SERIAL COMMUNICATION MANUAL

REVO C®
THE CONNECTING UNIT

Rev. 09/2026

0025

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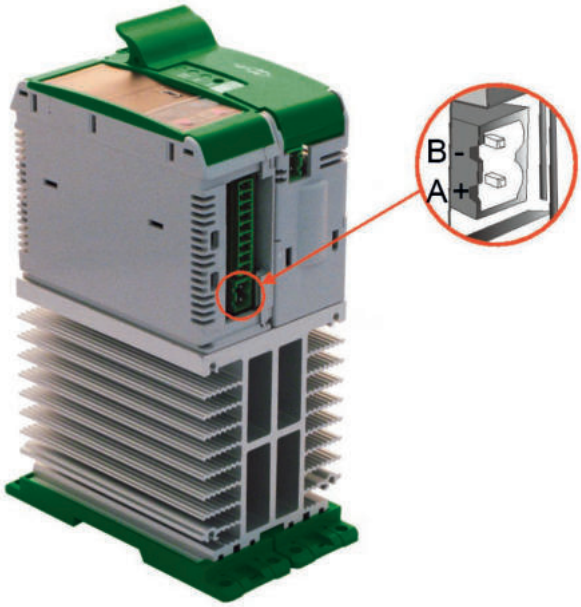
1 MODBUS-RTU communication protocol

1.1 Communication Terminals 30-40A (SR9-SR10-SR11)

1.1.1 RS485 standard Serial Port

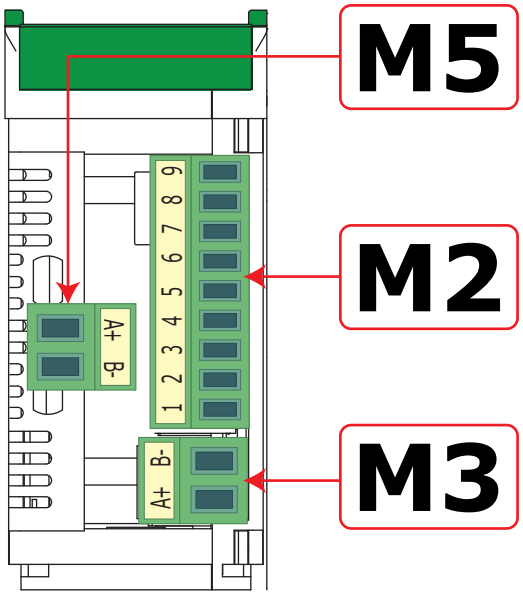
Terminal M1	Description
B-	RS485 B-
A+	RS485 A+

The serial communication port RS485 is available on the Command terminals.
On this port may be done a network up to 127 REVO C.



1.1.2 Second Serial 485 Configuration Connectors

Terminal M5	Description
A+	RS485 A+
B-	RS485 B-

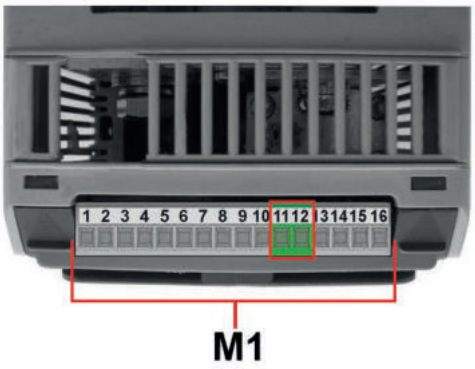


1.2 Communication Terminals 60-210A (from SR12 to SR17)

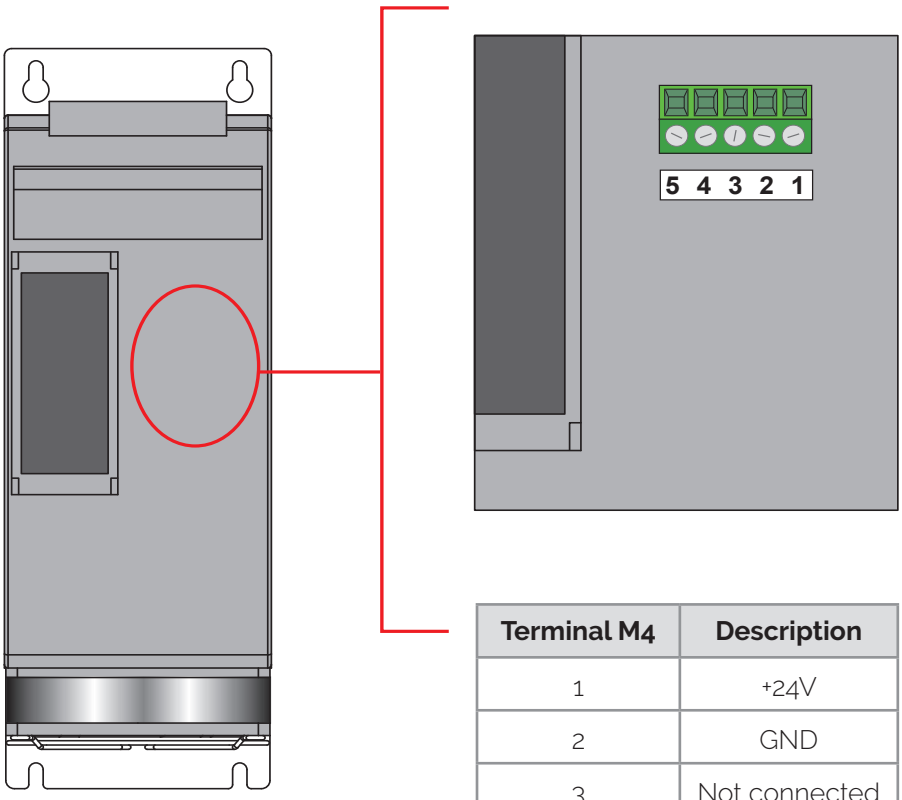
1.2.1 RS485 standard Serial Port

Terminal M1	Description
11	RS485 A+
12	RS485 B-

The serial communication port RS485 is available on the Command terminal.
On this port may be done a network up to 127 REVO C.



1.2.2 Second Serial 485 Configuration Connectors



Terminal M4	Description
1	+24V
2	GND
3	Not connected
4	RS485 A+
5	RS485 B-

1.3 Communication Terminals 300-800A (from S12 to S17)

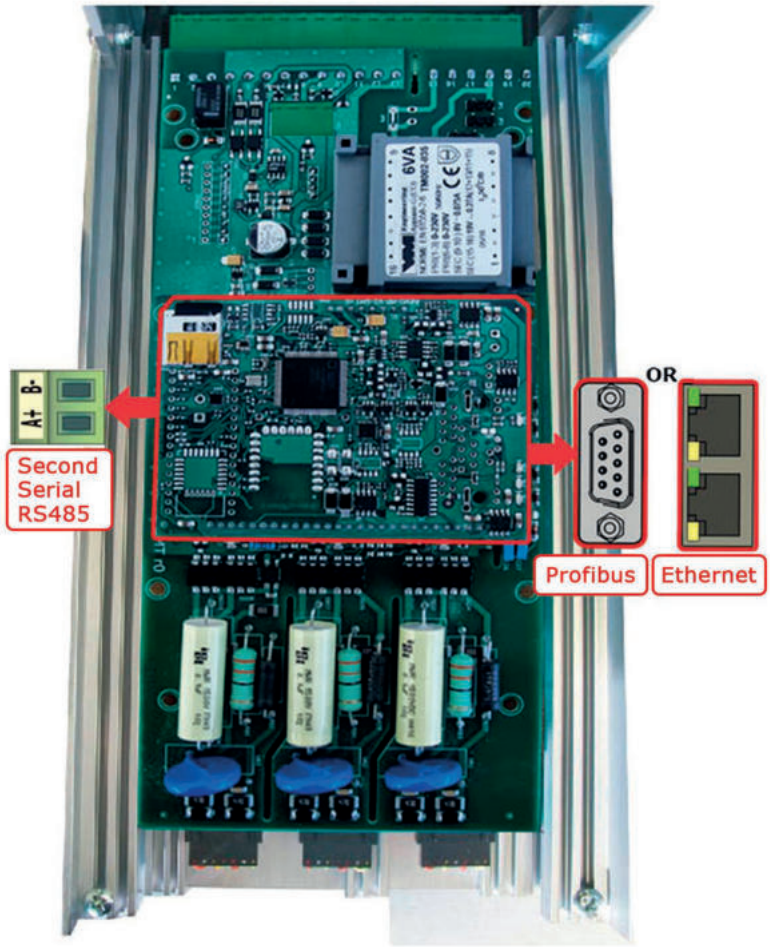
1.3.1 RS485 Serial Port

Terminal M1	Description
B-	RS485 B-
A+	RS485 A+

The serial communication port RS485 is available on the Command Terminals. On this port may be done a network up to 127 REVO C.

1.4 Fieldbus communication option

Other serial communication port are available as option.



1.5 MODBUS communication

The serial communication port of the thyristor unit is two-wire RS485 type.
This port use an half-duplex system.
While a Unit is transmitting the transmission line is activated, otherwise the transmission line is in high impedance.
The serial communication port allows to communicate between the thyristor units and a MASTER device (ex. a computer or a terminal). The cable must be rated for use to data transfer.

1.6 MODBUS RTU Protocol

The communication is based on the standard industrial MODBUS RTU with the following restrictions:

- The Baud rate can be 9600-19200-38400-115200 Baud (Standard 19200).

The following MODBUS functions are supported:

Function	Description
03/04	Read Holding Registers (max 121 reg.)
06	Preset Single Registers
16	Preset Multiple Registers (max 25 reg.)

The unit support the Broadcast messages:
It's possible to send a Broadcast message using the address 0, all the units respond to the message without sending back any reply.

1.7 Message Format

The transmission format is a 1 bit start, 8 date bit, and 1 bit stop with no parity verification.
A message for either a Query or a Response is made up of an inter-message gap followed by a sequence of data characters. The inter-message gap is at least 3.5 character times.
The first Byte of each message is always the address of the unit that is a value from 1 to 255 or 0 for the broadcast messages, the second is always the function number, and the rest of the message depends of the function demand.

When a slave receives a message, the unit sends an answer with the same structure but with the information requested.

Each message is followed by CRC (Cyclic Redundancy Check) with two bytes. The CRC identifies the incongruity situations of the message, in this case the receiver ignores the message.
The CRC is calculated in accordance with a formula that implies a recursive division of the data by a polynomial.
The polynomial divisor is:

$2^{16} + 2^{15} + 2^2 + 1$ (Hex 18005)

but is modified in two ways:

- Since the bits order are reversed, then the binary pattern is also reversed, and the most significant bit (MSB) is the right-most bit.
- Since interest only the remainder, the right-most bit could be discarded.

Therefore, the polynomial divisor has value: Hex A001

Normal bit order:

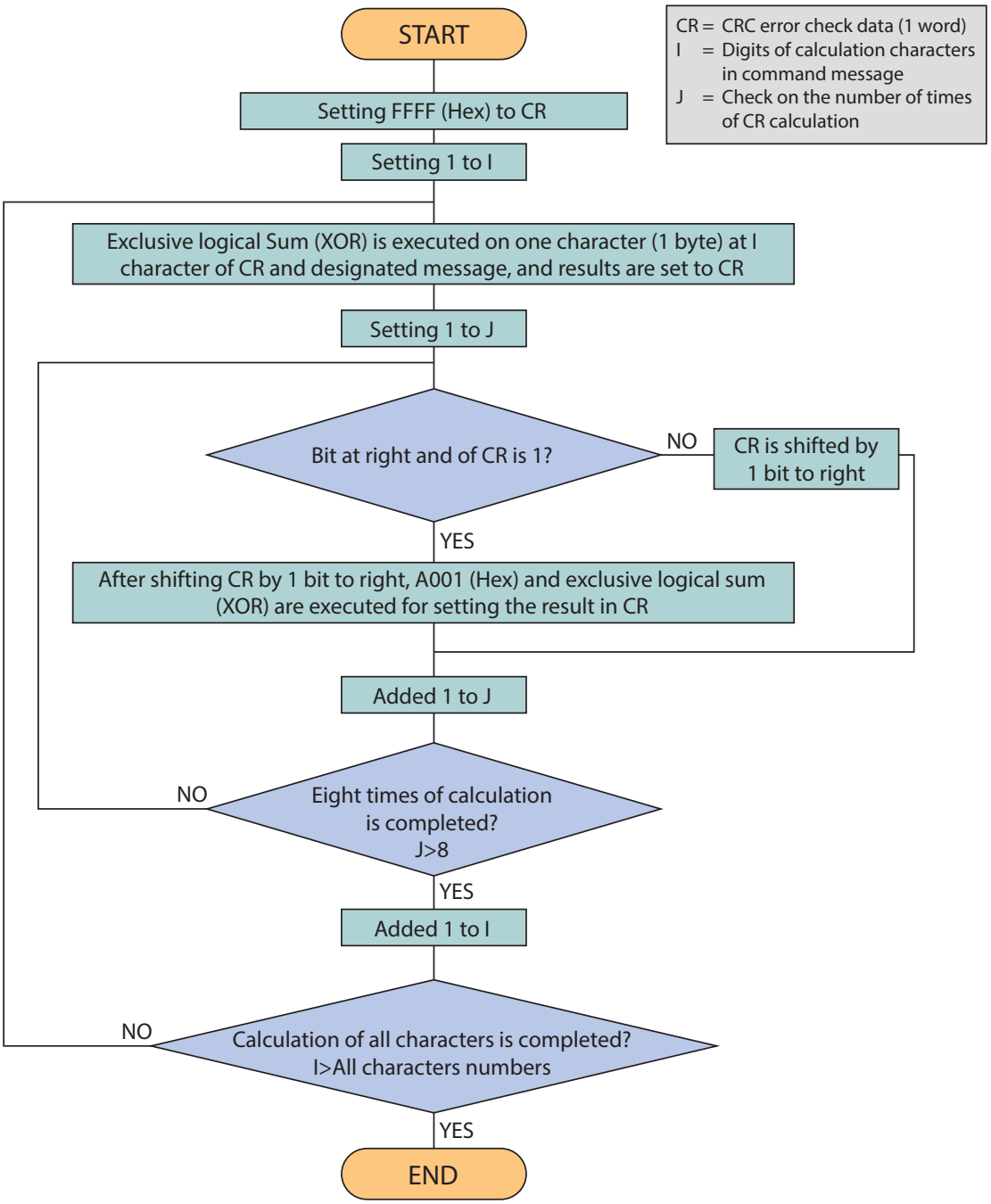
Most significant bit																Least significant bit
	Most significant Byte								Least significant Byte							

Reversed bit order:

Least significant bit																Most significant bit
	Least significant Byte								Most significant Byte							

N.B.: With the reversed bit order, also the CRC16 returns the with the reversed bit order

The following flowchart shows how to organize the CRC 16 bit.



1.7.1 C Language CRC 16 Example

```
static short CRC16 (unsigned char *p_first,unsigned char *p_last)
{
        unsigned int crc=0xffff;
        short j;
        for (;p_first<=p_last;p_first++)
        {
                crc ^= *p_first;
                for(j=8;j>0;j--)
                {
                if(crc & 0x0001)
                        {
                        crc = crc >> 1;
                        crc ^= 0xA001;
                        }
                 else
                        {
                        crc = crc >> 1;
                        }
                }
        }
  return (crc);
}
```

1.8 Read Holding Registers (function 03 /03Hex) - Read InputRegisters (function 04/04Hex)

This function reads the instantaneous values of a specified number of parameters from an address.
The message is composed by 8 Byte:

- one Byte is for the address
- one Byte for the function (03/04Hex)
- two Byte for the address of the first parameter to read
- two Byte for the total number of parameters to read (max **121**)
- two Byte for the CRC

Address Unit	Function	Address of the First Parameter		N° of read Parameter		CRC 16	
	3/4 3/4Hex	HI	LO	HI	LO	LO	HI

The answer is an echo of the first two Byte (address and function), one byte with the number of byte following (CRC excluded), the demanded values and finally two Byte for the CRC.

