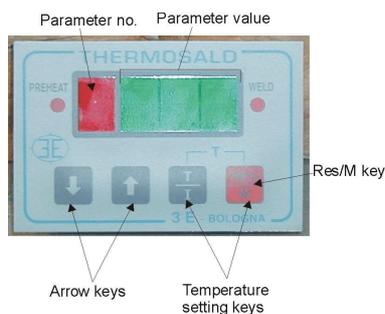


TEMPERATURE CONTROLLER FOR IMPULSE SEALING

THERMOSALD UPSCR AUTOMATIC CALIBRATION



- **MANUAL BALANCING** at first start up
- **AUTOMATIC BALANCING** at sealing band change
- **BURN IN** of sealing band
- **AUTOMATIC POWER FREQUENCY SWITCHING**
- **ENERGY CONTROL ON SEALING BAND**
- **485 SERIAL INTERFACE** to exchange data to supervisor

MAINTENANCE & OPERATIONS MANUAL Mod. UPSCR_N_V5 (M_V4)

3E S.r.l. - Via del Maccabreccia 37/a - 40012 LIPPO DI CALDERARA (BOLOGNA)

Tel. ++39 051 6466225

Fax ++39 051 6426252

e-Mail : mail@3e3e3e.com

Indirizzo internet : www.3e3e3e.com

0 WARNINGS**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.
- 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.
- Operate the equipment by following the instructions contained herein.
- Employ qualified and well-trained personnel, familiar with the technology used to install the equipment and put it into service.
- Use bands or wires having an adequate positive temperature coefficient ($> 1 \times 10E-3$)
- 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

Directives which apply :

- Low voltage electrical codes : 73/23 CEE - 93/68 CEE (in force since 01/01/97)
 - Electro-magnetic compatibility : 89/336 CEE - 92/31 CEE - 93/68 CEE (in force since 01/01/96)
 - Machine directive : 89/392 CEE - 91/368 CEE - 93/68 CEE (in force since 01/01/95)
- NOTE - this directive does not automatically apply to the electronic equipment; our controllers are designed to conform with the directive if installed correctly as described in this user's manual.

Electro-magnetic compliance tests :

Test conditions :

- Mains supply filter Mod. Siemens B84112-B-B60 (115 / 250 V - 6A - 50/60 Hz)
- Temperature controller connecting cable and standard panel 3ESD0035E (5 m)
- Input power cables (3 m long)
- Band output cables (10 m long)

Safety tests :

- The criteria indicated in the EN50082-2 directive have been followed: general standards regarding safety in industry.
- IEC 1000-4-2 (IEC 801-2/1991): STATIC ELECTRICITY DISCHARGE (ESD)
- IEC 1000-4-3 (CEI 801-3): RADIATED ELECTRO-MAGNETIC FIELD
- IEC 1000-4-4 (CEI 801-4): FAST TRANSIENT OSCILLATIONS (FAST TRANSIENT / BURST)
- ENV50141: MAINS PICKUP INTERFERENCE

Emissions tests :

- The criteria specified in the EN50081 -2 directive have been followed: general rules regarding emissions in industry
- EN55011 (CEI 110-6): LIMITS AND METHODS OF MEASURING RADIO INTERFERENCE PRODUCED BY INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT (ISM)

Compliance certificate :

- The temperature controller passed the compliance tests and is considered a class B device.
- The manufacturer states that the temperature controller fully complies with current council directives as regards electro-magnetic compatibility, 89/336 CEE standards and following amendments
- The manufacturer states that the temperature controller fully complies with current low voltage electrical codes 73/23 CEE and subsequent amendments.

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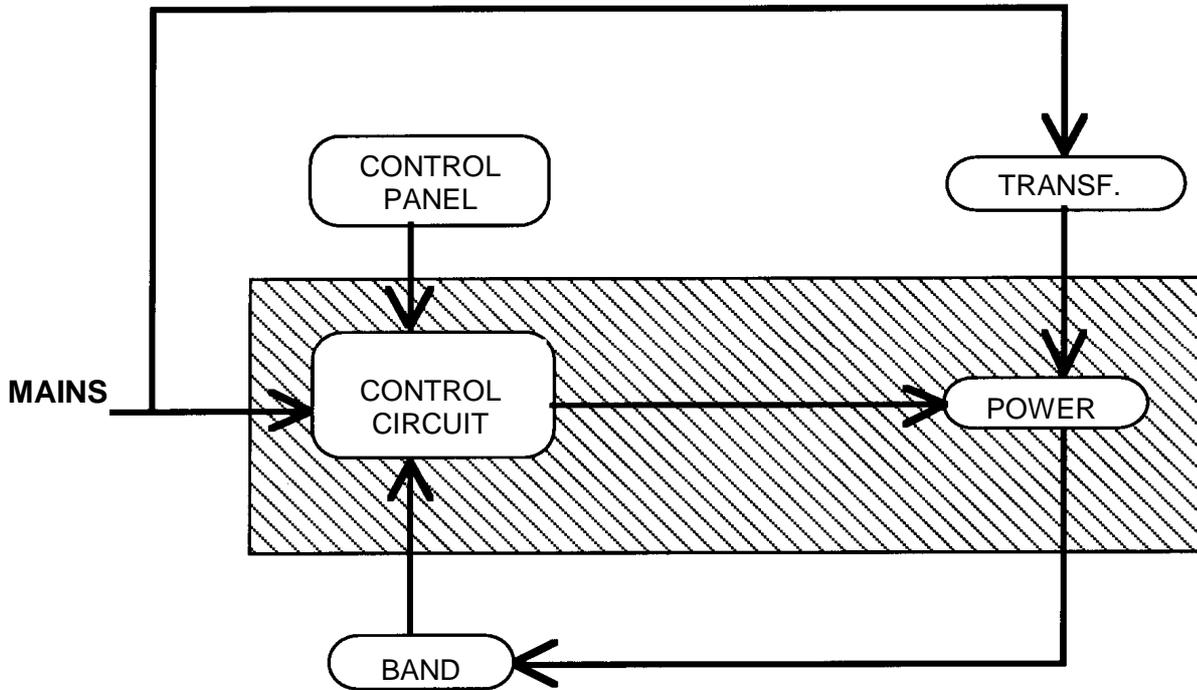
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1 DESCRIPTION

1.1 GENERAL DESCRIPTION

- **APPLICATION:** Impulse heat-seal technology is used to seal, rapidly and with great accuracy, polyethylen films, polypropilene 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 simply reads the feedback signals from the bands and controls the heating current with a closed-loop circuit. The thermoregulator 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 UPSCR_M_V4 is manufactured in 3 versions, different only in current, 30/60/90 Ampere; it is interchangeable with all thermoregulators of our company, manufactured before. With the last software release, the thermoregulator is very easy to use: it works as a thermometer, whose probe is the band itself: at start up, an analog balancing is done, an automatic burn-in is possible to do, the machine is ready to work.
At change of band, an automatic balancing is done, an automatic burn-in is possible to do, the machine is ready to work.
The thermoregulator do many controls and locate faults referring to the display; it is also possible analyse bands by display.
It's possible enable a special function to control power delivered to bands and increase so the safety.
It's possible enable a special function to exchange data with a supervisor by serial interface and set temperatures from distance.
- **DIAGNOSTICS:** The temperature controller comes with an efficient diagnostics system capable of identifying faults which have occurred during the production process, indicating the cause and suggesting the remedies required to restore normal operating conditions.
- **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

1.2 BLOCK DIAGRAM



2 WIRING DIAGRAM AND DIMENSIONS

2.1 LIST OF CHANGE-OVER SIGNALS

CN1 POWER

(Power circuit supply synchronised with control circuit supply)

PIN1	ALTERNATING CURRENT SUPPLY	(4 - 6 sq.mm)
PIN2	ALTERNATING CURRENT SUPPLY	(4 - 6 sq.mm)
PIN3	BAND +	(4 - 6 sq.mm)
PIN4	BAND -	(4 - 6 sq.mm)
PIN5	EARTH	(4 - 6 sq.mm)

CN2 CONTROL CIRCUIT SUPPLY

(Control circuit supply synchronised with power circuit supply)

PIN 1	230 Vac (0.1A absorption, max)	(1sq.mm)
PIN 2	230 Vac (0.1A absorption, max)	(1sq.mm)

CN3 CONTROLS

PIN1	COMMON 0 V PLC	(0,5 sq.mm)
PIN2	PRE-HEAT SIGNAL FROM PLC, 24V DC (12 mA absorption, max)	(0,5 sq.mm)
PIN3	SEALING SIGNAL FROM PLC, 24V DC (12 mA absorption, max)	(0,5 sq.mm)
PIN4	SEALING FAULT (CONTACT N.C.) $\cos\Phi = 1$ 250V 8A	(0,5 sq.mm)
PIN5	SEALING FAULT (CONTACT N.C.) $\cos\Phi = 0.4$ 250V 5A	(0,5 sq.mm)
PIN6	BAND REFERENCE +	(0,5 sq.mm)
PIN7	BAND REFERENCE -	(0,5 sq.mm)
PIN8	SIGNAL LEAD SCREEN (do not connect from the machine side)	(1 sq.mm)

