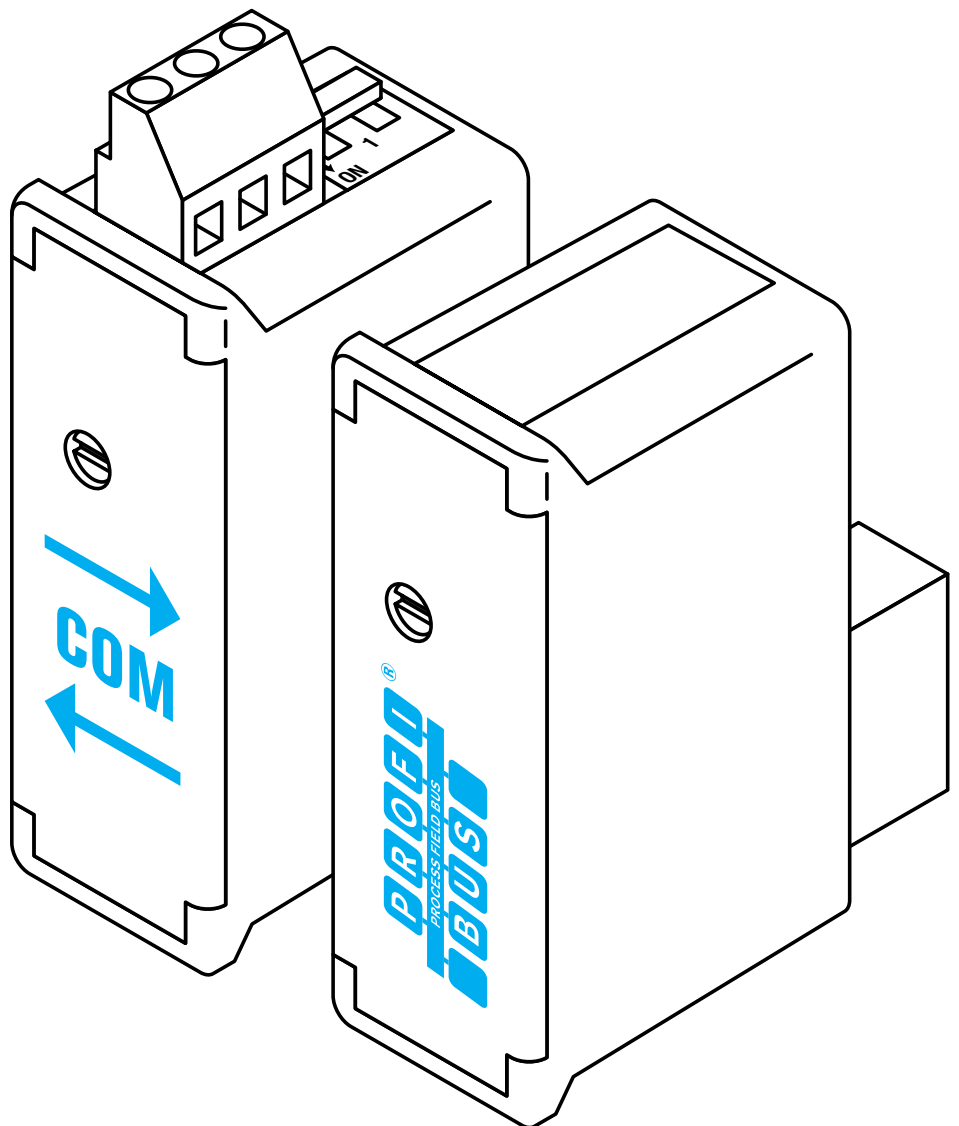


# DIRIS A40/A41 RS485 – PROFIBUS® DP

Operating instructions



PROFIBUS® Certification



PRELIMINARY OPERATIONS \_\_\_\_\_ 4

GENERAL INFORMATION \_\_\_\_\_ 4

INSTALLATION \_\_\_\_\_ 5

PROGRAMMING \_\_\_\_\_ 6

CONFIGURATION \_\_\_\_\_ 10

USE OF PROFIBUS®-DP MODULES \_\_\_\_\_ 15

    MODULE 1: MAIN MEASUREMENTS \_\_\_\_\_ 15

    MODULE 2: ADDITIONAL MEASUREMENTS \_\_\_\_\_ 20

    MODULE 3: TROUGH/POWER CUT/  
                    MEAN POWER \_\_\_\_\_ 22

    MODULE 4: OVERVOLTAGE/MEAN VOLTAGE  
                    AND FREQUENCIES/MAXIMUM  
                    AND MEAN I<sub>n</sub> \_\_\_\_\_ 23

