ bit 8: kvarh+ bit 9: kVA bit 10: kWh- bit 11: kvarh- bit 12: all the parameters bit 13: Input 1 | 2 |

USE OF THE PROFIBUS®-DP MODULES

MODULE 9: SPECIAL FRAME

Input frame

| Name | Size (bytes) |
|--|--------------|
| bit 14: Input2 bit 15: not used | |
| Zero reset, supplementary options bit 0: Input 1 bit 1: Input 2 bit 2: Input 3 bit 3: Input 4 bit 4: Input 5 bit 5: Input 6 bit 6: Min Max I bit 7: Min Max In bit 8: Min Max U bit 9: Min Max Frequency bit 10: Min Max PF bit 11: Min Max P bit 12: Min Max Q bit 13: Min Max Thd I bit 14: Min Max Thd In bit 15: Min Max Thd U | 2 |
| Not used | 4 |

Length: 33 bytes

If the bit is on 1, then the output frame is as follows

| Name | Size (bytes) |
|--|--------------|
| Frame number bit 0-6: frame number bit 7: 1 -> address frame | 1 |
| Address of value 1 | 2 |
| Address of value 2 | 2 |
| Address of value 3 | 2 |
| Address of value 4 | 2 |
| Address of value 5 | 2 |
| Address of value 6 | 2 |
| Address of value 7 | 2 |
| Address of value 8 | 2 |
| Address of value 9 | 2 |
| Address of value 10 | 2 |
| Address of value 11 | 2 |
| Address of value 12 | 2 |
| Address of value 13 | 2 |
| Address of value 14 | 2 |
| Address of value 15 | 2 |
| Address of value 16 | 2 |

NB:

The frame number is an identification number. It is used to check if the answer coming from the slave device corresponds to the PLC's request.

The list of values is available p. 31 to 35.

MODULE 9: SPECIAL FRAME

List of values

| Name | Decimal address | Hexa. address |
|---|-----------------|---------------|
| Phase 1 current (mA) | 0 | 0000 |
| Phase 2 current (mA) | 1 | 0001 |
| Phase 3 current (mA) | 2 | 0002 |
| Neutral current (mA) | 3 | 0003 |
| Phase to phase voltage U12 (V/10) | 4 | 0004 |
| Phase to phase voltage U23 (V/10) | 5 | 0005 |
| Phase to phase voltage U31 (V/10) | 6 | 0006 |
| Phase to neutral voltage phase 1 (V/10) | 7 | 0007 |
| Phase to neutral voltage phase 2 (V/10) | 8 | 0008 |
| Phase to neutral voltage phase 3 (V/10) | 9 | 0009 |
| Frequency (Hz/100) | 10 | 000A |
| _ Active power (W) | 11 | 000B |
| _ Reactive power (var) | 12 | 000C |
| _ Apparent power (VA) | 13 | 000D |
| _ Power factor L / C (0.001) | 14 | 000E |
| Max. value I1 (mA) | 15 | 000F |
| Max. value I2 (mA) | 16 | 0010 |
| Max. value I3 (mA) | 17 | 0011 |
| Maximum value active power + (W) | 18 | 0012 |
| Maximum value active power - (W) | 19 | 0013 |
| Maximum value reactive power + (var) | 20 | 0014 |
| Maximum value reactive power - (var) | 21 | 0015 |
| Maximum value apparent power (VA) | 22 | 0016 |
| Active energy + < 10000 (kWh) | 23 | 0017 |
| Active energy + > 10000 (kWh) | 24 | 0018 |
| Reactive energy + < 10000 (kvarh) | 25 | 0019 |
| Reactive energy + > 10000 (kvarh) | 26 | 001A |
| Apparent energy < 10000 (kVAh) | 27 | 001B |
| Apparent energy > 10000 (kVAh) | 28 | 001C |
| Active power phase 1 (W) | 29 | 001D |
| Active power phase 2 (W) | 30 | 001E |
| Active power phase 3 (W) | 31 | 001F |
| Reactive power phase 1 (var) | 32 | 0020 |
| Reactive power phase 2 (var) | 33 | 0021 |
| Reactive power phase 3 (var) | 34 | 0022 |
| Apparent power phase 1 (VA) | 35 | 0023 |
| Apparent power phase 2 (VA) | 36 | 0024 |
| Apparent power phase 3 (VA) | 37 | 0025 |
| Power factor phase 1 (0.001) | 38 | 0026 |
| Power factor phase 2 (0.001) | 39 | 0027 |
| Power factor phase 3 (0.001) | 40 | 0028 |
| Average value I1 (mA) | 41 | 0029 |
| Average value I2 (mA) | 42 | 002A |
| Average value I3 (mA) | 43 | 002B |
| Average value active power + (W) | 44 | 002C |
| Average value active power - (W) | 45 | 002D |
| Average value reactive power + (var) | 46 | 002E |
| Average value reactive power - (var) | 47 | 002F |
| Average value Apparent power (VA) | 48 | 0030 |
| Active energy - < 10000 | 49 | 0031 |
| Active energy - >10000 | 50 | 0032 |