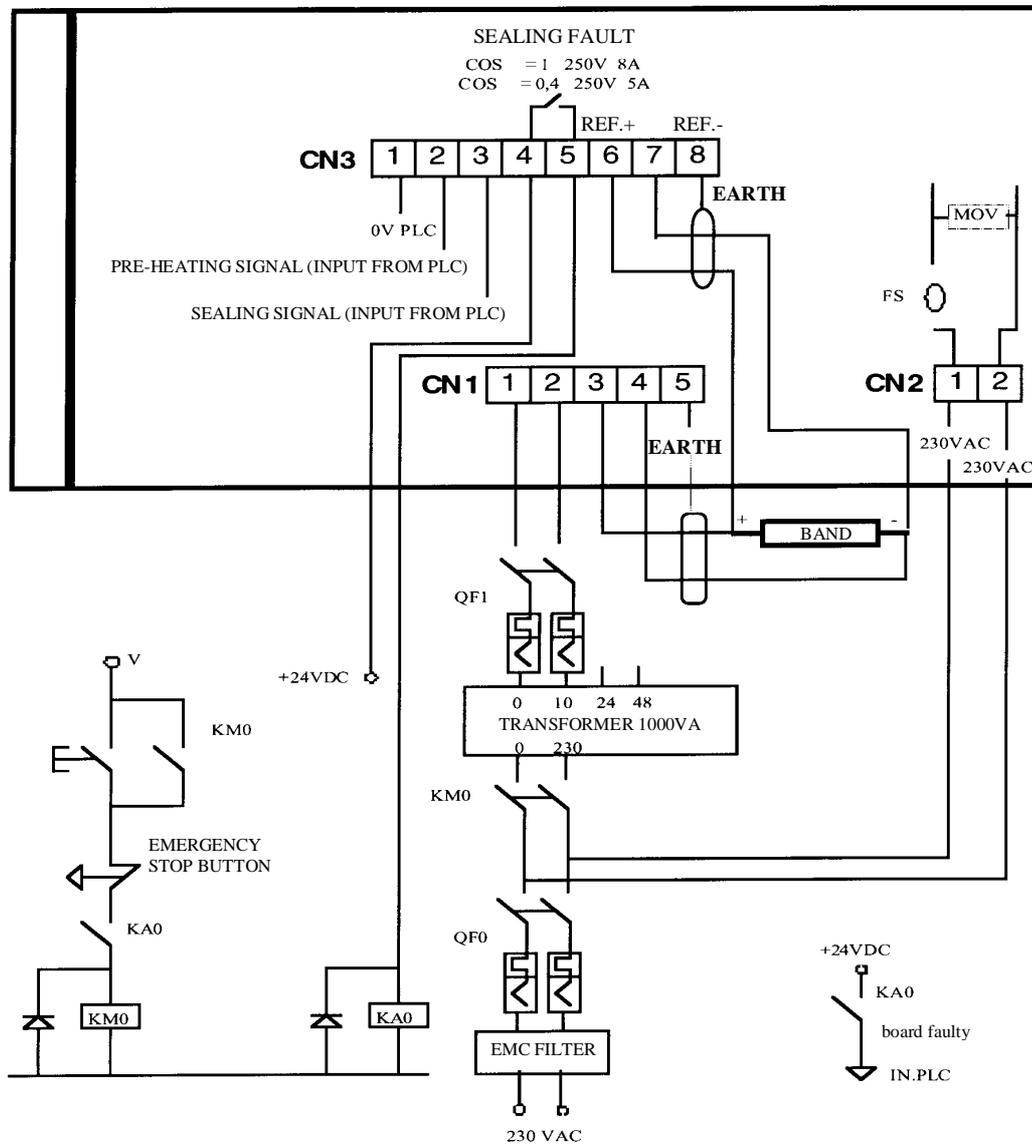
CN4 DISPLAY CONSOLE

PIN1	Supply, +5V	Screened	(0,25 sq.mm)
PIN2	Supply, 0 V	Screened	(0,25 sq.mm)
PIN3	Data	Screened	(0,25 sq.mm)
PIN4	Clock	Screened	(0,25 sq.mm)
PIN5	Key	Screened	(0,25 sq.mm)
PIN6	Key	Screened	(0,25 sq.mm)
PIN7	Key	Screened	(0,25 sq.mm)
PIN8	Key	Screened	(0,25 sq.mm)

CN5 RS485 SERIAL INTERFACE

PIN1			
PIN2			
PIN3	Channel A-	Screened	(0,25 sq.mm)
PIN4			
PIN5			
PIN6			
PIN7			
PIN8	Channel B+	Screened	(0,25 sq.mm)

2.2 WIRING DIAGRAM



- NOTE

The power circuit supply (CN1/1 and CN1/2) MUST BE synchronised with the control circuit supply (CN2/1 and CN2/2).

CN1/5 should be connected to the EARTH ELECTRODE of the machine by using a yellow-green wire whose size should be \geq that of the power leads.

2.3 PANEL – BOARD CONNECTING CABLE DIAGRAM

- Use a 8 x 0,22 multi-core screened cable. The screen must be wired to both connectors. It is advisable to run this cable away from transformer or unscreened power leads.

Canon 9-pin male connector Board side		Canon 9-pin female connector Panel side
1 + 5V	GREEN	1 + 5V
2 0V	RED	2 0V
3 Data	WHITE	3 Data
4 Clock	YELLOW	4 Clock
5 Key	ORANGE	5 Key
6 Key	BROWN	6 Key
7 Key	BLACK	7 Key
8 Key	BLUE	8 Key

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:

$$L-UTIL = LTOT - (LRAM \times 2) - LRAMC$$

Usable length: L-UTIL = [mm]

• CALCULATION OF THE BAND SECTION

The band section is calculated by the following formula:

$$SEZ = LARG \times SP \text{ in mmq}$$

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]

• **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

3.3 THERMOSALD CHOISE

• WHAT TYPE OF THERMOREGULATOR YOU NEED TO CHOOSE (30 / 60 / 90 AMPERE?)

The choise depend on the band section and on the connection in parallel or series.

In the next table, You can see some example of choosing.

For different bands You can calculate about 30 Ampere / mmq.

SECTION (SEZ.)	MODEL (RATED I)	CONFIGURATION	PARALLEL	ACTIVE I MAXIMUM	SHORT C. CURRENT
1	30A	4 x 0,25	NO	60 Amp	100 Amp
1	30A	5 x 0,2	NO	60 Amp	100 Amp
1,2	30A	6 x 0,2	NO	60 Amp	100 Amp
1,2	30A	8 x 0,15	NO	60 Amp	100 Amp

SECTION (SEZ.)	MODEL (RATED I)	CONFIGURATION	PARALLEL	ACTIVE I MAXIMUM	SHORT C. CURRENT
2	60A	4 x 0,25 x 2	SI	120 Amp	140 Amp
2	60A	5 x 0,2 x 2	SI	120 Amp	140 Amp
2,4	60A	6 x 0,2 x 2	SI	120 Amp	140 Amp
2,4	60A	8 x 0,15 x 2	SI	120 Amp	140 Amp

SECTION (SEZ.)	MODEL (RATED I)	CONFIGURATION	PARALLEL	ACTIVE I MAXIMUM	SHORT C. CURRENT
3,2	90A	8 x 0,2 x 2	SI	180 Amp	210 Amp

Thermoregulator model:

UPSCR_M_V4_100..... [30/60/90 Ampere]

3.4 - POWER TRANSFORMER CHOISE

- WHAT TYPE OF TRANSFORMER YOU MUST CHOOSE?**

The choise depend on the rated current oh the thermoregulator choosed.

For the first start up, we recommend to use the original multi-voltage power transformers by 3E, specific for the thermoregulators 30 / 60 / 90 Ampere.

For the following start up we can supply original single voltage power transformers by 3E, specific for the thermoregulators 30 / 60 / 90 Ampere.

If You prefer to use a different transformer from above refer to technical characteristic on this book, see ANNEX F – MULTIVLTAGE TRANSFORMER TECHNICAL FEATURES.

- WHICH VOLTAGE ON THE SECONDARY OF POWER TRASFORMER YOU MUST CHOOSE?**

The choise depend on the rated current of thermoregulator (30/60/90) and on the resistance of the bands R-BAND

Calculations:

(V SECONDARY lowest = R-BAND x I rated

V SECONDARY OPTIMUM = R-BAND x I rated x 1.5

V SECONDARY highest = R-BAND x I rated x 2

- Example:

If you must connect a band of resistance 0.4 Ohm, with a thermoregulator 60 Ampere, the V SECONDARY OPTIMUM VOLTAGE will be 0.4 Ohm x 60 Ampere x 1.5 = 36 Volts a.c..

