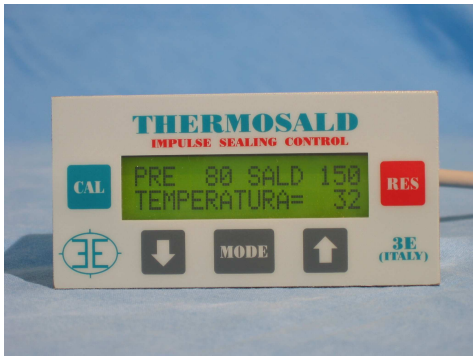
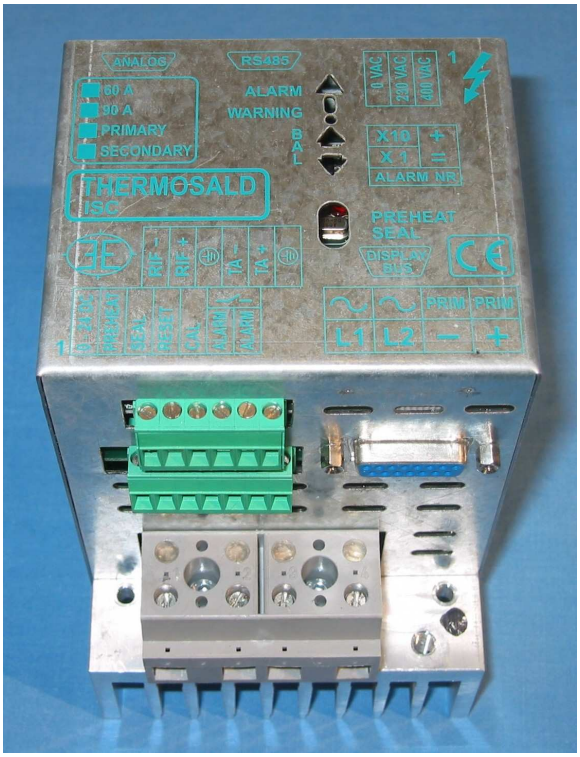
TEMPERATURE CONTROLLER FOR IMPULSE SEALING

THERMOSALD
ISC

MODULAR SYSTEM





- **AUTOMATIC CALIBRATION**
- **ANALISYS ON LINE OF BAND CHARACTERISTICS**
-
- **DIAGNOSTIC PANEL WITH 6 LANGUAGES**
- **CAN BUS INTERFACE (OPTIONAL)**
- **PROFIBUS INTERFACE (OPTIONAL)**
- **RS 485 INTERFACE (OPTIONAL)**
- **WORKING WITH POTENTIOMETER**
-
- **BURN IN OF SEALING BAND**

MAINTENANCE & OPERATIONS MANUAL

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 **web site: www.3e3e3e.com**

CONTENTS

0 WARNINGS

THIS BOOK IS SUPPLIED WITH OUR PRODUCT AND DESCRIBES THE FUNDAMENTAL FUNCTIONS

EMPLOY QUALIFIED AND WELL-TRAINED PERSONNEL, FAMILIAR WITH THE TECHNOLOGY USED TO INSTALL OR MAINTENANCE THE EQUIPMENT, CONSULTING MAINTENANCE & OPERATIONS MANUAL.

0.1 SAFETY PRECAUTIONS

- Never use the equipment in explosive atmospheres or with explosive materials.
- Never use the equipment with flammable material without first taking the required safety precautions.
- Operate the equipment by following the instructions contained in this MAINTENANCE & OPERATIONS MANUAL before doing an installation.
- Never turn on the temperature controller power circuit when the safety guards are open.
- Do not use the temperature controller for tasks other than those it is designed for i.e to control the temperature of bands or wires for industrial-grade sealing. Contact our engineering department for information regarding specific applications.
- Do not deliver electrical power to the temperature controller if the protective cover has been removed for special servicing on the electronic system.
- Employ qualified and well-trained personnel familiar with the technology used, to install and use the equipment.
- Grounding the thermoregulator by yellow-green cable connected to the predisposed screw and by 4 fixing screw.
- Use bands or wires having an adequate positive temperature coefficient (> 1 x 10E-3)
- When the machine is running under normal conditions, make sure the heat sink of the controller does not exceed 60°C . If this happens, increase heat sink ventilation or contact our engineering department.

0.2. COMPLIANCE WITH ELECTRO-MAGNETIC STANDARDS – CE KITE MARKS

TESTS AND RESULTS:

Test conditions:
- Mains supply filter Mod. Siemens B84112-B-B60 (115 / 250 V - 6A - 50/60 Hz)
- Connecting cable thermoregulator-panel mt.5
- Input power cables length mt. 5
- Output power cables length mt.5

Normative References:
- CEI EN 50081-2 (06/1997) Electromagnetic compatibility – Generic emission standard - Part 2 - industrial environment.
- CEI EN 61000-6-2 (02/2000) Electromagnetic compatibility - Generic immunity standard - industrial environment.

EMISSION Requisites

Test	**Normative References**	**Test Result**
• Electromagnetic Emission	CEI EN 55011	S

IMMUNITY Requisites

• Immunity elecricity static discharge (ESD)	CEI IEC 1000-4-2	S
• Immunity radiated electromagnetic field (AM)	EN 61000-4-3	S
• Immunity fast transient oscillation (BURST)	CEI IEC 1000-4-4	S
• Immunity high energy pulse (SURGE)	CEI EN61000-4-5	S
• Immunity conduit RF	CEI EN61000-4-6	S
• Immunity electromagnetic field 50Hz	CEI EN61000-4-8	S
• Immunity micro interruption of main	CEI EN61000-4-11	S

S=Prova Superata

THE PRODUCT IS COMPLIANCE TO ABOVE MENTIONED NORMES EMC in accord to DIRECTIVE 89/336/CEE and DLg N.476/92 e N.615/96
(EMC Test Report n. 029-03-RP on 03/02/03) .

THE PRODUCT IS COMPLIANCE TO LOW VOLTAGE NORME in accord to DIRECTIVE 73/23/CEE, 93/68CEE.

1 DESCRIPTION

1.1 – DESCRIPTION OF MANUALS

In Italian Language (IT) and in English Language (EN) the following manuals are avaliable:

- MANUAL COD. 3ES080x_Vx_CO_IT - COMMERCIAL CATALOGUE: IT DESCRIBES THE PRODUCT AND ITS FOUNDAMENTAL CARACTERISTICS.
- MANUAL COD. 3ES080x_Vx_QS_IT - QUICK START MANUAL: IT'S SUPPLIED WITH THE THERMOREGULATOR AND DESCRIBES THE ELETTRICAL CONNECTIONS, THE START UP OPERATIONS, THE USE OPERATIONS, THE MAINTENANCE OPERATIONS, THE TROUBLE-SHOOTING DIAGNOSTIC.
- MANUAL COD. 3ES080x_Vx_MU_IT – MAINTENANCE & OPERATIONS MANUAL: IT CONTAINS ALL THE INFORMATIONS ABOUT THE PRODUCT AND MUST BE KNOWN BEFORE DOING AN INSTALLATION; IT'S SUPPLIED TO INSTALLATOR AND DESCRIBES THE NORMES USED FOR DESIGN, THE INSTAL CONDITIONS FOR SAFETY, THE ELETTRICAL CONNECTIONS, THE START UP OPERATIONS, THE USE OPERATIONS, THE MAINTENANCE OPERATIONS, THE TROUBLE-SHOOTING DIAGNOSTIC.

- MANUAL COD. 3ES080x_Vx_CO_EN - COMMERCIAL CATALOGUE
- MANUAL COD. 3ES080x_Vx_QS_EN - QUICK START MANUAL
- MANUAL COD. 3ES080x_Vx_MU_EN - MAINTENANCE & OPERATIONS MANUAL

In French Language (FR), German (DE), Spanish (SP) the following manuals are avaliable:

- MANUALE COD. 3ES080x_Vx_QS_FR - QUICK START MANUAL
- MANUALE COD. 3ES080x_Vx_QS_DE - QUICK START MANUAL
- MANUALE COD. 3ES080x_Vx_QS_SP - QUICK START MANUAL

If requested It will be possible to edit specific language.

ALL MANUALS ARE AVALIABLE ON OUR INTERNET WEB SITE:

www.3e3e3e.com

1.2 GENERAL PRODUCT DESCRIPTION

- **APPLICATION:** Impulse heat-seal technology is used to seal, rapidly and with great accuracy, polyethylen films, polyprophilene films, single-component plastic films, multilayer plastic films in general, that must reach their melting temperature and a cool down immediately to avoid deformations.

- **OPERATING PRINCIPLES:** To execute impulse sealing, use a sealing bar with a sealing band o wire electrically insulated from earth, supplied by an equipment specific for impulse sealing, i.e. an impulse thermoregulator. This equipment must supply the power required to heat the band at the desired sealing temperature in an extremely short time and maintain the desired temperature with high precision during all the sealing operations; No additional probe are required, the equipment simpy reads the feedback signals from the bands and controls the heating current with a closed-loop circuit. The termoregulator first receives a pre-heat signal from the outside so that the sealing bar can reach a required pre-heat temperature not far from sealing temperature before starting works. The thermoregulator further receive a sealing signal from the outside so that the sealing bars can reach the correct sealing temperature when brought together.

- **MAIN FEATURES:** The thermoregulator THERMOSALD ISC is manufactured in 3 versions: switch of the power transformer on the secondary up to 60 or 90 ampere, switch on the primary up to 300 Ampere; it's interchangable with all the previous thermoregulator by our company; it's very easy to use.

- **RS485 SERIAL INTERFACE:** The low cost option /RS485 let user to interface thermoregulator with PLC or PC with or without digital panel; in this way it's possible to exchange RUN TIME data, SETTING data and MACHINE data; with an external temperature probe connected to PLC, it's possible read temperature of the bar and calibrating the machine with a very high precision

- **EASY TO USE:** At start up a calibrating command, automatically calibrate (for sealing bands from 10 cm length to 400)

I M P O R T A N T

- **START UP SUPPORT:** The thermoregulator has a special software to dimension the plant: the user introduces bands characteristics and the thermoregulator display the optimum voltage and power of transformer (see field diagnostic).

- **FIELD DIAGNOSTIC:** The thermoregulator has a potent diagnostic to compare easily and immediately, the current , voltage, resistance, power read in real time with the same memorized during start up and the same calculated theorically (see start up support): in this way the thermoregulator can enhance the differences which can causes the trouble.

- **ALARM DIAGNOSTICS:** The temperature controller comes with an efficient diagnostics system capable of identifying faults which have occured during the production process, indicating the cause and suggesting the remedies required to restore normal operating conditions.

2 WIRING DIAGRAM AND DIMENSIONS

2.1 LIST OF CHANGE-OVER SIGNALS

CN1	**POWER TERMINAL BLOCK (SWITCH ON SECONDARY)**	
PIN1	ALTERNATING CURRENT SUPPLY	(4 - 10 sq.mm)
PIN2	ALTERNATING CURRENT SUPPLY	(4 - 10 sq.mm)
PIN3	BAND -	(4 - 10 sq.mm)
PIN4	BAND +	(4 - 10 sq.mm)

NOTE 1: Power supply and control circuit supply with the same phase

NOTE 2: Twist power cable

CN1	**POWER TERMINAL BLOCK (SWITCH ON PRIMARY)**	
PIN1	ALTERNATING CURRENT SUPPLY (230Vac)	(4 - 10 sq.mm)
PIN2		(4 - 10 sq.mm)
PIN3	CONNECT TO 0 VOLTS ON THE SECONDARY OF THE POWER TRANSFORMER TO CONTROL LEAKAGE CURRENT TO GROUND	(4 - 10 sq.mm)
PIN4	ALTERNATING CURRENT SUPPLY (230Vac)	(4 - 10 sq.mm)

NOTE 1: Power supply and control circuit supply with the same phase

NOTE 2: Twist power cable

CN2	**CONTROL CIRCUIT SUPPLY TERMINAL BLOCK**	
PIN 1	400 Vac (0.1A absorption, max)	(1sq.mm)
PIN 2	230 Vac (0.1A absorption, max)	(1sq.mm)
PIN 3	0 Vac (0.1A absorption, max)	(1sq.mm)

NOTE 1: Power supply and control circuit supply with the same phase

CN3	**CONTROLS TERMINAL BLOCK**	
PIN1	COMMON 0 V PLC (24V DC)	(1 sq.mm)
PIN2	IN PRE-HEAT SIGNAL FROM PLC, 24V DC (0V DC) (12 mA absorption, max)	(1 sq.mm)
PIN3	IN SEALING SIGNAL FROM PLC, 24V DC (0V DC) (12 mA absorption, max)	(1 sq.mm)
PIN4	IN RESET SIGNAL FROM PLC, 24V DC (0V DC) (12 mA absorption, max)	(1 sq.mm)
PIN5	IN CALIBRATING SIGNAL FROM PLC, 24V DC (0V DC) (12 mA absorption, max)	(1 sq.mm)
PIN6	OUT SEALING FAULT (CONTACT N.C.) $\cos\Phi = 1$ 250V 8A	(1 sq.mm)
PIN7	OUT SEALING FAULT (CONTACT N.C.) $\cos\Phi = 0.4$ 250V 5A	(1 sq.mm)

CN4	DISPLAY PANEL CONNECTOR (15 PIN FEMALE)		
PIN1	+5Vcc	Screened	(0,25mmq)
PIN2	0 V	Screened	(0,25mmq)
PIN3	SPI-SDO	Screened	(0,25mmq)
PIN4	SPI-SCK	Screened	(0,25mmq)
PIN5	SPI-SDI	Screened	(0,25mmq)
PIN6			
PIN7			
PIN8			
PIN9	SPI-SS	Screened	(0,25mmq)
PIN10	RESERVED	Screened	(0,25mmq)
PIN11	RESERVED	Screened	(0,25mmq)
PIN12	RESERVED	Screened	(0,25mmq)
PIN13	RESERVED		
PIN14			
PIN15			

NOTE 1: The cable termoregulator-panel must be screened, pin to pin connected - Max Mt 15.