USE OF THE PROFIBUS®-DP MODULES

MODULE 9: SPECIAL FRAME

List of values

| Name | Decimal address | Hexa. address |
|-----------------------------|-----------------|---------------|
| Reactive energy - < 10000 | 51 | 0033 |
| Reactive energy - > 10000 | 52 | 0034 |
| Input pulse meter 1 < 10000 | 53 | 0035 |
| Input pulse meter 1 > 10000 | 54 | 0036 |
| Input pulse meter 2 < 10000 | 55 | 0037 |
| Input pulse meter 2 > 10000 | 56 | 0038 |
| Input pulse meter 3 < 10000 | 57 | 0039 |
| Input pulse meter 3 > 10000 | 58 | 003A |
| Input pulse meter 4 < 10000 | 59 | 003B |
| Input pulse meter 4 > 10000 | 60 | 003C |
| Status inputs 1 2 3 4 | 61 | 003D |
| Thd I1 | 62 | 003E |
| Thd I2 | 63 | 003F |
| Thd I3 | 64 | 0040 |
| Thd In | 65 | 0041 |
| Harmonic I1 row 3 | 66 | 0042 |
| Harmonic I2 row 3 | 67 | 0043 |
| Harmonic I3 row 3 | 68 | 0044 |
| Harmonic IN row 3 | 69 | 0045 |
| Harmonic I1 row 5 | 70 | 0046 |
| Harmonic I2 row 5 | 71 | 0047 |
| Harmonic I3 row 5 | 72 | 0048 |
| Harmonic IN row 5 | 73 | 0049 |
| Harmonic I1 row 7 | 74 | 004A |
| Harmonic I2 row 7 | 75 | 004B |
| Harmonic I3 row 7 | 76 | 004C |
| Harmonic IN row 7 | 77 | 004D |
| Harmonic I1 row 9 | 78 | 004E |
| Harmonic I2 row 9 | 79 | 004F |
| Harmonic I3 row 9 | 80 | 0050 |
| Harmonic IN row 9 | 81 | 0051 |
| Harmonic I1 row 11 | 82 | 0052 |
| Harmonic I2 row 11 | 83 | 0053 |
| Harmonic I3 row 11 | 84 | 0054 |
| Harmonic IN row 11 | 85 | 0055 |
| Harmonic I1 row 13 | 86 | 0056 |
| Harmonic I2 row 13 | 87 | 0057 |
| Harmonic I3 row 13 | 88 | 0058 |
| Harmonic IN row 13 | 89 | 0059 |
| Harmonic I1 row 15 | 90 | 005A |
| Harmonic I2 row 15 | 91 | 005B |
| Harmonic I3 row 15 | 92 | 005C |
| Harmonic IN row 15 | 93 | 005D |
| Thd U12 | 94 | 005E |
| Thd U23 | 95 | 005F |
| Thd U31 | 96 | 0060 |
| Harmonic U12 row 3 | 97 | 0061 |
| Harmonic U23 row 3 | 98 | 0062 |
| Harmonic U31 row 3 | 99 | 0063 |
| Harmonic U12 row 5 | 100 | 0064 |
| Harmonic U23 row 5 | 101 | 0065 |

