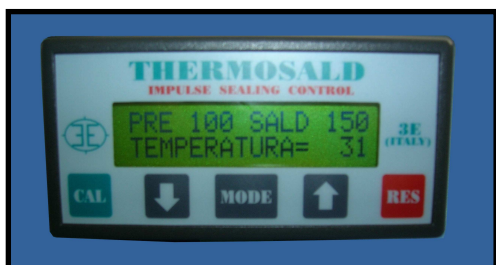
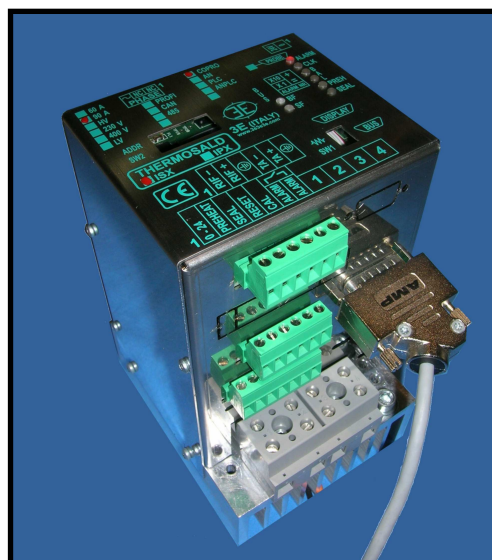


THERMOREGULATOR for PULSE WELDING

THERMOSALD ISX



- BUS ETHERNET PHYSICAL SUPPORT
- USED PROTOCOL: ETHERNET/IP



ETHERNET/IP
(V5)
(ENGLISH)

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1 General information

1.1 Revisions of this manual

<i>Rev.: 0</i>	<i>Date: 12/12/2013</i>	<i>EtherNet/IP Stack V1.0</i>	<i>ISX Software >=V5.0</i>
<i>Rev.: 1</i>	<i>Date: 24/01/2014</i>	<i>EtherNet/IP Stack V1.0</i>	<i>ISX Software >=V5.0</i>
<i>Rev.: 2</i>	<i>Date: 10/06/2014</i>	<i>EtherNet/IP Stack V1.0</i>	<i>ISX Software >=V5.1</i>

1.2 Information on this document

This document describes the functions of 3E's ETHERNET/IP interface developed on the THERMOSALD ISX thermoregulator.

To continue reading this document, you need to know the basic functions of the ETHERNET/IP communication.

For the ETHERNET/IP communication, the thermoregulator THERMOSALD ISX uses the ETHERNET/IP HMS-ANYBUS communication module PS/ABCC-EIPT_2P cod. AB6224-C

1.3 Reference documents

USE AND INSTALLATION MANUAL of thermoregulator THERMOSALD ISX - IPX code 3ES100_MDU_V4_EN (English) and following versions.

1.4 Definitions

THERMOSALD ISX	Pulse thermoregulator, model THERMOSALD ISX manufactured by 3E Srl.
DEVICE ADDRESS	Device Unit Address
INPUT / OUTPUT	As per PROFINET specification, inputs/outputs are the Controller inputs/outputs

2 ETHERNET/IP COMMUNICATION

2.1 Hardware interface

The thermoregulator THERMOSALD ISX can communicate simultaneously with a PC supervisor and a PLC via a double ETHERNET RJ45 communication port.

2.2 Protocol

PROFINET IO RT with cyclical exchange.

2.3 Communication parameters

The device supports a maximum communication speed of 100 Mbps.

2.4 ETHERNET/IP Warning LED

With module HMS-ANYBUS

LED NS	LED MS	Meaning
ON (green)	x	Online Module. Connection established
Flashing (green)	x	Online Module. No connection
OFF (green)	x	The module does not have an IP address
ON (red)	x	IP address doubled
Flashing (red)	x	Timeout of one or more connections
x	ON (green)	Normal operation. Module controlled by a Scanner/PLC in Run state
x	Flashing (green)	Not configured or Scanner/PLC in Idle state
x	OFF	Module not powered
x	ON (Red)	Module in error, 'EXCEPTION' state
x	Flashing (Red)	Recoverable error

2.5 ETHERNET/IP Interface

A single or 2 Ethernet ports can be connected.

