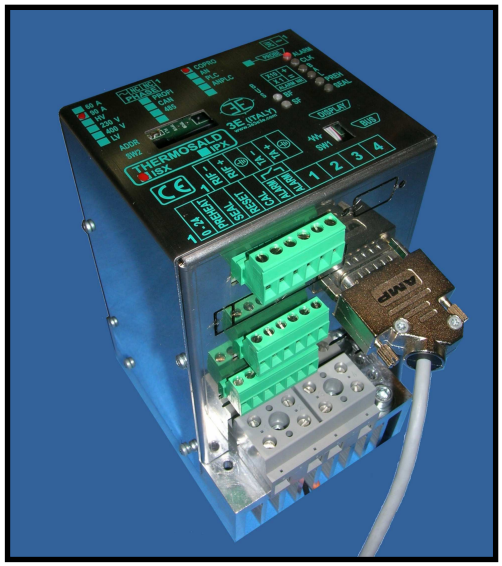
THERMOREGULATOR for PULSE WELDING

THERMOSALD ISX



- **SUPERVISOR INTERFACE UP TO 125 UNITS**

PROFIBUS (V4)

(ENGLISH)

3E S.r.l. - **Via del Maccabreccia 37/a - 40012 LIPPO DI CALDERARA (BOLOGNA)**
Tel. ++39 051 6466225-228 **e-Mail: mail@3e3e3e.com**
Fax ++39 051 6426252 **Internet address: www.3e3e3e.com**

1 GENERAL INFORMATION

1.1 Revisions of this manual

Rev.: 0	*Date: 06/07/2009*	*Profibus Software 1.0*	*ISX Software V1*
Rev.: 1	*Date: 28/08/2009*	*Profibus Software 1.1*	*ISX Software V1*
Rev.: 2	*Date: 25/06/2009*	*Profibus Software 1.1*	*ISX Software V2*
Rev.: 3	*Date: 01/03/2011*	*Profibus Software 1.1*	*ISX Software V3*
Rev.: 4	*Date: 19/12/2011*	*Profibus Software 1.1*	*ISX Software V4*
Rev.: 5	*Date: 15/04/2012*	*Profibus Software 1.1*	*ISX Software V4*
Rev.: 6	*Date: 20/06/2012*	*Profibus Software 1.1*	*ISX Software V4.3*
Rev.: 7	*Date: 26/11/2012*	*Profibus Software 1.1*	*ISX Software V4.3*
Rev.: 8	*Date: 25/03/2013*	*Profibus Software 1.1*	*ISX Software V4.4*

1.2 Information on this document

This document describes the functions of 3E's PROFIBUS interface developed on the THERMOSALD ISX thermoregulator.
To continue reading this document, you need to know the basic functions of the PROFIBUS communication.

1.3 Reference documents

USE AND INSTALLATION MANUAL of thermoregulator THERMOSALD ISX - IPX code 3ES100_MDU_V4_IT (English).

1.4 Definitions

THERMOSALD ISX	Pulse thermoregulator, model THERMOSALD ISX, manufactured by 3E Srl.
DEVICE ADDRESS	Slave unit address
INPUTS/OUTPUTS	As per PROFIBUS specification, inputs/outputs are the supervisor's inputs/outputs

2 PROFIBUS COMMUNICATION

2.1 Hardware Interface

The THERMOSALD ISX thermoregulator can communicate with a PC or PLC supervisor through connector CN10 (see USE MANUAL).

2.2 Protocol

PROFIBUS DPV0 with cyclical exchange.

2.3 Communication parameters

The slave supports a maximum communication speed of 12 Mbaud.

2.4 PROFIBUS warning LEDs

BF LED	SF LED	Meaning
ON	x	No communication (e.g. connector not plugged in)
Flashing	OFF	Communication present but not in data-exchange (e.g. address not called)
Flashing	ON	Communication present but configuration error
OFF	OFF	OK – Data exchange active

2.5 PROFIBUS termination

Activate the PROFIBUS termination on-board the THERMOSALD ISX slave (SW1 ON) only if the slave is the last one of segment RS-485 and if the connector's own internal termination is not already enabled.
EXAMPLE:
SW1.1=ON, SW1.2=ON -> last slave of the chain
SW1.1=OFF, SW1.2=OFF -> not last slave of the chain

2.6 PROFIBUS address

The PROFIBUS address should be set using the SW2 dip-switches on the device; the address is set in binary format in the 1 - 125 range.
EXAMPLES:
SW2.1=ON, all the others OFF -> address = 1 (2E0)
SW2.2=ON, all the others OFF -> address = 2 (2E1)
SW2.1=ON, SW2.2=ON, all the others OFF -> address = 3 (2E0+2E1)

3 PROFIBUS TELEGRAMS (DATA EXCHANGE)

Once parameterized and configured, slave 3E_ _ 0C4E (THERMOSALD ISX) begins to exchange the data-exchange cyclical telegrams.

