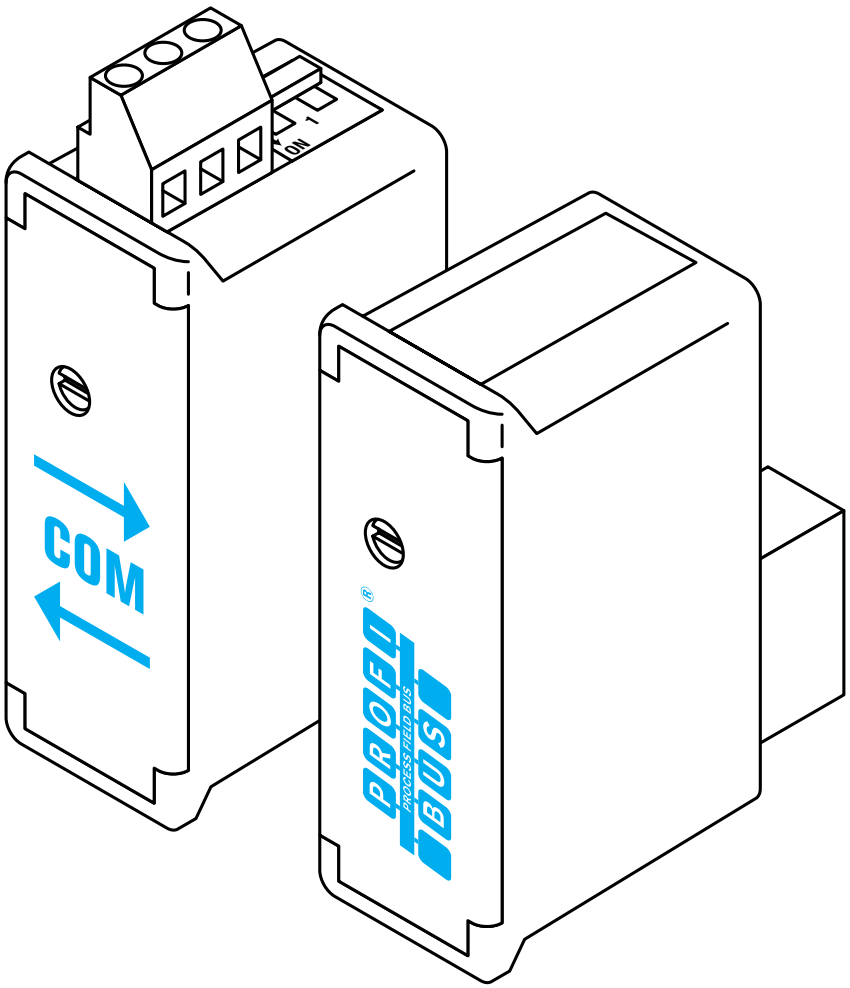
DIRIS A*p*
RS485 – PROFIBUS®-DP

GB



Industrial Switching & Protection Systems

GB

Contents

PRELIMINARY OPERATIONS

NB:
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 package containing the PROFIBUS®-DP option:
- 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

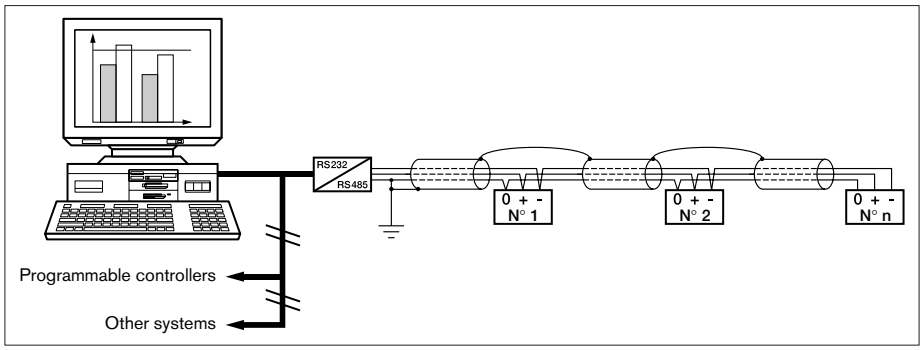
This option provides a PROFIBUS®-DP protocol RS485 series link (2 or 3 wires) in slave mode with an automatic speed detection facility. It allows the use of the DIRIS Ap from one or more PCs or PLCs.