CN5	RS 485 SERIAL INTERFACE CONNECTOR (9 PIN FEMALE)		
PIN3	Channel B+	Screened	(0,25mmq)
PIN8	Channel A-	Screened	(0,25mmq)

NOTE 1: Twist the cables

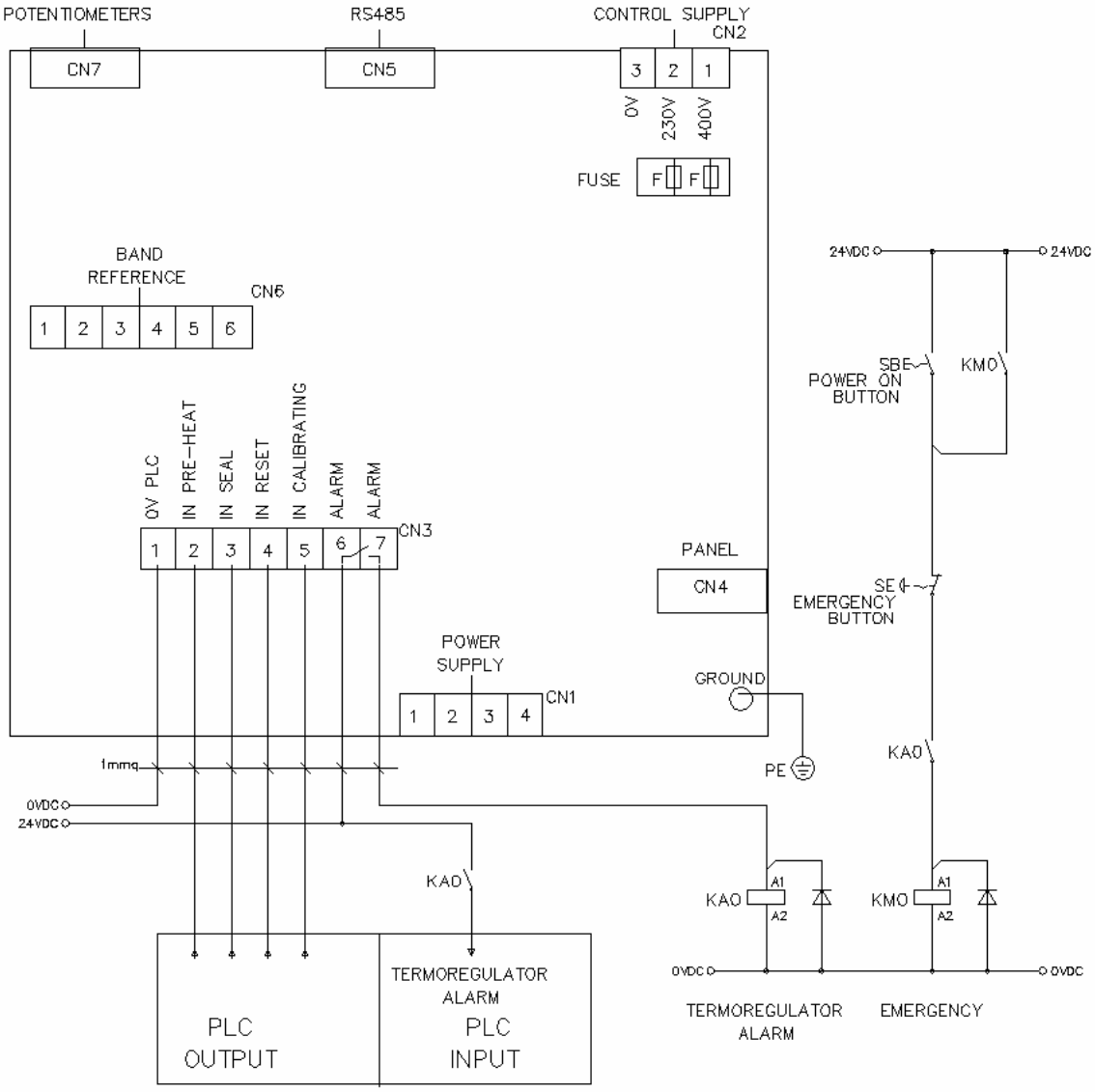
CN6	REFERENCE TERMINAL BLOCK	
PIN1	SEALING BAND REFERENCE REF-	(0,5mmq)
PIN2	SEALING BAND REFERENCE REF+	(0,5mmq)
PIN3	SCREEN REFERENCE CABLE REF 0 (Don't connect on machine side)	(1mmq)
PIN4	REFERENCE TA-	(0,5mmq)
PIN5	REFERENCE TA+	(0,5mmq)
PIN6	SCREEN TA CABLE TA0 (Don't connect on machine side)	(1mmq)

NOTE 1: Twist cables or better use cable TWINAX IBM (Ns. cod. 3esd0066)

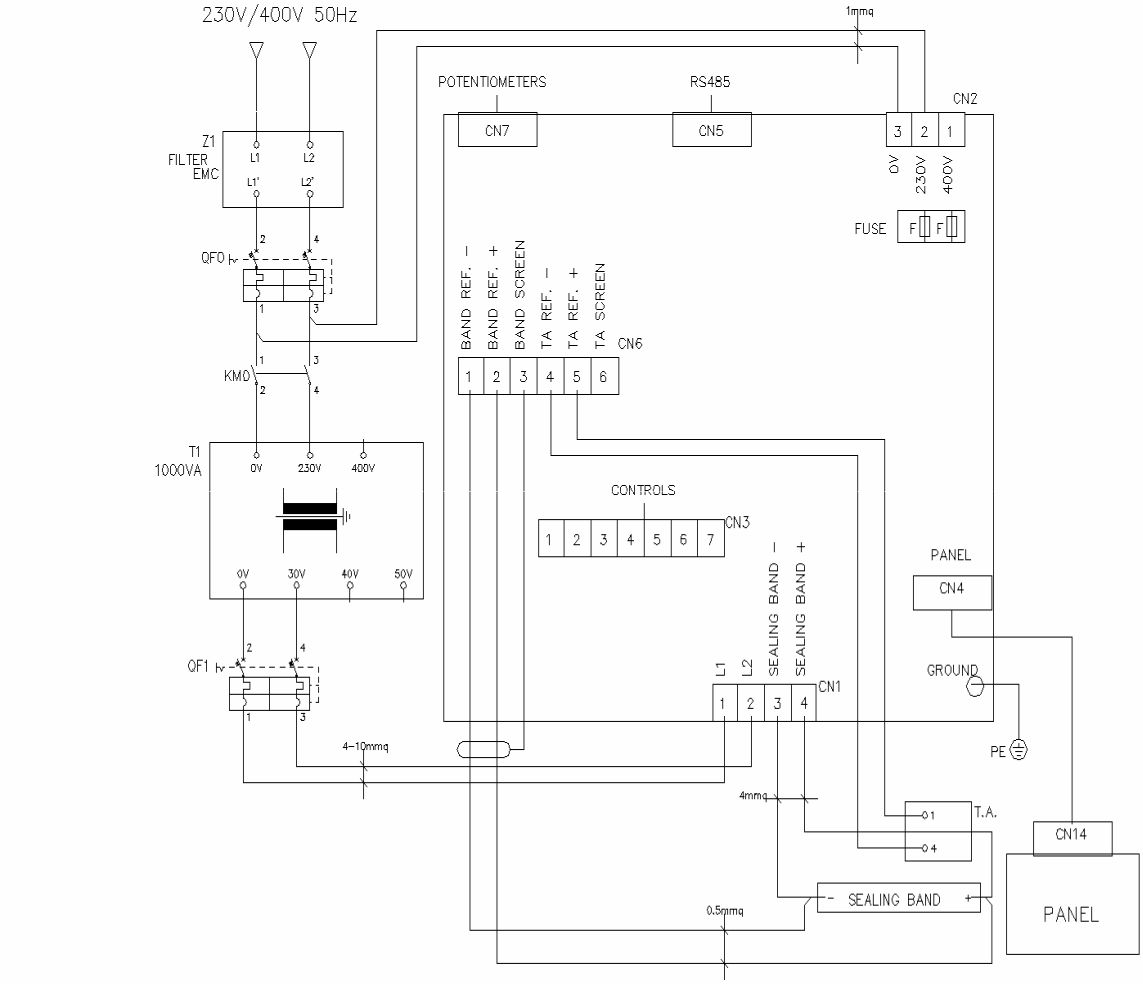
CN7	POTENTIOMETER CONNECTOR (9 PIN MALE)		
PIN1	PRE-HEAT POTENTIOMETER +4,58V	Screened	(0,25mmq)
PIN2	PRE-HEAT POTENTIOMETER RIF+	Screened	(0,25mmq)
PIN3	PRE-HEAT POTENTIOMETER 0V	Screened	(0,25mmq)
PIN4	Connect PIN3 to PIN4	Screened	(0,25mmq)
PIN5			
PIN6	SEAL POTENTIOMETER +4,58V	Screened	(0,25mmq)
PIN7	SEAL POTENTIOMETER RIF+	Screened	(0,25mmq)
PIN8	SEAL POTENTIOMETER 0V	Screened	(0,25mmq)
PIN9	Connect PIN 8 to PIN9	Screened	(0,25mmq)

NOTE 1: If conneted to PLC analog output use PIN2,PIN3,PIN7,PIN8 and leave free PIN4-PIN9
NOTE 2: Twist cables or better use cable TWINAX IBM (Ns. cod. 3esd0066)