    MODULE 5: CURRENT HARMONICS \_\_\_\_\_ 24

    MODULE 6: PHASE TO PHASE VOLTAGE \_\_\_\_\_ 25

    MODULE 7: PHASE TO NEUTRAL VOLTAGE \_\_\_\_\_ 26

    MODULE 8: INSTANTANEOUS MIN/MAX \_\_\_\_\_ 27

    MODULE 9: SPECIAL FRAME \_\_\_\_\_ 28

    MODULE 11: LIMITED SPECIAL FRAME \_\_\_\_\_ 35

DIAGNOSTICS \_\_\_\_\_ 37

TECHNICAL CHARACTERISTICS \_\_\_\_\_ 39

PROFIBUS® CERTIFICATION \_\_\_\_\_ 40

# 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 2 option modules, the first of which is equipped with a disconnectable terminal block,
- a CD-Rom.

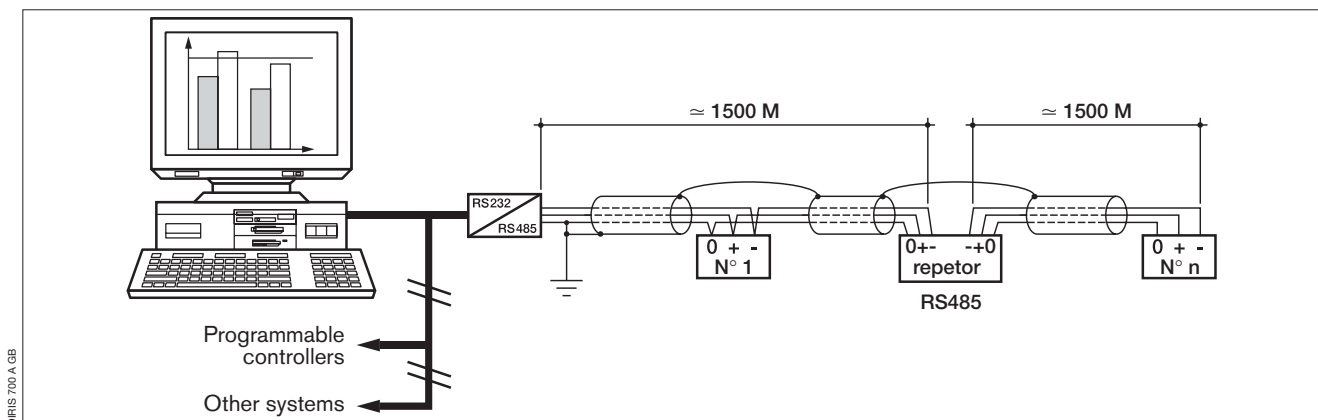
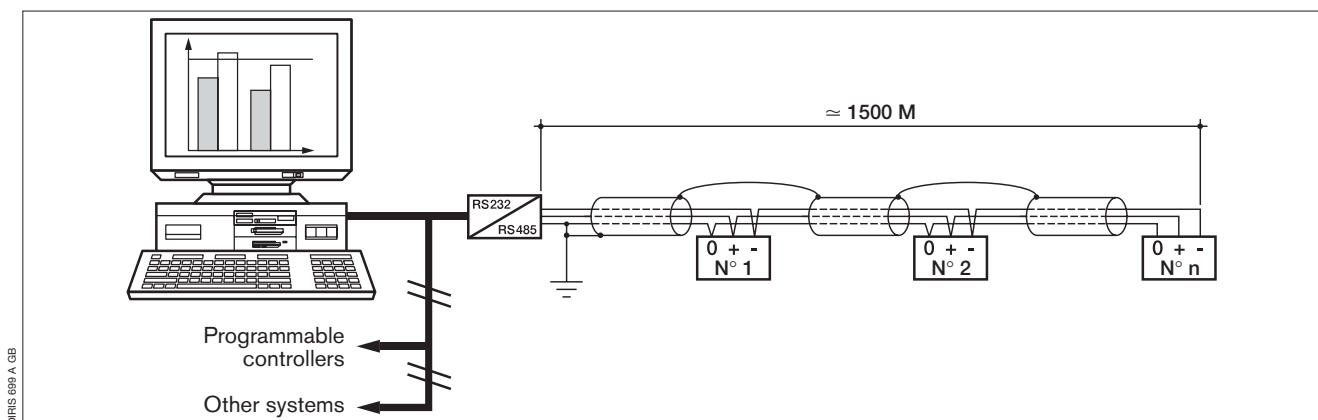
## GENERAL INFORMATION