Trasformer: POWER = [VA]
 PRIMARY = [V]
 SECONDARY = [V]

3.5 - PROTECTIVE DEVICE CHOISE

• WHICH PROTECTIVE DEVISE IS TO CHOOSE?

On the 220 supply voltage of logic, an internal fuse inside thermoregulator protect the internal trasformer and circuits.

It's necessary protect only 220 Va.c. supply cable fromshort circuit in compliance with the notmatives IEC204.1

On the supply voltage of power, a power transformer must be protected on the primary and on the secondary; see bottom some examples of calculations.

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

Thermoreg. 30 Amp. – transformer 800VA

- Primary 230V: Automatic breaker 6A type D (o del-action-fuse)
- Primary 400V: Automatic breaker 3A type D (o del-action-fuse)
- Secondary: Automatic breaker 40 A type D (o del-action-fuse)

Thermoreg. 60 Amp. – transformer 1400VA

- Primary 230V: Automatic breaker 10A type D (o del-action-fuse)
- Primary 400V: Automatic breaker 6A type D (o del-action-fuse)
- Secondary: Automatic breaker 63 A type D (o del-action-fuse)

Thermoreg. 90 Amp. – transformer 2000VA

- Primary 230V: Automatic breaker 16A type D (o del-action-fuse)
- Primary 400V: Automatic breaker 10A type D (o del-action-fuse)
- Secondary: Automatic breaker 100 A type D (o del-action-fuse)

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 thermoregulators 30 / 60 / 90 Ampere.

For the following start up we can supply original single voltage power transformers by 3E, specific for the thermoregulators 30 / 60 / 90 Ampere.

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 righth space around for cooling:

5 cm about for model 30Ampere

8 cm about for model 60 Ampere

10 cm about for model 90 Ampere

• **WIRING NOTE (SEE PICTURES IN THE FOLLOWING PAGES)**

L1 + L2 USE TWISTED CABLES NOT SCREENED
POWER+/POWER- USE TWISTED CABLES NOT SCREENED UP TO TERMINAL BOARD ON THE MACHINE
GROUND USE CABLE YELLOW/GREEN SECTION \geq SECTION L1,L2

TERMINAL BOARD ON THE MACHINE EVERY TERMOREGULATOR MUST HAVE AN INDIPENDENT TERMINAL ON THE MACHINE, BECAUSE OF THE CABLES OF DIFFERENT THERMOREGULATORS MUST NOT BE LINKED TOGETHER TO HAVE NOT INTERFERENCES.

1,2,7,8 USE FLEXIBLE CABLE (TASKER CABLE C235)
SECTION CONFORMED AT CURRENTS ($\geq 6\text{mmq}$)

3,4,5,6 USE FLEXIBLE CABLE (TASKER CABLE C235)
SECTION 1 mmq

10 USE CABLE TWISTED AND SCREENED (TWINAX IBM 7362211)

11 WIRE POWER AND REFERENCE CONNECTIONS ON THE BAND BY DIFFERENT EYES + SCREWS OR BY DIFFERENT EYES ON ONE SCREW

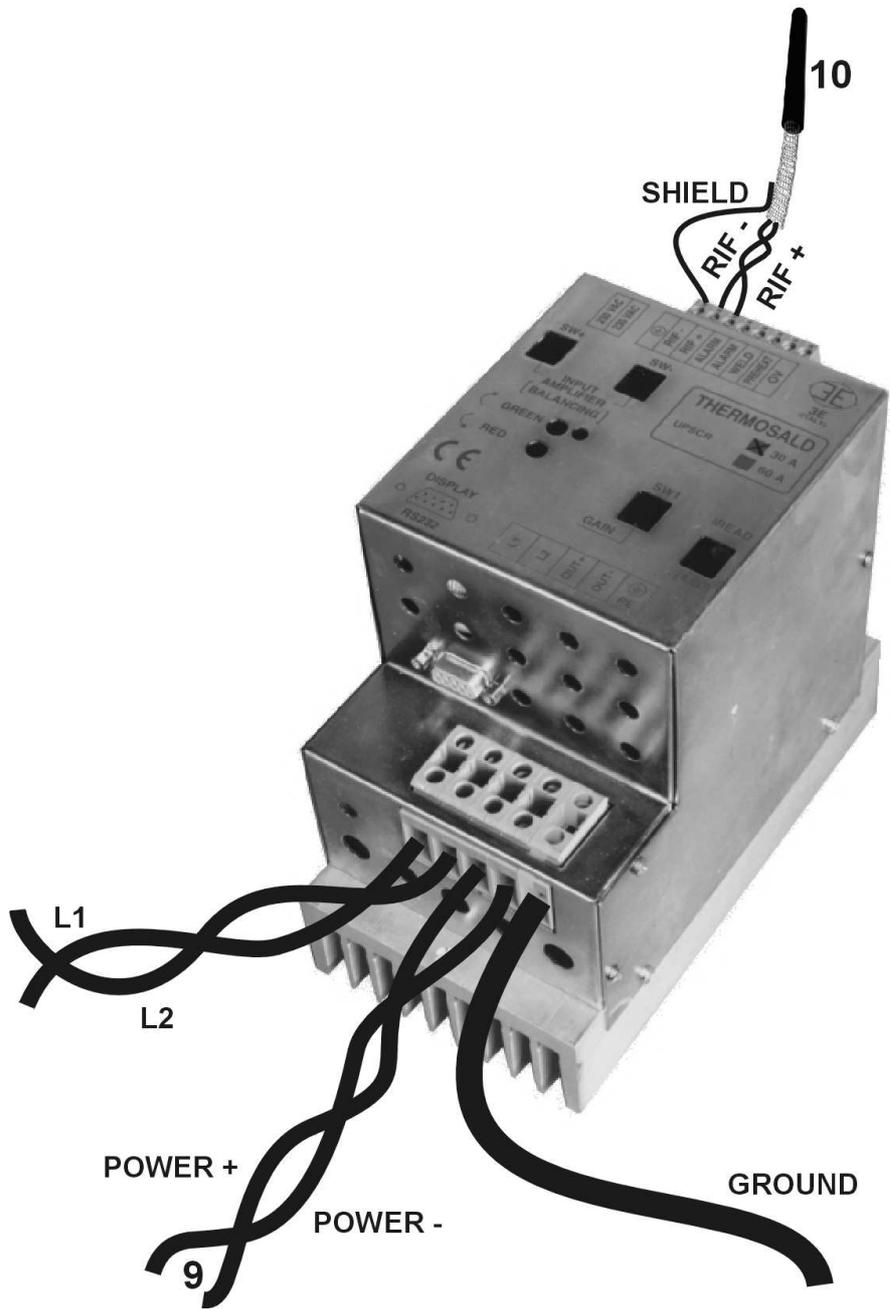
12 DO THE MECHANICAL LOCK OF THE BAND BY 2 SCREWS SO THAT CONTACT IS FLAT AND PERFECT