2.6 IP address

The IP address and the netmask can be set as described in the following chapter 4, via software through Anybus IPconfig tool, via PLC through a specific tool, via Web pages through Network Interface-Network Configuration, via Dip Switch related to the least significant byte.

3 ETHERNET/IP TELEGRAMS (DATA EXCHANGE)

Once parameterized and configured, the THERMOSALD ISX-HMS tool begins to exchange the data-exchange cyclical telegrams.

3.1 DESCRIPTION OF THE TELEGRAMS

PLC CONTROLLER → DEVICE THERMOSALD ISX-HMS

OUTPUT (WORD)	Description	Notes
00	Code	03 - Read code 06 - Write code
01	ADDRESS	See paragraph 5 for the list of possible values
02	Data	
03	COMMANDS	

WORD 3

bit 15	Reserved	
bit 14	Reserved	
bit 13	Reserved	
bit 12	Reserved	
bit 11	Master reset	(level)
bit 10	Current loop on	(level)
bit 9	Weld on	(level)
bit 8	Pre-heat on	(level)
bit 7	Save calibration data	(pulse > 50ms)
bit 6	Emergency test	(level)
bit 5	Burn-in off	(pulse > 50ms)
bit 4	Burn-in on	(pulse > 50ms)
bit 3	Read data from eeprom	(not active from V5.1)
bit 2	Save data in eeprom	(not active from V5.1)
bit 1	Calibration	(pulse > 50ms)
bit 0	Reset alarms	(pulse > 50ms)

DEVICE THERMOSALD ISX-HMS → PLC CONTROLLER

INPUT (WORD)	Description	Notes
00	Echo to PLC Code 03/06	Echo of sent commands (To check that commands have been accepted)
01	Echo to PLC ADDR	
02	Echo to PLC DATA	
03	RUN T. TEMPERATURE (signed)	Runtime values of matching variables
04	RUN T. ALARM	
05	RUN T. ISX STATUS	
06	I Run Time Ieff.	
07	Rx100 Run Time Resistance	
08	V Run Time Veff.	
09	P Run Time P.eff.	
10	Steady Work Cond. %	
11	I0 Calibration Ieff.	
12	R0x100Calibration Resist.	
13	V0 Calibration Veff.	
14	P0 Calibration P.eff.	
15	Calibration Temperature	
16	Max. Seal. Temperature	
17	Set Pre. Heat Temperature	
18	Set Seal Temperature	

0	1	2	3
Code	ADDR_H	Data	COMMAN DS_HI

Output Telegram
(dal Controller al Device)

0	1	2	4.....18	
Codice	ADDR	DATA	Dati runtime (vedi tabella)	

Telegramma Input
(dal Device al Controller)

3.2 LIST OF THE PARAMETERS DISPLAYED IN THE WEB PAGE

- 1 Code
- 2 Address
- 3 Data
- 4 Command
- 5 Code Echo
- 6 Address Eco
- 7 Data Echo
- 8 Run Time Temperature
- 9 Run Time Alarm
- 10 Run Time State
- 11 I Run Time Ieff.
- 12 Rx100 Run Time Resistance
- 13 V Run Time Veff.
- 14 P Run Time P.eff.
- 15 Steady Work Cond. %
- 16 I0 Calibration Ieff.
- 17 R0x100 Calibration Resistance
- 18 V0 Calibration Veff.
- 19 P0 Calibration P.eff.
- 20 Calibration Temperature
- 21 Max. Seal. Temperature
- 22 Set Pre. Heat Temperature
- 23 Set Seal Temperature

4 APPLICATION INTERFACE AND STARTUP

4.1 General Description

All the PARAMETERS listed in paragraph 5 can be read and/or written with a simple procedure.

All the RUN TIME data listed in paragraph 5 can be read in real time.

4.2 STARTUP

4.2.1 PC and PLC connection in a local network

Connect the PC to the thermoregulator THERMOSALD ISX and to the PLC by means of the two Ethernet cables.

Carry out the following operations given only as an example:

- Open network communication (small icon)
- Connection to the local network (LAN)
- Proprieties
- Internet Protocol version 4 (TCP/IP V4)
- Use the following address 192.168.0.100

4.2.2 EDS file installation

Install the EDS file supplied with the installation PACKAGE in the PLC.