### 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 :

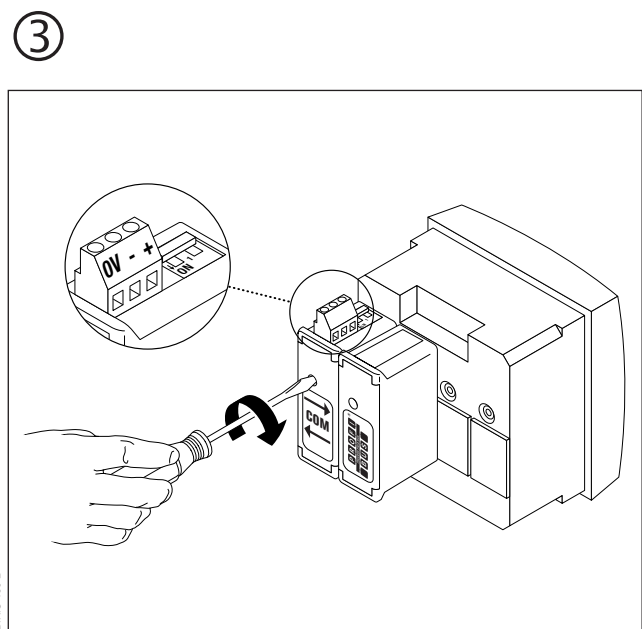
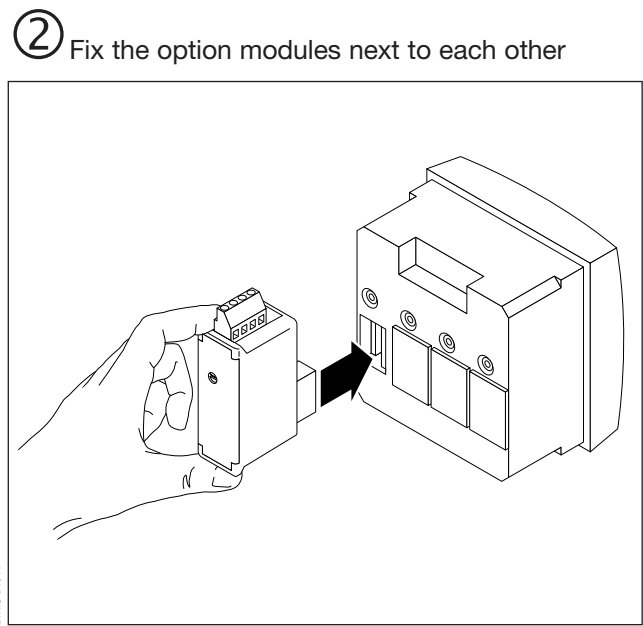
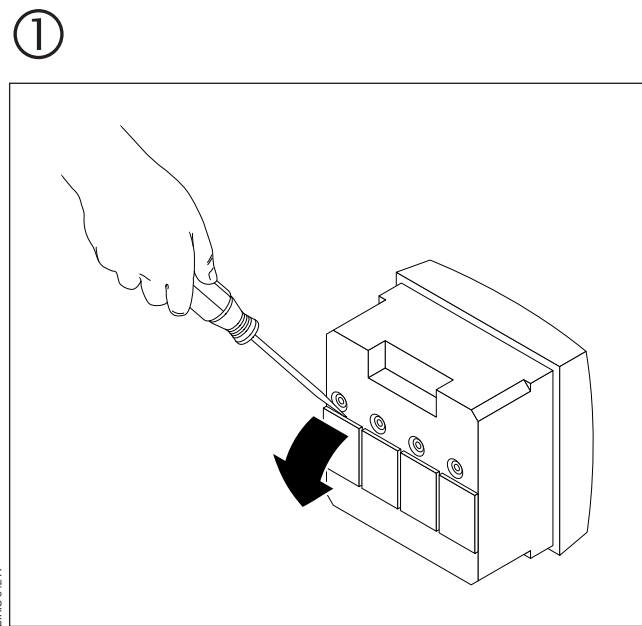
It is essential to attach an active termination to the 2 link-up ends. This termination can be found on the model RS 485. Remember to put the 2 switches to ON when attaching.