2.2 ELECTRIC DRAW – DIGITAL CONNECTIONS

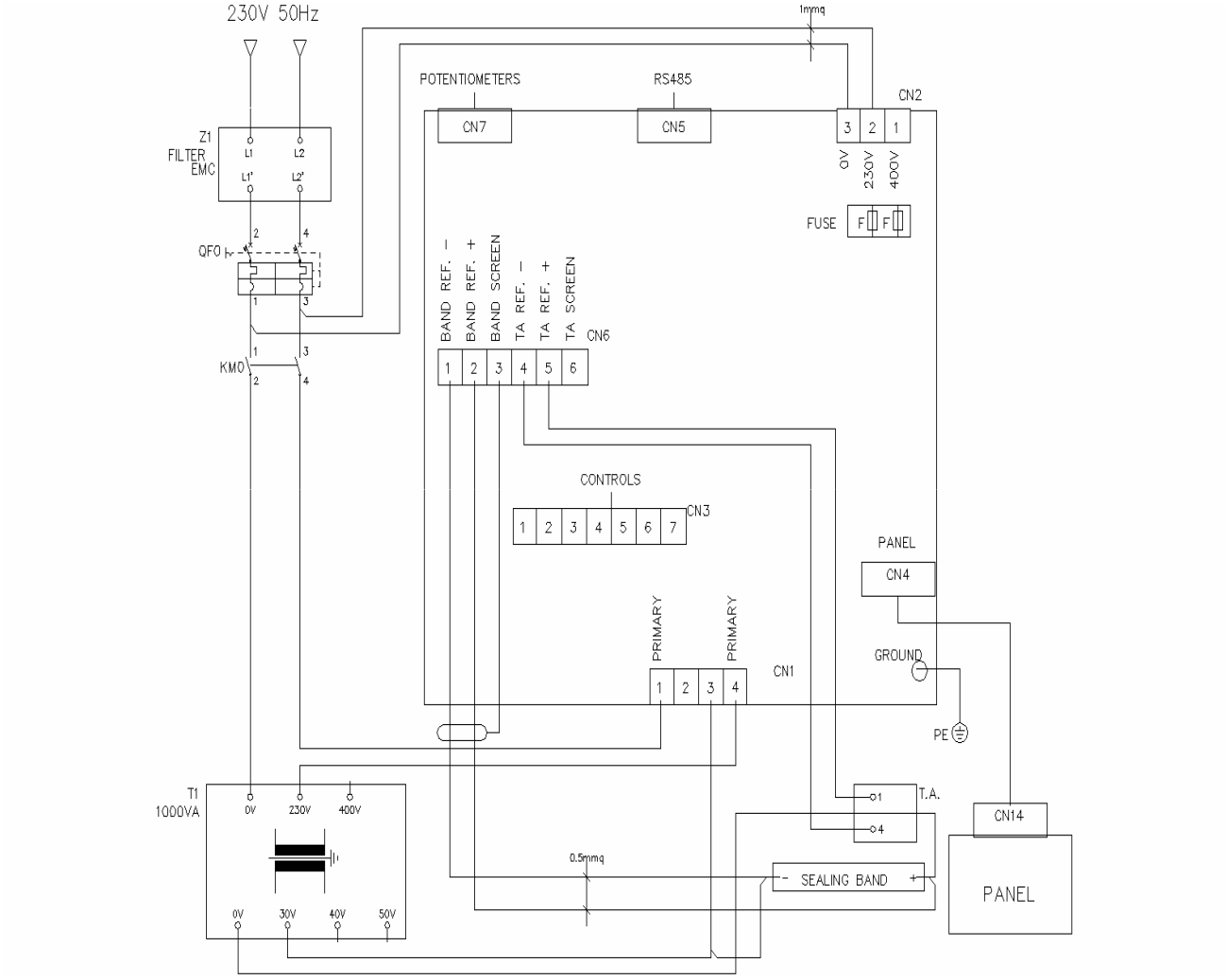


2.2 ELECTRIC DRAW – POWER CONNECTIONS (CONTROL OF THE SECONDARY)



NOTE -
Power supply (CN1/1 e CN1/2) must be with the same phase as control supply (CN2/3 e CN2/2).
Ground screw must be connected to the ground of machine, with the cable jellow green section > = power cable section.
Twist power cable, twist TA cable
Twist and screen sealing reference cable

2.2 ELECTRIC DRAW – POWER CONNECTIONS (CONTROL OF THE PRIMARY)



NOTE -
Power supply (CN1/1 e CN1/4) must be with the same phase as control supply (CN2/3 e CN2/2).
Ground screw must be connected to the ground of machine, with the cable jellow green section > = power cable section.
Twist power cable, twist TA cable
Twist and screen sealing reference cable

3 INSTALLATION

3.1 – ANALYSIS OF APPLICATION

BEFORE BEGINNING THE FIRST INSTALLATION, READ CAREFULLY THE WARNINGS AT CHAPTER 0 AND PARTICULARLY THE SAFETY PRECUTIONS AT CHAPTER 0.1 AND COMPLIANCE WITH ELECTRO-MAGNETICS STANDARDS AT CHAPTER 0.2.

IT IS ENOUGH FOLLOW STEP TO STEP THE FOLLOWING INSTRUCTIONS TO START UP THERMOREGULATOR WELL; FOR ANY QUESTIONS DON'T EXITATE TO CONTACT OUR TECHNICAL OFFICE.

- **WHICH BAND CAN USE TO HAVE THE MAXIMUM?**

If You like You can contact our technical office to choise band

Material:

- Original bands by 3E in special alloy — Good
- NiCr80/20 — No good
- Altro: — Contact our technical office

Profile:

- Chamfered (tapered edge) …….
- Flat …….
- Concave (grooved) …….
- Double …….
- Beaded …….
- T-Shape …….
- Cutting wire …….
- Endless steel bands …….
- Other …….

Geometrical Dimensions:

- Width: LARG= ……. [mm]
- Thickness: SP= ……. [mm]
- Length : L-TOT= ……. [mm]
- Copper/Silver Ends: L-RAM= ……. [2 x mm]
- Copper/Silver in the center: L-RAMC= ……. [mm]
- Teflon in the center: L-TEFL= ……. [mm]
- Other: …….

- **CALCULATION OF THE USABLE BAND LENGTH**

It's the length of the part not coppered; it's calculated by the following formula:
L-UTIL = LTOT – (LRAM x 2) – LRAMC)

Usable length: L-UTIL = ……. [mm]

- **CALCULATION OF THE BAND SECTION**

The band section is calculated by the following formula:
SEZ = LARG x SP in mmq

Section: SEZ = ……. [mmq]

3.2 - CALCULATION OF SEALING BAND RESISTANCE

If You USE AN ORIGINAL band 3E included in the underlying tables, You can calculate band resistance using the tables and applying the following formula:

1 – single band = **R-BAND = R0 x L-UTIL [mt.]**
2 – 2 bands in series = **R-BAND = R0 x L-UTIL x 2 [mt.]**
3 – 2 bands in parallel = **R-BAND = R0 x L-UTIL / 2 [mt.]**

R0 = Specific resistance of the band [Ω / mt]
L – UTIL = Usable length of the band [mt.]

If You DON'T USE AN ORIGINAL band 3E included in the underlying tables, You must measure the band resistance directly on te contact with a precision instrument.

Resistance: R-BAND= ……. [Ω]

3.3 - THERMOREGULATOR CHOISE

- **WHAT TYPE OF THERMOREGULATOR IS TO CHOOSE ?**
  -SECONDARY 60 AMPERE? (ICC= 60 x 2.5 = 150 AMPERE)
  -SECONDARY 90 AMPERE? (ICC= 90 x 2.5 = 225 AMPERE)
  -PRIMARY 120A? (ICC=120 x 2.5 = 300 AMPERE)
  -STANDARD OR LOW VOLTAGE?

It depends from the HEATING CURRENT as following:
calculate the section of the band, if serial or parallel; in the case of parallel the section is twice.
If we think a current of 30 Ampere/mmq (from experience, for more informations contact our technical office) we have the following:

I HEATING =BAND SECTION S[square mm] x 30[Amp/squaremm]

The thermoregulator must have a nominal current more then I HEATING.

SAMPLES:

CONFIGURATION SINGLE	**SECTION**	**I HEATING**	**I THERMOSALD**
4 x 0,25	**1**	30 Amp	60
5 x 0,2	**1**	30 Amp	60
6 x 0,2	**1,2**	36 Amp	60
8 x 0,15	**1,2**	36 Amp	60

CONFIGURATION SINGLE	**SECTION**	**I HEATING**	**I THERMOSALD**
4 x 0,25 x 2	**2**	60 Amp	60
5 x 0,2 x 2	**2**	60 Amp	60
6 x 0,2 x 2	**2,4**	72 Amp	60-90
8 x 0,15 x 2	**2,4**	72 Amp	60-90

CONFIGURATION SINGLE	**SECTION**	**I HEATING**	**I THERMOSALD**
8 x 0,2 x 2	**3,2**	96 Amp	90-120

3.4 - POWER TRANSFORMER CHOISE

- **WHICH TRANSFORMER IS TO CHOOSE?**

The choise depends on I heating current and resistance.
At the first start up it's better to use transformers multivoltage original by 3E, specific for the thermoregulators 60 Ampere, 90 Ampere, with control of the secondary, with control of the primary; for the following applications it's possible to manufacture specific transformers lower cost by 3E or to supply electric features (see append F).

- **WHICH VALUE OF SECONDARY VOLTAGE?**

It's calculate from I heatin current and band's resistance:
(VOLT SECONDARY = R-BAND x I HEATING)

- **Sample:**

It's to connect a band with 0,4 Ohm of resistance, section 2 sqmm, heating current will be 60 Ampere (30Ampere x 2sqmm) and the voltage of secondary will be 24 Volts (0.4 ohm x 60 Ampere)

Transforer:	**POWER =**	**…….**	**[VA]**
	PRIMARY =	**…….**	**[V]**
	SECONDARY =	**…….**	**[V]**

3.5 - PROTECTION DEVICE CHOISE

- **WHICH PROTECTIVE DEVICES ARE TO CHOOSE? (MODULATION ON THE SECONDARY)**

On the 220 Vac supply voltage of the logic, 2 fuses inside the thermoregulator protect the internal transformer.
It's necessary protect only the 220 Vac supply cables from short circuit in compliance with the normes IEC204.1

On the power supply, the transformer must be protect on the primary and secondary; protective devices depends on the HEATING CURRENT on the secondary and the same rated to the primary.
Use the D curve protections (or delay fuses)

The protections suggested must be verified by the designer in compliance with the application.

- **WHICH PROTECTIVE DEVICES ARE TO CHOOSE? (MODULATION ON THE PRIMARY)**

On the 220 Vac supply voltage of the logic, 2 fuses inside the thermoregulator protect the internal transformer.
It's necessary protect only the 220 Vac supply cables from short circuit in compliance with the normes IEC204.1

On the power supply, the transformer must be protect on the primary; on the secondary it's possible to connect directly the transformer to the band, without protections, because of an active protection inside the termoregulator by the T.A. circuit; protective devices depends on the HEATING CURRENT on the secondary rated to the primary.
Use the D curve protections (or delay fuses)

The protections suggested must be verified by the designer in compliance with the application.

3.6 – ADVICES TO DEVELOP ELECTRIC CONNECTIONS

- **WHICH ACTIONS ARE TO DO, TO HAVN'T PROBLEMS DURING STARTING UP?**

Use original power transformers by 3E
For the first start up, we recommend to use the original multi-voltage power transformers by 3E, specific for the thermoregolators 3E.
For the following start up we can supply original single voltage power transformers by 3E, lower cost.
If You prefer to use a different transformer from above refer to technical characteristic on this book, see ANNEX F – MULTIVLTAGE TRANSFORMER TECHNICAL FEATURES.

Use original bands by 3E in special alloy
For the first start up this is indispensable.
For the following start up, we advise to continue to use the original bands to don't loose stability.
In the market You can find other good bands; don't use bands of any materials; for informations contact our commercial office.

Execute wiring as advised in the WIRING NOTE and in the FOLLOWING PICTURES (SEE FOLLOWING PAGES)
Pay much attention to the connections on the machine of the reference wire and of the power cables to have no problems at starting up and in the future; contact our technical office for more informations.

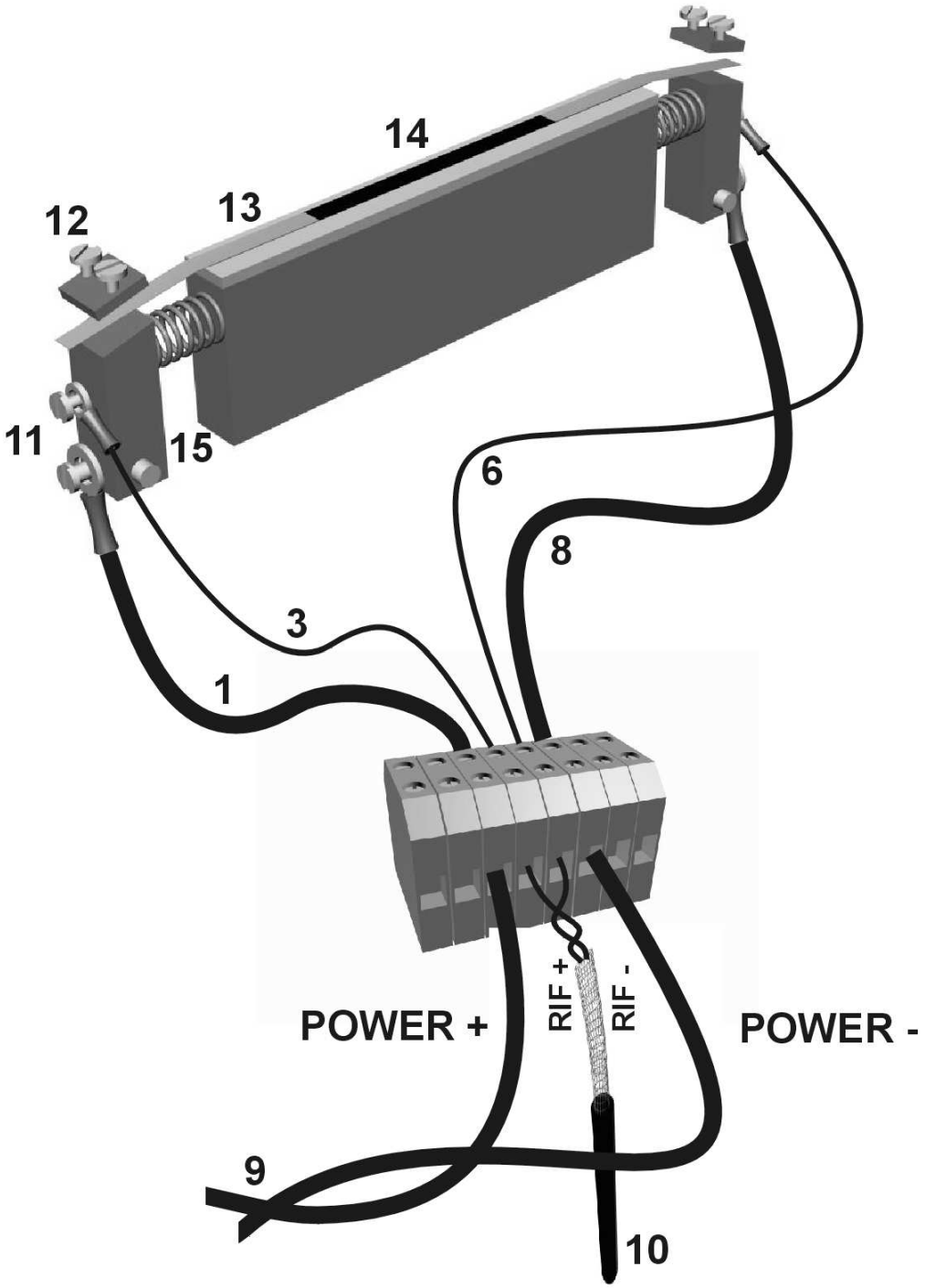
Connect in phase the supply of logic (230 Volts) with the primary of power transformer (230Vac o 380 Vac).
The 230V of logic must be:
1 – The same of the primary of the power transformer (if the primary of the power transformer is 230V)
2 – In phase or out of phase 180 degree, originated by a little transformer es. 30VA - 0-400 / 0-230 (if the primary of the power transformer is 400V)