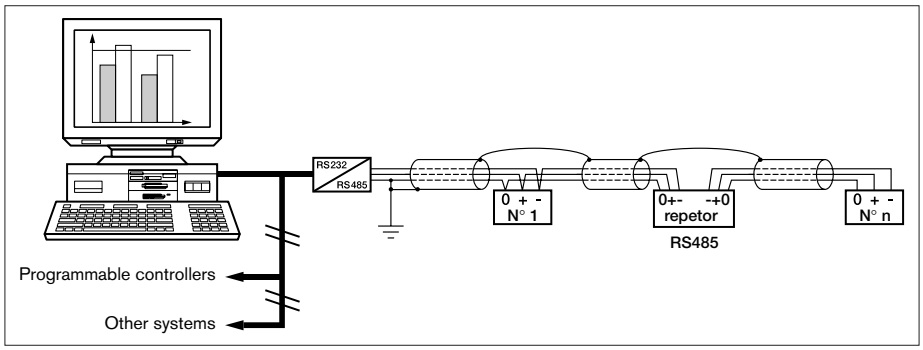
GENERAL POINTS

Recommendations:
You should use a shielded twisted pair (LIYCY type). In a disturbed environment or large network (in terms of length) we recommend the use of 2 shielded pairs (type LIYCY-CY). In this case, one pair is used for the + and the -, and another pair, where the 2 wires are short-circuited, for the 0.V.

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.

In a standard configuration, an RS485 link allows 1 to 32 DIRIS Aps 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).





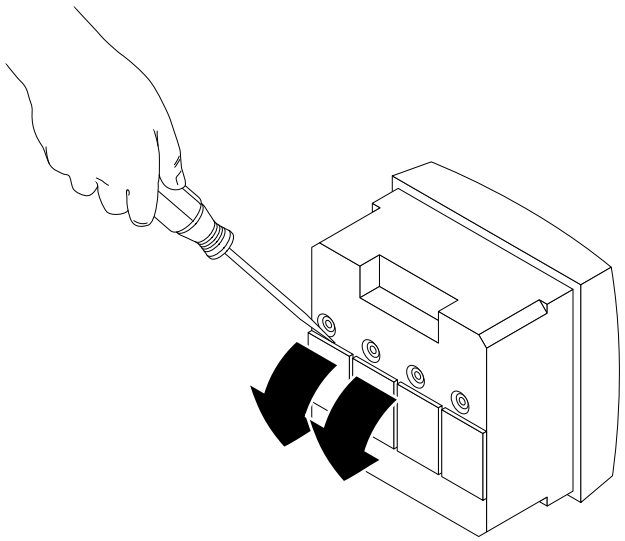
INSTALLATION

The option modules are installed on the rear panel of the DIRIS Ap in one of the four positions provided.

CONNECTION

⚠ The DIRIS Ap must be switched off

1



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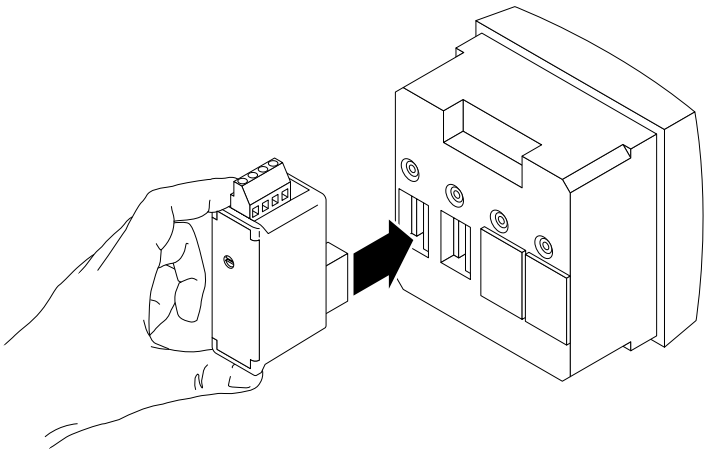
2 Fix the option modules next to each other



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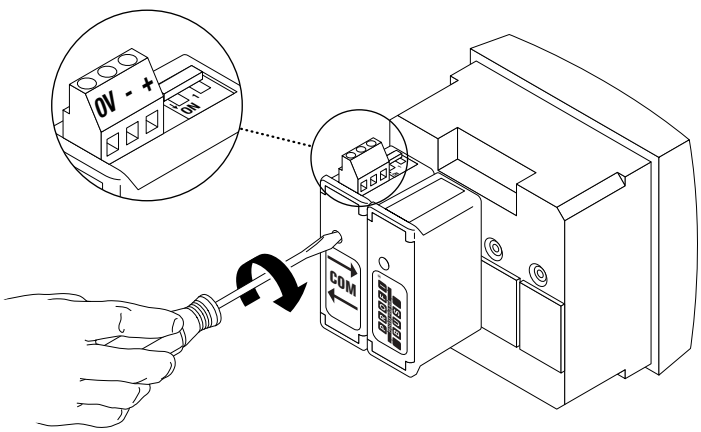
Note:
Correspondence with a HAN BRID connector
+ = B (red)
- = A (green)