# 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



④ Follow indications when connecting the terminal Switch on voltage supply

**Note :**  
 Correspondence with a HAN BRID connector  
 + = B (red)  
 - = A (green)



# PROGRAMMATION

I	U F	P PF	MAX AVG	H	E ☉
◀ / TEST	▶	▼	▲	≡	PROG



I	U F	P PF	MAX AVG	H	E ☉
◀ / TEST	▶	▼	▲	≡	PROG



I	U F	P PF	MAX AVG	H	E ☉
◀ / TEST	▶	▼	▲	≡	PROG



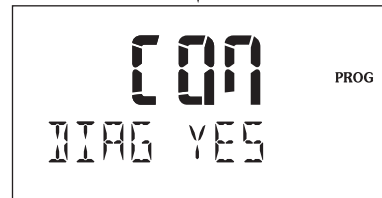
I	U F	P PF	MAX AVG	H	E ☉
◀ / TEST	▶	▼	▲	≡	PROG



Previous menu



p.7



p.8



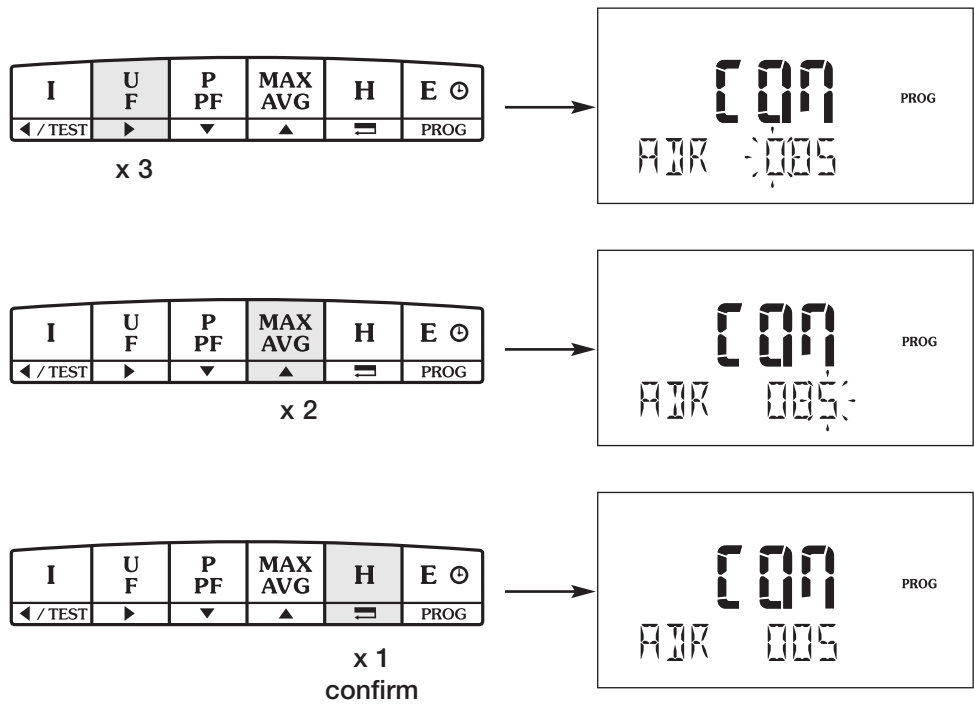
p.9



Following menu

COMMUNICATION ADDRESS

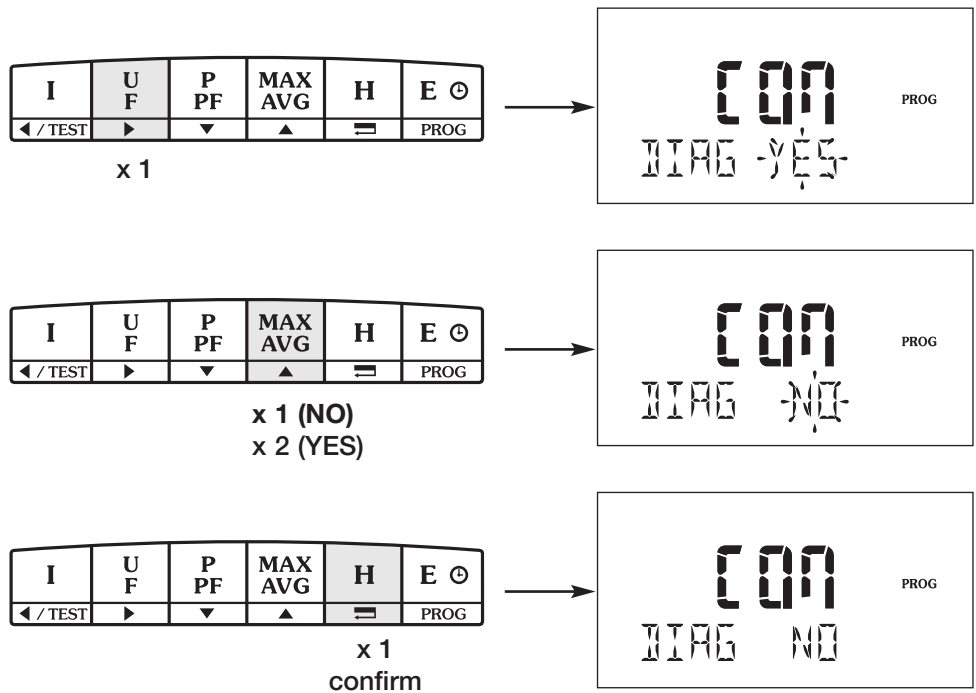
> Example : COM ADR = 7



# PROGRAMMATION

## DIAGNOSTIQUE

> Example : COM DIAG = NO

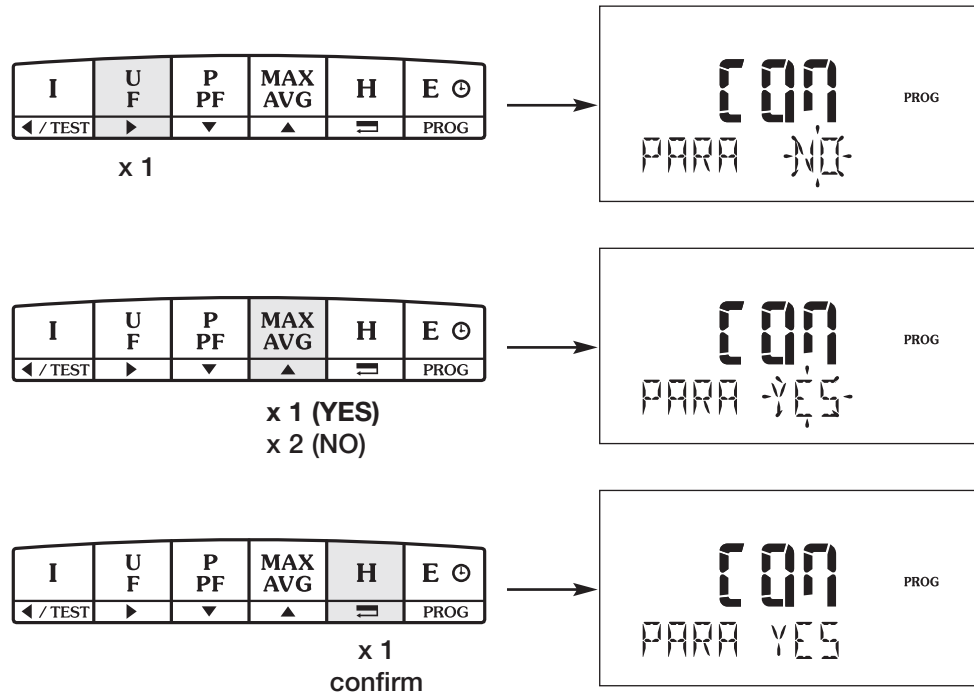


**NB :**  
 This function allows switching the diagnosis function or off. (see p. 46)



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

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



## PARAMETRAGE

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



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

## PARAMETRAGE

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

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



## 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
∑ Active power +/- (kW / 10)	2
∑ Reactive power +/- (kvar / 10)	2
∑ Apparent power +/- (kVa / 10)	2
∑ 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 x 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)
<b>Last voltage dips</b>	
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
<b>Last power interruption</b>	
Month	1
Day	1
Year	1