Read diagnostic warning and act accordingly
If it happens to have some problems during start up or later, read and pay attention at the alarm number that appears on the display panel; read the cause and the remedy in this book, see append D, and act accordingly; if the problems persist don't exitate to contact our technical office: the diagnostic permit to us to help You to solve problems also at distance.

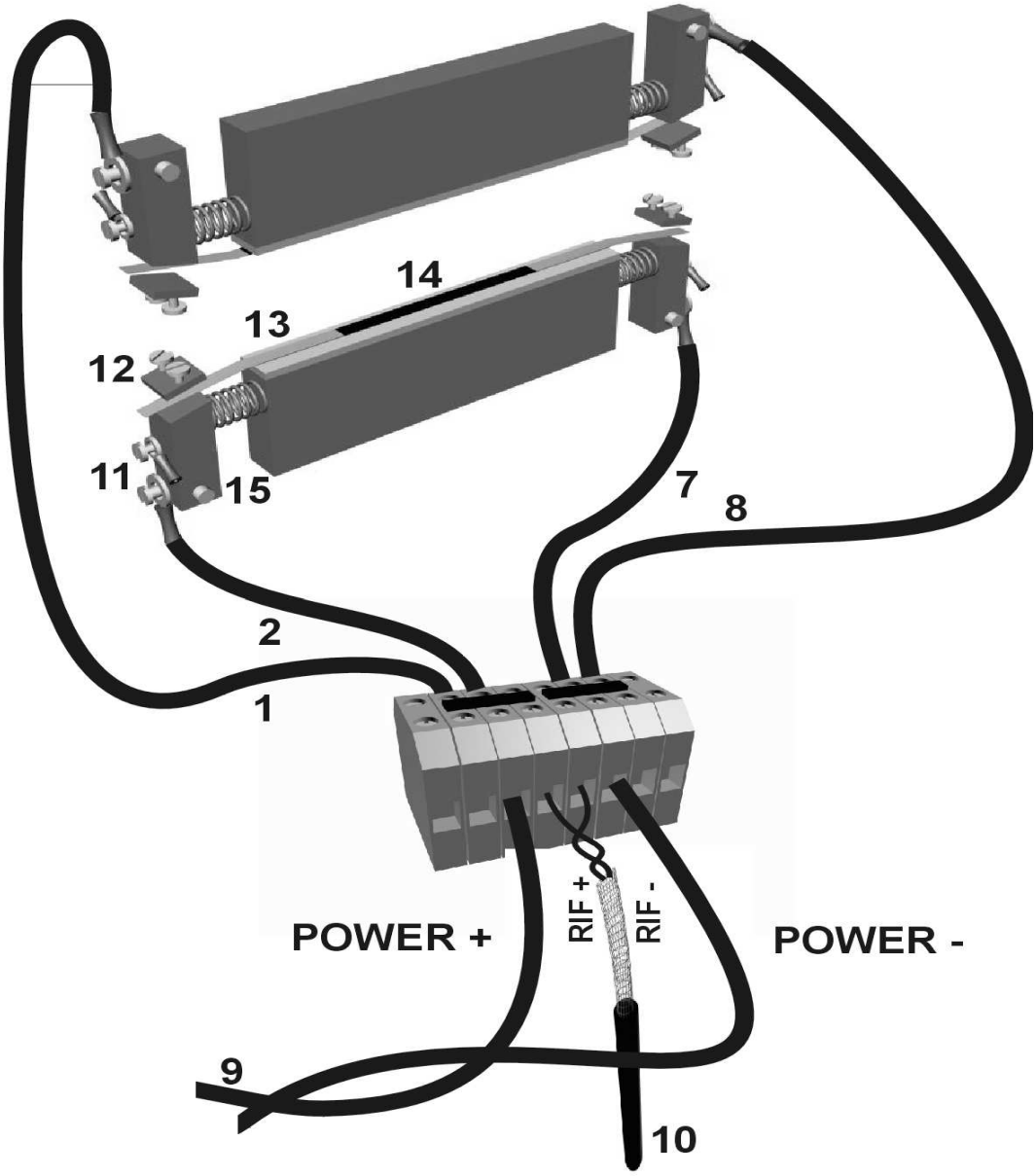
It's better to position the panel cable far from cables supplying high currents or other electrical noise sources.
In any case the panel cable is screened and protected from electrical noise.

Mount the thermoregulator leaving a rigth space around for cooling:
8 cm about for model 60 Ampere
10 cm about for model 90 Ampere

CONNECTIONS TO SINGLE BAND



CONNECTIONS IN PARALLEL (SUGGESTED)



CONNECTION IN PARALLEL (HIGH PRECISIOUS)
(CONTACT OUR TECHNICAL OFFICE FOR 2 o 4 REFERENCE CABLE)
(if 2 reference cables use the couple 3-6 or 4-5)

OBSOLETE

- **CHAMFERED SPECIAL ALLOY ELEMENTS RESISTANCES CHART**

Band width (mm)	Band thickness (mm)	Specific resistance R0 Ω / mt
1.5	0.3	1.67
2	0.25	1.59
3	0.1	2.95
3	0.15	1.95
3	0.2	1.50
3	0.25	1.27
4	0.15	1.40
4	0.25	0.96
5	0.2	0.8
5	0.25	0.69
6	0.1	1.6
6	0.2	0.72
8	0.1	1.2
8	0.2	0.51

- **T-SHAPE SPECIAL ALLOY ELEMENTS RESISTANCES CHART**

Band width (mm)	Band thickness (mm)	Specific resistance R0 Ω / mt
2.8	0.3	0.9
4	0.3	0.6

- **BEADED SPECIAL ALLOY ELEMENTS RESISTANCES CHART**

Band width (mm)	Band thickness (mm)	Specific resistance R0 Ω / mt
4	0.15	1.4
4	0.25	0.9
6	0.15	0.99
6	0.25	0.6

- **CONCAVE SPECIAL ALLOY ELEMENTS RESISTANCES CHART**

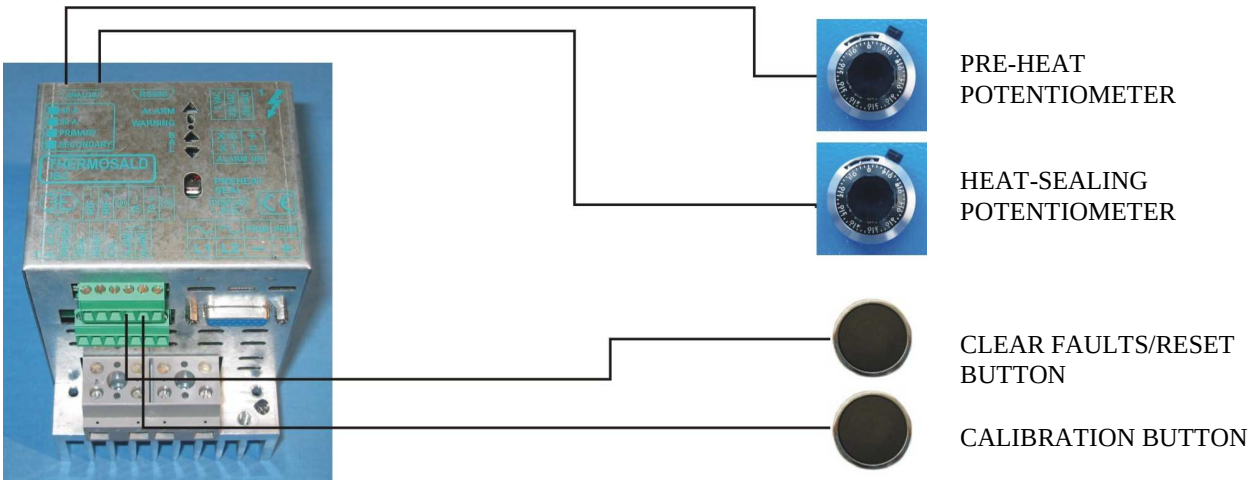
Band width (mm)	**Band thickness (mm)**	**Specific resistance R0 Ω / mt**
2.8	0.3	0.9

4 STURT UP

4.1 - STURT UP PROCEDURES – INSPECTING THE SYSTEM AND THE PARTS USED

Stage 1 – In order to properly set up the system, read the instructions given in paragraph 4.8 THEORETIC CALCULATIONS AND DIAGNOSTIC PROCEDURES and 4.9 SETUP PROCEDURES WITH THE AID OF THE MULTI-LINGUAL CONTROL PANEL
Stage 2 – Switch over to Low Voltage mode for power transformer outputs up to 10 Volt
Select Standard mode for power transformer outputs from 11 to 99 V.
Switch to High Voltage mode for power transformer outputs from 100 to 140 V.
Select Primary or Secondary mode for pulsed currents up to 100 Amps
Select Primary mode for pulsed currents from 100 A to 300 A.
Stage 3 – Make the system has been contructed in an workmanshiplike manner.
Stage 4 – For any further information, call 3E – ENGINEERING DEPARTMENT.

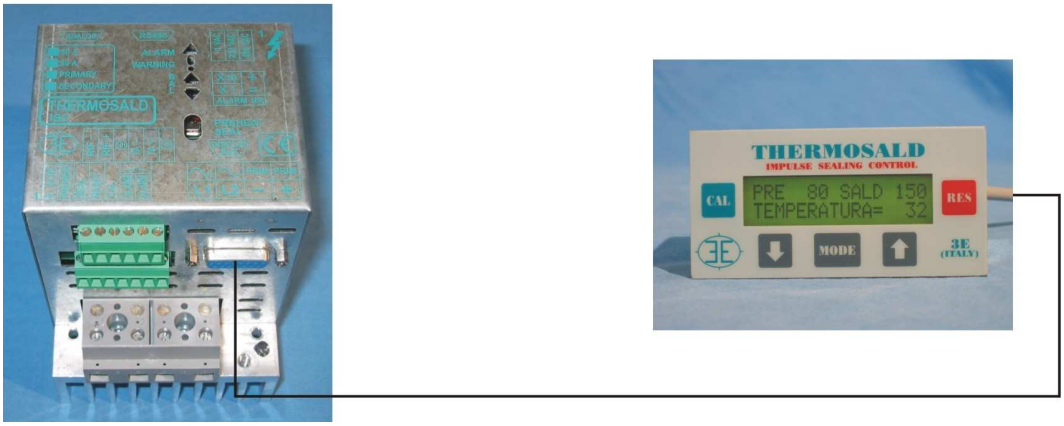
4.2 - PUTTING THE SYSTEM INTO SERVICE – BASIC SETUP (+RS485 OPTION)



Step 1 – Calibrate the system after performing the steps indicated in paragraph 4.1.
Step 2 – The machine should be at ambient temperature
Step 3 – The pre-heat and heat-sealing controls should be inactivated
Step 4 – Power up the temperature controller
Step 5 – In the event of faults (the Red ALARM Led lights up), follow the instructions given on the temperature regulator and put the faults right as required (the id. number of the fault can be found by multiplying the pulses emitted by the green Balance Led by 10 (e.g. 9 pulses= 90) + the pulses of the red Balance Led by the units (e.g. 10 pulses =0)
Step 6 – Calibrate the system. Keep the external CALIBRATION button pressed for 3 seconds and wait (the four LEDS on the system go on flashing as long as the the instrument is being calibrated).
Step 7 – The system is ready to start cycling as soon as the calibration procedure has been completed. Set the Heat-Sealing and Pre-Heat temperature by using the respective potentiometers (30 degrees/turn)

WARNING – If calibration problems arise, perform a MASTER RESET procedure starting from stage 5 (to perform the MASTER RESET procedure, keep the external RESET + CALIBRATION buttons pressed for 6 seconds; the 4 Leds on the equipment stay on for 3 seconds).