From PLC assign 8 BYTES to the output (4 words) and 38 BYTES to the input (19 words)
Assign TAG to PLC IN/OUT address location.

4.2.3 Setup of IP address and netmask of the THERMOSALD ISX – ANYBUS board

The factory's IP address of the Thermosald ISX is 192.168.0.7

If switch SW2 is set to 0, all switches are set to off, the IP address and the netmask can be set from the software.

If SW2 value ranges from 1 to 254, the last byte IP address takes the figure set by SW2.
The 255 address is not valid.

Switch OFF/ON after changing the address.

To set the netmask and the IP address

- 1) Launch the Anybus Ipconfig programme.
- 2) Select Settings -> Network Interface Controller
 - Click Broadcast from specific Network
 - Select Intel 82579 LM GIGABIT NETWORK
- 3) Select SCAN Find the network units
 - Click the device twice
 - Set DHC to off
 - Assign the required IP address and netmask

4.2.4 Displaying the data exchanged between PLC and ISX – ANYBUS as a Web page

Launch INTERNET EXPLORER

Write the THERMOSALD - ANYBUS thermoregulator address (default address 192.168.0.7)

The WEB PAGE of the thermoregulator ABCC-PRT (2-port) is displayed on the PC.

Select PARAMETER DATA

Press F5 to update data

4.3 Data exchange through read/write protocol

4.3.1 Reading and writing the parameters

Refer to the lists in paragraph 5, for the location of the parameter addresses, and to the EXCHANGE SIGNALS in paragraph 3 for the inputs & outputs to be used.

Read: write code 00 at output 00, the address of the parameter to read at outputs 01 and 02. The thermoregulator responds code 03 at input 00, the address of the parameter at inputs 01 and 02 and the value of the parameter at inputs 03 and 04.

Write: write code 06 at output 00, the address of the parameter at outputs 01 and 02 and the value of the parameter to write at outputs 03 and 04. The thermoregulator responds code 06 at input 00, the address of the parameter at inputs 01 and 02 and the value of the parameter at inputs 03 and 04.

4.3.2 Command codes

Refer to the lists in paragraph 5, for the location of the parameter addresses, and to the EXCHANGE SIGNALS in paragraph 3 for the inputs & outputs to be used.

It is advisable to pass commands in bits directly to the COMMAND output word 03 of the Output telegram (Controller Outputs). Refer to paragraph 3.1 DESCRIPTION OF THE TELEGRAMS.

Any Command Code can also be written, with the same write procedure of any parameter, to 0505H hexadecimal address.

Write code 06 at output 00, hexadecimal address 0505H at outputs 01 and the value of the command code at output 02. The thermoregulator responds code 06 at input 00, hexadecimal address 0505H at inputs 01 and the value of the command code at input 02.

4.3.3 Reading RUN TIME data

Refer to the lists in paragraph 5, for the location of the parameter addresses, and to the EXCHANGE SIGNALS in paragraph 3 for the inputs & outputs to be used.

RUN TIME DATA of common use can be read directly from word 03 to word 18 of the Input telegram (Controller Inputs). Refer to paragraph 3.1 DESCRIPTION OF THE TELEGRAMS.

5 LISTS

- Default values are outlined in the "USE AND MAINTENANCE MANUAL"
- All exchanged data are words (2 bytes)
- Data are read with code 03 and written with codes 06
- N.U. means: do not use