Address Unit	Function	N° of Byte	First Parameter Value			Last Parameter Value		CRC 16	
	3/4 3/4Hex	2 - 32	HI	LO		HI	LO	LO	HI

1.9 Preset Multiple Registers (function 16/10Hex)

This function could write maximum 25 parameters for each message.
The message is composed by:

- one Byte for the address
- one Byte for the function (10 Hex)
- two Byte for first parameter address to write
- two Bytes for the N° of parameters
- one Byte with the number of following Bytes
- values to write, two Byte for the CRC:

Address Unit	Function	Address of the First Parameter		N° of the parameter		N° of Byte	Value to Write		→
	16 10Hex	HI	LO	HI	LO	2	HI	LO	→

→	First Value to Write			Last Value to Write		CRC 16	
→	HI	LO		HI	LO	LO	HI

The answer is an echo of the first two Byte (address and function), two Byte for first written parameter, two Byte with the N° of parameters, fixed to 1 (0001 Hex), two Byte for the CRC.

Address Unit	Function	Address of the First Parameter		N° of the Parameter		CRC 16	
	16 10Hex	HI	LO	0	1	LO	HI

1.10 Preset single register (function 06/06Hex)

This function writes a single Modbus paramter.
The message is composed by 8 Bytes:

- one Byte for the address,
- one Byte for the function (6 Hex),
- two Bytes for the parameter address to write
- two bytes for the value to write
- two Bytes for the CRC

Address Unit	Function	Address of the First Parameter		Value to Write		CRC 16	
	6 6Hex	HI	LO	HI	LO	LO	HI

The normal response is a complete echo of the received message.

1.11 Error and exception responses

If a message contains an altered character, if fails the CRC, or if the received message contains a syntax error (for example the number of the byte or of the words is not correct), then the unit will ignore the message.

If the received message is correct but contains a not valid value, the unit will send an answer of exception (5 byte):

Address Unit	Function	Error Code	CRC 16	
			LO	HI

The byte with the function number, represent the function number of the message that has caused the error with the first Bit set to 1 (ex. the function 3 becomes 0x83) The error code could be one of the followings:

Error Code	Name	Cause
1	ILLEGAL FUNCTION	Function not supported
2	ILLEGAL DATA ADDRESS	Address out of range
4	FAILURE IN ASSOCIATED DEVICE	Too Many parameter request

1.12 Address Configuration

The thyristor unit is assigned a unique device address by the user in the range 1 (default) to 247 using the parameter P115 Addr in the Hardware menu. This address is used to recognise Modbus Queries intended for this instrument.
The thyristor unit does not respond to modbus queries that don't have the same assigned address.

1.13 Parameter List

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
1	0	65535				X	0	X	X	Change User Access Level Level 0: Par 1 = 0 Level 1: Par 1 = 1111 (dec) Level 2: Par 1 = 2222 (dec) Level 3: Par 1 = 3333 (dec)
2	0	1					1	X	X	Fieldbus write lock 0 = Fieldbus write enabled Par 14, 15 and 16 are updated every cycle from the fieldbus write area (see 2.6.2). Any value written to these parameters via RS485 is overwritten at the next cycle. 1 = Fieldbus write disabled Par 14, 15 and 16 can be written via RS485. But These values are not retained: when Par 2 is set back to 0, the fieldbus values are applied again.
3							0	X	X	Internal use
4							0	X	X	Internal use
5							0	X	X	Displays which bus module is populated
6						X	0	X	X	Used to specify if secondary port is used for WiFi, 2nd Modbus, bus or LOG
7	0	9999					-	X	X	Used for factory reset (wipes all EEPROM except serial number) of system or Wifi
8	0	65535				X	3	X	X	Used to save or restore default configuration
9	0	65535	0	655,35	Hz		0	X	X	Frequency of the power input
10	0	1023	0	1023	V		0	X	X	Average (RMS) voltage of all phases
11	0	1023	0,0	102,3	A		0	X	X	Average (RMS) current of all phases
12	0	1023	0	1023	%		0	X	X	Average (RMS) power output
13	0	1023	0	1023	Sw		0	X	X	**Status bitmask** Bit 0 ShortCut Alarm Bit 1 Heat Break Alam Bit 2 ON/OFF unit Bit 3 Thermal warning * Bit 4 Current Limit Alarm Bit 5 Thermal Alarm Bit 6 Communication Alarm (WD) Bit 7 Fuses alarm * Bit 8 Digital input 1 status Bit 9 Digital input 2 status Bit 10 Phase unbalanced Bit 11 Not used Bit 12 Fan * Bit 13 Line Loss / Phase Loss Bit 14 Bakeout in function Bit 15 Thermal Alarm Active

* Available only for REVO C Extended

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
14	0	255	0	1023	Sw	X	0	X	0	**Command bitmask** Bit 0 Not used Bit 1 Digital reference 0 = from analogue input 1 = from communication/keyb Bit 2 Unit enable 1= Enable 0= Disable Bit 3 0 = Normal Operation 1 = Alarm reset Bit 4 Current line switch 0 = from analogue input 1 = from communication/keyb Bit 5 Not used Bit 6 Save factory Bit 7 Load factory Bit 8 Not used Bit 9 Not used Bit 10 Not used Bit 11 Not used Bit 12 Not used Bit 13 Not used Bit 14 Not used Bit 15 Not used
15	0	1023	0,0	100,0	%	X	0	X	X	Remote set point for unit
16	0	255	0	100	%	X	0	X	X	Indicates the percentage by which the power demand set point is scaled
17	0	1023	0	100	%	X	0	X	No	Digital current limit value 0 = From analogue Input 1 = From communication/keyb
18	0	1023	0	1023	Sw	X	0	X	Only ZC BF	**Firing mode options** Zero cross 1 Single Cycle 2 Burst Firing 3 Phase Angle 4 Phase Angle + Soft Start 20 Half Cycle 10 Burst Cycle + Soft Start 19 Burst Firing + Delay Trigger 35 Burst Firing + Delay Trigger + Safety Ramp Peak 227 Burst Firing + Delay Trigger + Saftyramp 99 Half Cycle + Soft Start 74
19	0	1023	0	1023	Sw	X	0	X	X	**Control Mode (Feed-back)** VOLTAGE 32 VOLTAGE² 0 CURRENT 64 CURRENT² 2 POWER 128 NO_FEEDBACK 1
20	0	255	0	255	-	X	0	X		Number of cycles to fire in burst fire mode
21	0	255	0	255	-	X	0	X	No	Number of half cycles with a delay in burst fire mode

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
22	0	90	0	90	°	X	0	X	No	Degrees of delay from zero cross when the first cycle is triggered to on when in Delay Trigger Mode. (Delay for a transformer is 45 degrees)
23	0	255	0	255	x50ms	X	0	X	No	Number of 50 msec periods over which soft start is active
24	0	255	0	255	x50ms	X	0	X	No	Number of 50 msec periods that make up the fixed time base (Cycle time) calculation
25	0	1024	0	1024	HC	X	0	X	X	How many half cycles to use for soft start
26	0	255	0	255	-	X	1	X	X	Proportional term for the primary feedback loop
27	0	255	0	255	-	X	1	X	X	Integral term for the primary Feedback loop
28	0	255	0	255	x50ms	X	1	X	X	Number of 50 msec periods after the heater break is detected before the alarm is triggered
29	0	100	0	100	%	X	1	X	X	Threshold of resistance that activates the HB alarm as a percentage of the nominal load resistance
30	0	3	0	3	Sw	X	1	X	X	Baud rate for primary (RS485) Modbus port
31	0	255	0	255	Addr	X	1	X	X	Address for primary (RS485) Modbus port
32	0	5	0	5	Sw	X	1	X	No:4,7	Defines the function activated when: 0 = Enable thyristor 2 = Change to V feedback 3 = Change digital reference from AI/communication 4 = Force PA firing 5 = Select reference 1/2 6 = LOG: function enable 7 = Bakeout enable 8 = Fast enable thyristor Digital Input 1
33	0	5	0	5	Sw	X	1	X	No:4,7	Defines the funcion activated when: 0 = Enable thyristor 2 = Change to V feedback 3 = Change digital reference from AI/communication 4 = Force PA firing 5 = Select reference 1/2 6 = LOG: function enable 7 = Bakeout enable 8 = Fast enable thyristor Digital Input 2
34	0	65535	0	65535	Sw	X	1	X		Defines the function of the output relay Bit 0 HB alarm Bit 1 SC alarm Bit 2 I LIM Alarm Bit 3 \ Bit 4 Modbus Watchdog

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
35	0	1023	0	1023	Sw	X	1	x	X	Analogue Input Calibration 0 = Normal operation 1 = Store low analogue input value 2 = Store high analogue input value
36	0	65535	0	65535	Sw		-	X	X	Unit type (1PH, 2PH, 3PH) 7 = REVO C 1PH 8 = REVO C 2PH 9 = REVO C 3PH 10 = REVO C 3PH PA
37	0	1023	0	1023	V	X	0	X	X	Nominal value for the line voltage input.
38	0	9999	0	999,9	A	X	0	X	X	Nominal load Current.
39	0	9999	0	999,9	A		-	X	X	Current transformer amperage rating
40	0	1	0	1	-		-	X	X	Used for current retransmission gain
41	0	1023	0	1023	V		-	X	X	Unit rating (max voltage rating for the product ex: 480, 600, 690)
42	0	1023	0	1023	V		-	X	X	Used to calibrate the aux voltage
43	0	1023	0	1023	V		0	X	X	Aux voltage
44	0	3	0	3	Sw	X	1	X		Analog input 1 type 1 = 0-10 V 2 = 4-20 mA 3 = 0-20 mA
45	0	255	0	255	Sw	X	1	X	X	Baud rate, secondary Modbus port (if mounted) 0 = 9600 baud 1 = 19200 baud 2 = 38400 baud 3 = 115200 baud
46	0	65535	0	655,35	ohm		0	X	X	Indicates the resistance of the load. Based on a calculation of the Vrms load voltage divided by the Irms load current. (Average Irms in multi-phase unit)
47	0	65535	0	65535	V		0	X	X	Average (RMS) voltage input
48	0	65535	0	65535	-		0	X	X	Version number (X.XX.X)
49	0	65535	0	65535	-		0	X	X	Year and week of release (YYWW)
50										Not used
51										Not used
52	0	1	0	1		X	0	X	X	Selector for the current limit type 0 = RMS 1 = PEAK
53										Not Used
54	0	4096	0	4096	A		0	X	X	Measured RMS Current - phase 1
55	0	4096	0	4096	A		0	No	X	Measured RMS Current - phase 2
56	0	4096	0	4096	A		0	No	X	Measured RMS Current - phase 3

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
57	0	1023	0	1023	-		0	X	X	Internal use
58	0	1023	0	1023	-		0	X	X	Internal use
59	0	1023	0	1023	-		0	X	X	Internal use
60	0	1023	0	1023	Sw	X	1	X	X	Output value displayed when the Thyristor unit starts up 0 = I current 1 = V voltage 2 = P power
61	0	65535	0	65535	-	X	1	X	X	Selects which analogue input is used for the SP input 0 = Analogue Input 1 1 = Analogue Input 2
62	0	9999	0	9999	A		-	X	X	Thyristor unit Amperage Rating
63	0	255	0	255	-	X	1	X	No	Proportional term for the current limit loop
64	0	255	0	255	-	X	1	X	No	Integral term for the current limit loop
65	0	65535			x50mS	X	0	X	No	Once the output turns off, how much time must pass before safety ramp will be re-enabled
66	0	65535			x50mS	X	0	X	No	Time for the safety rmap
67	1	9999	0	99.99			-	X	X	Current transformer gain correction
68	0	1024	0	1024		X	1	X	X	Selects the parameter to retransmit 0 = No value 10 = Load Voltage 11 = Load Current 12 = Load Power 15 = Input Signal
69	0	1024	0	1024		X	1	X	X	Retransmission type 0 = 4-20 mA 1 = 0-10 V 2 = 0-20 mA
70	0	255	0	255	s	X	1	X	X	Data logging period
71	0	255	0	255		X	2	X	X	IP Address for Hilscher module
72	0	255	0	255		X	2	X	X	
73	0	255	0	255		X	2	X	X	
74	0	255	0	255		X	2	X	X	
75	0	255	0	255		X	2	X	X	Mask for the Hilscher module
76	0	255	0	255		X	2	X	X	
77	0	255	0	255		X	2	X	X	
78	0	255	0	255		X	2	X	X	
79	0	255	0	255		X	2	X	X	Gateway for the Hilscher module
80	0	255	0	255		X	2	X	X	
81	0	255	0	255		X	2	X	X	
82	0	255	0	255		X	2	X	X	

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
83	0	65535	0	65535		X	1	X	X	WiFi Machine Name (2 characters each, 16 characters total) PROFINET NAME: 120 WORDS IN EXTERNAL ADDRESS MAP (from address 300 to 420)
84	0	65535	0	65535		X	1	X	X	
85	0	65535	0	65535		X	1	X	X	
86	0	65535	0	65535		X	1	X	X	
87	0	65535	0	65535		X	1	X	X	
88	0	65535	0	65535		X	1	X	X	
89	0	65535	0	65535		X	1	X	X	
90	0	65535	0	65535		X	1	X	X	
91	0	65535	0	65535		X	0	X	X	DAY_MONTH High byte -> DAY Low byte -> MONTH
92	0	65535	0	65535		X	0	X	X	YEAR_HOUR High byte -> YEAR Low byte -> HOUR
93	0	65535	0	65535		X	0	X	X	MIN_SEC High byte -> MIN Low byte -> SEC
94	0	255					0	X	X	IP Address for WiFi module
95	0	255					0	X	X	
96	0	255					0	X	X	
97	0	255					0	X	X	
98	0	9995	0	9995	ms	X	2	No	X	Delay for zero cross of phase 1
99	0	9995	0	9995	ms	X	2	No	X	Delay for zero cross of phase 2
100	0	9995	0	9995	ms	X	2	No	X	Delay for zero cross of phase 3
101	0	1	0	1	Sw	X	1	X	No	Enable the current limit 0 = off 1 = on
102	0	1000	0	1000	ratio		0	X	X	Power Factor of the output power
103	0	1000	0	1000	ratio		0	No	X	Bus module version
104										Not used
105	0	3	0	3		X	1	X	X	Process signal type for analogue input 2 1 = 4-20 mA 2 = 0-10 V 3 = 0-20 mA
106	0	4096	0	4096			-	X	X	stored calibration value (internal use)
107	0	4096	0	4096			-	X	X	
108	0	4096	0	4096			-	X	X	
109	0	4096	0	4096			-	X	X	
110	0	4096	0	4096			-	X	X	
111	0	4096	0	4096			-	X	X	
112	0	4096	0	4096			-	X	X	
113	0	4096	0	4096			-	X	X	
114	0	4096	0	4096			-	X	X	
115	0	4096	0	4096			-	X	X	

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
116	0	2	0	2	Sw	X	1	X	No	Function associated with AN2 0 = Current Limit 1 = Feed-back 2 = External input
117	0	9999	0	9999			-	X	X	Gain for power set point
118	0	9999	0	9999			-	X	X	Gain for measured power rtx (VxI)
119	0	2			Sw		-	X	X	Not used
120	0	1			Sw		2	X	X	Enable the Bluetooth 0 = off 1 = on
121	0	65535					0	X	X	Thyristor unit type (=7)
122	0	1024				X	1	X	X	If PROFIBUS is mounted, this is the external address that is used to communicate over PROFIBUS
123	0	65535		<500A 655.35 -- ≥500A 6553.5	kW		0	X	X	Real time power consumption calculation
124	0	65535				X	1	X	X	Retransmission gain
125					kW/h			X	X	Par125=L (low) / Par126=H (High) KWh=[Par125 + (Par126 x 65536)]/10
126										
127	0	1200	0	120	°C			X	X	Temperature of the Heatsink (SCR) if NTC, you will see the value Available on sizes from 60A to 800A
128	0	1200	0	120	°C	X	3	X	X	SCR Temp. alarm set (setting to 0 disables this alarm)
129	0	4096	0	4096			-	X	X	Calibration value for AI1
130	0	4096	0	4096			-	X	X	
131	0	65535		<500A 655.35 -- ≥500A 6553.5	kVA		-	X	X	Real Time power consumption calculation (read only, can set to 0 to reset total count)
132	0	65535					-	X	X	Not used
133	0	65535					-	X	X	Not used
134	0	9999	0	9999			-	X	X	Gain for voltage rtx
135	0	9999	0	9999			-	X	X	Gain for current rtx
136										Not used
137	0	1000	0	100,0			0	X	X	Current value of analog input 2 in percent
138	0	1000	0	100,0			0	X	X	Current value of analog input 1 in percent