3



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4 Follow indications when connecting the terminal
Switch on voltage supply

PROGRAMMING THE PROFIBUS®-DP ADDRESS

1 PROGRAMMING THE PROFIBUS®-DP COMMUNICATION ADDRESS (COM ADR)

NB: *The address default setting is 5 (ADR 5). If you want this value, press ▼. You will pass to communication speed programming (COM BDS). If not, proceed as follows:*

KEYS	INSTRUCTION	DISPLAY	COMMENT
▶	Press once	COM ADR - BDS PROG	To display flashing the 1st digit (press twice and three times for the 2nd and 3rd digit) or press ◀ to return to the left.

Press ▼ to decrement or ▲ to increment the selected digit value;
Press ⮂ once to confirm;
Press ▼ once to pass to speed programming (COM BDS).

NB: *the address can vary between 1 to 126.*

CONFIGURATION

The table below gives the configuration of the DIRIS Ap 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 minutes 8: 8 minutes 10: 10 minutes 15: 15 minutes 20: 20 minutes 30: 30 minutes 60: 60 minutes	1
Synchronisation of P/Q/S AVG/MAX 5: 5 minutes	1

Name	Size (bytes)
8: 8 minutes 10: 10 minutes 15: 15 minutes 20: 20 minutes 30: 30 minutes 60: 60 minutes	
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 3: 100 4: 1000 5: 10000	1
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	1

Name	Size (bytes)
5: U23 6: U31 7: P 8: Q 9: S 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: Supply	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
Allocation of analog output OUT 3 0: I1 1: I2 2: I3 3: In 4: U12 5: U23	1

Name	Size (bytes)
6: U31 7: P 8: Q 9: S 10: PF 11: V1 12: V2 13: V3 14: F	
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
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

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

Length: 54 bytes

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

USE OF THE PROFIBUS®-DP MODULES

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

1 MODULE 1: MAIN MEASUREMENTS

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

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
Upper threshold unit OUT 1 0:/ 1: k 2: M	1
Hysteresis 0 to 99 OUT 1 (%)	1
Time delay OUT 1 (s)	2

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).*

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Name	Size (bytes)
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
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

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.

Nota :
System I $= \frac{I_1 + I_2 + I_3}{3}$

System U $= \frac{U_{12} + U_{21} + U_{31}}{3}$

System V $= \frac{V_1 + V_2 + V_3}{3}$

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/100)	2
Phase to phase voltage U23 (V/100)	2
Phase to phase voltage U31 (V/100)	2
Phase to neutral voltage phase 1 (V/100)	2
Phase to neutral voltage phase 2 (V/100)	2
Phase to neutral voltage phase 3 (V/100)	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 + (kW/100)	2
Maximum value active power – (kW/100)	2
Maximum value reactive power + (kvar/100)	2
Maximum value reactive power – (kvar/100)	2
Maximum apparent power (kVA/100)	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/100)	2
System V (V/100)	2
Hour meter < 10000 (H/100)	2
Hour meter >10000 (H/100)	2

Length: 68 bytes

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 1001 0111 0001 0000
- opposite is equal to 0110 1000 1110 1111
- opposite + 1 is equal to 0110 1000 1111 0000 or in decimal 386.72V.

ENGLISH

2 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.

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.

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 + (kW/100)	2
Average value active power - (kW/100)	2
Average value reactive power + (kvar/100)	2
Average value reactive power - (kvar/100)	2
Average value apparent power (kVA/100)	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

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 1001 0111 0001 0000
- opposite is equal to 0110 1000 1110 1111
- opposite + 1 is equal to 0110 1000 1111 0000 or in decimal 386.72V.

3 MODULE 3: STORED ALARMS RELAY 1

This module contains the alarm log for relay 1
The output frame is identical to module1.