MODULE 9: SPECIAL FRAME

List of values

| Name | Decimal address | Hexa. address |
|---------------------|-----------------|---------------|
| Harmonic U31 row 5 | 102 | 0066 |
| Harmonic U12 row 7 | 103 | 0067 |
| Harmonic U23 row 7 | 104 | 0068 |
| Harmonic U31 row 7 | 105 | 0069 |
| Harmonic U12 row 9 | 106 | 006A |
| Harmonic U23 row 9 | 107 | 006B |
| Harmonic U31 row 9 | 108 | 006C |
| Harmonic U12 row 11 | 109 | 006D |
| Harmonic U23 row 11 | 110 | 006E |
| Harmonic U31 row 11 | 111 | 006F |
| Harmonic U12 row 13 | 112 | 0070 |
| Harmonic U23 row 13 | 113 | 0071 |
| Harmonic U31 row 13 | 114 | 0072 |
| Harmonic U12 row 15 | 115 | 0073 |
| Harmonic U23 row 15 | 116 | 0074 |
| Harmonic U31 row 15 | 117 | 0075 |
| Thd V1 | 118 | 0076 |
| Thd V2 | 119 | 0077 |
| Thd V3 | 120 | 0078 |
| Harmonic V1 row 3 | 121 | 0079 |
| Harmonic V2 row 3 | 122 | 007A |
| Harmonic V3 row 3 | 123 | 007B |
| Harmonic V1 row 5 | 124 | 007C |
| Harmonic V2 row 5 | 125 | 007D |
| Harmonic V3 row 5 | 126 | 007E |
| Harmonic V1 row 7 | 127 | 007F |
| Harmonic V2 row 7 | 128 | 0080 |
| Harmonic V3 row 7 | 129 | 0081 |
| Harmonic V1 row 9 | 130 | 0082 |
| Harmonic V2 row 9 | 131 | 0083 |
| Harmonic V3 row 9 | 132 | 0084 |
| Harmonic V1 row 11 | 133 | 0085 |
| Harmonic V2 row 11 | 134 | 0086 |
| Harmonic V3 row 11 | 135 | 0087 |
| Harmonic V1 row 13 | 136 | 0088 |
| Harmonic V2 row 13 | 137 | 0089 |
| Harmonic V3 row 13 | 138 | 008A |
| Harmonic V1 row 15 | 139 | 008B |
| Harmonic V2 row 15 | 140 | 008C |
| Harmonic V3 row 15 | 141 | 008D |
| I System | 142 | 008E |
| U System | 143 | 008F |
| V System | 144 | 0090 |
| Hour meter < 10000 | 145 | 0091 |
| Hour meter > 10000 | 146 | 0092 |