STURT UP THE SYSTEM INTO SERVICE – BASIC SETUP + MULTI-LINGUAL CONTROL PANEL (+RS485 OPTION)



Step 1 – Carry out the calibration procedure after performing the steps indicated in paragraph 4.1.
Step 2 – Make sure the machine is at ambient temperature
Step 3 – The Pre-Heat and Heat-Sealing controls should be inactivated.
Step 4 – Power up the temperature controller
Step 5 – In the event of faults (the Red ALARM LED on the temperature controller comes on), follow the instructions given on the control panel and put the faults right as required (the number of the fault occured is displayed on the control panel along with the relevant description in one of the 6 languages provided).
Step 6 – Calibration: keep the CAL button on the multi-lingual control panel pressed for 3 seconds as indicated in the illustration below, Figure 3 (the four LEDS on the equipment go on flashing as long as calibration is being performed).
NOTE: For further calibration procedures, press buttons CAL+MODE+CAL on the multi-lingual panel in the order given . Also refer to the illustration below, Figures 1+2+3:

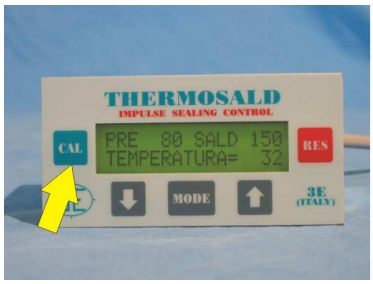


Figure 1

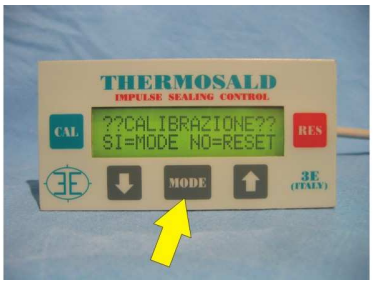


Figure 2

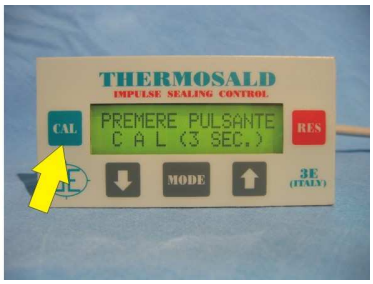


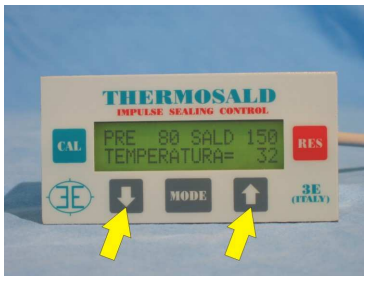
Figure 3

NOTE: Calibration can be carried out from the "outside" as described in paragraph 4.2 with the basic setup.

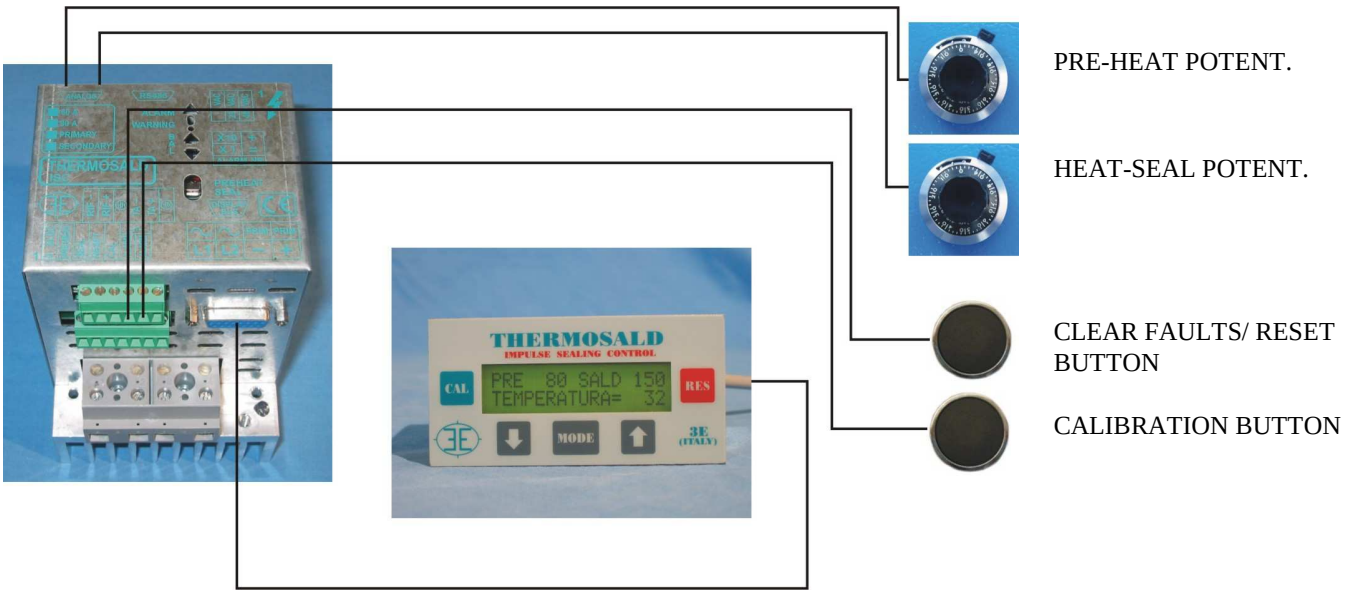
Step 7 – The system is ready to cycle once the calibration procedure has been carried out. Set the Pre-Heat and Heat-Sealing temperatures (press the MODE+MODE button in the sequence given to access the TEMPERATURE submenu - refer to paragraph 4.7).

Step 8 – To go back to the initial display, press the RES button and follow the instructions given.

NOTE – If calibration problems arise, perform a MASTER RESET procedure starting from stage 5.
To perform a MASTER RESET procedure, use either of the two modes below:
mode 1 – Keep the ARROW DOWN + ARROW UP buttons pressed for 6 seconds.
mode 2 - Keep the external RESET+CALIBRATION buttons pressed for 6 seconds.
The four LEDS on the equipment stay on for 3 seconds

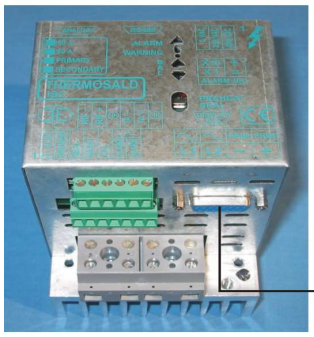


4.4 - PUTTING THE SYSTEM INTO SERVICE – BASIC SETUP + MULTI-LINGUAL PANEL + POTENTIOMETERS (+RS485 OPTION)



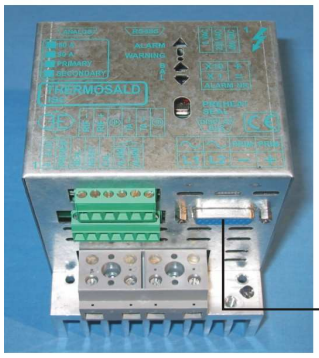
NOTE 1: Perform the same operations as those described in paragraph 4.3 above.
NOTE 2: To enable the potentiometers, change the MACHINE DATA items = 1, Potentiometers + display.
NOTE 3: Set the maximum pre-heat and heat-seal temperatures by using the control panel. To step them down, adjust the analog inputs (potentiometer setting: 30 degrees/turn; analog input settings: 13 mV/degree).

4.5 - BASIC SETUP + CAN BUS (PRELIMINARY STAGES)



CAN BUS

4.6 - BASIC SETUP + PROFIBUS (PRELIMINARY STAGES)

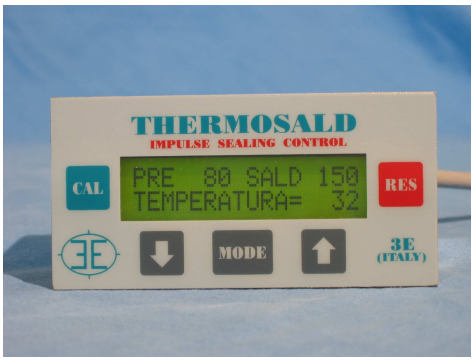


PROFIBUS

4.7 - OPERATING THE MULTI-LINGUAL CONTROL PANEL

NOTe: The user can go back to the initial display from any video pages by pressing the RES button several times.

INITIAL DISPLAY	LEVEL 1



NOTe: To scroll the sub-menus, press buttons MODE+ARROW DOWN or ARROW UP in the order given.

TEMPERATURE SUBMENU	LEVEL 2
DIAGNOSTIC SUBMENU	LEVEL 2
EMERGENCY TEST SUBMENU	LEVEL 2
BURN-IN SUBMENU	LEVEL 2
DATA SETTING SUBMENU	LEVEL 2
MACHINE DATA SUBMENU	LEVEL 2
INFORMATION SUBMENU	LEVEL 2

NOTE: Press buttons MODE+ARROW DOWN or ARROW UP to access any submenu or parameter.

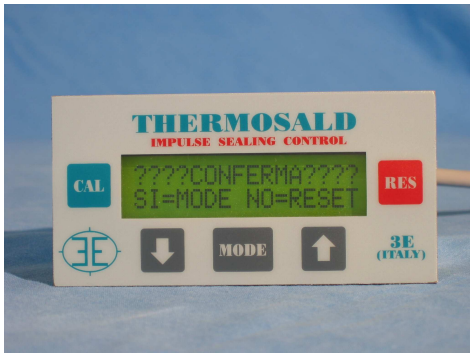
NOTE: To alter any parameter displayed, proceed as follow:
Press the MODE button to switch over to modification mode: ? 080
Press the ARROW UP button to alter any data item: ? 081
Press the MODE button to quit the modification mode: = 081

NOTE: Before saving any changes made, the system prompts the user to confirm the entry:

????ENTER????

YES=MODE NO=RES

Select YES to confirm, NO to restore the earlier data



4.8 - THEORETICAL CALCULATIONS AND DIAGNOSTIC PROCEDURES WITH THE AID OF THE DATA INPUT PANEL

1) Access the DIAGNOSTIC – THEORETICAL CALCULATION submenu.
2) Enter the data that concern the shape of the strip: length, width, cross-section, number of strips in series, number of strips in parallel.
3) Enter the data and quit.

DIAGNOSTIC

1) Select the DIAGNOSTIC – ANALISYS submenu.
2) Scroll the diagnostic video-pages by using the ARROW UP – DOWN buttons. These pages contain the electrical specifications that concern the sealing strip: maximum effective currents, resistance, full-wave effective currents, full-wave effective power.
3) Each video page indicates 3 values that relate to the same variable under different conditions i.e.: THEORETICAL VALUES, CALIBRATION SETTINGS, REAL TIME VALUE, in particular:

PAGE 1: IMAX=
I0= I=

Where IMAX stands for the maximum pulsed effective currents of the temperature controller, I0 represents the full-wave effective current for calibration and I is the actual full-wave effective current

PAGE 2: R THEORETICAL =
R0= R=

Where R THEORETICAL stands for the theoretical resistance of the temperature controller, R0 is the calibration resistance and R represents the actual resistance.

PAGE 3: I THEORETICAL =
I0= I=

PAGE 4: V THEORETICAL =
V0= V=

PAGE 5: P THEORETICAL =
P0= P=

4) Particularlty useful information on the system conditions can be obtained by comparing the three variables so that any malfunctioning and diagnostic problems can be dealt with remotely.