MACHINE DATA	HEX ADDRESS		
0-Heat. Ramp degrees/100ms	00 00H	[xxx]	(R/W)
1- KV Gain	00 01H	[xxx]	(R/W)
2- KINT Gain (x10)	00 02H	[xx.x]	(R/W)
3- Final KINT threshold	00 03H	[xxx]	(R/W)
4- Partial short circuit factor (x10)	00 04H	[xx.x]	(R/W)
5- Mode Configuration	00 05H	[000 pulse weld]	(R/W)
6- Display Configuration	00 06H	[000 analog	(R/W)
		001 analog+panel	(R/W)
		002 panel or FIELDBUS]	(R/W)
7- Rated current	00 07H	[xx.x]	(R/W)
8- KD derivative gain	00 08H	[xxx]	(R/W)
9- Alarm disable 1	00 09H	[xxx]	(R/W)
10-BUS CODE	00 0AH	[031= ETHERNET/IP]	(R)
11-	00 0BH	[xxx] Fieldbus	(R) not used
12-1=Reset master done	00 0CH	[xxx]	(R)
13- Alarm disable 2	00 0DH	[xxx]	(R/W)
14- Temperature coefficient (PPM)	00 0EH	[xxx]	(R/W)
15-Units per degree	00 0FH	[xxx]	(R)
16-Primary	00 10H	[xxx]	(R)
17- Low voltage	00 11H	[xxx]	(R)
18- PLC enable	00 12H	[xxx]	(R/W)
19-Password	00 13H	[xxx]	(R/W)
20- Key password (1-9999)	00 14H	[000=Disabled	(R/W)
		001=Partial	
		002=Total]	
21- THERMOSALD Model	00 15H	[010=Thermosald ISX]	(R)
22-	00 16H	[xxx]	not used
23- I2T - I rms max for 1 sec.	00 17H	[xxx]	(R/W)
24- Temperature probe enable	00 18H	[xxx]	(R/W)
25-Tmargin_read (v4.4)	00 19H	[xxx]	(R/W)
26- Initial KINT threshold (v4.4)	00 1AH	[xxx]	(R/W)
27- Fs KINT threshold (v4.4)	00 1BH	[xxx]	(R/W)
28-	00 1CH	[xxx]	not used
SETTING DATA			
256- Burn-in number of cycles	01 00H	[xxx]	(R/W)
257-Language	01 01H	[xxx]	(R/W)
258- Calibration temperature (°C)	01 02H	[xxx]	(R/W) (*A)
259- 0 = °C / 1 = ° F	01 03H	[xxx]	(R/W)
260- Temperature Burn-in (°C)	01 04H	[xxx]	(R/W)
261- Heating Time Burn-in (sec.)	01 05H	[xxx]	(R/W)
262-Max. weld temperature (°C)	01 06H	[xxx]	(R/W) (*A)

263- Max.weld time (x 10)	01 07H	[xx.x]	(R/W)	
264- Cooling gradient during bal. (degrees/10sec.)	01 08H	[xxx]	(R/W)	
265- Warn66 display time (sec.)	01 09H	[xxx]	(R/W)	
266- Weld temperature increase	01 0AH	[xxx]	(R/W)	
267- Increase no. of welds	01 0BH	[xxx]	(R/W)	
268- Set end-of-weld temperature	01 0CH	[0 / 1]	(R/W)	
269- Set Preaheat. Temp. (°C)	01 0DH	[xxx]	(R/W)	(*A)
270- Set weld temperature (°C)	01 0EH	[xxx]	(R/W)	(*A)
271-	01 0FH	[N.U.]	Fieldbus(R) not used	
272-	01 10H	[N.U.]	Fieldbus (R) not used	
273-	01 11H	[N.U.]	Fieldbus (R) not used	
274-	01 12H	[N.U.]	Fieldbus not used	
275-	01 13H	[N.U.]	Fieldbus not used	
276- Weld delay timer (x 100)	01 14H	[x.xx]	(R/W)	
277- Bars closing timer (x 100)	01 15H	[x.xx]	(R/W)	
278- Weld timer (x 100)	01 16H	[x.xx]	(R/W)	
279- Cooling timer (x 100)	01 17H	[x.xx]	(R/W)	
280- Weld range timer (x 100)	01 18H	[x.xx]	(R/W)	
281- Set temperature at page 1	01 19H	[x.xx]	(R/W)	
282- Set% band to ground for all.69	01 1AH	[x.xx]	(R/W)	
283- Set current loop value	01 1BH	[x.xx]	(R/W)	
284- Increase time to restore (time in seconds)	01 1CH	[x.xx]	(R/W)	