Input frame

Name	Size (bytes)
Lower threshold Alarm 1 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 1	4
Upper threshold Alarm 1 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1

Name	Size (bytes)
Upper value threshold Alarm 1	4
Alarm duration (s)	2
Lower threshold Alarm 2 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 2	4
Upper threshold Alarm 2 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Upper value threshold Alarm 2	4
Alarm 2 duration (s)	2

Name	Size (bytes)
Lower threshold Alarm 3 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 3	4
Upper threshold Alarm 3 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Upper value threshold Alarm 3	4
Alarm 3 duration (s)	2

Length: 36 bytes

4 MODULE 4: STORED ALARMS RELAY 2

This module contains the storage of the alarms for relay 2.
The output frame is identical to module1.

Input frame

Name	Size (bytes)
Lower threshold Alarm 1 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 1	4
Upper threshold Alarm 1 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Upper value threshold Alarm 1	4

Input frame

Name	Size (bytes)
Alarm 1 duration (s)	2
Lower threshold Alarm 2 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 2	4
Upper threshold Alarm 2 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Upper value threshold Alarm 2	4
Alarm 2 duration (s)	2

Input frame

Name	Size (bytes)
Lower threshold Alarm 3 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Lower value threshold Alarm 3	4
Upper threshold Alarm 3 0: no alarm 1: I1 2: I2 3: I3 4: In 5: U12 6: U23 7: U31 8: P 9: Q 10: S 11: F 12: PF 15: Thd I1 16: Thd I2 17: Thd I3 18: Thd U12 19: Thd U23 20: Thd U31 21: time 22: V1 23: V2 24: V3 25: Thd In 26: Thd V1 27: Thd V2 28: Thd V3 29: P- 30: Q- 31: CPF	1
Upper value threshold Alarm 3	4
Alarm 3 duration (s)	2

Length: 36 bytes

5 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.

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

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

6 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.

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

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

7 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.

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

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

8 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/100)	2
Min. frequency (Hz/100)	2
Min. power factor (0.001)	2
Min. active power (kW/100)	2
Min. reactive power (kvar/100)	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/100)	2
Max. frequency (Hz/100)	2
Max. power factor (0.001)	2
Max. active power (kW/100)	2
Max. reactive power (kvar/100)	2
Thd I max (0.1 %)	2
Thd In max (0.1 %)	2
Thd U max (0.1 %)	2

Length: 40 bytes

9 MODULE 9: SPECIAL FRAME

This module allows the creation of a personalised module.

Output 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
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	1

Example:
Modification of relay 1 :
- *set bit 4 (relay configuration change),*
- *set bit 0 (relais 1 à 1),*
- *modify the status byte on relay 1 break (next byte).*

ENGLISH

Name	Size (bytes)
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	
Lower threshold OUT 1	2
Lower threshold unit OUT 1 0: / 1: k 2: M	1
Upper threshold OUT 1	2
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

Name	Size (bytes)
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
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. 24, 25 and 26.

List of values

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

Measurements		
Name	Decimal address	Hexa. address
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
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

Measurements		
Name	Decimal address	Hexa. address
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

Note:
msb: most significant byte.
lsb: least significant byte.

Alarms stored		
Name	Decimal address	Hexa. address
Alarm1 OUT1 lower threshold	4096	1000
Alarm1 OUT1 upper threshold	4097	1001
Alarm1 OUT1 lower threshold value msb	4098	1002
Alarm1 OUT1 lower threshold value lsb	4099	1003
Alarm1 OUT1 upper threshold value msb	4100	1004
Alarm1 OUT1 upper threshold value lsb	4101	1005
Alarm1 OUT1 duration	4102	1006
Alarm2 OUT1 lower threshold	4103	1007
Alarm2 OUT1 upper threshold	4104	1008
Alarm2 OUT1 lower threshold value msb	4105	1009
Alarm2 OUT1 lower threshold value lsb	4106	100A
Alarm2 OUT1 upper threshold value msb	4107	100B
Alarm2 OUT1 upper threshold value lsb	4108	100C
Alarm2 OUT1 duration	4109	100D
Alarm3 OUT1 lower threshold	4110	100E
Alarm3 OUT1 upper threshold	4111	100F
Alarm3 OUT1 lower threshold value msb	4112	1010
Alarm3 OUT1 lower threshold value lsb	4113	1011
Alarm3 OUT1 upper threshold value msb	4114	1012
Alarm3 OUT1 upper threshold value lsb	4115	1013
Alarm3 OUT1 duration	4116	1014
Alarm1 OUT2 lower threshold	4117	1015
Alarm1 OUT2 upper threshold	4118	1016
Alarm1 OUT2 lower threshold value msb	4119	1017
Alarm1 OUT2 lower threshold value lsb	4120	1018
Alarm1 OUT2 upper threshold value msb	4121	1019
Alarm1 OUT2 upper threshold value lsb	4122	101A
Alarm1 OUT2 duration	4123	101B
Alarm2 OUT2 lower threshold	4124	101C
Alarm2 OUT2 upper threshold	4125	101D
Alarm2 OUT2 lower threshold value msb	4126	101E
Alarm2 OUT2 lower threshold value lsb	4127	101F
Alarm2 OUT2 upper threshold value msb	4128	1020
Alarm2 OUT2 upper threshold value lsb	4129	1021
Alarm2 OUT2 duration	4130	1022
Alarm3 OUT2 lower threshold	4131	1023
Alarm3 OUT2 upper threshold	4132	1024
Alarm3 OUT2 lower threshold value msb	4133	1025
Alarm3 OUT2 lower threshold value lsb	4134	1026
Alarm3 OUT2 upper threshold value msb	4135	1027
Alarm3 OUT2 upper threshold value lsb	4136	1028
Alarm3 OUT2 duration	4137	1029