13 USE BANDS COPPER OR SILVER PLATED AT THE ENDS TO HAVE NOT ELECTRIC POTENTIAL ON THE TERMINAL BECAUSE OF OXIDATION

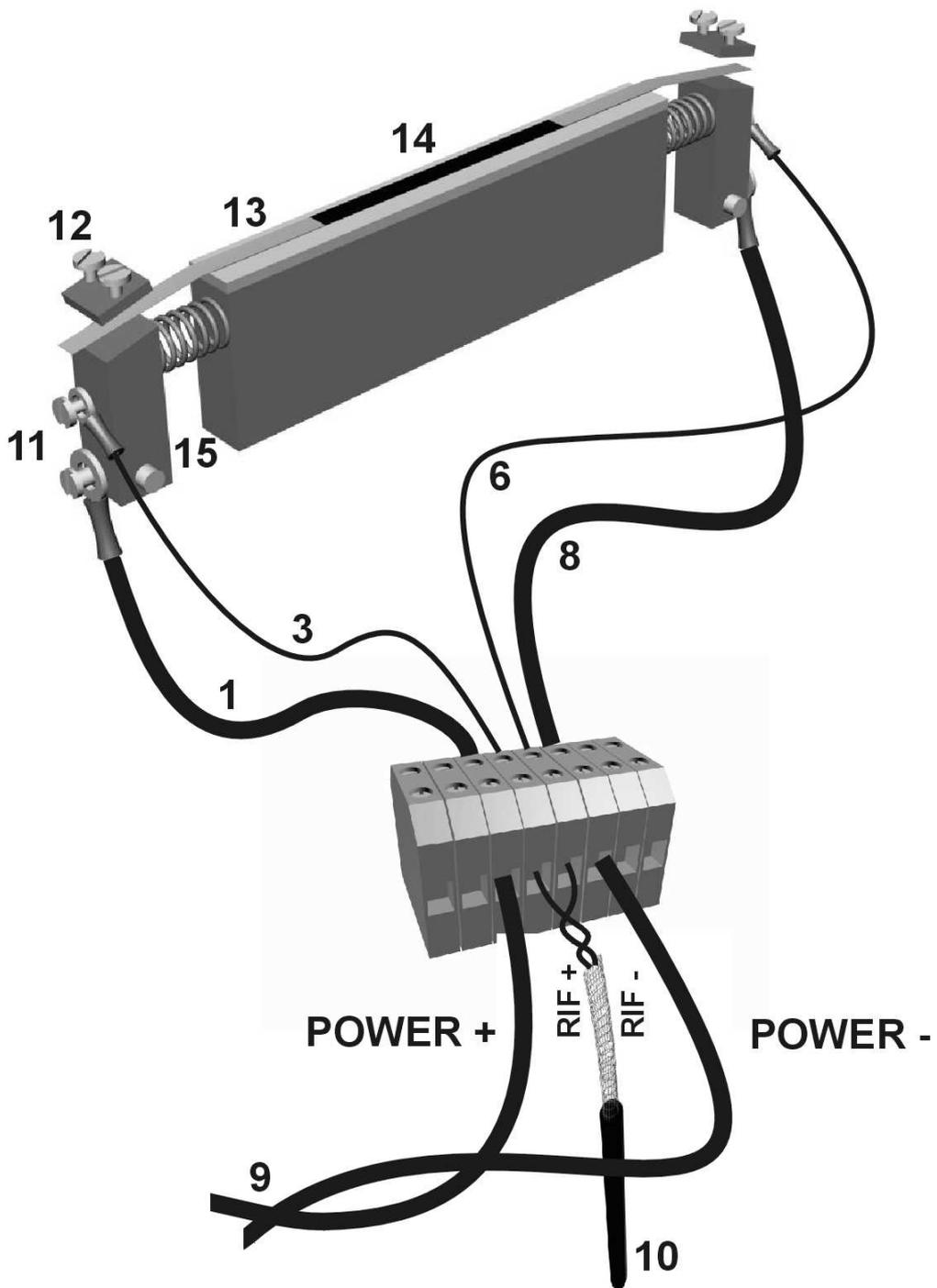
14 SOMETIME IT'S POSSIBLE TO USE TEFLON COATED BANDS; THE CONTROL IS MORE PRECISIOUS BUT MACHINE INCREASE THE STOPS FOR CHANGING BANDS