USE OF THE PROFIBUS®-DP MODULES

MODULE 9: SPECIAL FRAME

| Name | Decimal address | Hexa. address |
|--|-----------------|---------------|
| Last voltage dips | | |
| Residual phase to phase involved: 0: none, 5: U12 6: U23 7: U31 | 4096 | 1000 |
| Msb value (V/100) | 4097 | 1001 |
| Isb value (V/100) | 4098 | 1002 |
| Residual phase to neutral involved 0: none 22 : V1 23: V2 24: V3 | 4099 | 1003 |
| Msb value (V/100) | 4100 | 1004 |
| Isb value (V/100) | 4101 | 1005 |
| Msb length (ms) | 4102 | 1006 |
| Isb length (ms) | 4103 | 1007 |
| Day | 4104 | 1008 |
| Month | 4105 | 1009 |
| Year | 4106 | 100A |
| Hour | 4107 | 100B |
| Minute | 4108 | 100C |
| Second | 4109 | 100D |
| Last power interruption | | |
| Day | 4110 | 100E |
| Month | 4111 | 100F |
| Year | 4112 | 1010 |
| Hour | 4113 | 1011 |
| Minute | 4114 | 1012 |
| Second | 4115 | 1013 |
| Last average power | | |
| Last P+ value (W) | 4116 | 1014 |
| Last P- value (W) | 4117 | 1015 |
| Last Q+ value (var) | 4118 | 1016 |
| Last Q- value (var) | 4119 | 1017 |
| Average frequency | | |
| Last frequency value (Hz/100) | 4120 | 1018 |
| Last swell | | |
| Maximum phase to phase involved 0: none 5: U12 6: U23 7: U31 | 4121 | 1019 |
| Isb value (V/100) | 4122 | 101A |
| Msb value (V/100) | 4123 | 101B |
| Maximum phase to neutral involved 0: none 22 : V1 23: V2 24: V3 | 4124 | 101C |

MODULE 9: SPECIAL FRAME

| Name | Decimal address | Hexa. address |
|-----------------------------|-----------------|---------------|
| Isb value (V/100) | 4125 | 101D |
| Msb value (V/100) | 4126 | 101E |
| Msb length (ms) | 4127 | 101F |
| Isb length (ms) | 4128 | 1020 |
| Month | 4129 | 1021 |
| Day | 4130 | 1022 |
| Year | 4131 | 1023 |
| Hour | 4132 | 1024 |
| Minute | 4133 | 1025 |
| Second | 4134 | 1026 |
| Average voltage | | |
| Last value U12 (V/10) | 4135 | 1027 |
| Last value U23 (V/10) | 4136 | 1028 |
| Last value U31 (V/10) | 4137 | 1029 |
| Last value U1 (V/10) | 4138 | 102A |
| Last value U2 (V/10) | 4139 | 102B |
| Last value U3 (V/10) | 4140 | 102C |
| New values available | | |
| Average In (mA) | 4141 | 102D |
| Average maximum In (mA) | 4142 | 102E |

Note:

msb: most significant byte.

Isb: least significant byte.

Input frame

| Name | Size (bytes) |
|--------------|--------------|
| Frame number | 1 |
| Value 1 | 2 |
| Value 2 | 2 |
| Value 3 | 2 |
| Value 4 | 2 |
| Value 5 | 2 |
| Value 6 | 2 |
| Value 7 | 2 |
| Value 8 | 2 |
| Value 9 | 2 |
| Value 10 | 2 |
| Value 11 | 2 |
| Value 12 | 2 |
| Value 13 | 2 |
| Value 14 | 2 |
| Value 15 | 2 |
| Value 16 | 2 |

Length: 33 bytes

USE OF THE PROFIBUS®-DP MODULES

MODULE 10 : RESERVED FOR MANUFACTURER

MODULE 11 : SIZE LIMITED SPECIAL FRAME

This module allows the creation of a personalised module of 4 values.

Output frame

| Name | Size (bytes) |
|--------------------|--------------|
| Frame number | 1 |
| Address of value 1 | 2 |
| Address of value 2 | 2 |
| Address of value 3 | 2 |
| Address of value 4 | 2 |

Length: 9 bytes

NB:

The frame number is an identification number. It is used to check if the answer coming from the slave device corresponds to the PLC's request.

The list of values is available p. 31 to 35 (module 9).