4.9 - SETUP PROCEDURES WITH THE AID OF THE CONTROL PANEL

1) Enter the theoretical values (see paragraph 4.8 above)
2) Access the DIAGNOSTIC – ANALYSIS submenu (see paragraph 4.8 above)
3) Read the **effective pulsed voltage of the strip, THEORETICAL V**.
4) Set the transformer secondary voltage allowing for a multiplication coefficient of 1.5 – 2 for pulsed operation and a coefficient of 1.5 for continuous operation:
   transformer V = strip V x multiplication coefficient (1.5 - 2), select the nearest one.

4.10 - SETUP PROCEDURES WITHOUT USING THE CONTROL PANEL – MANUAL MODE

Calculating total resistance:
R strip=specific resistance[Ohm/m] x strip length[m]
Calculating the strip cross-section S:
Strip cross-section S[mm^2]=strip length[mm] x strip thickness[mm]
Calculating the theoretical pulsed heating currents I:
I heating=strip cross-section S[mm^2] x 30[Amp/ mm^2]
Calculating the effective pulsed voltage applied to the strip:
V strip=R strip x I heating
Calculating the transformer secondary voltage allowing for a multiplication coefficient of 1.5 – 2 to increase the sealing speed under pulsed operating conditions and coefficient 1 for continuous operation:
V transformer= V strip x multiplication coefficient (1.5 - 2)
(select the nearest one)

5 MAINTENANCE

5.1 – CHANGING THE SEALING BANDS WITH MACHINE COLD (i.e. gripper jaws at ambient temperature)

- **HAVE YOU TO CHANGE THE SEALING BANDS WITH THE MACHINE AT AMBIENT TEMPERATURE, BECAUSE OF A PROGRAMMED MAINTENANCE?**

Pre-heat and seal comands are off; the machine is at ambient temperature; The sealing bands have little differences in measure; for optimum accuracy it is possible to do an automatic cold balance to compensate the differences; it is possible doing a burn-in cycle after, to become stable electric characteristics.

1 – Switch off power, release pre-heat and seal commands, let the gripper jaws getting cold down.

2 – Install the new sealing bands, switch on power.

3 – Make the CALIBRATING
Normally is not necessary change ambient temperature (gripper jaws temperature) in the SETTING DATA and doing a burn in cycle at the end of calibrating.

4 - THE MACHINE IS READY TO WORK.

5.2 – CHANGING THE SEALING BANDS WITH MACHINE HOT
(i.e. gripper jaws cooling down , but hot too because of inertia)

- **HAVE YOU TO CHANGE THE SEALING BANDS WITH THE MACHINE HOT, WITH THE PRODUCTION IN PROGRESS, WITHOUT WAITING THAT GRIPPER JAWS TEMPERATURE FALLS DOWN AT AMBIENT TEMPERATURE?**

A sealing bands change, with the machine hot, with the production in progress, is less accurate then a change with the machine cold, in a programmed maintenance, because the automatic cold balancing must not be done (an automatic cold balance is done to compensate the differences in measure of the sealing bands).
If the application needs a very high precision, it is possible doing a quick change of the all gripper jaws with sealing bands, and go on with the preceding procedure of CHANGING THE SEALING BANDS WITH MACHINE COLD(see par. 5.1).
Another less expensive way to work, but easier to make a mistake, is to set the parameter of ambient temperature at the gripper jaws temperature and doing an automatic cold balancing (do not exitate to contact our technical office)

1 – Switch off power, release pre-heat and seal commands, let the gripper jaws cooling down.

2 - Install the new sealing bands, switch on power.
- If the machine is hot, must not do the automatic cold balancing.

3 – Only if necessary do the BURN-IN CYCLE.
- Verify if burn-in is necessary in the specific application, looking at the quality of the first seal.

4 - THE MACHINE IS READY TO WORK.

5.3 – TROUBLESHOOTING

- **PROBLEM:** Allarm Fxxx appears on the display - **VERIFY** alarm list in this book (ANNEX D)
- **PROBLEM:** In Balancing the band is hot - **VERIFY** that logic and power supply are in the same phase
- **PROBLEM:** On the display You can see oscillating temperature - **VERIFY** that contacts of bands are good, Verify that connections are not linked together, verify machine data and, if they are not regular, do a master reset and a following calibration with machine cold.

5.4 – THERMOREGULATOR MAINTENANCE

Depend on the working environment, in every way not more then every 180 days.

1 – Verify that all the thermoregulator terminals are screw tight

2 – Verify the right function of the emergency output floating contact (press the key mode as requested at power on periodically; the output relay must open power circuit)

5.5 – GRIPPER JAWS MAINTENANCE

Depend on the working environment, in every way not more then every 20 days.

1 – Verify that the reference and power terminals are screw tight

2 – Verify that the connections of the bands are good without oxidation.

3 – Verify the teflon and the isolation of gripper jaws

6 SPECIFICATIONS

6.1 SPECIFICATIONS – MODELS WITH CONTROL OF THE SECONDARY

LOGIC CIRCUIT SUPPLY (CN2)	230Vac +/- 10% (0.1 A absorption)
POWER CIRCUIT SUPPLY MODEL SECONDARY	10 - 100V
MAXIMUM SHORT CIRCUIT CURRENT MOD. 60 A	150 AMP
MAXIMUM SHORT CIRCUIT CURRENT MOD. 90 A	260 AMP + 10%
MAINS FREQUENCY	50 - 60 Hz (automatic changing)
DIGITAL CONTROLS	24 VDC (12 mA max. absorption)
OUTPUT SEALING FAULT CONTACT	250 V 8A cosΦ = 1 250V 5A cosΦ = 0.4
ACCURACY	≅ +/- 1 °C
PRE-HEATING TEMPERATURE	can be set from display console, 0 - 250 °C
SEALING TEMPERATURE	can be set from display console, 0 - 250 °C
SEALING TIME	determined by PLC (or precision timer)
COOLING TIME	determined by PLC (or precision timer)
AMBIENT TEMPERATURE	0° C +50° C
LEVEL OF BOARD PROTECTION	IP00
LEVEL OF DISPLAY CONSOLE PROTECTION	IP65
POWER ASSEMBLY WEIGHT	1,6 Kg
PANEL WEIGHT	0.2 Kg
PANEL-POWER ASSEMBLY EXTENSION WEIGHT	0.2 Kg

6.2 SPECIFICATIONS – MODELS WITH CONTROL OF THE PRIMARY

LOGIC CIRCUIT SUPPLY (CN2)	230Vac +/- 10% (0.1 A absorption)
POWER CIRCUIT SUPPLY MODEL PRIMARY	230Vac +/- 10%
MAXIMUM SHORT CIRCUIT CURRENT MOD. PRIMARY	300 AMP
MAINS FREQUENCY	50 - 60 Hz (automatic changing)
DIGITAL CONTROLS	24 VDC (12 mA max. absorption)
OUTPUT SEALING FAULT CONTACT	250 V 8A cos Φ = 1 250V 5A cos Φ = 0.4
ACCURACY	≅ +/- 1 °C
PRE-HEATING TEMPERATURE	can be set from display console, 0 - 250 °C
SEALING TEMPERATURE	can be set from display console, 0 - 250 °C
SEALING TIME	determined by PLC (or precision timer)
COOLING TIME	determined by PLC (or precision timer)
AMBIENT TEMPERATURE	0° C +50° C
LEVEL OF BOARD PROTECTION	IP00
LEVEL OF DISPLAY CONSOLE PROTECTION	IP65
POWER ASSEMBLY WEIGHT	1,6 Kg
PANEL WEIGHT	0.2 Kg
PANEL-POWER ASSEMBLY EXTENSION WEIGHT	0.2 Kg

7 DETAILS FOR ORDER FORM

7 - DETAILS FOR ORDER FORM

MODEL:	- Description	CODE
THERMOSALD ISC -	Impulse Thermoregulator 100V 60A	**3ES080DH**
THERMOSALD ISC -	Impulse Thermoregulator 100V 90A (obsolete)	**3ES081DH**
THERMOSALD ISC -	Impulse Thermoregulator 100V 60A on PRIMARY	**3ES082DH**
THERMOSALD ISC -	Impulse Thermoregulator 100V 90A	**3ES083DH**
PANEL	- Multilanguage Panel data input	**3ES080DL**
PANEL RS485	- Multilanguage Panel data input connection RS485	**3ES080DM**
CAVO	- Cable panel-Thermoregulator	**3ES080A001**
TA	- Amperometric Transformer	**3ES080A002**
CORNICE ADATT.	- Aluminum molding for mounting ISC panel on old machines with old UPSCR panel	**3ES080A003**
OPTIONS:		
RS485	- Option serial interface RS485	**3ES080DZ=485**
INAN	- Option analog input	**3ES080DZ=INAN**
LOWVOLT	- Opzione low volts	**3ES080DZ=LOVL**

- OPTIONAL EQUIPMENT:

TRANSFORMER 2100VA/70V/30A **3ESD0063**
Impulsive transformer for Thermoregulator 60 Ampere
0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50 / 60 / 70

TRANSFORMER 3000VA/50V/60A **3ESD0064**
Impulsive transformer for Thermoregulator 60 Ampere
0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50

TRANSFORMER 3000VA/30V/90A **3ESD0065**
Impulsive transformer for Thermoregulator 90 Ampere
0 / 230 / 400 / SCH / GND = 0 / 20 / 30

TRANSFORMER 3000VA/15V/200A (PER PRIMARIO) **3ES082A001**
Impulsive transformer for Thermoregulator 120 Ampere on PRIMARY
0 / 230 / 400 / 500 / 900 / SCH / GND = 0 / 15

SEALING BANDS WIRES ENDLESS BELT
Bands, wires and endless belts with many profiles, selled in meters, on specific draw,
Copper/Silver ended, teflon coated.

THERMOSALD_485 – Supervisor simulator for RS485 **3ESD0075**
(CD + Box RS232-RS485)

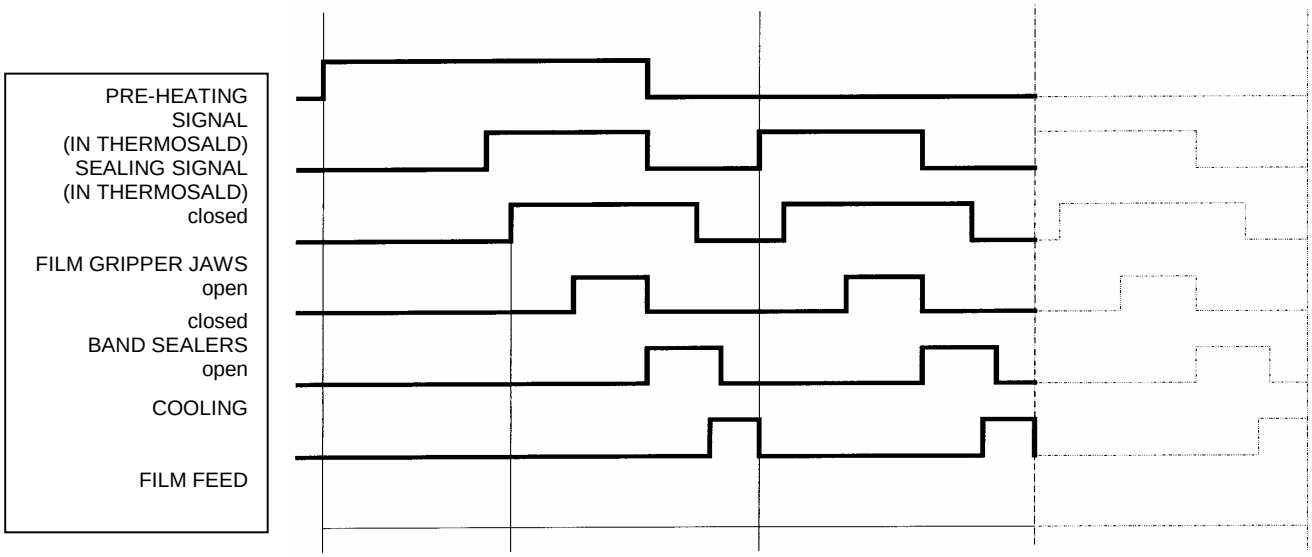
- MANUALS:

ITALIAN COMMERCIAL CATALOGUE	**3ES080x_Vx_CO_IT**
ITALIAN QUICK START MANUAL	**3ES080x_Vx_QS_IT**
ITALIAN MAINTENANCE & OPERATOR MANUAL	**3ES080x_Vx_MU_IT**
ENGLISH COMMERCIAL CATALOGUE	**3ES080x_Vx_CO_EN**
ENGLISH QUICK START MANUAL	**3ES080x_Vx_QS_EN**
ENGLISH MAINTENANCE & OPERATOR MANUAL	**3ES080x_Vx_MU_EN**
FRENCH MANUAL QUICK START MANUAL	**3ES080x_Vx_QS_FR**
GERMAN MANUAL QUICK START MANUAL	**3ES080x_Vx_QS_DE**
SPANISH MANUAL QUICK START MANUAL	**3ES080x_Vx_QS_SP**

ANNEX A – TYPICAL SEALING CYCLE

NOTE - The sealing cycle showed bottom is only for example and not a standard cycle to follow everytime. From experience we have learnt that it's necessary modify the cycle depending on materials, dimensions, speeds and else. For other informations don't exitate to contact our technical office.