15 USE AN ELASTIC SYSTEM TO MAINTAIN BANDS TIGHT

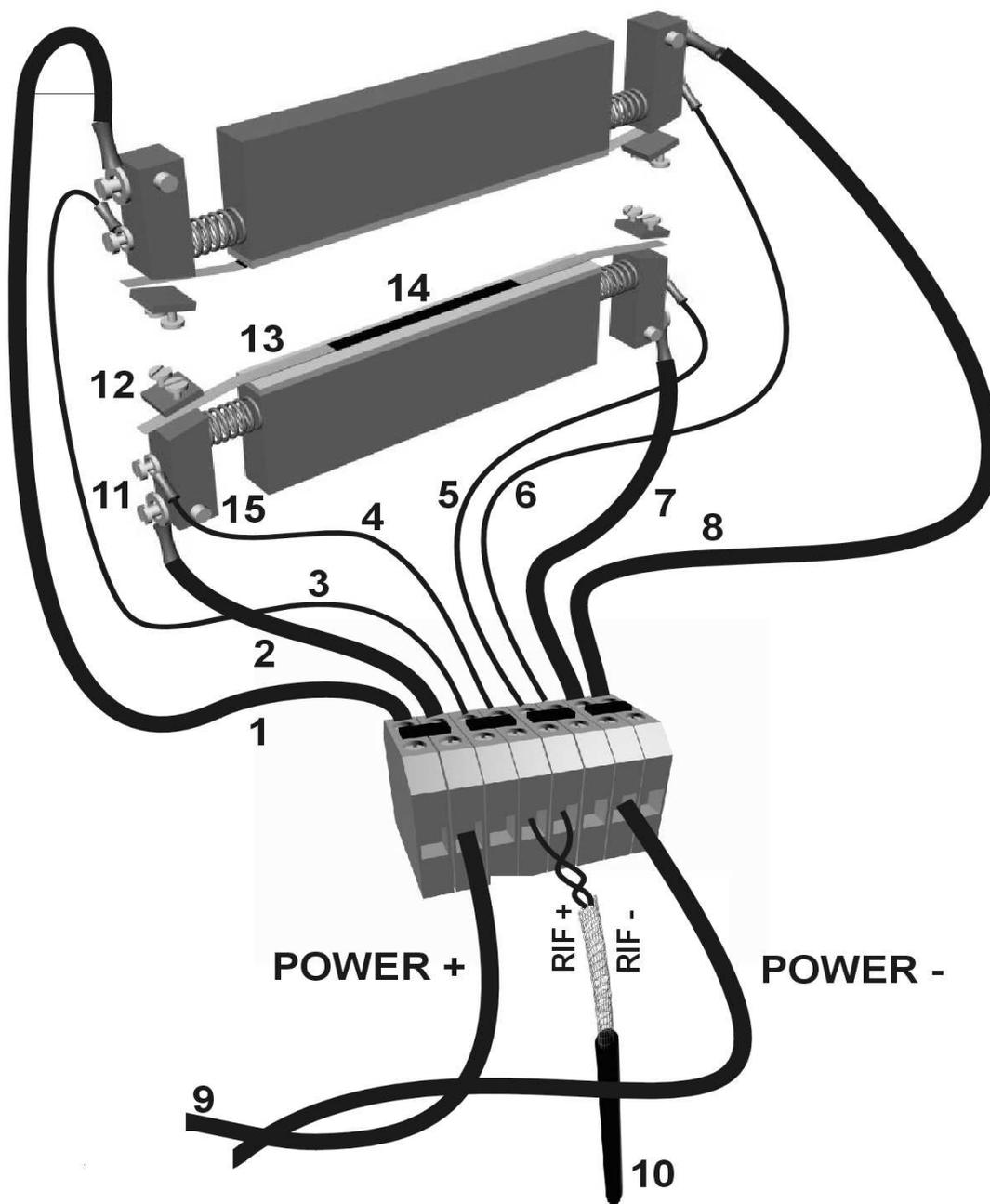
• CONNECTIONS TO THERMOREGULATOR



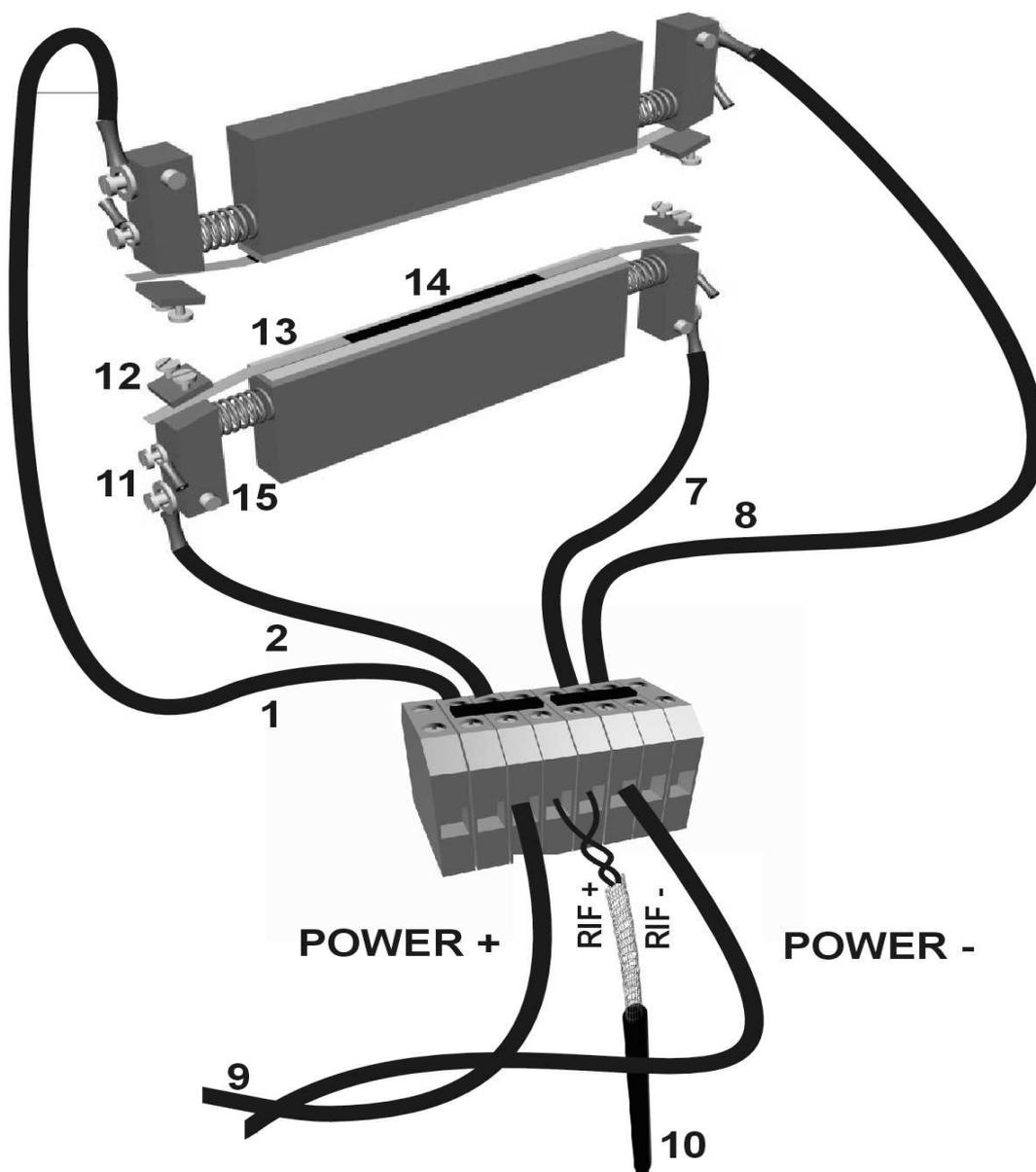
• CONNECTIONS TO SINGLE BAND



• CONNECTIONS TO BANDS IN PARALLEL (SOLUTION ADVISED)



• CONNECTION BANDS IN PARALLEL (SOLUTION PASSABLE)



4 – START UP

4.1 – START UP – START UP WITH GENERAL RESET

1 - The machine must be at ambient temperature.

2 - Pre-heat and seal remote controls must be off.

3 - Set dip switch SW+/SW- according to the rated voltage of the power transformer; see next CALCULATION TABLE and DIP SWITCH SW+ / SW- TABLE:

CALCULATION TABLE

Example:

Sealing band = 1 Ω - RATED I = 30 A,

TRANSFORMER RATED VOLTAGE = 30 V

TRANSFORMER MAXIMUM VOLTAGE = 30 V x 1.5 = 45 V

TRANSFORMER SECONDARY VOLTAGE = Compresa fra 30V e 45V

DIP SWITCH SW+ e SW- = OFF OFF ON ON (See DIP SWITCH SW+ / SW- TABLE)

NOTE: SW+ e SW- set depend on

TRANSFORMER RATED VOLTAGE = 30V (field 26V - 35 V)

(don't depend on TRANSFORMER SECONDARY VOLTAGE)

DIP SWITCH SW+ / SW- TABLE

Dip 1	Dip 2	Dip3	Dip4	TRANSFORMER RATED VOLTAGE	
ON	ON	ON	ON	05 - 07	(TO LIGHT GREEN LED)
OFF	ON	ON	ON	08 - 15	
ON	OFF	ON	ON	16 - 25	
OFF	OFF	ON	ON	26 - 35	
ON	ON	OFF	ON	36 - 42	
OFF	ON	OFF	ON	43 - 50	
ON	OFF	OFF	ON	51 - 57	binary system
OFF	OFF	OFF	ON	58 - 65	
ON	ON	ON	OFF	66 - 75	
OFF	ON	ON	OFF	76 - 82	
ON	OFF	ON	OFF	83 - 92	
OFF	OFF	ON	OFF	93 - 97	
ON	ON	OFF	OFF	97 - 100	
OFF	ON	OFF	OFF	-	
ON	OFF	OFF	OFF	-	
OFF	OFF	OFF	OFF	-	(TO LIGHT RED LED)

4 – Press the keys 1 + 4 (down + reset) and, at the same time, power on the thermoregulator



- 4 blocks appear on the display; the reset procedure begins; release keys down + reset (1 + 4).
- Thermoregulators leave our factory in reset state, then at power on 4 blocks always appear and reset procedure begins.
- Whenever an operator needs to repeat reset procedure, he can keep keys 1 + 4 (down + reset) pressed 6 + 8 seconds until on the display the 4 blocks appear and the reset procedure begins.

4 - Release the keys 1+4 (down+reset)

5 – Display = “ P H A S ”

On the display appears “ P H A S ” to mean that logic and power supplies phase control is in progress (if logic and power supplies are not on the same phase, “ F 0 8 3 “ fault signal is sent).

5 – Wait

6 – Display = “ V O L T ”

On the display appears “ V O L T ” to mean that TRANSFORMER SECONDARY VOLTAGE control is in progress (this voltage must be between TRANSFORMER RATED VOLTAGE and TRANSFORMER MAXIMUM VOLTAGE).

6 – Wait

6 – Display = “ V 0 . 5 0 ” -> “ V 1 . 1 0 ” - USE FACTOR

On the display appears “ V ” followed by a number that informs if thermoregulator is well used or not: the right value are included in the range V 0.6 – V 1.0; absolute maximum rating V 1.3.

V 1.0 means active current 45A (for model 30A), 90A (for model 60A), 135A (for model 90A)

7 – Wait

8 – Display = “ V D I P ” blinking

On the display blinks “ V D I P ” to remember that SW+ / SW- dip switch must be set (see CALCULATION TABLE and DIP SWITCH SW+ / SW- TABLE).

8 - Press the RESET key

**9 – Display = “ T 0 2 0 ” = 20 DEGREES – Set gripper jaws temperature or wait
 (“ T 0 3 0 ” = 30 DEGREES from software release V4.9)**

On the display appears the ambient (grripper jaws) temperature set on the thermoregulator.

In applications where a great precision of temperature is necessary, it is possible change this parameter and set it with the actual gripper jaws temperature, simply pressing keys DOWN / UP.

9 - Wait

**10 – Display = “ _ B A L ” / “Temperature” – START UP COLD BALANCING BY TRIMMER
(TO TOUCH AND ROTATE ONLY IN THE COURSE OF FIRST START UP)**



NOT BALANCED SYSTEM

- On the display appears alternatively “ B A L ” and “temperature value not balanced ” to remember that green/red led balancing need to do (Note: a red bar down before “ B A L “ means unbalance towards down; a red bar up before “ B A L “ means unbalance towards up; the wording “ T - - - “ means temperature overflow toward down).
- rotate balancing trimmer clockwise to light green led, rotate anticlockwise to light red led; update of green/red led is 1 time in a second, so to calibrate fine it is necessary to rotate balancing trimmer and wait up to one second to wait update condition.
- When green and red leds are light both, the thermoregulator is balanced; we advise to read temperature value on the display and rotate trimmer until having 20 degree, if 20 degree is the temperature of the gripper jaws: in any case the thermoregulator will do next an automatic perfect balancing.

BALANCED SYSTEM

- On the display appears fixed “ B 0 2 0 “, if 20 degree is temperature of the gripper jaws;
- When green and red leds are light both, the thermoregulator is balanced; we advise to read temperature value on the display and rotate trimmer until having 20 degree, if 20 degree is the temperature of the gripper jaws: in any case the thermoregulator will do next an automatic perfect balancing.

**10 – Press the key RESET (ON DISPLAY DISAPPEAR THE “ B “ OF “ B 0 2 0 “ AFTER SOME SECONDS)
(From software release V4.9 it is possible press also the keys DOWN + UP)**

11 – Keep the key RESET pressed for 3 seconds to start the AUTOMATIC BURN-IN CYCLE



On the display appears “ H100” , to inform that the first heating at 100 degree is in progress; next the writing H200, H100, H200, H100, H200, H100 will appear to inform that cycles of heating and cooling at 200 and 100 degrees are in progress. At the end the thermoregulator will be ready to work.

Burn in cycle can be stopped before end pressing key reset.

THE MACHINE IS READY TO WORK.

NOTE: After the BURN IN cycle, sealing bands modify a little its electric characteristic, but are stable. If pay attention can observe that temperature of sealing bands is some degree lower then before burn_in cycle. Do not modify temperature by rotating balancing trimmer (used only in the course of first start up, after a master reset) or pressing the up/down keys to do an automating balancing (used only after a change of the sealing band)

NOTE: It's possible to do the machine more hot increasing HOT FACTOR value, parameter 5; From software release V4.9 it's possible to change it pressing the keys DOWN+T/I for 3 seconds, parameter nr. 5 appears, change the value by key DOWN or UP, wait 6 seconds to return to main menu.

(As previous software release, it's possible to change this parameter entering in the SETTING DATA or HOT CALIBRATION DATA, pressing key UP+RESET 6 seconds, see ANNEX C)

4.2 – SETTING THE PRE-HEATING AND/OR SEALING TEMPERATURES

1 – Press the keys 3+4 (T/I+RESET) for 3 seconds

The PREHEAT led on the panel start flashing and indicate the set pre-heating temperature.