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
139	0	1				X	0	X	X	Start or stop data logging (0 = off / 1 = on)
140	0	1					0	X	No	Enable bakeout function (0 = off / 1 = MoSi / 2= SiC)
141	0	65535					-	X	X	Used to select CDA protocol for Data log file transfer, Live mode (bit0 - Live Mode / bit1 - file upload mode)
142	0	1				X	1	X	X	Enable to Modbus watchdog
143	0	255			s	X	1		X	Watch dog alarm time
144	0	9999			min	X	1	X	No	Bakeout total ramp time
145	0	9999			A	X	1	X	No	Bakeout current limit
146	0	9999			min	X	1	X	No	Time to wait while off before bakeout is needed again
147	0	1024					0	X	X	Scaled AN1 value (0-1024)
148	0	1024					0	X	X	Scaled AN2 value (0-1024)
149	0	9999					-	X	X	Serial Number
150	0	9999					-	X	X	
151	0	9999					-	X	X	
152	0	9999					-	X	X	
153	0	1000					0	X	X	Internal use
154										Not used
155										Not used
156										Not used
157										Not used
158	0	65535					0	X	X	CRC used for WiFi communication
159	0	65535					0	X	X	16 bit CRC of Modbus map

2 Fieldbus

The Revo C is available in these fieldbus types:

- MODBUS/TCP
- PROFINET
- PROFIBUS DP
- EtherCAT

NOTE: In order change the write parameters (see page 35) from Configuration Software (USB port) or from RS485 Modbus-RTU port, write from fieldbus must be disabled. If the connection is terminated/compromised, these parameters will be continuously set to 0 until parameter 2 is disabled or the connection is re-established and the parameters are set.
To disable write from bus use parameter 2
Parameter 2:

Par	Min	Max	Min UM	Max UM	UM	Write Enable	Access Level	1PH	2/3PH	Description
2	0	1					1	X	X	Used to temporarily disable Field Communications 0: Enabled 1: Disabled

2.1 MODBUS/TCP

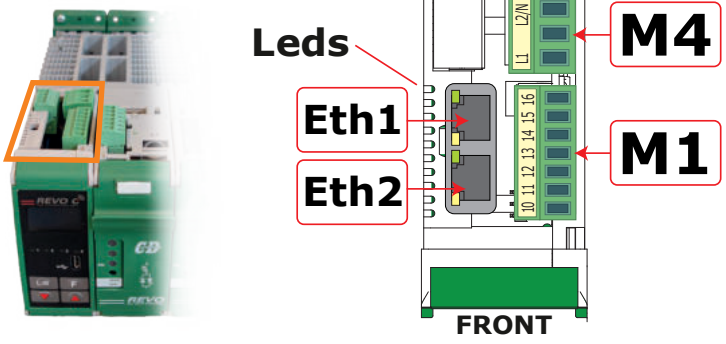
2.1.1 General description

The thyristor unit permit a data exchange via Modbus/TCP to an external device (HMI or PLC).

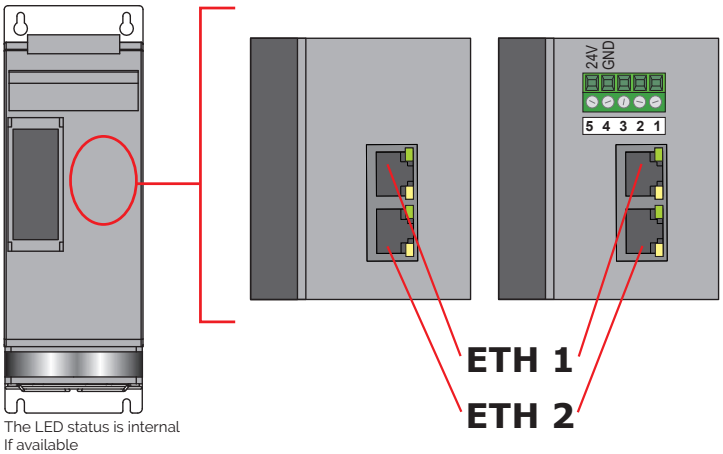
2.1.2 Modbus/TCP Connection

2.1.2.1 Communication Terminals 30-40A (SR9-SR10-SR11)

Ethernet Configuration Connectors

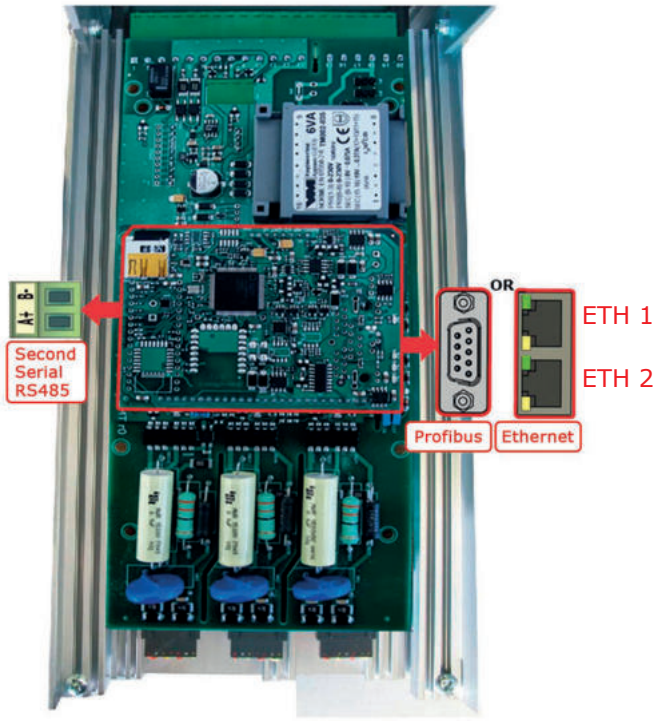


2.1.2.2 Communication Terminals 60-210A (from SR12 to SR17)



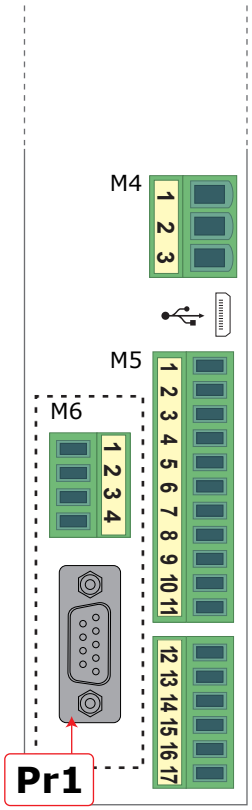
The LED status is internal
If available

2.1.2.3 Communication Terminals 300-800A (from S12 to S17)

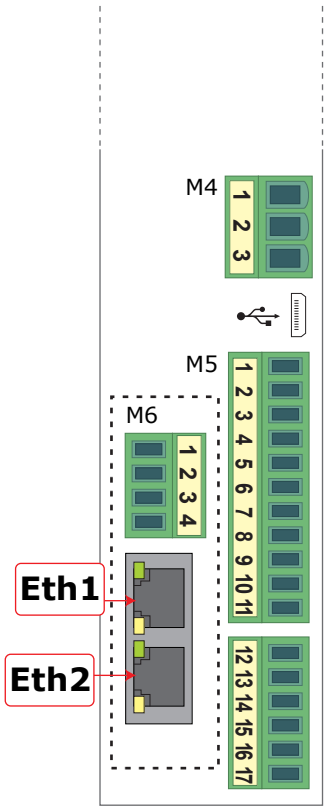


2.1.2.4 Communication Terminals 1100-2100A (from SR18 to SR23)

Profibus configuration connectors



Ethernet configuration connectors



2.1.3 Modbus/TCP Protocol

The communication is based on the standard industrial Modbus/TCP with the following restrictions:
The following Modbus functions are supported:

Function	Description
03	Holding register
04	Read Input Registers
06	Preset Single Registers
16	Preset Multiple Registers

2.1.4 PLC/Device Configuration

The device to connect to the unit need to set the correct IP address, the port and the unit ID
Default values are:
IP: 192.168.0.221
S.M.: 255.255.255.0
Gateway: 192.168.100.101

2.1.5 Instrument IP Setting

On Software configuration is not possible set IP address, but only see the value.
Is possible to set it via web page or via application software

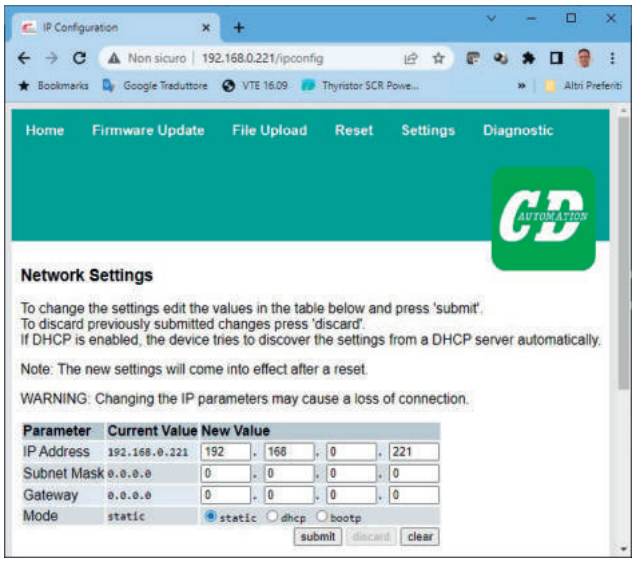
2.1.5.1 Set IP Andress via web page

Open a browser and set on URL the actual IP address (Ex: http://192.168.0.221)

Click on settings and when credentials are required, set:

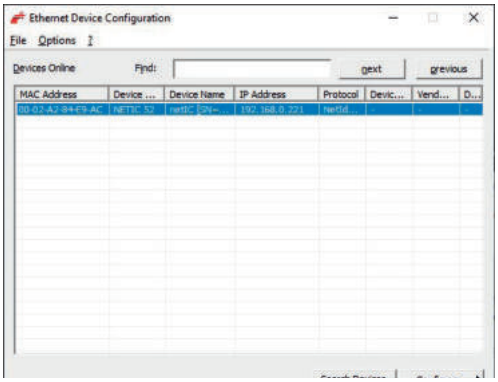
Modbus/TCP	
User:	ute1
Password:	ute1_

Will appear a page with IP address, Subnet Mask, Gateway and Mode, set the configuration required and click on "submit" button to confirm.

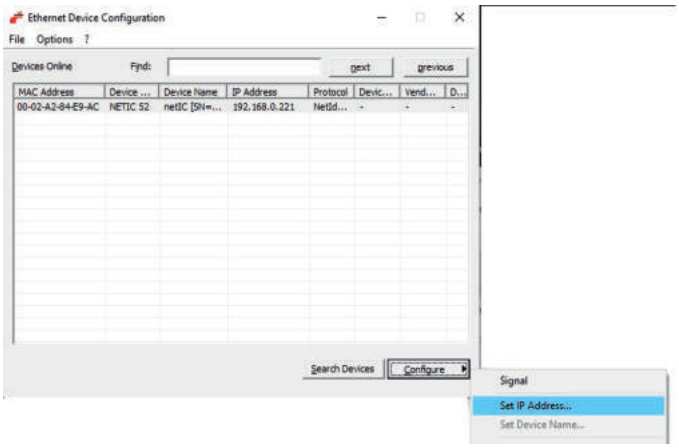


2.1.5.2 set IP address desktop application

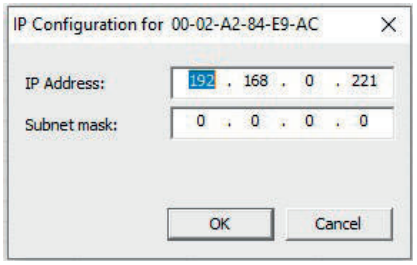
With a search tool on Ethernet (https://www.cdautomation.com/download/cd-automation/software/fieldbus/EthernetDeviceConfiguration_V1.0900.1.8378-Setup.msi)
It's possible to search the units connected to the network, read the MAC address and set the correct IP address.



To set the IP address select the device with mouse left button then click on "Configure" button.
Click on "Set IP address".



Write the right IP and Snubnet Mask and click OK to confirm.



2.2 PROFINET

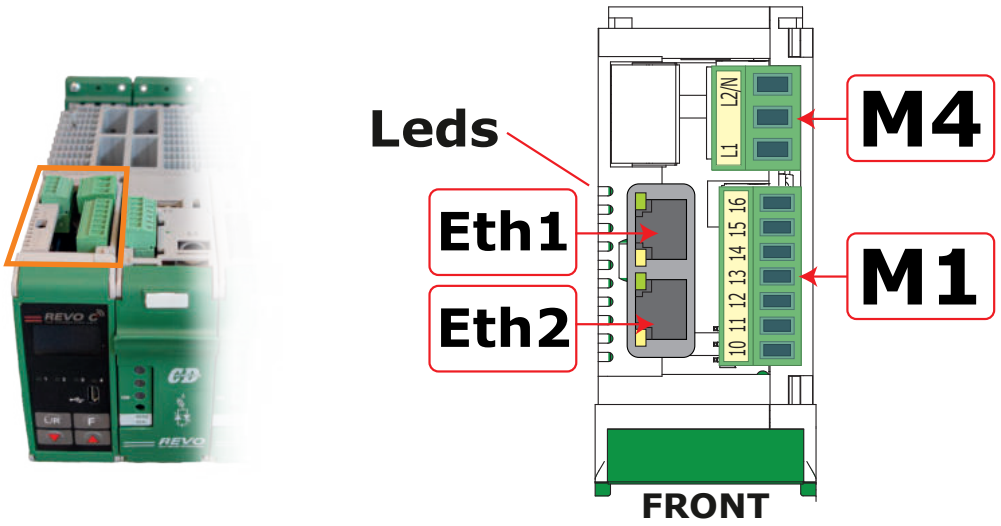
2.2.1 General description

The thyristor unit permit a data exchange via PROFINET-IO Siemens protocol.