SEALING CYCLE



ANNEX B – MACHINE DATA LIST

NOTE – The machine data must be changed only by skilled workers with experience, after getting in contact with our technical office; the necessity to change some machine data, may be in specific applications.

TO ENTER: from secondary menu **MACCHINE DATA** press key **MODE.**
TO OUTPUT: press key **RES** and follow guide.

- **RATED CURRENT = 60 / 90 / 120 (AMPERE)**
  Not changeable, it shows the nominal current of the model used (conseguently the short circuit current will be I_short_circuit=Inominal x 2.5)
- **HEATING INCREASE DEGREE / 10 MS = 4 (U.M.)**
  It is the speed of temperature increase following a pre-heat or a sail comand [Units degree / 10 ms].
  Increase this parameter means decrease time necessary to hot the sealing band to pre-heat temperature, i.e. increase speedy, increase overshoot, increase bands wear and tear.
- **PROPORTIONAL GAIN KV = 100 (U.M.)**
  Loop integral gain. Increase this parameter means to increase the precision of the target temperature, increase the speedy, increase the stability of the system.
  Increase too much means to introduce a temperature overshoot following a pre-heat or sealing command.
- **INTEGRAL GAIN KI = 100 (U.M.)**
  Loop integral gain. Increase this parameter means to increase the precision of the target temperature, increase the speedy, increase the stability of the system.
  Increase too much means to introduce a temperature overshoot following a pre-heat or sealing command.
- **KI OPERATING LIMIT = 60 (%)**
  Limits the maximum value of the integral gain KI; increasing this value, overshoot with the machine cold increases.
- **DERIVATIVE GAIN KD = 40 (U.M.)**
  Loop derivative gain. Increase this parameter means increase speed of the loop and then increase speed of the system.
  Increase too much means to do the system and temperature less stable.
- **HEATING FACTOR = 1.9 (U.M.)**
  This parameter modify the temperature characteristic of the thermoregulator.
  Increase this parameter means increase the temperature of the band.
  INITIAL TEMPERATURE = 0 (DEGREE)
  Degree Value relating to “0” of AD converter.
- **PARTIAL SHORT CIRCUIT FACTOR = 1.1 (U.M.)**
  This parameter is used to set an istantaneous current threshold, above which a partial short-circuit occurs and the thermoregulator sends fault signal F097.
- **FAULT DISABLE = 0 (U.M.)**
  Disable any alarm; use much caution; sometime it can help to continue the production; alarm disable must be considered temporary and it’s necessary understand immediately the cause of the trouble.
- **CONFIGURATION (MODE) = 0**
  The thermoregulator is designed to develope 2 type of functions:
  0 = standard function IMPULSE SEALING.
  1 = function HOT BAR.

- **CONFIGURATION PANEL = 2**
  The thermoregulator is designed for 5 type of functions:
  0 = function only with potentiometers (at first start up)
  1 = function with potentiometers and display: the temperature set on display in pre-heat and seal is the maximum value, with potentiometers can decrease (also with analog input).
  2 = function only with display.
  3 = predisposed for CAN BUS
  4 = predisposed for PROFIBUS
- **CONFIGURATION (SERIAL INTERFACE) = SERIAL 485 OFF**
  Thermoregulator can exchange data with supervisor by RS485 interface.
- **SERIAL ADDRESS RS485 = 0**
  Unit address for serial interface RS485; value admitted 0-15

ANNEX C – SETTING DATA LIST

NOTE – The setting data must be changed only by skilled workers with experience, after getting in contact with our technical office; the necessity to change some machine data, may be in specific applications.

TO ENTER: from secondary menu **SETTING DATA** press key **MODE.**
TO OUTPUT: press key **RES** and follow guide.

- **LANGUAGE SELECTION = ITALIAN**
  It' possible select up to 6 language: ITALIAN, ENGLISH, FRENCH, GERMAN, SPANISH, FREE
- **DEGREES SELECTION = CELSIUS**
  Select the temperature display in Celsius or Farheneit degrees.
- **CALIBRATING TEMPERATURE = 30 (DEGREE)**
  Set the calibrating temperature; it inform the thermoregulator of the sealing band temperature at the time of calibrating; if machine is cold the calibrating temperature is equal to the ambient temperature.
- **MAXIMUM SEALING TEMPERATURE = 220 (DEGREE)**
  Limit of the temperature set in pre-heat and seal.
- **MAXIMUM SEALING TIME = 0.0 (SECONDS)**
  Set the maximum sealing time; if sealing time is longer than this value, thermoregulator sends fault signal F085.
  000 means that control is not active and it is possible to do continuos sealing.
- **BURN IN TEMPERATURE = 160 (DEGREES)**
  Hot temperature in a burn-in cycle.
  Note: the burn-in cycle is used to stabilize bands in temperature; it executes 3 cycles of heating and cooling .
- **BURN IN TIME = 30 (SECONDS)**
  Heating time in seconds of the Burn_in cycle.
  Nota: the Burn-in cycle is used to stabilize bands in temperature; it executes 3 cycles of heating and cooling .
- **BURN IN CYCLE NUMBER = 3 (U.M.)**
  Numbers of heating and cooling phases in a burn-in cycle; a standard burn-in cycle includes 3 phases of heating at burn-in temperature and 3 phases of cooling at 100 degrees.
- **TEMPERATURE GRADIENT FOR CALIBRATING START (DEGREES/10SECONDS)**
  Indica la massima velocità di raffreddamento della temperatura in gradi/10secondi, sopra la quale il bilanciamento non è abilitato e compare warning 38. Se aumentiamo questo parametro si può perdere precisione.
- Set the maximum speed of cooling in degrees/10seconds; upper this value the calibrating is disabled and a warning 38 is displayed. Increasing this parameter can loose precision of calibrating.
- **ENABLE COMPENSATION WITH SYSTEM COLD (SCC) = 0 (U.M.)**
  Not developed; enable the special function of a different initial seal temperature. For more informations do not Exitate to contact our technical office.
- **SEAL TEMPERATURE WITH SYSTEM COLD (WITH SCC=1) = 220 (GRADI)**
  Not developed; it's the seal temperature of the first seals, when temperature of the band is less then structure temperature. For more informations do not exitate to contact our technical office.
- **STRUCTURE TEMPERATURE WITH SYSTEM COLD (WITH SCC=1) = 80 (GRADI)**
  Not developed; if sealing band temperature is less then structure temperature, the seal temperature will be equal to SEAL TEMPERATURE WITH SYSTEM COLD. For more informations do not exitate to contact our technical office.
- **TIME WARN66 = 3 (SECONDS)**
  In the case of frequency instability, caused by power factor correction, the thermoregulator display warning 66, without to stop the production; this parameter indicates the seconds that the message is displayed.

ANNEX D – FAULT AND WARNINGS LIST (CAUSES – REMEDIES)

NOTE - To reset every alarm give external reset command or press reset button RES on the panel

NOTE – when an alarm happens, on the thermoregulator the led red of alarm light; it's possible to know the number of alarm reading the multilanguage panel or reading the number of lightening of led red and green:
ALARM NUMBER = NR. IMPULSES OF LED GREEN x 10 + NR.IMPULSES LED RED

WARNING - ALARM CAUSES
Remedies

ALARM A TERMOREGULATOR OFF AND DISPLAY OFF
Verify power, Logic supply fault, call the supplying builder.

ALARM B TERMOREGULATOR WITH LED OFF AND DISPLAY ON
Circuit of synchronisme fault, call the supplying builder.

ALARM C TERMOREGULATOR WITH LED ON AND DISPLAY ON AND INDICATION "3E SRL + THERMOSALD"
Verify cable connection display

F06 DISPLAY EEPROM FLASH WRITE
Switch off and switch on the equipment and call the supplier

F07 A/D CONVERTER
Switch off and switch on the equipment and call the supplier

F08 INTERNAL TRASMISSION I2C-X
Switch off and switch on the equipment

F09 INTERNAL TRASMISSION I2C-EEPR
Switch off and switch on the equipment and verify parameters

F19 RS485 MASTER - CHECKSUM ERROR
Verify checksum selection on the Master or Slave

F20 RS485 SLAVE - CHECKSUM ERROR
Verify checksum selection on the Master or Slave

F21 RS485 SLAVE - OE ERROR-OVERRUN
Following data arrived before reading the previous

F22 RS485 SLAVE - FE ERROR-FRAME ERROR
Data stop bit not arrived

F23 RS485 MASTER – NO ANSWER FROM SLAVE
After a Master calling no answer received from the slave

F24 RS485 SLAVE – TOO DATA REQUESTED FROM MASTER OR WRONG ADDRESS
Master ha s requested to the slave too many data or a wrong address

F25 RS485 SLAVE – BUFFER FULL
Slave Buffer is full because of too many data trasmitted or too frequently trasmitted

F26 RS485 MASTER - OE ERROR-OVERRUN
Following data arrived before reading the previous

F27 RS485 MASTER - FE ERROR-FRAME ERROR
Data stop bit not arrived

F28 RS485 MASTER - TOO DATA REQUESTED FROM SLAVE OR WRONG ADDRESS
Slave ha s requested to the master too many data or a wrong address

F29 RS485 MASTER - BUFFER FULL
Master Buffer is full because of too many data trasmitted from the slave

F33 NO VOLTAGE ON POWER TRASFORMER
Verify power on CN1/L1,L2, verify power trasformer circuit

F34 DON'T USE

F35 CALIBRATION REQUEST

Used in distance control RS485

F36 **CALIBRATING IN PROGRESS**
Used in distance control RS485 to know when calibrating end.

F38 **THE MACHINE IS WAITING A COOLING DOWN DURING A CALIBRATION PROCEDURE**
Wait please

F46 **NO CURRENT SIGNAL**
Verify sealing band connection,TA connection

F47 **TA SIGNAL WRONG TURNED**
TurnTA connection

F48 **PRE-HEATING POTENZIOMETER NO CONNECTED OR CABLES BROKEN**
Verify pre-heating potenziometer connections and cables

F49 **SEALING POTENZIOMETER NO CONNECTED OR CABLES BROKEN**
Verify sealing potenziometer connections and cables

F51 **WIPER-I**
Switch off and switch on the thermoregulator; if problem persist call the supplying

F52 **WIPER-V**
Switch off and switch on the thermoregulator; if problem persist call the supplying

F53 **WIPER-VGROSS**
Switch off and switch on the thermoregulator; if problem persist call the supplying

F54 **WIPER-VFINE**
Switch off and switch on the thermoregulator; if problem persist call the supplying

F60 **RESET WITH CALIBRATING IN PROCESS**
Repeat the calibrating

F61 **BALANCE UNSUCCESSFULL**
Repeat the calibrating

F62 **BALANCE V UNSUCCESSFULL**
Repeat the calibrating

F63 **BALANCE VGROSS UNSUCCESSFULL**
Repeat the calibrating

F64 **BALANCE VFINE UNSUCCESSFULL**
Repeat the calibrating

F65 **BALANCE UNSUCCESSFULL**
Repeat the calibrating

F66 **MAIN PHASE SYNCHRONISM**
Reset the thermoregulator if problem persist call the supplying

F69 **CURRENT TO GROUND**
Verify sealing bands in the machine touch ground.

F71 **FAULT HARDWARE –15V INTERNAL**
Reset the thermoregulator; if problem persist call the supplying

F72 **FAULT HARDWARE +15V INTERNAL**
Reset the thermoregulator; if problem persist call the supplying

F73 **FAULT HARDWARE +5V INTERNAL REFERENCE**
Reset the thermoregulator; if problem persist call the supplying

F76 **IREAD TOO HIGH**
Verify if short circuit on the seals

F78 **THERMOREGULATOR NOT CALIBRATED**
Do a calibrating

F79 **FAULT OF EMERGENCY CIRCUIT**
Verify contactor power, verify emergency chain

F081 **FAULT HARDWARE - CHECK-SUM**
Data in the eeprom wrong, pay much attention please
Press button RES, verify TEMPERATURE, SETTING, MACHINE, DATA;
call the builder

F082 **LOGIC SUPPLY (CN2) AND POWER SUPPLY (CN1) HAVE DIFFERENT PHASES**
Verify that the supplies have the same fase

F083 **REFERENCE CABLE WRONG TURNED**
Turn reference cable: (CN1/3 WITH CN6/1 - CN1/4 WITH CN6/2)

F085 **SEALING TIME HIGHER THEN MACHINE DATA "SEALING TIME"**
Increase machine data sealing time (If 0 the controll is off).