2 – Press the keys UP or DOWN to change the temperature of pre-heating.

3 – Press the key RESET to switch to the temperature of sealing changing.

The WELDING led on the panel start flashing and indicate the set sealing temperature.

4 – Press the keys UP or DOWN to change the temperature of sealing.

5 – Wait 3 seconds to leave temperature setting.

4.3 – WRITING DOWN THE START UP DATA CARD

Write down the START UP DATA CARD – PAG. 1, ANNEX G

If any machine or setting data is modified, write down also START UP DATA CARD – PAG. 2.

That above lets to record start up data in the documentation of the machine; it will be useful for future verify and for starting up of the next machines, so it will be easier to do and all machine will be equal.

4.4 - SPECIAL FUNCTION ENERGY CONTROL

- **CAN BE PERFORMED ON ALL MACHINES HANDLING SLIGHTLY FLAMMABLE MATERIAL; THIS INCREASE REDUNDANCY AND AUTO-CONTROL THEREBY MAKING THE SYSTEM SAFER TOO (BEFORE GOING ON, GET IN TOUCH WITH OUR TECHNICAL OFFICE FOR INSTRUCTIONS)**

1 - Enter the machine data

F = 1 to Enable the control for the pre-heating procedure

F = 2 to Enable the control for the heat-sealing procedure

F = 3 to Enable the control for the pre-heating + heat-sealing procedure

2 - Pre-heat for 10 seconds

The thermoregulator acquire the power supplied in pre-heating.

3 – Start the machine running with the bags loaded

The thermoregulator acquire the power supplied in sealing.

When acquisition phase is finished, if thermoregulator detects a power on the bag out of tolerance stop in emergency.

In the case of slightly flammable materials, the machine builder must pay much attention to applications and take right solutions for safety.

NOTE – Each time the pre-heating and sealing temperature or some machine data are changed, an automatic data acquisition needs to be performed.

4.5 - SPECIAL FUNCTION 485 SERIAL INTERFACE AND FIELD BUS (IN PROGRESS)

4.6 – UP-DATE OLD MACHINES

- **WOULD YOU LIKE TO UPDATE OLD MACHINES WITH NEW SOFTWARE RELEASE?**

For this procedure do not hesitate to contact our technical office. From Thermosald Hardware M it is possible update machine without lose any performance; for older units needs pay attention to. This operation is easy enough, but must be done only by skilled workers with experience. After update a careful test need to be done. We don't take any responsibility on ourself for damage to people or animals or things, if operations are done without our direct control.

Procedure to change the eeprom:

Disconnect and detach completely the thermoregulator from electrical panel, to can work on a tooled table, with the power connector on the left and the 2 connectors + fuse on the right. Unscrew the 4 screws on the bottom heat sink and the 6 self-tapping screws on the carter; pay much attention to the internal flat, and take off the carter enlarging lightly lateral panel to unlock the connectors; disconnect internal flat and take off completely the carter.

Inside You can see 3 boards: on the central board, with the components mounted towards inside, the eeprom on socket (28 pin) You can see. Pay attention not to stretch some pins, pay attention to the polarity of the eeprom; with a right tool pickup the old eeprom and mount the updated eeprom (pin 1 and reference mark towards inside like as the other chips).

To close You must: connect the flat, pay much attention to mount the carter enlarging lightly lateral panel and rotating the carter on the side of the flat; close the lateral panel; screw lightly the 4 screws on the bottom heat sink; screw tight the 6 self-tapping screws on the carter; screw now tight the 4 screws on the bottom heat sink.

Mount and connect the thermoregulator.

Before power on, set DIP SWITCH in the bottom way:

SW+ / SW-	NO CHANGE
SW1	1=ON 2=ON 3=ON 4=ON (ALL = ON)
IREAD	1=ON 2=OFF 3=ON 4=ON (IREAD/2 = OFF)

DO THE START UP WITH GENERAL RESET PROCEDURE – SEE CHAPTER 4.1

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 – Keep the keys 1 + 2 (DOWN + UP) pressed for 6 seconds to make the AUTOMATIC COLD BALANCING



- On the display appears “ B A L “
- Release the key 1 + 2 (DOWN + UP)

4 - Display = “ T 0 2 0 ” = 20 DEGREES – Set gripper jaws temperature or wait
(“ T 0 3 0 ” = 30 DEGREES from software release V4.9)

On the display appears the ambient (gripper jaws) temperature set on the thermoregulator.

In applications where a great precision of temperature is necessary, it is possible change this parameter and set it with the actual gripper jaws temperature, simply pressing keys DOWN / UP.

5 – Keep the key RESET pressed for 3 seconds to start the AUTOMATIC BURN-IN CYCLE



On the display appears “ H100” , to inform that the first heating at 100 degree is in progress; next the writing H200, H100, H200, H100, H200, H100 will appear to inform that cycles of heating and colding at 200 and 100 degrees are in progress. At the end the termoregulator will be ready to work.
Burn in cycle can be stopped before end pressing key reset.

THE MACHINE IS READY TO WORK.

NOTE: After the BURN IN cycle, sealing bands modify a little its electric characteristic, but are stable. If pay attention can observe that temperature of sealing bands is some degree lower then before burn_in cycle. Do not modify temperature by rotating balancing trimmer (used only in the course of first start up, after a master reset) or pressing the up/down keys to do an automating balancing (used only after a change of the sealing band)

**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 – Keep the key RESET pressed for 3 seconds to start the AUTOMATIC BURN-IN CYCLE.

- Verify if burn-in is necessary in the specific application, looking at the quality of first sealing.



On the display appears “ H100” , to inform that the first heating at 100 degree is in progress; next the writing H200, H100, H200, H100, H200, H100 will appear to inform that cycles of heating and cooling at 200 and 100 degrees are in progress. At the end the termoregulator will be ready to work.

Burn in cycle can be stopped before end pressing key reset.

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 emergency output by an electrical floating contact (it opens when the logic supply 230 Volts power off)

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

LOGIC CIRCUIT SUPPLY (CN2)	230Vac +/- 10% (0.1 A absorption)
POWER CIRCUIT SUPPLY	10 - 100V (max 60 A absorption at 100 V)
MAXIMUM CURRENT MOD. 30 A	45 AMP + 10%
MAXIMUM CURRENT MOD. 60 A	90 AMP + 10%
MAXIMUM CURRENT MOD. 90 A	135 AMP + 10%
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	\cong +/- 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	2.5 Kg
PANEL WEIGHT	0.3 Kg
PANEL-POWER ASSEMBLY EXTENSION WEIGHT	0.2 Kg