3.1 DESCRIPTION OF THE TELEGRAMS

MASTER PLC ➔ SLAVE 3E_ _ THERMOSALD

OUTPUT	Description	Notes
00	Code	03 - Read code 06 - Write code
01	ADDR_HI	See paragraph 5 for the list of possible values
02	ADDR_LO	
03	DATA_ HI	
04	DATA_ LO	
05	COMMANDS_HI	
06	COMMANDS_LO	

BYTE 5	bit 7	Reserved	
COMMANDS-HI	bit 6	Reserved	
	bit 5	Reserved	
	bit 4	Reserved	
	bit 3	Master reset	(level)
	bit 2	Current loop on	(level)
	bit 1	Weld on	(level)
	bit 0	Pre-heat on	(level)
BYTE 6	bit 7	Save calibration data	(pulse > 50ms)
COMMANDS-LO	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	(pulse > 50ms)
	bit 2	Save data to eeprom	(pulse > 50ms)
	bit 1	Calibration	(pulse > 50ms)
	bit 0	Reset alarms	(pulse > 50ms)

SLAVE 3E _ _ THERMOSALD ➔ MASTER PLC

INPUT	Description	Notes
00	Echo to PLC Code 03/06	Echo of commands sent (to check that commands have been accepted)
01	Echo to PLC ADDR_HI	
02	Echo to PLC ADDR_LO	
03	Echo to PLC NULL/DATA_HI	
04	Echo to PLC NULL/DATA_LO	
05	RUN T. HI TEMPERATURE (signed)	Runtimes of matching variables
06	RUN T. LO TEMPERATURE (signed)	
07	RUN T. HI ALARM	
08	RUN T. LO ALARM	
09	RUN T. ISX STATUS	
10	RUN T. RESERVED 10	
11	RUN T. RESERVED 11	

0	1	2	3	4	5	6
Code	ADDR_H	ADDR_L	Data _HI	Data_LO	Commands_HI	Commands_LO

Output Telegram
(from master to slave)

0	1	2	3	4	5 … 11
Code	ADDR_H	ADDR_L	Data _HI	Data_LO	Runtime data (see table)

Input Telegram
(from slave to master)

4 APPLICATION INTERFACE AND START-UP

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 START-UP

Install file GSD 3E__0C4E.gsd and file 3E__0C4E.bmp in the configuration tool of the PROFIBUS used.
Select module ThermoSald.

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 03 at output 00 and the address of the parameter to be 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 HI COMMANDS and LO COMMANDS output bytes, bytes 05 and 06 of the Output telegram (Master Outputs). Refer to paragraph 3.1 DESCRIPTION OF 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 02 and the value of the command code at outputs 03 and 04. The thermoregulator responds code 06 at input 00, hexadecimal address 0505H at inputs 01 and 02 and the value of the command code at inputs 03 and 04.

4.3.3 Reading of 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 byte 05 to byte 11 of the Input telegram (Master 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 Modbus code 03 and written with Modbus codes 06, 16
- N.U. means: do not use

MACHINE DATA	HEX ADDRESS		
0- Heating 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)
8- KD derivative gain	**00 08H**	[xxx]	(R/W)
9- Disabling 1 alarm	**00 09H**	[xxx]	(R/W)
10- PROFIBUS-P1 enable	**00 0AH**	[000=Disabled	(R)
		011=PROFIBUS]	
11- PROFIBUS-P2 RS485 address	**00 0BH**	[selection from dip switch DIP1/1-7]	(R)
12- 1=Master reset done	**00 0CH**	[xxx]	(R)
13- Disabling 2 alarm	**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] Free	
23- I2T - I effective for max 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] Free	