F089 **BAND BROKEN IF THE BANDS ARE PARALLEL CONNECTED**
Verify the bands.

F090 **SHORT CIRCUIT BETWEEN THE BANDS OR BETWEEN A BAND AND GROUND IN THE CASE OF HIGH CURRENT**
Verify bands, verify power connection between thermoregulator and bands

F092 **POWER PART FAILURE**
Reset the thermoregulator; if problem persist call the supplying

F093 **BAND BROKEN DURING A SEAL**
Verify power on the transformer, Verify voltage on CN/1 CN/2 connector, verify breaking of power cables, verify breaking of bands.

F094 **REFERENCE SIGNAL CABLE FROM BANDS IS INTERRUPTED**
Verify the connection of reference signal cable from band (CN6/1 - CN6/2)

F095 **MAIN SUPPLY SYNCRONISM DOES NOT MUCH MACHINE REQUIREMENTS**
Internal hardware problem, call the supplying builder

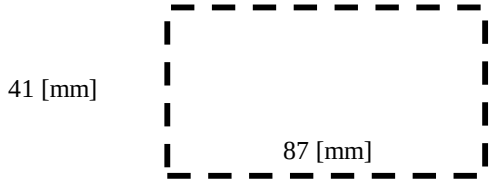
F096 **FAULT V-I TOO HIGH**
Saturation of the voltage circuit, verify connection, probable break of one seal, if seals in parallel.

F097 **PARTIAL SHORT CIRCUIT BETWEEN THE BANDS**
Verify bands into machine probably not perfectly isolated.
If the problem persist repeat burn-in procedure or do calibrating.
To reduce the problems increase machine data partial short circuit

F099 **FAULT GENERIC**
call the builder

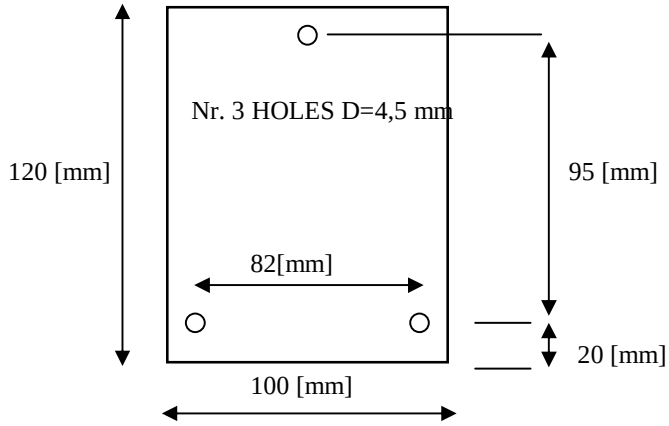
ANNEX E – DIMENSIONS

PANEL BORING (DIGITAL PANEL 96x48 – BACK DIMENSION 86x40.5)



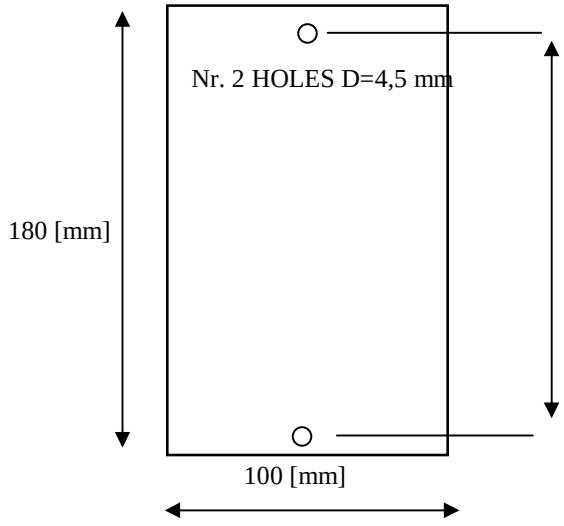
H=55+CONNECTION [mm]

TOP VIEW TERMOREGULATOR 60 AMPERE + 90 AMPERE AND HOLES FOR PANEL MOUNTING



H=145 [mm]

TOP VIEW TERMOREGULATOR 90 AMPERE (OBSOLETE) AND HOLES FOR PANEL MOUNTING



H=145 [mm]

ANNEX F – MULTIVOLTAGE TRANSFORMER TECHNICAL FEATURES

TRANSFORMER 1400VA/70V/30A **CODE: 3ESD0063**
Impulsive Transformer for thermoregulator 30A
0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50 / 60 / 70

DESCRIPTION

REFERENCE NORM: CEI 96-2 EN60742 "Insulation and safety transformers"
TRASFORMER IN CLASS I
MONOPHASE
PROTECTION RATIO: IP20
COOLING: Natural air

FEATURES

RATED POWER: 1400 VA
FREQUENCY: 50….60 Hz
MAINS SUPPLY: 230 – 400 Monophase
ACTIVE MAINS CURRENT: 6,1 – 3,5 A
OUTPUT VOLTAGE: 30 – 40 – 50 – 60 – 70 V Monophase
ACTIVE OUTPUT CURRENT: 30 A
OUTPUT UNLOAD VOLTAGE : 31 – 41.3 – 51.6 – 64.8 – 76.8 V c.d.t. at rated power : 5.4%
ISTANTANEUS APPARENT POWER: 2.1 the rated power
(Supplied for a short time with c.d.t. 5% e cosφ= 0.5)
PRIMARY PROTECTION: "D" type circuit braker with In = active supply current
THERMIC CLASS: F
INSULANCE CLASS MATERIALS: F
MAXIMUM AMBIENT TEMPERATURE: 40°C
VACUUM TEST: cosφ0 = 0.11 P0 = 18 W I0 = 0.4 A +/- 30% a 230 V
SHORT CIRCUIT TEST: cosφcc = 0.94 Pcc = 75 W Vcc% = 5.7%
ADDITIONAL LEAKAGE: Padd = 10 W
TOTAL LEAKAGE: Pp = Pcc + P0 + Padd = 103 W
EFFICENCY A cosφ = 1: η = 92.5%

MATERIAL CHARACTERISTIC

SUPPORT BY INSULANCE MATERIAL: Class "F"
COILS IN COPPER, GRADE 2: Classe "H"
PROTECTION OF THE OUTPUTS WIRES: class "H"
(electric strength 4 KV)
OUTPUTS TERMINALS: (IP20)
INSULANCE TREATMENT: Impregnating by insulance paint auto-extinguishing type BC359/D green Class "F"
DRYING: oven-drying of the insulance paints , after treatment

TRANSFORMER 3000VA/50V/60A SERV. 40% **CODE: 3ESD0064**
Impulsive Transformer for thermoregulator 60A
0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50

DESCRIPTION

REFERENCE NORM: CEI 96-2 EN60742 "Insulation and safety transformers"
TRASFORMER IN CLASS I
MONOPHASE
PROTECTION RATIO: IP20
COOLING: Natural air

FEATURES

RATED POWER: 3000 VA Serv. 40%
FREQUENCY: 50….60 Hz
MAINS SUPPLY: 230 – 400 Monophase
ACTIVE MAINS CURRENT: 6,1 – 3,5 A
OUTPUT VOLTAGE: 30 – 40 – 50 V Monophase
ACTIVE OUTPUT CURRENT: 60 A
OUTPUT UNLOAD VOLTAGE : 31 – 41.3 – 51.6 – 64.8 – 76.8 V c.d.t. at rated power : 5.4%
ISTANTANEUS APPARENT POWER: 2.1 the rated power
(Supplied for a short time with c.d.t. 5% e cosφ= 0.5)
PRIMARY PROTECTION: "D" type circuit braker with In = active supply current
THERMIC CLASS: F
INSULANCE CLASS MATERIALS: F
MAXIMUM AMBIENT TEMPERATURE: 40°C
VACUUM TEST: cosφ0 = 0.11 P0 = 18 W I0 = 0.4 A +/- 30% a 230 V
SHORT CIRCUIT TEST: cosφcc = 0.94 Pcc = 75 W Vcc% = 5.7%
ADDITIONAL LEAKAGE: Padd = 10 W
TOTAL LEAKAGE: Pp = Pcc + P0 + Padd = 103 W
EFFICENCY A cosφ = 1: η = 92.5%

MATERIAL CHARACTERISTIC

SUPPORT BY INSULANCE MATERIAL: Class "F"
COILS IN COPPER, GRADE 2: Classe "H"
PROTECTION OF THE OUTPUTS WIRES: class "H"
(electric strength 4 KV)
OUTPUTS TERMINALS: (IP20)
INSULANCE TREATMENT: Impregnating by insulance paint auto-extinguishing type BC359/D green Class "F"
DRYING: oven-drying of the insulance paints , after treatment

ANNEX G – START UP CARD – PAG. 1

COMMERCIAL NOTE

MODEL OF MACHINE:
CUSTOMER:
BAND POSITION:
KIND OF FILM TO SEAL:
THICKNESS OF FILM TO SEAL:

APPLICATION NOTE

Band material	= _____	
Band form profile	= _____	
Width of the band	= _____	[mm]
Thickness of the band	= _____	[mm]
Length overall	= _____	[mm]
Copper/Silver ends	= _____	[2 x mm]
Copper/Silver in the centre	= _____	[mm]
Teflon coat in the centre	= _____	[mm]
Type of connections (Parallel/Serial)	= _____	[P/S]

TECNICHAL NOTE

SECTION OF THE SEALING BAND	= _____	[square mm]
RESISTANCE OF THE SEALING BAND	= _____	[Ω]
HEATING CURRENT CALCULATED	= _____	[60/90/120 A]
SECONDARY VOLTAGE OF THE TRANSFORMER	= _____	[V]

MODEL OF THE THERMOSALD ISC = _____

PRIMARY ☐ **SECONDARY** ☐
LOW VOLT ☐

RATED CURRENT 60 ☐ **90** ☐ **120** ☐

PRE-HEAT TEMPERATURE	= _____	[°C]
SEALING TEMPERATURE	= _____	[°C]
SEALING TIME (SET INTO THE PLC)	= _____	[Sec.]

ANNEX G – START UP CARD – PAG. 2

MACHINE DATA TABLE		**Default**					
RATED CURRENT	**1**	[xxx]	:	**1**			
HEATING INCREASE DEGREE	**2**	[4]	:	**2**			
PROPORZION.GAIN KV	**3**	[100]	:	**3**			
INTEGRAL GAIN KI	**4**	[100]	:	**4**			
OPERATING LIMIT KI	**5**	[60]	:	**5**			
DERIVATIV GAIN KD	**6**	[40]	:	**6**			
HEATING FACTOR	**7**	[1.9]	:	**7**			
INITIAL TEMPERATURE	**8**	[0]	:	**8**			
PARTIAL SHORT CIRC.FACT.	**9**	[1.2]	:	**9**			
ALLARM DISABLE	**10**	[0]	:	**10**			
CONFIG. IMPULSE SEAL	**11**	[0]	:	**11**			
CONFIG. PANEL	**12**	[2]	:	**12**			
CONFIG.SER. RS485(1=9600)	**13**	[1]	:	**13**			
ADDRESS SERIAL RS485	**14**	[1]	:	**14**			

SETTING DATA TABLE		**Default**					
LANGUAGE SELECTION	**0**	[ITAL.IAN]	:	**0**			
DEGREES SELECTION	**1**	[CELSIUS]	:	**1**			
CALIBRATING TEMPERAT.	**2**	[30]	:	**2**			
MAX SEALING TEMPER.AT.	**3**	[250]	:	**3**			
MAX SSEALING TIME	**4**	[0.0]	:	**4**			
BURN IN DEGREES	**5**	[180]	:	**5**			
BURN IN SECONDS	**6**	[5]	:	**6**			
BURN IN NR. CYCLES	**7**	[5]	:	**7**			
TEMPERATURE GRADIENT	**8**	[4]	:	**8**			
ENABLE COMP.WITH COLD	**9**	[0]	:	**9**			
SEAL TEMPER. WITH COLD	**10**	[220]	:	**10**			
STRUCTURE TEMPERATURE	**11**	[80]	:	**11**			
TIME WARN66	**12**	[3]	:	**12**			
PAR.1=ODD,2=EVEN	**13**	[0]	:	**13**			
NR.STOP BIT	**14**	[2]	:	**14**			
PROTOCOL TIME OUT	**15**	[0.1]	:	**15**			
IDLE CHAR BEFORE TX	**16**	[0]	:	**16**			
CHECK 1=CRC,2=XOR,0=NO	**17**	[1]	:	**17**			