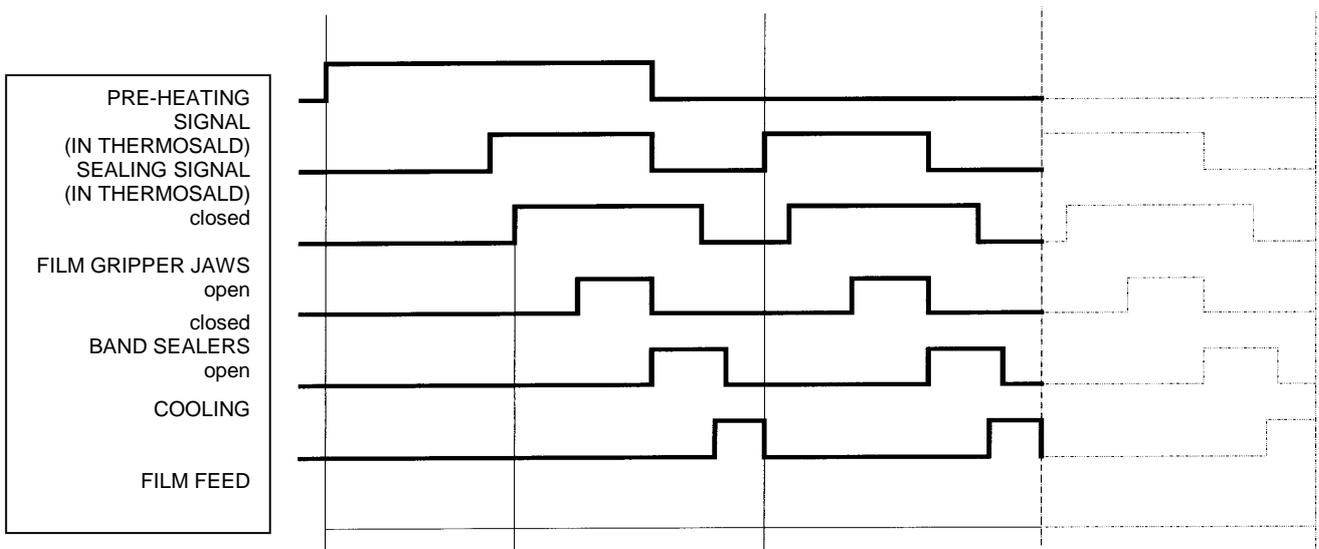
7 – DETAILS FOR ORDER FORM

7.1 DETAILS FOR ORDER FORMS

MODEL - Description	CODE
THERMOSALD UPSCR - Impulse Thermoregulator 100V 30A	UPSCR_N_V5_10030
THERMOSALD UPSCR - Impulse Thermoregulator 100V 60A	UPSCR_N_V5_10060
THERMOSALD UPSCR - Impulse Thermoregulator 100V 90A	UPSCR_N_V5_10090
PANEL 3ESD0039 - Digital panel data input	3ESD0039
CAVO 3ESD0035 - Cable panel - thermoregulator	3ESD0035
/RS485 – RS485 Serial interface	/RS485
THERMOSAL_485 – Supervisor simulator (CD+RS232-485 Box)	3ESD0075
 OPZIONAL EQUIPMENT	
 TRANSFORMER 1400VA/70V/30A	 3ESD0063
Impulsive transformer for Thermoregulator 30A 0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50 / 60 / 70	
 TRANSFORMER 1400VA/50V/60A	 3ESD0064
Impulsive transformer for Thermoregulator 60A 0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50	
 TRANSFORMER 2000VA/50V/90A	 3ESD0065
Impulsive transformer for Thermoregulator 90A 0 / 230 / 400 / SCH / GND = 0 / 30 / 40 / 50	
 GRAPHIC PRINTER – Printer to report temperature graphic	 3ESD0056
 BANDS AND WIRES FOR SEALING	
Bands and wires with many profiles, sold in meters, on specific draw, Copper/silver ended, teflon coated.	
 USE AND MAINTENANCE MANUAL	 UPSCR_N_V5_MUM
OPERATOR MANUAL	UPSCR_N_V5_MOP

ANNEX A – 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.



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: keep keys **DOWN + RESET/MODE (1 + 4)** pressed for 6 seconds (on the display appears **0.0.0.0.**).

TO OUTPUT: Release **EVERY KEY** for 8 seconds.

TO LOOK NEXT PARAMETER: Press key **RESET/MODE**

TO INCREASE THE VALUE: Press key **UP**

TO DECREASE THE VALUE: Press key **DOWN**

- **0.0.0.0. - INITIAL STATE OF MACHINE DATA LIST**

Press key **RESET/MODE** To look next parameter.

- **1.XXX - HEATING INCREASE DEGREE / 10 MS**

It is the speed of temperature increase following a pre-heat or 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.

- **2.XXX - KV PROPORTIONAL GAIN**

Loop proportional gain. Increase this parameter means increase speed of loop and then increase speed of the system.

Increase too much means to do the system and temperature less stable.

- **3.XXX - KINT INTEGRAL GAIN**

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.

- **4.XXX - KINT OPERATING LIMIT**

- **5.XXX - SELECT °C / °F DISPLAY**

Select the temperature display in degree Centigrade (Celsius) or Farhenheit.

- **6.XXX - MAINS SUPPLY FREQUENCY 50 / 60 Hz**

Display electric network frequency recognized automatically at power on.

- **7.XXX - SELECT MAXIMUM SEALING TIME**

Set the sailing time [Units seconds]. 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 continuous sealing.

- **8.XXX - PARTIAL SHORT CIRCUIT FACTOR**

This parameter is used to set an istantaneous current threshold, above which a partial short-circuit occurs and the thermoregulator sends fault signal F097.

The standard istantaneous current is acquired during the balancing or burn-in procedures.

- **9.XXX - FAULT ENABLE**

Numeric code to enable/disable some fault

0 = disable all faults in the bottom list

255 = enable all faults in the bottom list

to enable only some faults, the code is determined as follow:

ENABLE FAULT 82	1 +
ENABLE FAULT 84	2 +
ENABLE FAULT 86	4 +
ENABLE FAULT 87	8 +
ENABLE FAULT 89	16 +
ENABLE FAULT 97	32 =

CODE CALCULATED

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- **A.XXX - RATED CURRENT**

Displays the rated current of termoregulator 30 / 60 / 90 Ampere

- **B.XXX - KD DERIVATIVE GAIN**

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.

- **C.XXX - ENABLE COMPENSATION WITH SYSTEM COLD**

001 = enable the special function on different initial pre-heating. For more informations do not hesitate to contact our technical office.

- **D.XXX - SERIAL PRINTER ENABLE**

1 = enable data to be exchanged with the 3E printer model GRAPHIC PRINTER, that permits to record sealing data.

- **E.XXX - SEALER NUMBER FOR PRINTER**

It is the number assigned to the heat sealer that allow the 3E GRAPHIC PRINTER to recognise what sealer is sending data. For more informations do not hesitate to contact our technical office.

- **F.XXX - ENERGY CONTROL ENABLE**

1 = enable energy pre-heat control

2 = enable energy sealing control

3 = enable energy pre-heat + sealing control

- **H.XXX - ENERGY CURRENT TOLERANCE DURING PRE-HEATING**

- **I.XXX - ENERGY PHASE TOLERANCE DURING PRE-HEATING**

- **L.XXX - ENERGY CURRENT TOLERANCE DURING SEALING**

- **O.XXX - ENERGY PHASE TOLERANCE DURING SEALING**

- **P.XXX - ENERGY MINIMUM TEMPERATURE THRESHOLD TO ACQUIRE**

It is the temperature threshold over which energy acquisition cannot begin.

- **BARRA CODICE 1 - BURN-IN TEMPERATURE**

Hot temperature of the Burn_in cycle.

Note: the Burn-in cycle is used to stabilize bands in temperature; it executes 3 cycles of heating and cooling .

- **BARRA CODICE 2 - BURN_IN HEATING TIME**

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 .

- **BARRA CODICE 3 - CYCLES NUMBER TO CHANGE 1/10000 PERIOD MAINS SUPPLY FREQUENCY**

Internal parameter. Set 0 to disable alarm 63 and phase control PHLL.

- **BARRA CODICE 4 - MAXIMUM ERROR 1/10000 PERIOD MAINS SUPPLY FREQUENCY**

Internal parameter.

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.

NOTE – In some setting data state is possible analyse the performances of the sealing bands on machine. These works must be done only by skilled workers with experience, after getting in contact with our technical office.

TO ENTER: keep keys **DOWN + RESET/MODE (1 + 4)** pressed for 6 seconds (on the display appears **0.0.0.0.**).

TO OUTPUT: Release **EVERY KEY** for 8 seconds.

TO LOOK NEXT PARAMETER: Press key **RESET/MODE**

TO INCREASE THE VALUE: Press key **UP**

TO DECREASE THE VALUE: Press key **DOWN**

- **1.1.1.1. - INITIAL STATE OF SETTING DATA LIST**

Press key **RESET/MODE** To look next parameter.

- **0. XXX - HEATING CURRENT FOR TEST**

Allow to set the current to heat manually band and examine it [U.M. = Ampere].

- **1. XXX - INSTANTANEUS V-I FOR TEST**

Internal parameter.

- **2. XXX - INSTANTANEUS IREAD FOR TEST**

Internal parameter.

- **3. XXX - MAXIMUM ACTIVE CURRENT**

Display maximum active current that the thermoregulator can supply.

45 Ampere per il termoregolatore UPSCR_M_V4_10030

90 Ampere per il termoregolatore UPSCR_M_V4_10060

135 Ampere per il termoregolatore UPSCR_M_V4_10090

- **4. XXX - WORKING ACTIVE CURRENT**

Display active current supplied by thermoregulator: this parameter must be less than above parameter N. 3.

- **5. XXX - HEATING FACTOR**

This parameter modify the temperature characteristic of the thermoregulator.

Increase this parameter means increase the temperature of the band.

- **6. XXX - V-I 100 DEGREE**

Internal parameter.

- **7. XXX - I-V ABSOLUTE MAXIMUM RATING**

Internal parameter.

- **8. XXX - I-V RATED**

Internal parameter.

- **9. XXX - MAINS SUPPLY FREQUENCY**

On the display switch before the number integer of mains supply frequency for 3 seconds es. **50.** (Note the point on the right of number), then the thousandth of herz for 10 seconds es. **.008** (Note the point at the left of number)

- **A.XXX - VOFFSET**

Internal parameter.

- **B.XXX - MAXIMUM SEALING TEMPERATURE**

Internal parameter.