STARTUP DATA

512- Software release units (ASCII)	02 00H	[xxx]	(R)	
513- Software release tenths (ASCII)	02 01H	[xxx]	(R)	
514- Ohms x mm ² / mt (x 1000)	02 02H	[xxx]	(R/W)	
515- Band length (mm)	02 03H	[xxx]	(R/W)	
516- Band thickness(mm x 100)	02 04H	[x.xx]	(R/W)	
517- Wire diameter (mm x 100)	02 05H	[x.xx]	(R/W)	
518- Band width (mm x 100)	02 06H	[xx.x]	(R/W)	
519- Amperes/mm ² (A / mm ²)	02 07H	[xxx]	(R/W)	
520- No. of bands in parallel (u)	02 08H	[xxx]	(R/W)	
521- No. of bands in series (u)	02 09H	[xxx]	(R/W)	
522- Duty cycle (x 10)	02 0AH	[xx.x]	(R/W)	
523- I _t I rms theoretical full wave	02 0BH	[xxx]	(R)	
524- R _{tx100} Theoretical resistance	02 0CH	[x.xx]	(R)	
525- V _t V rms theoretical full wave	02 0DH	[xxx]	(R)	
526- P _t P rms theoretical full wave	02 0EH	[xxx]	(R)	
527- I ₀ I rms calibration full wave	02 0FH	[xxx]	(R)	(*B)
528- R _{0x100} calibration resistance	02 10H	[x.xx]	(R)	(*B)
529- V ₀ V rms calibration full wave	02 11H	[xxx]	(R)	(*B)
530. P ₀ P rms power Calibration	02 12H	[xxx]	(R)	(*B)
531- I rms max for alarm 90 (A)	02 13H	[xxx]	(R)	

RUN TIME DATA

768- Current temperature (°C)	03 00H	[xxx]	(R)	(*A)
769- Alarm/warning number (u)	03 01H	[xxx]	(R)	(*A)
770-I I rms runtime full wave	03 02H	[xx.x]	(R)	(*B)
771-Rx100 Resistance runtime	03 03H	[x.xx]	(R)	(*B)
772-V V rms runtime full wave	03 04H	[xxx]	(R)	(*B)
773-P P rms runtime full wave	03 05H	[xxx0]	(R)	(*B)
774- Thermoregulator status	03 06H	[xxx]	(R)	(*A)
Status 000 [0x00]		Power off		
Status 017 [0x11]		Not Calibrated		
Status 096 [0x60]		Balancing		
Status 100 [0x64]		Current loop		
Status 112 [0x70]		Pre-heat		
Status 128 [0x80]		Weld		
Status 136 [0x88]		Master reset in progress		
Status 153 [0x99]		Calibration in progress		
Status 154 [0x9A]		Wait for scaling		
Status 170 [0xAA]		Burn-in in progress		
Status 187 [0xBB]		Wait for coprocessor calibration		
Status 238 [0xEE]		Alarm		
775- I rms runtime	03 07H	[xxx]	(R)	
776- Active temperature probe	03 08H	[xxx]	(R)	
777- Bar temperature probe	03 09H	[xxx]	(R)	
778- Steady working conditions % (updated every 10 seconds)	03 0AH	[xxx]	(R)	(*B)

(*A) Data needed to be handled in the fieldbus interface

(*B) Data recommended to be handled in the fieldbus interface

**1285-COMMANDS
(WRITE CODE 06 ONLY)**

It is advisable

to use the commands
on word at paragraph 3.1

05 05H COMMAND CODES (DECIMALS)

Reset alarms = 14	(W) (*B)
Calibration = 15	(W) (*B)
Burn-in on = 18	(W)
Burn-in off = 19	(W)
Emergency test = 20	(W)
Save calibration data = 26	(W)
Pre-heat on = 31	(W)
Pre-heat off = 32	(W)
Weld on = 33	(W)
Weld off = 34	(W)
Current loop on = 35	(W)
Current loop off = 36	(W)
Master reset = 99	(W)

Commands not working from V5.1 software

Save data to eeprom = 16	(W) (*B)
Read data from eeprom = 17	(W) (*B)
Save coprocessor data = 27	(W)
Disable coprocess. alarms = 28	(W)

NOTE: command 26 "save calibration data" allows you to store the data of the last calibration; it is advisable to use this command after the machine's first startup in order to store calibration data after factory testing. This figure, compared with RUN TIME data, will be used later to make a remote diagnosis of the machine.