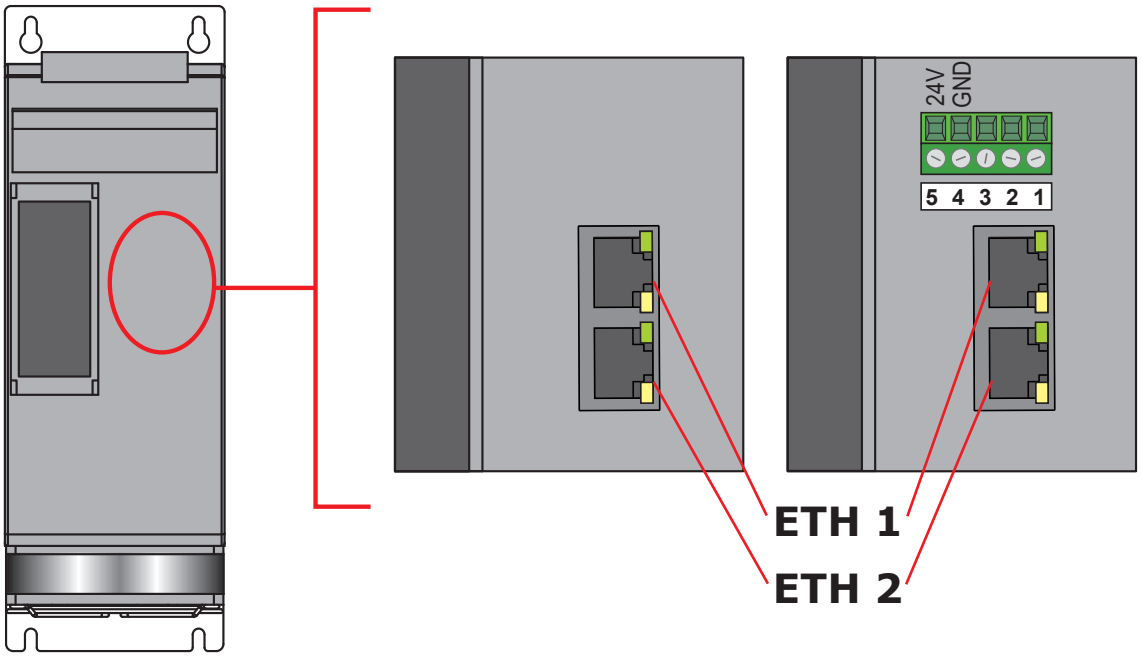
2.2.2 PROFINET Connection

2.2.2.1 Communication Terminals 30-40A (SR9-SR10-SR11)

Ethernet Configuration Connectors

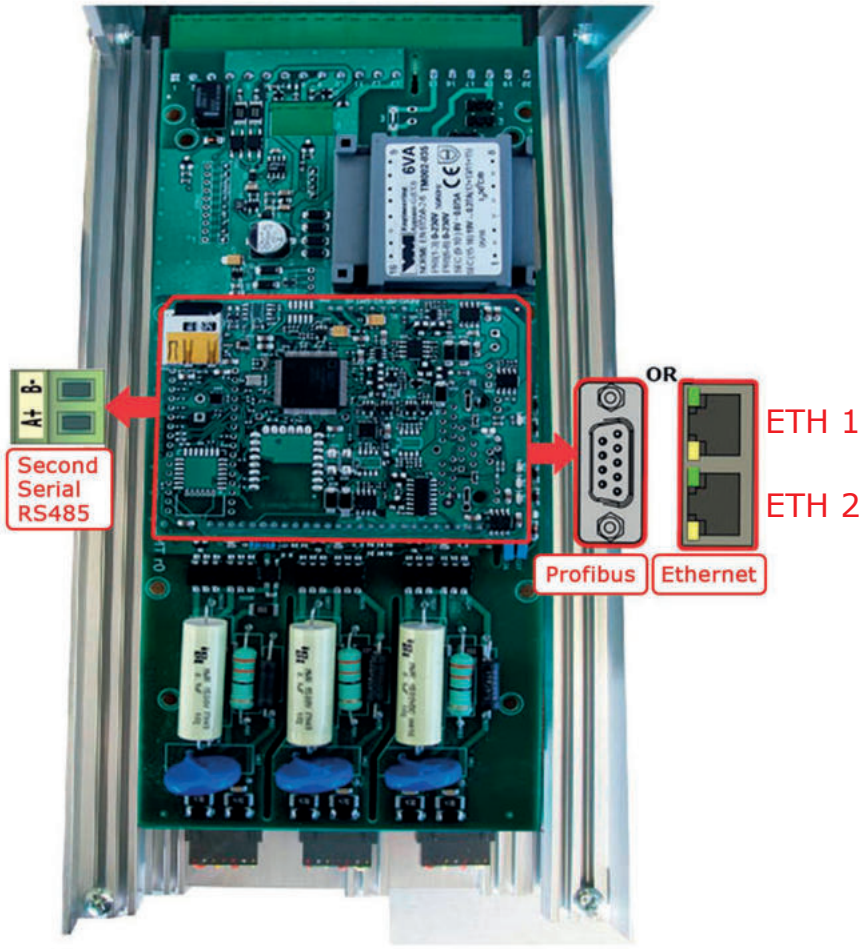


2.2.2.2 Communication Terminals 60-210A (from SR12 to SR17)



The LED status is internal
If available

2.2.2.3 Communication Terminals 300-800A (from S12 to S17)

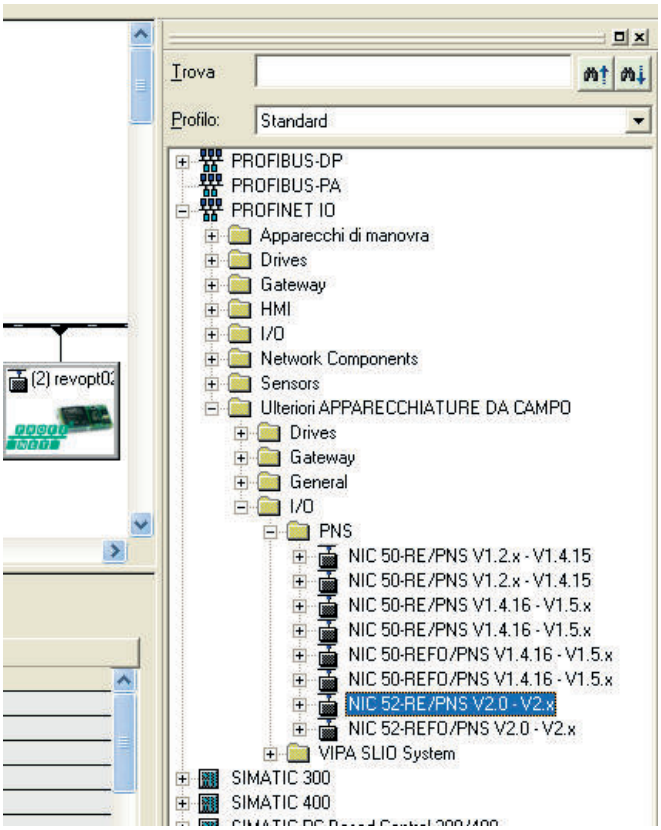


2.2.3 PLC Configuration

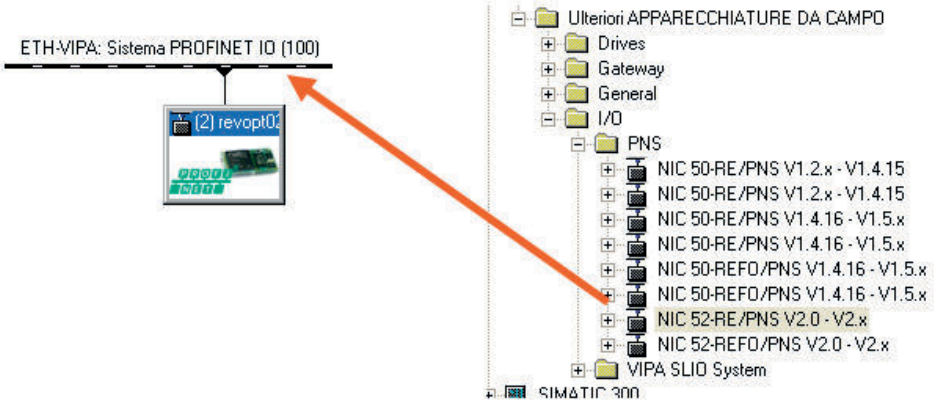
With PROFINET connection it's possible to read value in cyclic mode.
To do it you need to use the GSDML plc configuration file that describe the product, and install in PLC configuration software environment.
(GSDML-V2.32-HILSCHER-NIC 5X-RE PNS-20161102.xml)

If GSDML file is not installed, please install it

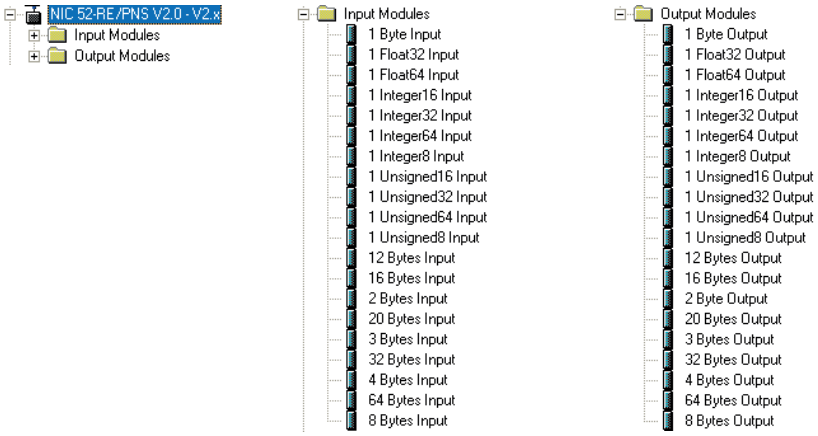
If installed or after installation will be present (NIC 52-RE/PNS V2.0-V2.x)



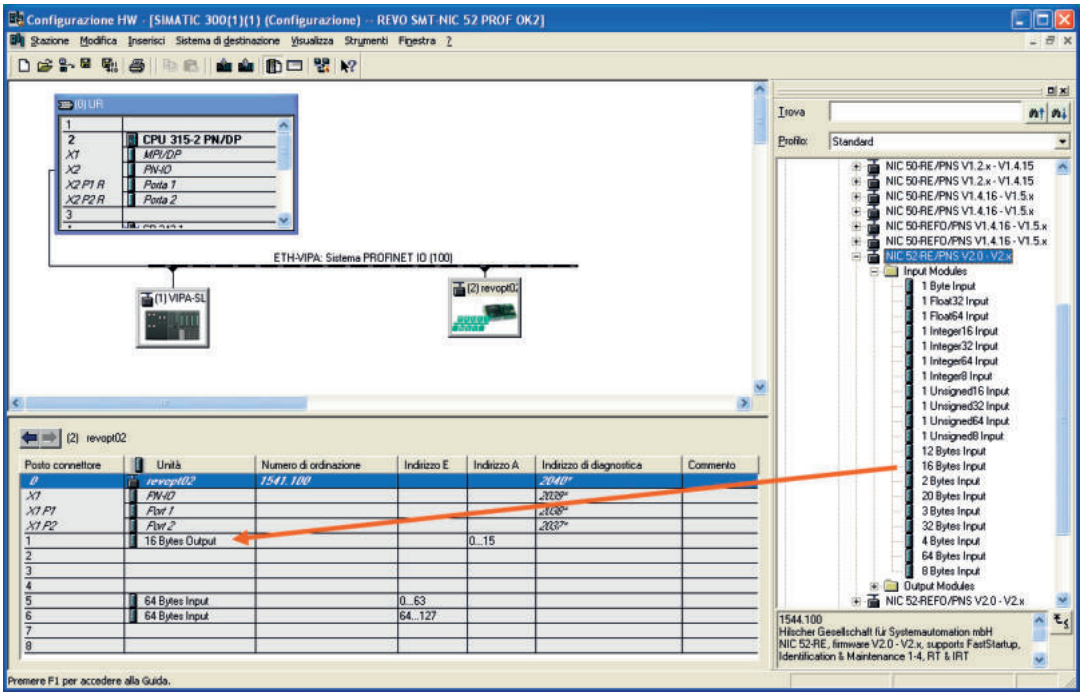
So it's possible to drag and drop it on the network



Then expand Input and output



And set Input and output with drag and drop



NOTE:

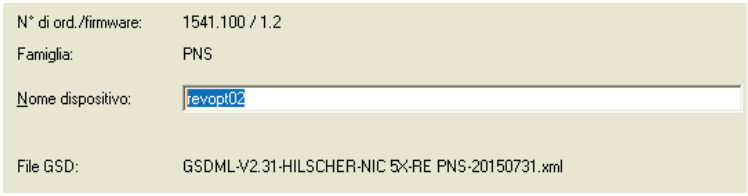
The modules must have the right sequence

The data module position and size are important, the positions are:

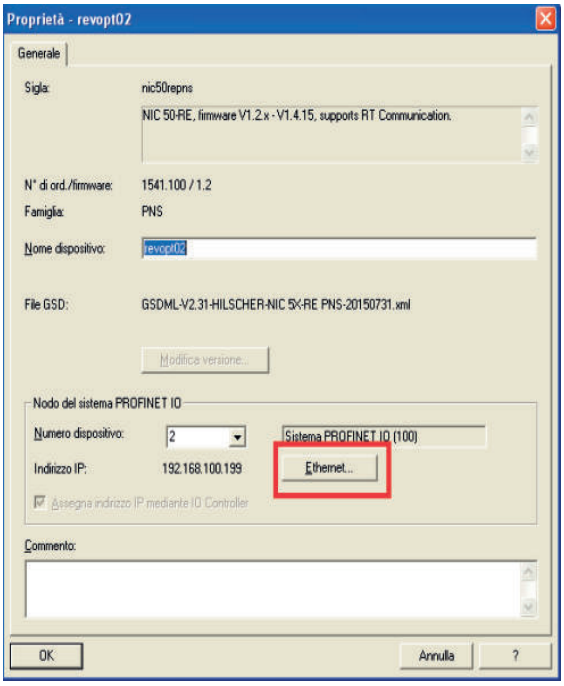
- Position 1: 16 Bytes Output
- Position 2: none
- Position 3: none
- Position 4: none
- Position 5: 64 Bytes Input
- Position 6: 64 Bytes Input
- Position 7: none
- Position 8: none

Set the configuration IP address and Name it with double-click on it

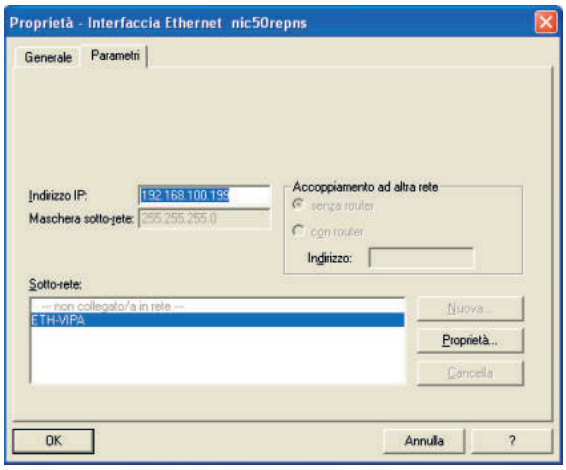
Fill the Device Name



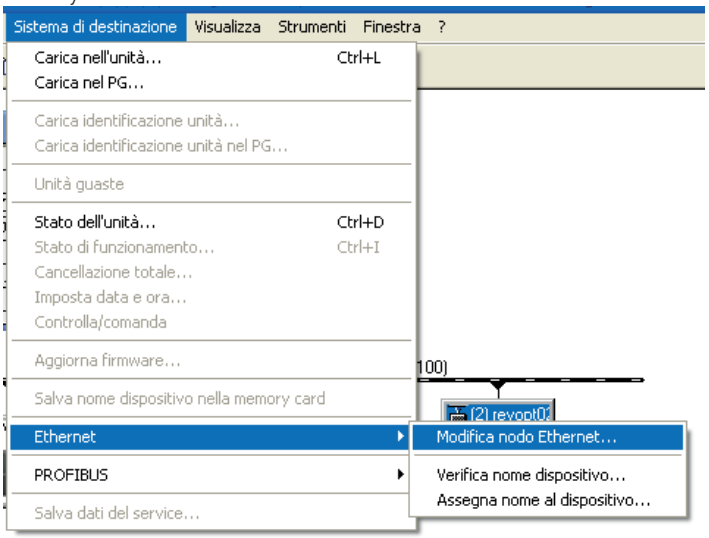
Click on Ethernet



Set the IP address



Then save and send the configuration to the PLC
Finally set the Name to the THYRISTOR unit with Siemens tools



2.3 PROFIBUS

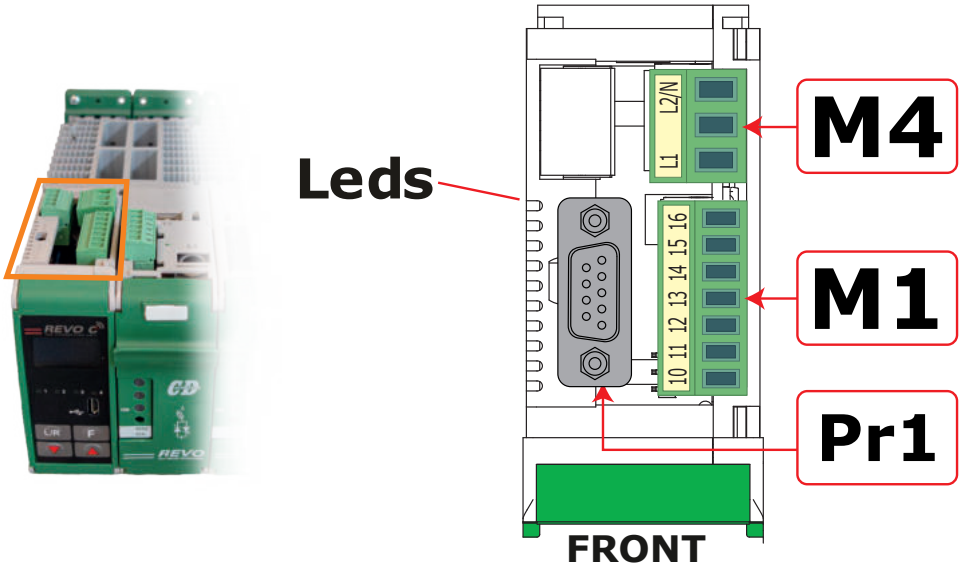
2.3.1 General description

The thyristor unit permit a data exchange via PROFIBUS-DP Siemens protocol.