Hour	1
Minute	1
Second	1
<b>Last average power</b>	
Last P+ value (kW/10)	2
Last P- value (kW/10)	2
Last Q+ value (kvar/10)	2
Last Q- value (kvar/10)	2
<b>Last average frequency</b>	
Last frequency value (Hz/100)	2

Length: 36 bytes

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

Name	Size (bytes)
<b>Last swell</b>	
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
<b>Average voltage</b>	
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
<b>Average and maximum neutral current</b>	
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  <b>Example:</b> <i>Modification of relay 1 :</i> <ul style="list-style-type: none"> <li>• set bit 4 (relay configuration change),</li> <li>• set bit 0 (relais 1 à 1),</li> <li>• modify the status byte on relay 1 break (next byte).</li> </ul>
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
<b>Last voltage dips</b>		
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
<b>Last power interruption</b>		
Day	4110	100E
Month	4111	100F
Year	4112	1010
Hour	4113	1011
Minute	4114	1012
Second	4115	1013
<b>Last average power</b>		
Last P+ value (W)	4116	1014
Last P- value (W)	4117	1015
Last Q+ value (var)	4118	1016
Last Q- value (var)	4119	1017
<b>Average frequency</b>		
Last frequency value (Hz/100)	4120	1018
<b>Last swell</b>		
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
<b>Average voltage</b>		
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
<b>New values available</b>		
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

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 MODULE 10 : RESERVED FOR MANUFACTURER
 