Input frame

Description	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

10 MODULE 10 : RESERVED FOR MANUFACTURER

11 MODULE 11 : SIZE LIMITED SPECIAL FRAME

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

Output frame

Description	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. 27, 28 and 29.

List of value addresses

Measurements		
Name	Decimal address	Hexa. address
Phase 1 current	0	0000
Phase 2 current	1	0001
Phase 3 current	2	0002
Neutral current	3	0003
Phase to phase voltage U12	4	0004
Phase to phase voltage U23	5	0005
Phase to phase voltage U31	6	0006
Phase to neutral voltage phase 1	7	0007
Phase to neutral voltage phase 2	8	0008
Phase to neutral voltage phase 3	9	0009
Frequency	10	000A
_ Active power	11	000B
_ Reactive power	12	000C
_ Apparent power	13	000D
_ Power factor L/C	14	000E
Max. value I1	15	000F
Max. value I2	16	0010
Max. value I3	17	0011
Maximum value active power +	18	0012
Maximum value active power -	19	0013
Maximum value reactive power +	20	0014
Maximum value reactive power -	21	0015
Maximum value apparent power	22	0016

Measurements		
Name	Decimal address	Hexa. address
Active energy + < 10000	23	0017
Active energy + > 10000	24	0018
Reactive energy + < 10000	25	0019
Reactive energy + > 10000	26	001A
Apparent energy < 10000	27	001B
Apparent energy > 10000	28	001C
Active power phase 1	29	001D
Active power phase 2	30	001E
Active power phase 3	31	001F
Reactive power phase 1	32	0020
Reactive power phase 2	33	0021
Reactive power phase 3	34	0022
Apparent power phase 1	35	0023
Apparent power phase 2	36	0024
Apparent power phase 3	37	0025
Power factor phase 1	38	0026
Power factor phase 2	39	0027
Power factor phase 3	40	0028
Average value I1	41	0029
Average value I2	42	002A
Average value I3	43	002B
Average value active power +	44	002C
Average value active power -	45	002D
Average value reactive power +	46	002E
Average value reactive power -	47	002F
Average value Apparent power	48	0030
Active energy - < 10000	49	0031
Active energy - >10000	50	0032
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

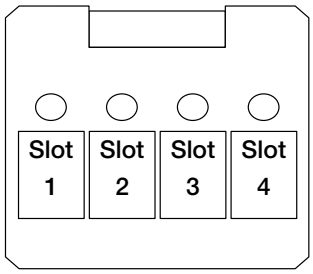
Measurements		
Name	Decimal address	Hexa. address
Harmonic I3 row 13	88	0058
Harmonic IN row 13	89	0059
Harmonic I1 row 15	90	005A
Harmonic I2 row 15	91	005B
Harmonic I3 row 15	92	005C
Harmonic IN row 15	93	005D
Thd U12	94	005E
Thd U23	95	005F
Thd U31	96	0060
Harmonic U12 row 3	97	0061
Harmonic U23 row 3	98	0062
Harmonic U31 row 3	99	0063
Harmonic U12 row 5	100	0064
Harmonic U23 row 5	101	0065
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

Input frame

Description	Size (bytes)
Frame number	1
Value 1	2
Value 2	2
Value 3	2
Value 4	2

DIAGNOSTICS

These contain an indication of the presence of DIRIS option modules, the serial number, the Diris Ap product code and the presence of an alarm or an excess.



DIRIS 475 A

Description	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
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	4

Description	Size (bytes)
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	
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

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