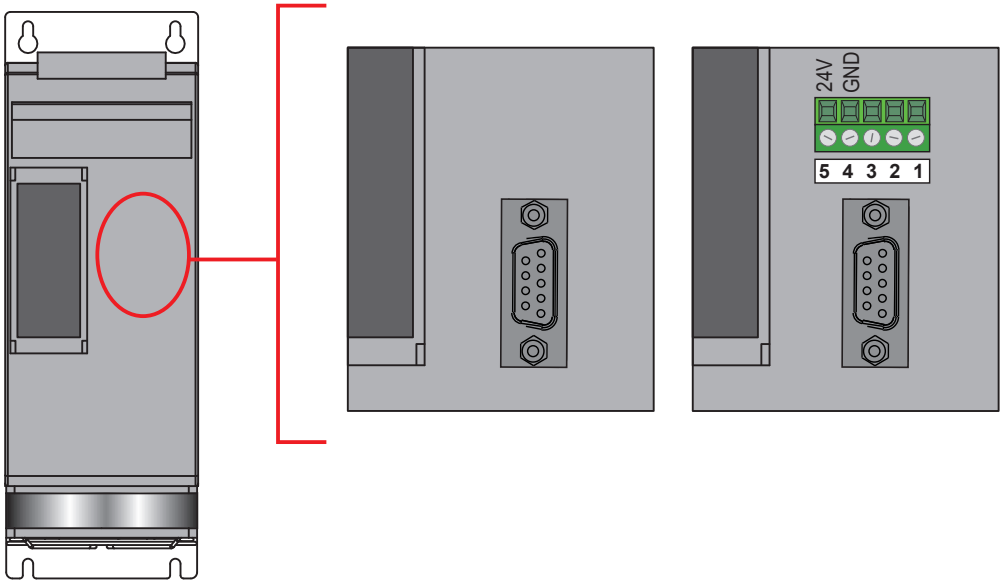
2.3.2 PROFIBUS Connection

2.3.2.1 Communication Terminals 30-40A (SR9-SR10-SR11)

Ethernet Configuration Connectors

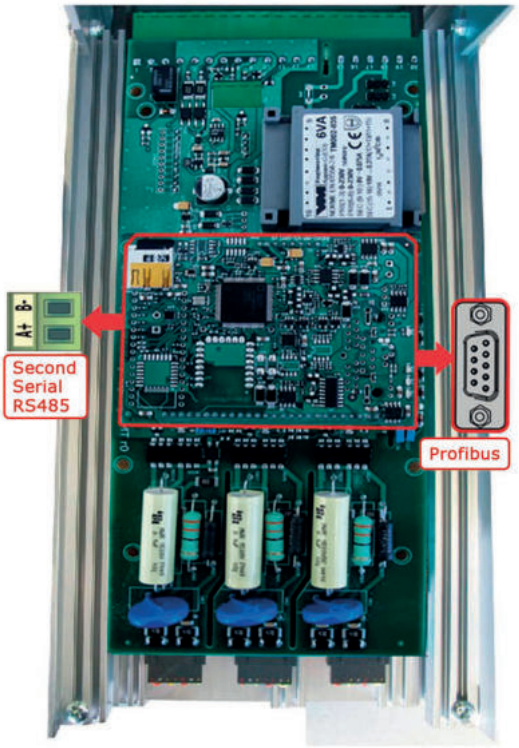


2.3.2.2 Communication Terminals 60-210A (from SR12 to SR17)



The LED status is internal

2.3.2.3 Communication Terminals 300-800A (from S12 to S17)

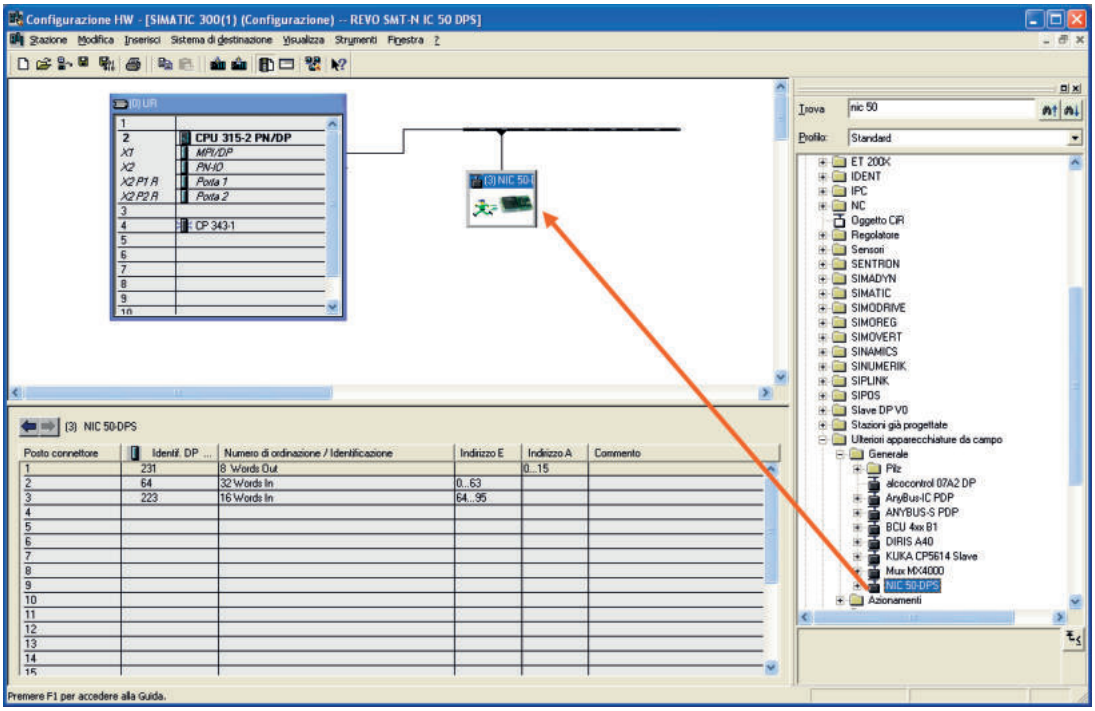


2.3.3 PLC Configuration

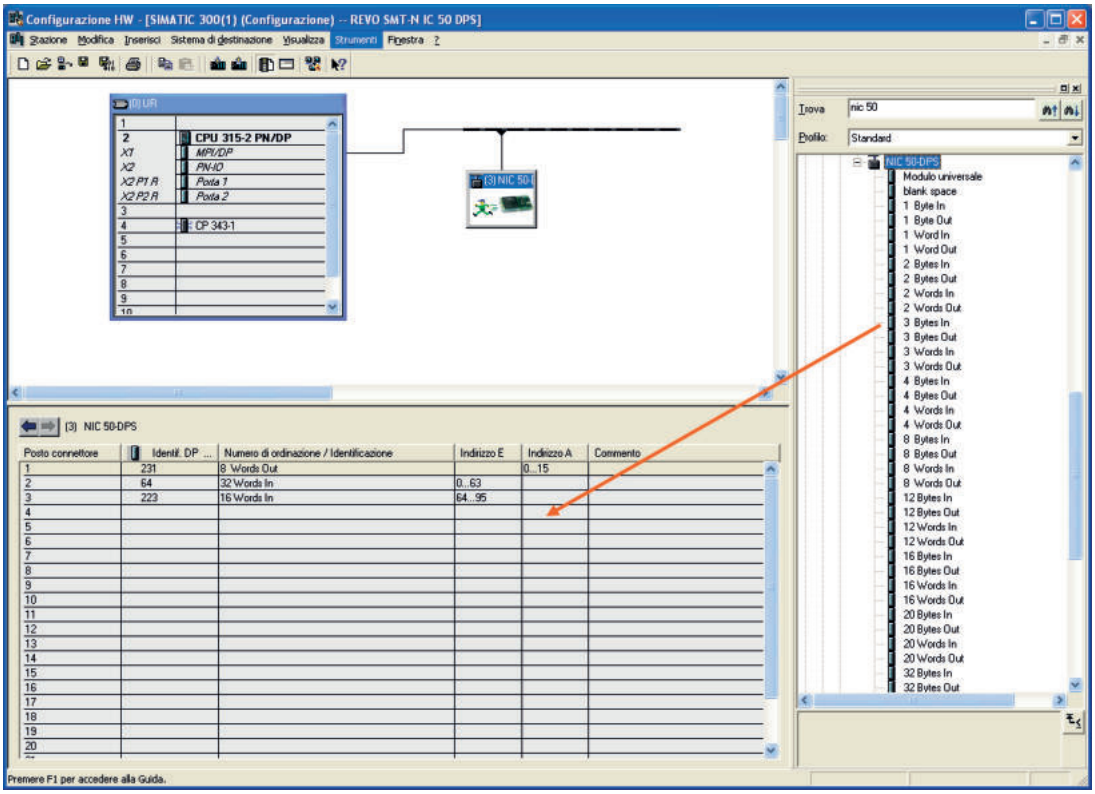
With PROFIBUS connection it's possible to read value in cyclic mode.
To do it you need to use the GSD plc configuration file that describe the product, and install in PLC configuration software environment.

If GSD file is not installed, please install it

If installed or after installation will be present (NIC 50-DPS)



And set Input and output with drag and drop



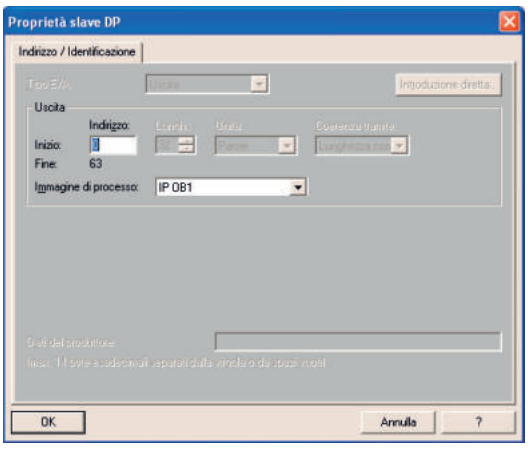
NOTE:
The module must have the right sequence

(3) NIC 50-DPS

Posto connettore	Identif. DP ...	Numero di ordinazione / Identificazione	Indirizzo E	Indirizzo A	Comm
1	231	8 Words Out		0...15	
2	64	32 Words In	0...63		
3	223	16 Words In	64...95		
4					

The position is important, and:
- Position 1 must be 8 Word OUT
- Position 2 must be 32 Word IN
- Position 3 must be 16 Word IN

Then it's possible to assign the start address with a double click on it



2.4 ETHERNET/IP

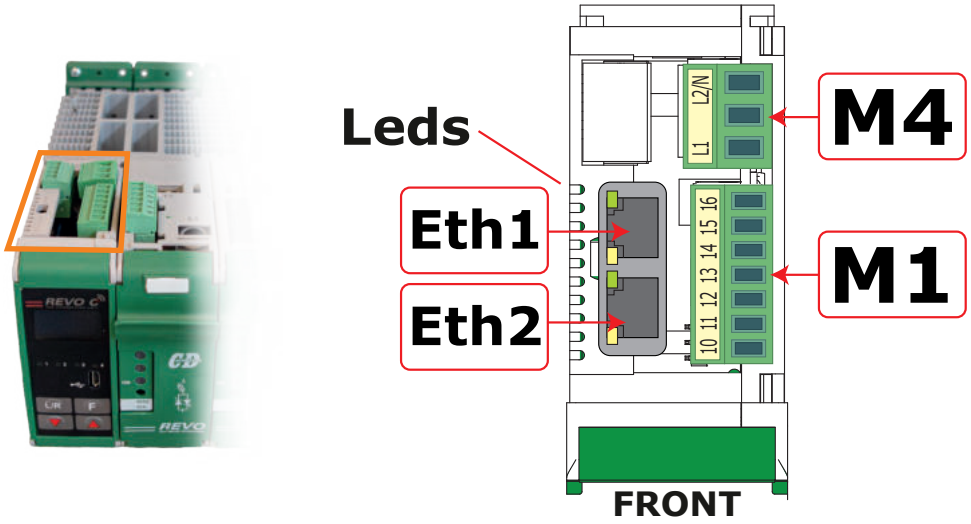
2.4.1 General description

The thyristor unit permit a data exchange via ETHERNET/IP protocol.