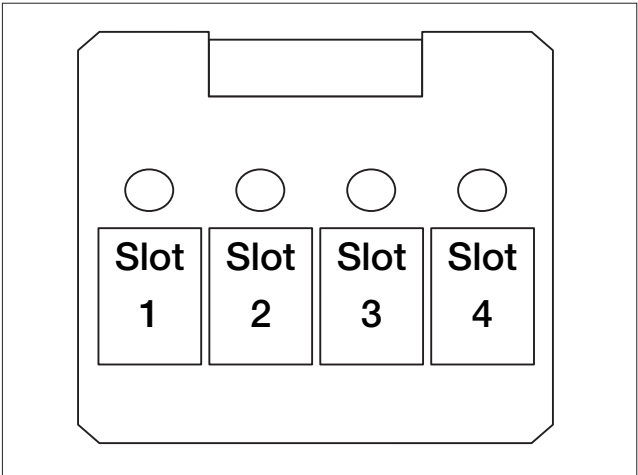
Input frame

| Name | Size (bytes) |
|--------------|--------------|
| Frame number | 1 |
| Value 1 | 2 |
| Value 2 | 2 |
| Value 3 | 2 |
| Value 4 | 2 |

Length: 9 bytes

DIAGNOSTICS

These contain an indication of the presence of **DIRIS A40/A41** option modules, the serial number, the **DIRIS A40/A41** product code and the presence of an alarm or an excess.



GB

| Name | Size (bytes) |
|--|--------------|
| Option present on slot 1 0: RS485 1: Metering 3: Harmonics F0: In 20: 2 In / 2 out 30: 2 0 / 4 - 20 mA 50: PROFIBUS®-DP | 1 |
| Option present on slot 2 0: RS485 1: Metering 3: Harmonics F0: In 20: 2 In / 2 out 30: 2 0 / 4 - 20 mA 50: PROFIBUS®-DP | 1 |
| Option present on slot 3 0: RS485 1: Metering 3: Harmonics F0: In 20: 2 In / 2 out 30: 2 0 / 4 - 20 mA 50: PROFIBUS®-DP | 1 |
| Option present on slot 4 0: RS485 1: Metering 3: Harmonics F0: In 20: 2 In / 2 out 30: 2 0 / 4 - 20 mA 50: PROFIBUS®-DP | 1 |

DIAGNOSTICS

| Name | Size (bytes) |
|--|-----------------|
| Serial number | 4 |
| Product code | 1 |
| Alarms bit 0: Alarm I bit 1: Alarm In bit 2: Alarm U bit 3: Alarm V bit 4: Alarm P+ bit 5: Alarm Q+ bit 6: Alarm S bit 7: Alarm F bit 8: Alarm PFL bit 9: Alarm Time bit 10: Alarm Thd I bit 11: Alarm Thd In bit 12: Alarm Thd U bit 13: Alarm Thd V bit 14: Alarm P- bit 15: Alarm Q- bit 16: Alarm PFC bit 17-31: not used | 4 |
| Excesses bit 0: Excess I bit 1: Excess In bit 2: Excess U bit 3: Excess V bit 4: Excess P+ bit 5: Excess Q+ bit 6: Excess S bit 7: Excess F bit 8: Excess PFL bit 9: Excess Time bit 10: Excess Thd I bit 11: Excess Thd In bit 12: Excess Thd U bit 13: Excess Thd V bit 14: Excess P- bit 15: Excess Q- bit 16: Excess PFC bit 17-31: not used | 4 |

Length: 17 bytes

TECHNICAL CHARACTERISTICS

COMMUNICATION

| | |
|------------------------|---|
| RS485 | 2 or 3 wires half duplex |
| Protocol | PROFIBUS®-DP |
| Speed | 9.6 to 1500 kbauds |
| Galvanic insulation | 4 kV |
| UL-CSA Approval | |
| Standard | UL 61010-1 CSA-C22.2 No. 61010-1 |
| Certificate | UL file No: E257746 CSA report No. for DIRIS A20: 1810571 CSA report No. for DIRIS A40: 1810577 |

GB

GLOSSARY OF ABBREVIATIONS

| | |
|------|--------------------------------------|
| COM | Communication |
| ADR | Slave address |
| DIAG | Diagnostic function activated or not |
| PARA | Remote parametering activated or not |

TECHNICAL CHARACTERISTICS

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