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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).*

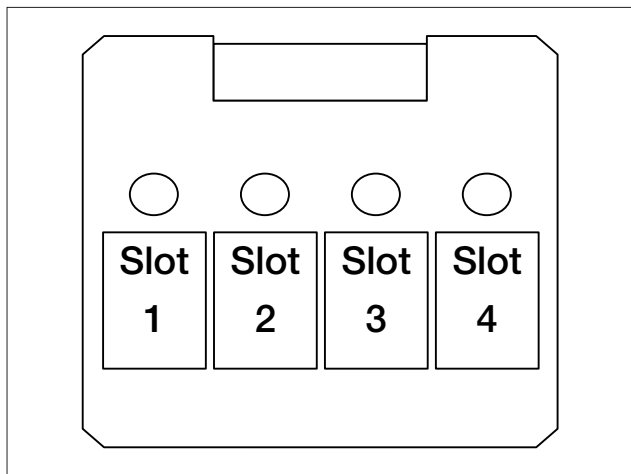
**Input frame**

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.



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
<b>Certification</b>	
UL 61010	N° file : E25 7746

## GLOSSARY OF ABBREVIATIONS

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



# TECHNICAL CHARACTERISTICS



## Certificate

PROFIBUS Nutzerorganisation e.V. grants to

### SOCOMEK

Rue de Westhouse, BP 10, F-67235 Benfeld Cedex

the Certificate No.: **Z00939** for the following product:

**Name:** DIRIS AP  
**Model:** Energy Control Device  
**Revision:** 1.03; SW: 4.0  
**GSD:** DIRI06B7.gsd

This certificate confirms that the device has successfully passed the conformance tests for PROFIBUS DP Slave devices.

The tests were executed in accordance with "Test Specifications for PROFIBUS DP Slaves, Version 2.0, February 2000" based on EN 50170-2 at Siemens AG in Fürth which is an authorized test laboratory of PROFIBUS Nutzerorganisation. The detailed test procedure and the test results are recorded in the inspection report 407-1.

This certificate is granted according to the PNO guideline for testing and certification (PRZ) dated August 1, 1999 and is valid for 3 years, i.e. until November 28, 2006.

Karlsruhe, January 8, 2004



*[Handwritten Signature]*  
 .....  
 (Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

*[Handwritten Signature]*  
 \_\_\_\_\_  
 (Edgar Küster)

*[Handwritten Signature]*  
 \_\_\_\_\_  
 (K.-P. Lindner)



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