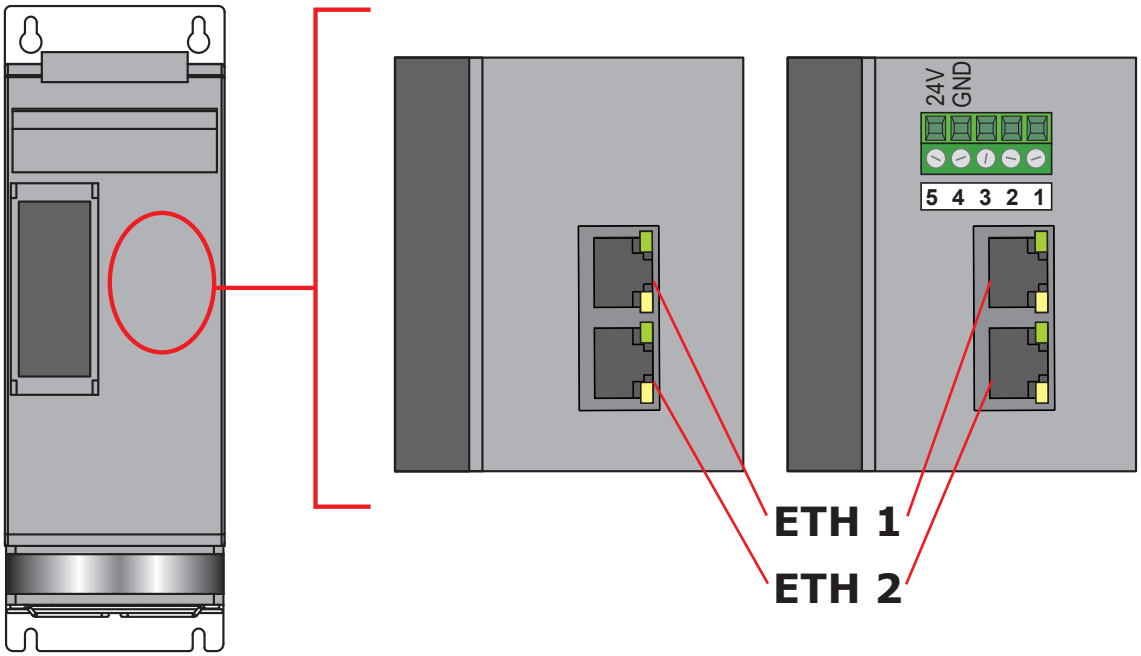
2.4.2 ETHERNET/IP Connection

2.4.2.1 Communication Terminals 30-40A (SR9-SR10-SR11)

Ethernet Configuration Connectors

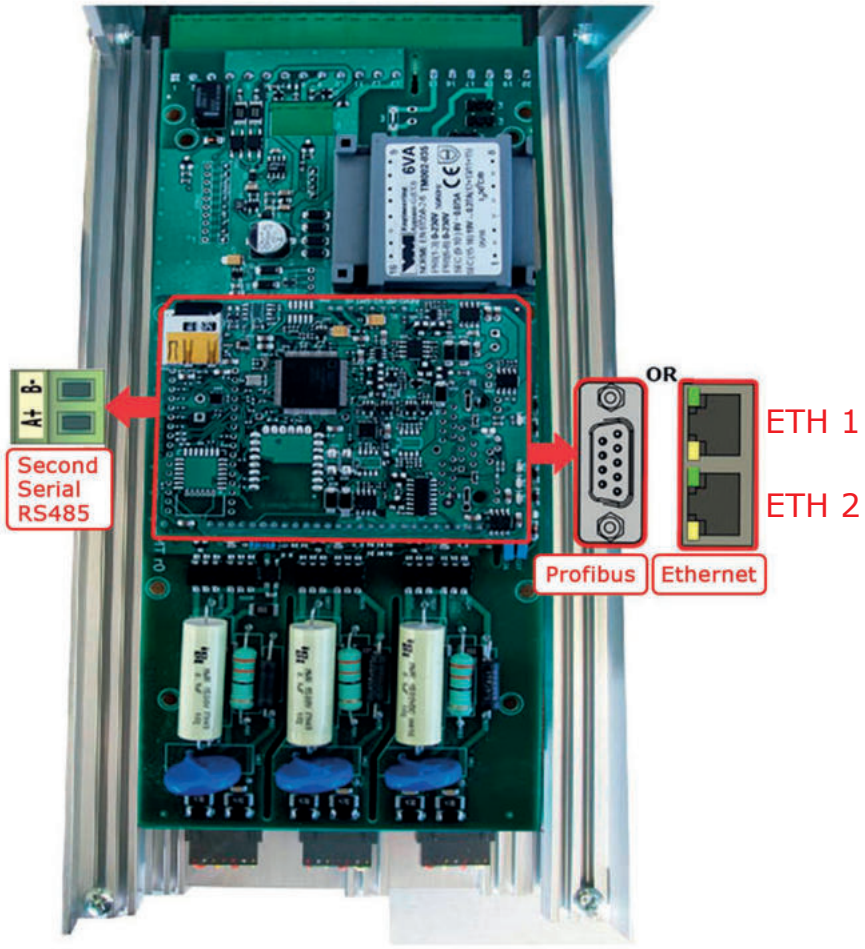


2.4.2.2 Communication Terminals 60-210A (from SR12 to SR17)



The LED status is internal
If available

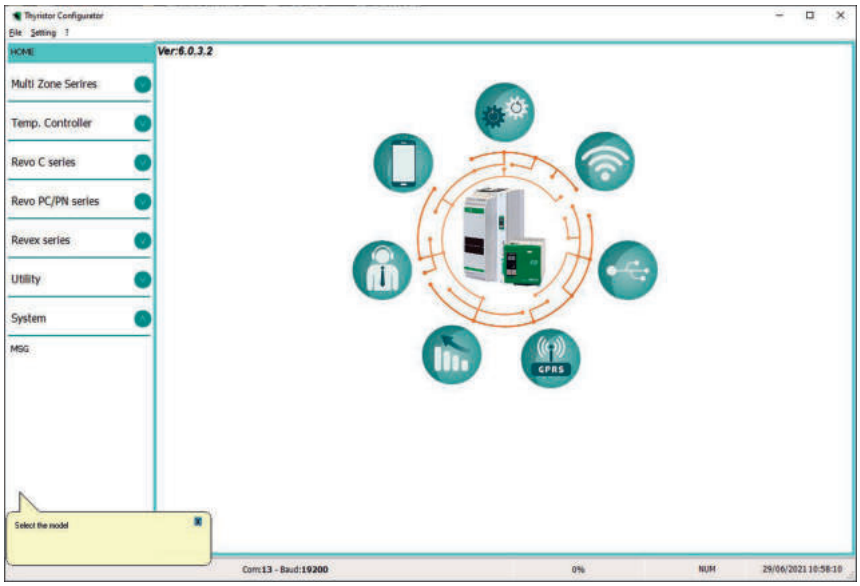
2.4.2.3 Communication Terminals 300-800A (from S12 to S17)



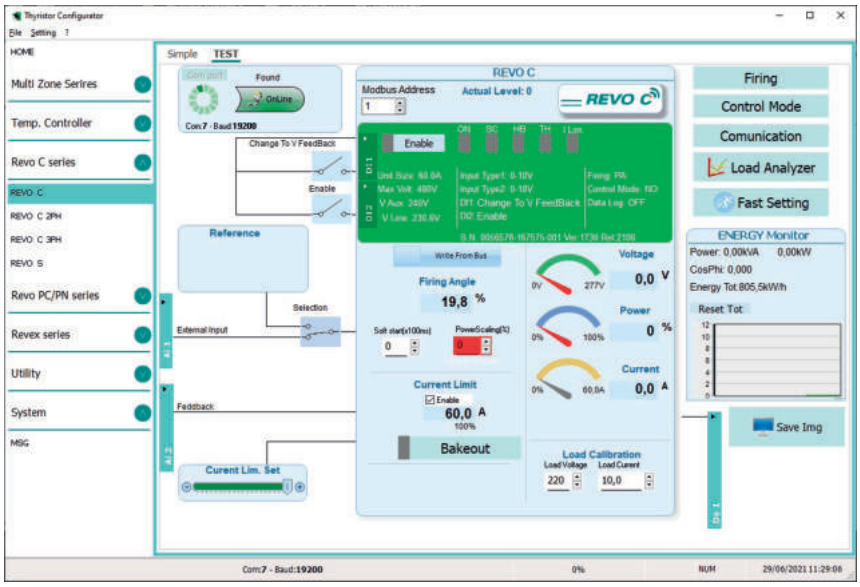
2.4.3 IP Address Configuration

To set the IP address of Revo C, follow this steps:

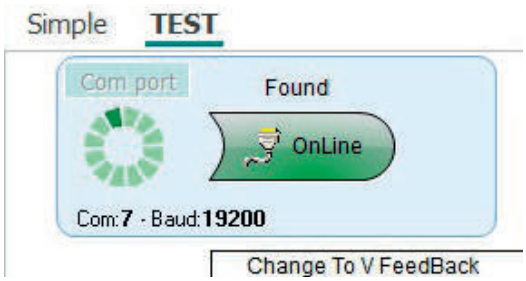
1. Start Thyristor configurator



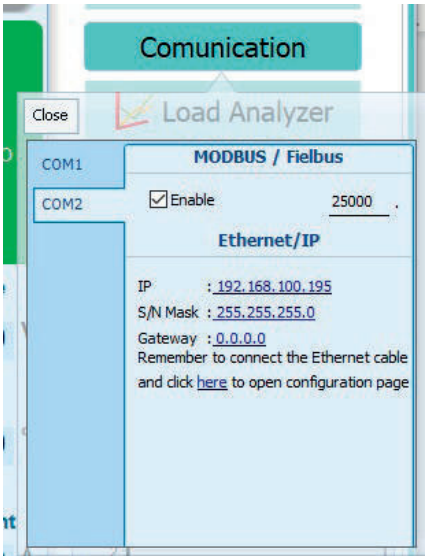
2. Enter in Revo C ⟶ Test page



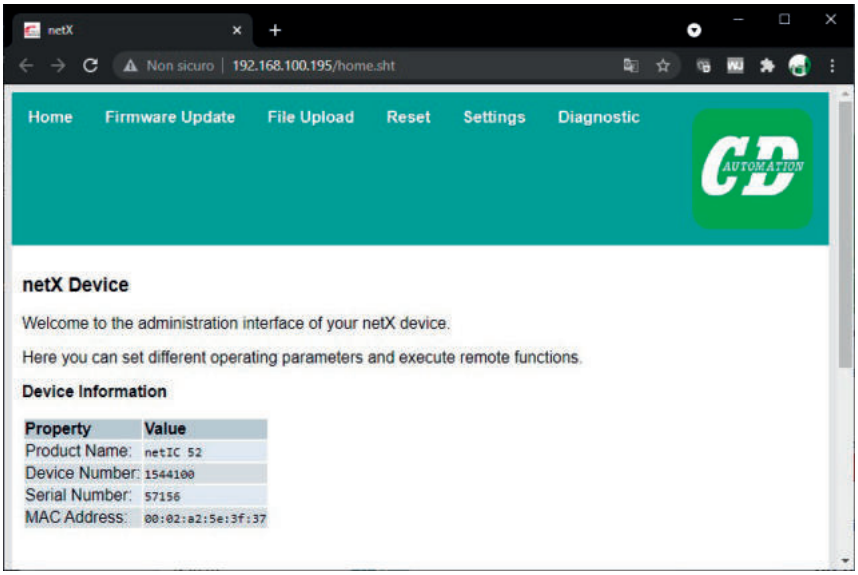
3. Click on “OnLine” button



4. Click on "Communication" button ⟶ "Com2" label
   Default IP Address: 192.168.100.195
   Note: *the IP class of Ethernet port must be* ***192.168.100.xxx***

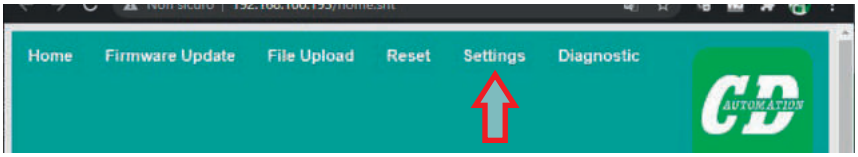


5. Click on IP address label and will appear a internet page

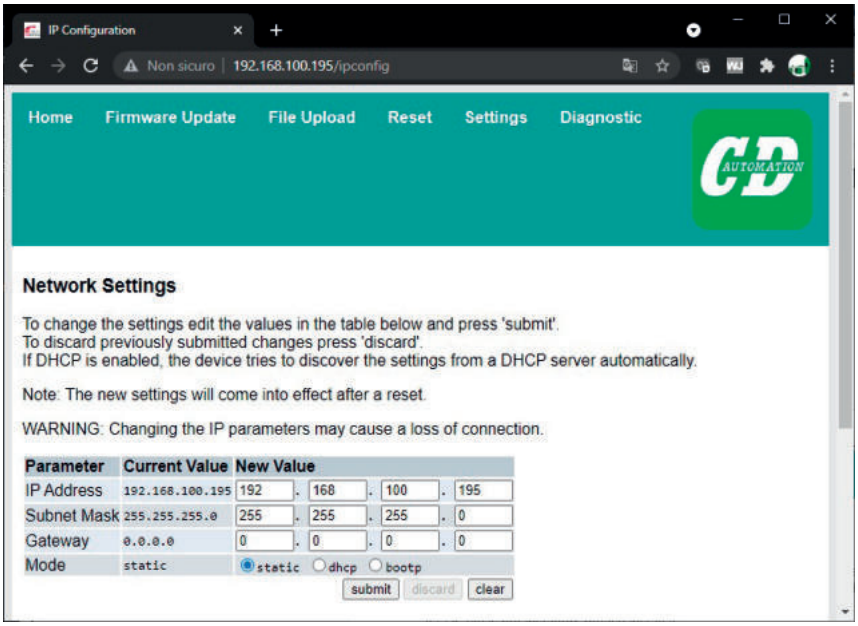


6. Click on Settings and set User and Password

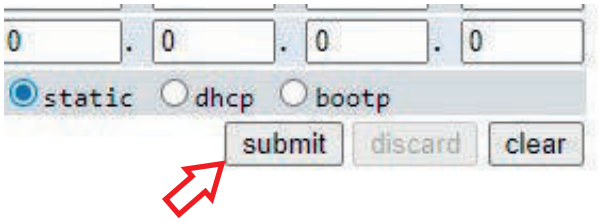
Ethernet IP	
User:	ute
Password:	ute1



7. Set the right IP address



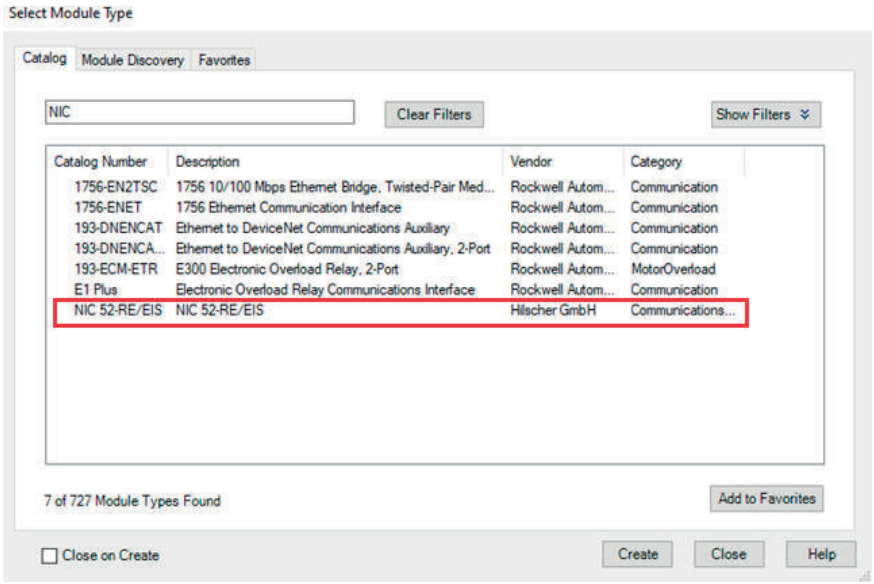
8. Click “submit” button to save



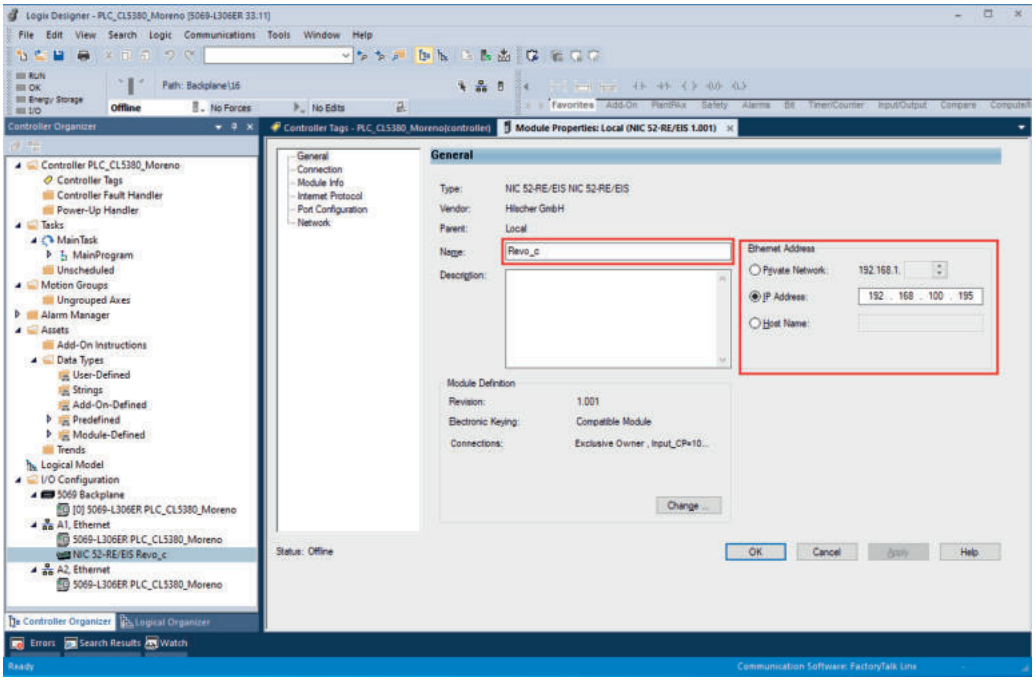
9. Switch-off and switch-on the unit with USB cable disconnected