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)	(***B)**
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)	(***B)**
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- Increase weld temperature	**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 pre-heat temperature (°C)	**01**	**0DH**	[xxx]	(R/W)	(***A)**
270- Set weld temperature (°C)	**01**	**0EH**	[xxx]	(R/W)	(***A)**
271-	**01**	**0FH**	[N.U.]		
272-	**01**	**10H**	[N.U.]		
273-	**01**	**11H**	[N.U.]		
274-	**01**	**12H**	[N.U.]		
275-	**01**	**13H**	[N.U.]		
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- Welds interval timer (x 100)	**01**	**18H**	[x.xx]	(R/W)	
281- Set temperature in 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 (in seconds)	**01**	**1CH**	[x.xx]	(R/W)	

COMMISSIONING DATA

512- Software release units (ASCI)	**02**	**00H**	[xxx]	(R)	
513- Software release tenths (ASCI)	**02**	**01H**	[xxx]	(R)	
514- Ohms x mm² / mt (x 1000)	**02**	**02H**	[xxx]	(R/W)	
515- Sealing band length (mm)	**02**	**03 H**	[xxx]	(R/W)	
516- Sealing band thickn.(mm x 100)	**02**	**04H**	[x.xx]	(R/W)	
517- Wire diameter (mm x 100)	**02**	**05H**	[x.xx]	(R/W)	
518- Sealing band width (mm x 10)	**02**	**06H**	[xx.x]	(R/W)	
519- Amperes/mm² (A / mm²)	**02**	**07H**	[xxx]	(R/W)	
520- No. of sealing bands in parallel	**02**	**08H**	[xxx]	(R/W)	
521- No. of sealing bands in series	**02**	**09H**	[xxx]	(R/W)	
522- Duty cycle (x 10)	**02**	**0AH**	[xx.x]	(R/W)	
523- Theoretical-I eff. full wave (A)	**02**	**0BH**	[xxx]	(R)	
524- Theoretic-Resist. (Ohms x100)	**02**	**0CH**	[x.xx]	(R)	
525- Theoretical-V eff. full wave (V)	**02**	**0DH**	[xxx]	(R)	
526- Theoretical-P.eff. full wave (VA)	**02**	**0EH**	[xxx]	(R)	
527- Calibration-I eff. full wave (A)	**02**	**0FH**	[xxx]	(R)	(***B)**
528- Calibr.-Resistance (Ohms x100)	**02**	**10H**	[x.xx]	(R)	(***B)**
529- Calibration-V eff. full wave (V)	**02**	**11H**	[xxx]	(R)	(***B)**
530- Calibration - P.eff.full wave (VA)	**02**	**12H**	[xxx]	(R)	(***B)**
531- Max I effective for alm. 90 (A)	**02**	**13H**	[xxx]	(R)	

RUN TIME DATA

768- Current temperature (°C)	**03 00H**	[xxx]	(R)	(***A)**
769- Alarm/warning number (U/M)	**03 01H**	[xxx]	(R)	**(*A)**
770- I effective full wave (Ax10)	**03 02H**	[xx.x]	(R)	(***B)**
771- Resistance (Ohms x100)	**03 03H**	[x.xx]	(R)	(***B)**
772- V effective full wave (V)	**03 04H**	[xxx]	(R)	(***B)**
773- P. effective full wave (VA/10)	**03 05H**	[xxx0]	(R)	(***B)**
774- Thermoregulator status	**03 06H**	[xxx]	(R)	
Status 000 [0x00]	Power off			
Status 017 [0x11]	Not Calibrated			
Status 096 [0x60]	Balancing			
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 effective	**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)	**05 05H**	**COMMAND CODES (DECIMALS)**	
		Reset alarms = **14**	(W) (***B)**
		Calibration = **15**	(W) (***B)**
		Save data to eeprom = **16**	(W) (***B)**
		Read data from eeprom = **17**	(W) (***B)**
		Burn-in on = **18**	(W)
		Burn-in off = **19**	(W)
		Emergency test = **20**	(W)
		Save calibration data = **26**	(W)
		Save coprocessor data = **27**	(W)
		Disable coprocess. alarms = **28**	(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)
		Disable checksum= **80 (*)**	(N.U.)
		Enab.checks RTU/CRC= **81 (*)**	(N.U.)
		Enable checksum XOR= **82 (*)**	(N.U.)
		Master reset = **99**	(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 commissioning 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.