2.4.4 PLC Configuration

With an Ethernet / IP connection, the value can be read cyclically.
To do this, you need to use the EDS plc configuration file that describes the product, install it in the PLC configuration software environment.
If the EDS file is not installed, please install it
If it's already installed, or after the installation, it will be present "NIC 52-RE / EIS"



Set the Name and the network IP Numbers



Click on “Change” button, and set:

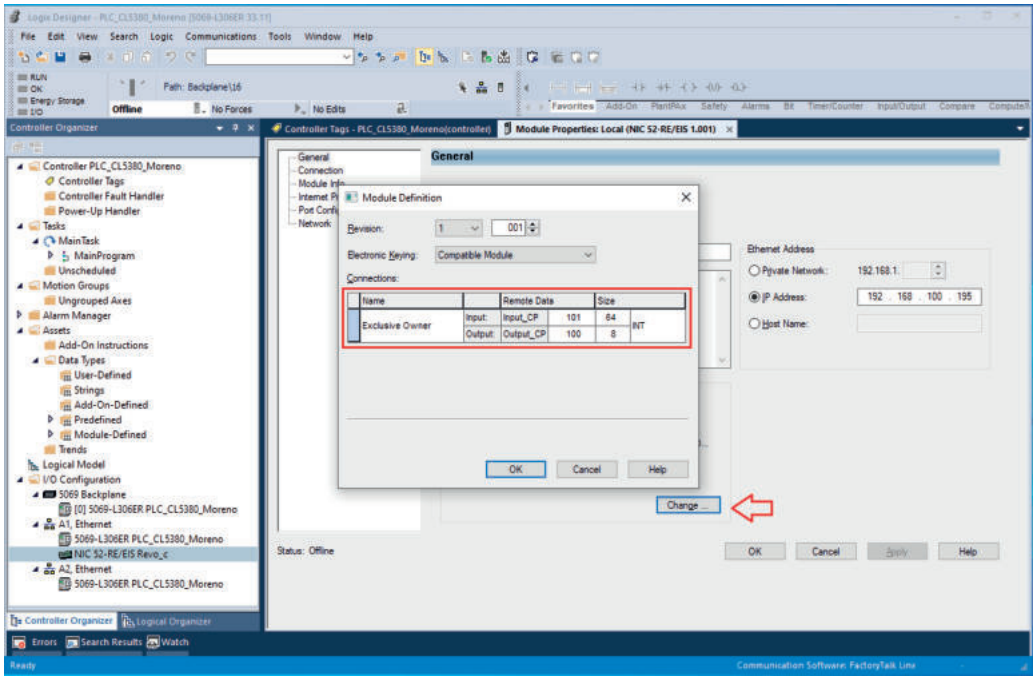
Name: Exclusive Owner

Input: *Remote Data:* Input_CP 101

Size: 64 INT

Output: *Remote Data:* Input_CP 100

Size: 8 INT



2.5 EtherCAT

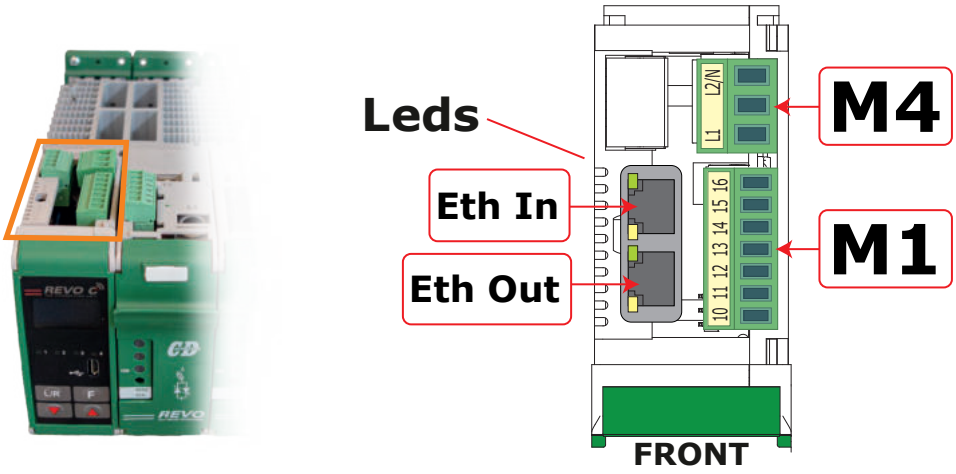
2.5.1 General description

The thyristor unit enables data exchange via EtherCAT with an external device (HMI or PLC).

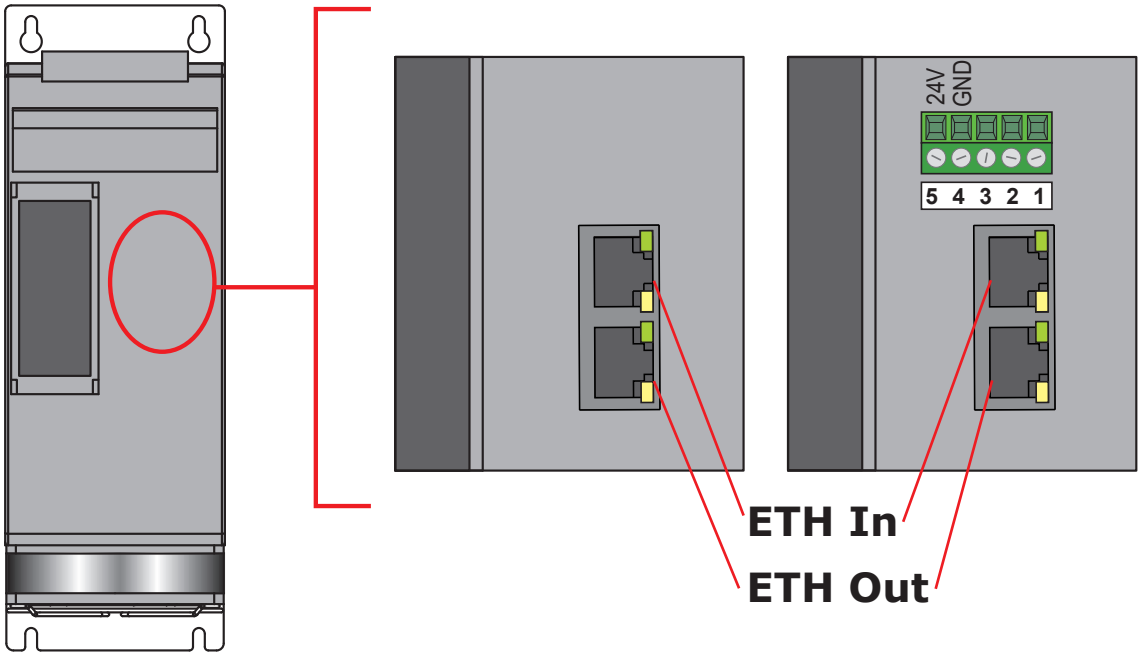
2.5.2 EtherCAT Connection

2.5.2.1 Communication Terminals 30-40A (SR9-SR10-SR11)

Ethernet Configuration Connectors

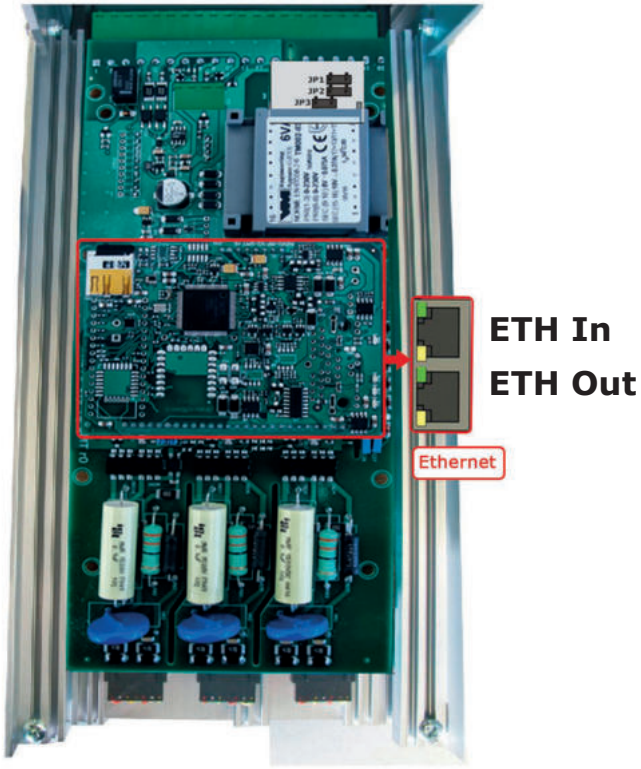


2.5.2.2 Communication Terminals 60-210A (from SR12 to SR17)



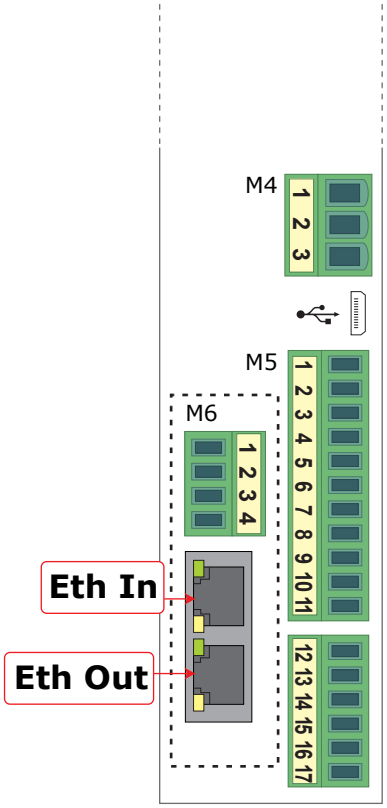
The LED status is internal
If available

2.5.2.3 Communication Terminals 300-800A (from S12 to S17)



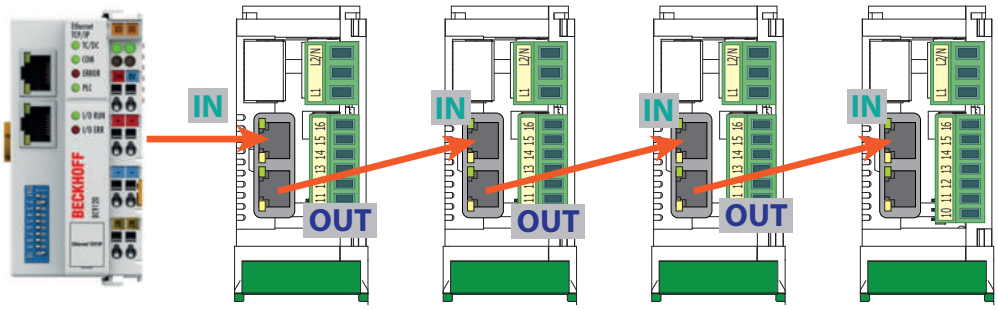
2.5.2.4 Communication Terminals 1100-2100A (from SR18 to SR23)

Ethernet configuration connectors



Connection

The connection is a chain connection, i.e. with an input and an output connected to each other. The PLC will connect to the input (Eth In) of the first thyristor unit, the output (Eth Out) of the first thyristor unit will connect to the input (Eth In) of the second thyristor unit, and so on.



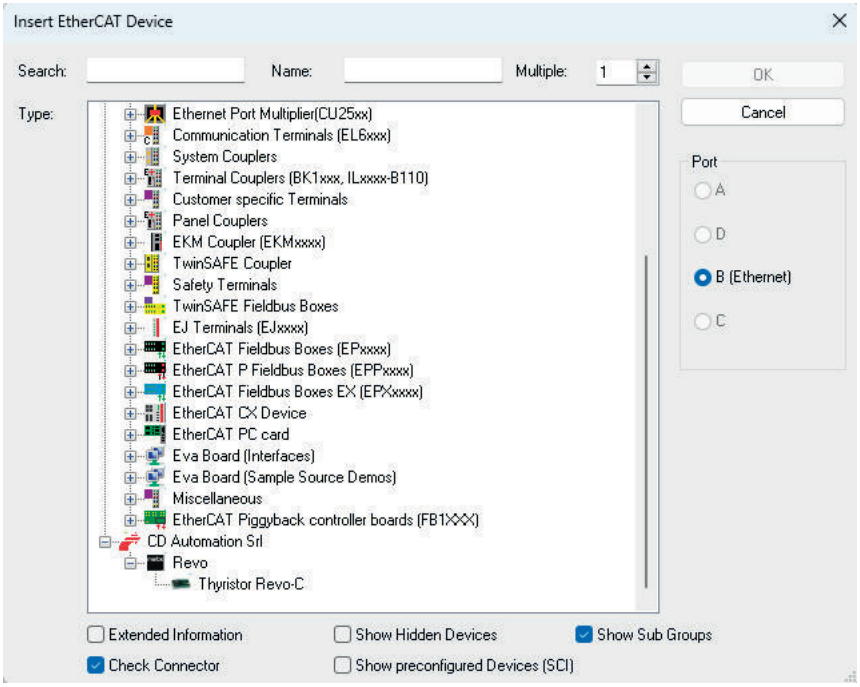
2.5.4 PLC Configuration

With an EtherCAT connection, the value can be read cyclically.

To do this, you need to use the XML plc configuration file, on IDE.
If the XML file is not installed on IDE, please install it.
If it's already installed, or after the installation, will appear on device list

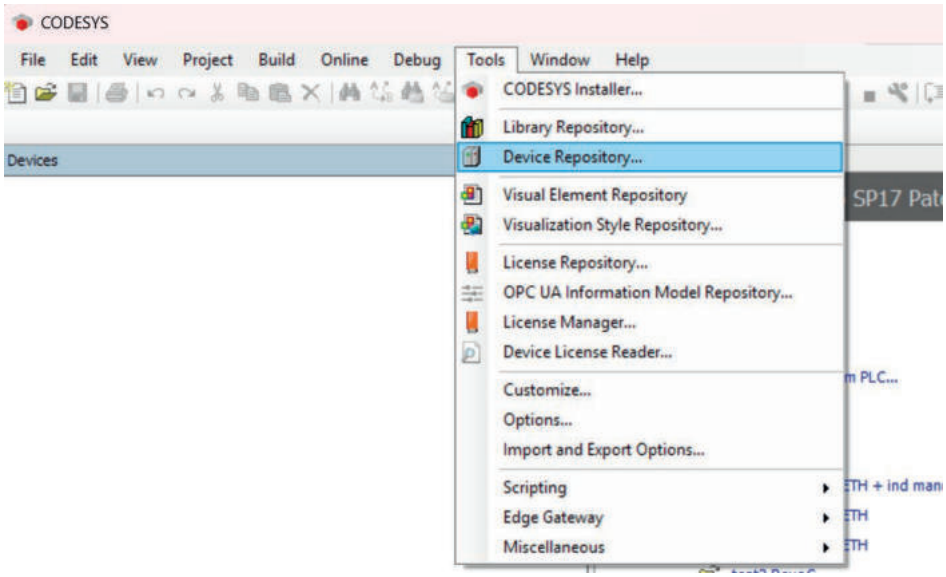
2.5.4.1 With TwinCAT

To install XML file close TwinCAT and copy the XML file on TwinCAT directory:
C:\TwinCAT\3.1\Config\Io\EtherCAT
When you start TwinCAT and add a new device to the EtherCAT node, the device will appear in the EtherCAT device catalogue.

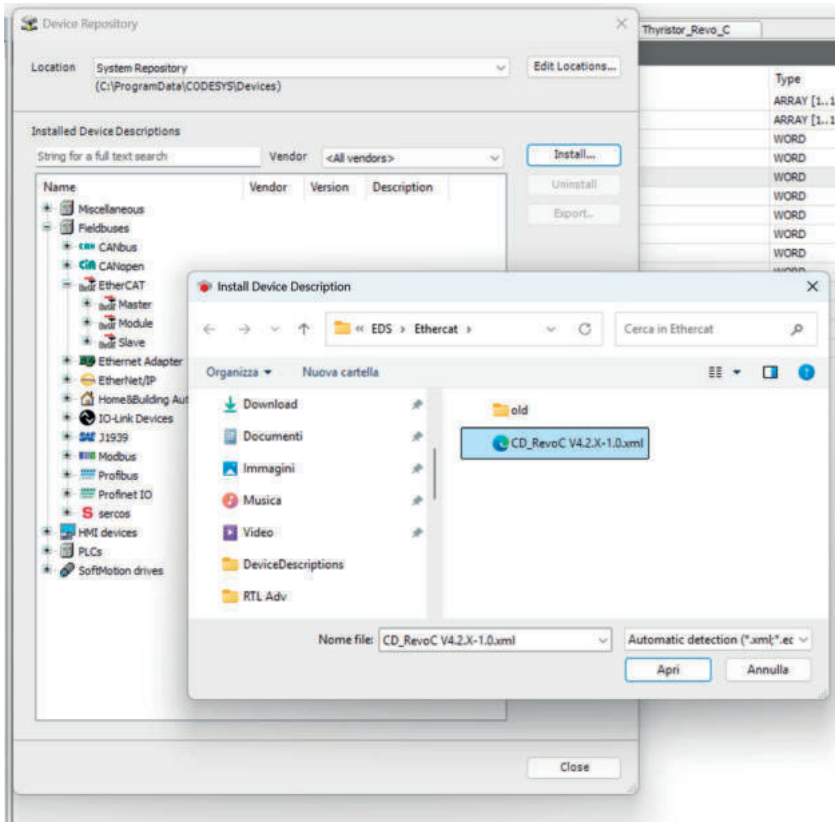


2.5.4.2 With Codesys

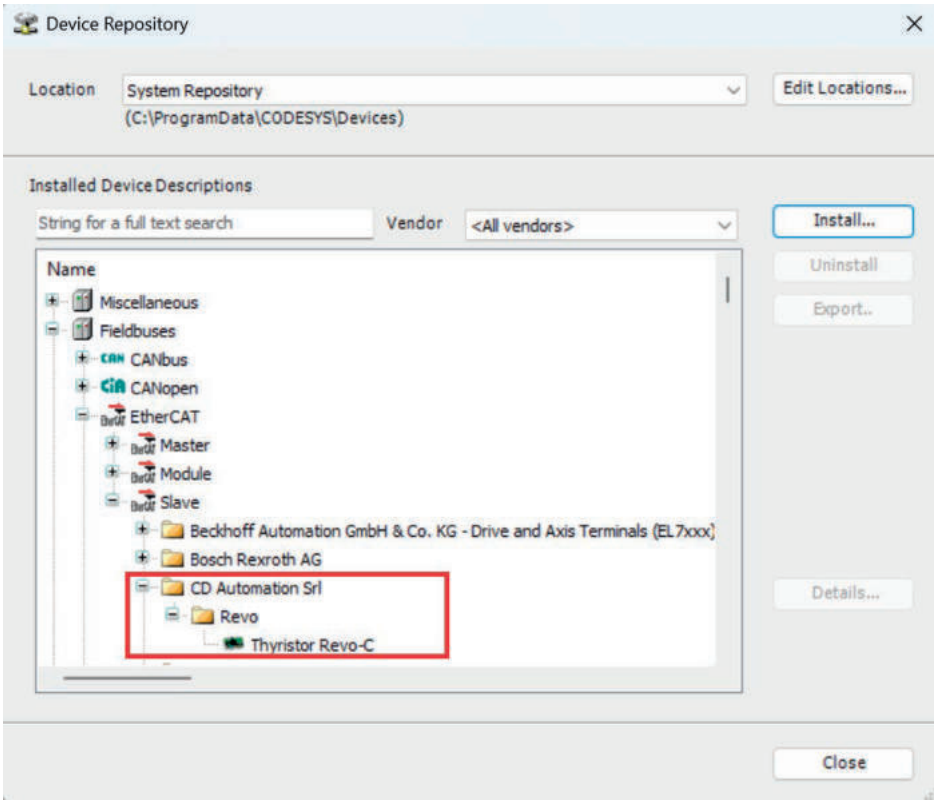
With Codesys open "Device Repository" on "Tools" --> "Device Repository",



click on "Install" button, select XML file and click Open.

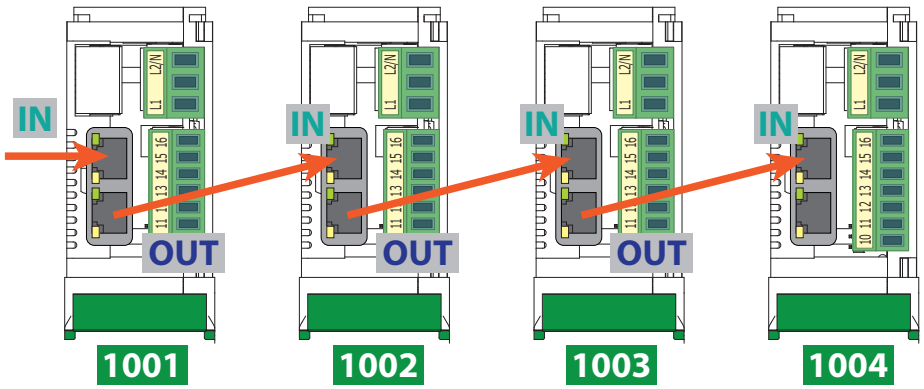


Now the device will appear in the catalogue.



Addressing

The addressing of thyristor units follows the network topology.
Thyristor units are automatically addressed based on the EtherCAT network topology. This means that address assignment depends on the order in which the devices are physically connected to each other along the cable, starting from the master and following the chain of slaves.



2.6 Data Exchange Area

2.6.1 Read area

Columns

Byte Bus Offset:	The number of bytes from the "0" address to the parameter start address
Word Bus Offset:	The number of "Words" offset from the "0" address.
Parameter Number:	The Modbus parameter number (Is Input register, so to read the data you Must use function 4)
Min:	The minimum actual value of the parameter
Max:	The maximum actual value of the parameter
Min UM:	The minimum value translated to its unit of measurement
Max UM:	The maximum value translated to its unit of measurement
UM:	Unit of measurement
1PH:	Checked if available on a single phase unit
2/3PH:	Checked if available on a two/three phase unit

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
0	0	0 30001								Not used
2	1	1 30002								Not used
4	2	2 30003	0	65535	0	655.35	Hz	X	X	Main network frequency
6	3	3 30004	0	65535	0	6553.5	V	X	X	Rms Voltage or average Voltage of rms for multi-phase
8	4	4 30005	0	65535	0,0	6553.5	A	X	X	RMS Current or Average RMS Current (multi-phase)
10	5	5 30006	0	1023	0	1023	%	X	X	RMS Power or Average RMS Power (multi-phase)

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
12	6	6 30007	0	1023	0	1023	Sw	X	X	**Status bitmask** See relative Tables Chapter Bit0 ShortCut Alarm Bit1 Heat Break Alam Bit2 ON/OFF unit Bit3 Not used Bit4 Current Limit Alarm Bit5 Thermal Alarm Bit6 Communication Alarm (WD) Bit7 Not used Bit8 Digital input 1 status Bit9 Digital input 2 status Bit10 Not used Bit11 Not used Bit12 Not used Bit13 Line Loss / Phase Loss Bit14 Not used Bit15 Thermal Alarm Active
14	7	7 30008	0	255	0	1023	Sw	X	0	**Command bitmask** Bit0 Not used Bit1 Digital Reference 0 = from analogue input 1 = from communication/keyb. Bit2 unit enable 1 = Enable 0 = Disable Bit3 Not used Bit4 Current Limit Switch 0 = from analogue input 1 = from communication/keyb. Bit5 Not used Bit6 Save Factory Bit7 Load Factory
16	8	8 30009	0	1023	0,0	100,0	%	X	X	Remote setpoint for unit
18	9	9 30010	0	255	0	100	%	X	X	How to scale the power set point
20	10	10 30011	0	1023	0	100	%	X	No	Digital current limit value 0 = From analogue Input 1 = From communication/keyb
22	11	11 30012	0	1023	0	1023	V	X	X	Nominal load voltage
24	12	12 30013	0	9999	0	999,9	A	X	X	Nominal load Current
26	13	13 30014	0	4096	0	4096	A	X	X	Measured RMS Current - phase 1
28	14	14 30015	0	4096	0	4096	A	No	X	Measured RMS Current - phase 2
30	15	15 30016	0	4096	0	4096	A	No	X	Measured RMS Current - phase 3
32	16	16 30017	0	65535	0	65535	V	X	X	Average (RMS) voltage input

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
34	17	17 30018	0	65535	0	<500A 655.35 -- ≥500A 6553.5	kW	X	X	Real time power consumption calculation (includes power factor)
36	18	18 30019	0	65535	0	<500A 655.35 -- ≥500A 6553.5	kVA	X	X	Real Time power consumption calculation
38	19	19 30020					kW/h	X	X	Par38=L (low) / Par40=H (High) KWh=[Par38 + (Par40 x 65536)]/10
40	20	20 30021								
42	21	21 30022	0	1000	0	1000	ratio	X	X	Power Factor
44	22	22 30023	0	1000	0	1000	ratio	No	X	(not used)
46	23	23 30024	0	1000	0	1000	ratio	No	X	(not used)
48	24	24 30025	0	1200	0	120	°C	X	X	Temperature of the SCR (if NTC, you will see the value 0 = Okay 1 = Alarm
50	25	25 30026	0	65535	0	655.35	ohm	X	X	Calculated resistance of the load. Based on a calculation of the Vrms load voltage divided by the Irms load current. (Average Irms in multi-phase unit)
52	26	26 30027	0	65535	0	65535	ohm	X	X	Used for calibrating the calculation of resistance
54	27	27 30028	0	65535	0	65535	Sw	x	X	Unit type (1PH, 2PH, 3PH) 7 = REVO C 1PH 8 = REVO C 2PH 9 = REVO C 3PH 10 = REVO C 3PH PA
56	28	28 30029	0	1023	0	1023	V	X	X	Unit rating (max voltage rating for the product ex: 480, 600, 690)
58	29	29 30030	0	9999	0	9999	A	X	X	Thyristor Amperage Rating
60	30	30 30031	0	1023	0	1023	V	X	X	Calculated aux voltage

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
62	31	31 30032	0	1023	0	1023	Sw	X	Only ZC BF	**Firing mode options** Zero cross 1 Single Cycle 2 Burst Firing 3 Phase Angle 4 Phase Angle + Soft Start 20 Half Cycle 10 Burst Cycle + Soft Start 19 Burst Firing + Delay Trigger 35 Burst Firing + Delay Trigger + Safety Ramp Peak 227 Burst Firing + Delay Trigger +Saftyramp 99 Half Cycle + Soft Start 74
64	32	32 30033	0	1023	0	1023	Sw	X	X	**Control Mode (Feed-back)** See relative table Chapter VOLTAGE 32 VOLTAGE² 0 CURRENT 64 CURRENT² 2 POWER 128 NO_FEEDBACK 0
66	33	33 30034	0	1	0	1		X	No	Selector for the current limit 0 = RMS 1 = Peak
68	34	34 30035	0	65535	0	65535	-	X	X	Selects which analogue input is used for the SP input 0 = Analogue Input 1 1 = Analogue Input 2
70	35	35 30036	0	1000	0	100,0	%	X	X	Current value of analog input 1 in percent
72	36	36 30037	0	1000	0	100,0	%	X	X	Current value of analog input 2 in percent
74	37	37 30038	0	5	0	5	Sw	X	No:4,7	Defines the function activated when: 0 = Enable thyristor 2 = Change to V feedback 3 = Change digital reference from AI/communication 4 = Force PA firing 5 = Select reference 1/2 6 = LOG: function enable 7 = Bakeout enable 8 = Fast enable thyristor Digital Input 1

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
76	38	38 30039	0	5	0	5	Sw	X	No:4,7	Defines the function activated when: 0 = Enable thyristor 2 = Change to V feedback 3 = Change digital reference from AI/communication 4 = Force PA firing 5 = Select reference 1/2 6 = LOG: function enable 7 = Bakeout enable 8 = Fast enable thyristor Digital Input 2
78	39	39 30040	0	65535	0	65535	Sw	X		Defines the function of the output relay Bit 0 HB alarm Bit 1 SC alarm Bit 2 I LIM Alarm Bit 3 \ Bit 4 Modbus Watchdog
80	40	40 30041	0	65535			x50 mS	X	No	Once the output turns off, how much time must pass before safety ramp will be re-enabled
82	41	41 30042	0	65535			X50 mS	X	No	Time for the safety ramp
84	42	42 30043	0	1				X	No	Enable bakeout function 0 = off 1 = on
86	43	43 30044	0	9999			min	X	No	Bakeout total ramp time in minutes
88	44	44 30045	0	9999			A	X	No	Bakeout current limit
90	45	45 30046	0	9999			min	X	No	Time to wait while off before bakeout is needed again (time for the heater to cool)
92	46	46 30047	0	1				X	X	Start or stop data logging 0 = off 1 = on
94	47	47 30048	0	1			Sw	X	X	Enable the Wi-Fi 0 = off 1 = on
96				float		float	V	X	X	AUX RMS input voltage
100				float		float	V	X	X	Rms Voltage or average Voltage of rms for multi-phase
104				float		float	A	X	X	RMS Current or Average RMS Current (multi-phase)
108				float		float	A		X	Measured RMS Current - phase 1
112				float		float	A		X	Measured RMS Current - phase 2
116				float		float	A		X	Measured RMS Current - phase 3

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 4	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
120				float		float	Ω	X	X	Calculated resistance of the load. Based on a calculation of the Vrms load voltage divided by the Irms load current. (Average Irms in multi-phase unit)
124				float		float	W	X	X	Real time power consumption calculation (includes power factor)
128				float		float	VA	X	X	Real Time power consumption calculation

2.6.2 Write area

Columns

Byte Bus Offset:	The number of bytes from the "0" address to the parameter start address
Word Bus Offset:	The number of "Words" offset from the "0" address.
Parameter Number:	The Modbus parameter number (Is Holding register, so to read the data you Must use function 4 so to write the data you Must use function 6 or 16)
Min:	The minimum actual value of the parameter
Max:	The maximum actual value of the parameter
Min UM:	The minimum value translated to its unit of measurement
Max UM:	The maximum value translated to its unit of measurement
UM:	Unit of measurement
1PH:	Checked if available on a single phase unit
2/3PH:	Checked if available on a two/three phase unit

PROFIBUS PROFNET ETHERNET/IP EtherCAT		MODBUS TCP								
Byte Bus Offset	Word Bus Offset	Parameter Number Func 3/6/16	Min	Max	Min UM	Max UM	UM	1PH	2/3PH	Description
0	0	0 40001								Not used
2	1	1 40002								Not used
4	2	2 40003	0	255	0	1023	Sw	X	X	**Command bitmask** Bit0 Not used Bit1 Digital Reference 0 = from analogue input 1 = from communication/keyb. Bit2 unit enable 1 = Enable 0 = Disable Bit 3 0 = Normal Operation 1 = Alarm reset Bit4 Not used Bit5 Not used Bit6 Save Factory Bit7 Load Factory Bit8 Not used Bit9 Not used Bit10 Not used Bit11 Not used Bit12 Not used Bit13 Not used Bit14 Not used Bit15 Not used
6	3	3 40004	0	1023	0,0	100,0	%	X	X	Remote set point for unit
8	4	4 40005	0	255	0	100	%	X	X	How to scale the power set point For normal use set to 255
10	5									

Caution: If Bus port is not connected or in error, all writable parameters are set to 0 value

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