- **C.XXX - TEMPERATURE GRADIENT** – maximum temperature decrease to enable balancing

(Degrees/10 seconds)

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

NOTA – Press the key **RESET / MODE** to reset every alarm

WARNINGS CAUSES REMEDIES

UDIP	A GENERAL RESET PROCEDURE HAS BEEN PERFORMED Set or Verify the DIP SWITCH SW+/SW- and press the key RESET/MODE
FBAL	A GENERAL RESET PROCEDURE HAS BEEN PERFORMED Make cold balancing of led green/red by trimmer and press the key RESET/MODE
FCAL	EQUIPMENT NOT CALIBRATED Make hot automatic calibration (only previous software up to release 4.0)
Fo5o	ENTER THE HEATING FACTOR Keep keys 2+4 (UP+Reset/Mode) Pressed for 6 seconds and set parameter 5 (heat factor) (only previous software up to release 4.0)
F21	RS485 INTERFACE ERROR(OE) Overrun error-please wait autoreset and try again
F22	RS485 INTERFACE ERROR(FE) Frame error-please wait autoreset and try again
F23	RS485 INTERFACE ERROR(RX READ INDEX) Line error-please wait autoreset and try again
F25	RS485 INTERFACE ERROR(TX BUFFER FULL) Tx buffer full error-please wait autoreset and try again
F26	RS485 INTERFACE ERROR(RX BUFFER FULL) Rx buffer full error-please wait autoreset and try again
F33	NO CURRENT TO THE BAND Verify power on the transformer, Verify Voltage on CN1/1-CN1/2 connector, Verify breaking of power cables, Verify breaking of bands.
F34	VERIFY DIP SWITCH AND PRESS RESET KEY Verify DIP and Press RESET/MODE key
F35	DO A BALANCE BY TRIMMER BALANCING Only at start up after a master reset, it's necessary to do a trimmer balancing and an electronic balancing
F36	DO AN ELECTRONIC BALANCE BY PRESS DOWN+UP KEY At start up after a master reset and a trimmer balancing, it's necessary to do an electronic balancing
F38	THE MACHINE IS WAITING A COOLING DOWN DURING A CALIBRATION PROCEDURE Wait please
F39	THE MACHINE IS WAITING A COOLING DOWN DURING AN ENERGY ANQUISITION Wait please (only previous software up to release 4.0)

FAULTS	CAUSES REMEDIES
---------------	----------------------------------

F41	ENERGY FAULT BY PRE-HEAT CURRENT CONTROL Verify bands in the machine, repeat energy acquisition
F42	ENERGY FAULT BY PRE-HEAT PHASE CONTROL Verify bands in the machine, repeat energy acquisition
F43	ENERGY FAULT BY PRE-HEAT CURRENT CONTROL NOT ACQUIRED Do energy acquisition

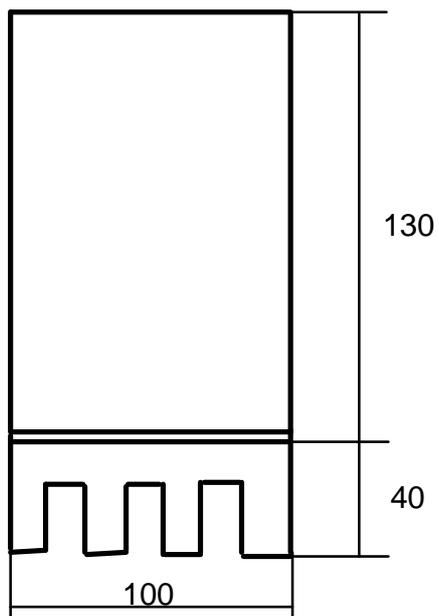
- F44 ENERGY FAULT BY PRE-HEAT PHASE CONTROL NOT ACQUIRED**
Do energy acquisition
- F51 ENERGY FAULT BY SEALING CURRENT CONTROL**
Verify bands in the machine, repeat energy acquisition
- F52 ENERGY FAULT BY SEALING PHASE CONTROL**
Verify bands in the machine, repeat energy acquisition
- F55 ENERGY FAULT BY CONTINUOS SEALING CURRENT CONTROL**
Verify bands in the machine, repeat energy acquisition
- F56 ENERGY FAULT BY CONTINUOS SEALING PHASE CONTROL**
Verify bands in the machine, repeat energy acquisition
- F61 AUTOMATIC COLD CALIBRATION OVERFLOW TO LOW**
Verify bands characteristic, repeat operation, if problem persists contact our technical office.
- F62 AUTOMATIC COLD CALIBRATION OVERFLOW TO HIGH**
Verify bands characteristic, leave the machine cooling, repeat operation, if the problem persists do not exitate to contact our technical office.
- F63 MAINS SUPPLY FREQUENCY OUT OF RANGE**
Wait mains supply frequency to stabilize, press key RESET/MODE; if the problem persist set parameter DATI DI SETTING / BAR CODE 3 = 0.
- F69 CURRENT TO GROUND**
Verify bands into machine that touch probably ground.
NOTE: the thermoregulator is connected to ground, to verify with an instrument the band problem, it is necessary disconnect before bands cables from connector CN1/3-CN1/4 and connector CN3/6-CN3/7.
- F76 IREAD TOO HIGH**
Current circuit saturation.
Verify bands in machine not perfectly isolated.
Verify voltage on secondary of power transformer.
Contact our technical office.
- F77 50/60 HZ FREQUENCY CHANGE DETECTED**
Verify at power on a change in the mains supply frequency 50/60 Hz.
After a master reset or at start up the thermoregulator has recognise 60 Hz mains supply frequency.
Press key RESET/MODE
- F78 EQUIPMENT NOT CALIBRATED**
Make an automatic calibration
(only previous software up to release 4.0)
- F081 CHECK-SUM FAULT – HARDWARE FAILURE**
Checked data in the eeprom wrong, pay much attention please.
Press key RESET/MODE, verify MACHINE DATA, SETTING DATA, PRE-HEAT AND SEAL TEMPERATURE SET, do not exitate to contact our technical office.
- F082 LOGIC SUPPLY(CN2) AND POWER SUPPLY(CN1) HAVE DIFFERENT PHASES**
Verify that the supplies have the same phase or out of phase 180 degree.
- F083 REFERENCE CABLE OR POWER CABLE WRONG TURNED**
Verify connections of reference and power cables:
CN3/6 corresponding to CN1/3
CN3/7 corresponding to CN1/4
- F084 POWER TRANSFORMER VOLTAGE TOO HIGH**
Verify calculation of power transformer, Verify setting of DIP SWITCH SW+ SW-
- F085 SEALING TIME HIGHER THAN MACHINE SET DATA 7.XXX**
Verify sealing time set into the PLC, increase MACCHINE DATA 7.XXX
- F086 MAINS SUPPLY VOLTAGE DECREASED BY MORE THEN 10%**
Fault do not stop machine and disappear after 10 seconds, Verify mains supply voltage because floating.
- F087 MAINS SUPPLY VOLTAGE DECREASED BY MORE THEN 10% DURING SEALING**
Fault do not stop machine and disappear after 10 seconds, Verify main supply voltage because floating.

- F088 NO SIGNAL FROM BAND**
 Verify the band into machine because probably not perfectly isolated.
 Fault Hardware on the analog input.
 Do not exitate to contact our technical office.
- F089 BAND BROKEN IF THE BANDS ARE PARALLEL CONNECTED**
 Verify the bands in parallel.
 If the problem persist, repeat Burn-in procedure, only few seconds to permit starting of procedure, and press RESET/MODE to interrupt procedure.
- F090 SHORT CIRCUIT BETWEEN THE BANDS OR BETWEEN A BAND AND GROUND IN THE CASE OF HIGH CURRENT**
 Verify bands, Verify power connectios between thermoregulator and bands.
- F091 FAULT I²T**
 Verify currents.
- F092 POWER PART FAILURE**
 Hardware problems, press key RESET/MODE, if the problem persists do not exitate to contact our technical office.
- F093 BAND BROKEN DURING A SEAL**
 Verify power on the transformer, Verify Voltage on CN1/1-CN1/2 connector, Verify breaking of power cables, Verify breaking of bands.
- F094 REFERENCE SIGNAL CABLE FROM BAND IS INTERRUPTED**
 Verify the connections of reference signal cable from band (CN3/6 - CN3/7)
- F095 MAINS SUPPLY SYNCRONISM DOES NOT MATCH MACHINE REQUIREMENTES**
 Internal hardware problem, do not exitate to contact our technical office.
- F096 V-I TOO HIGH**
 Voltage circuit saturation.
 Verify trimmer BALANCING
 Verify DIP SWITCH SW1 (only previous software up to release 4.0)
- F097 PARTIAL SHORT-CIRCUIT BETWEEN THE BANDS**
 Verify bands into machine, probably not perfectly isolated.
 If the problem persist, repeat Burn-in procedure, only few seconds to permit starting of procedure, and press RESET/MODE to interrupt procedure.
 To reduce the problem increase MACHINE DATA 8.XXX (PARTIAL SHORT CIRCUIT)
- F098 NO CURRENT DELIVERED DURING CALIBRATION**
 Verify power on the transformer, Verify Voltage on CN1/1-CN1/2 connector, Verify breaking of power cables, Verify breaking of bands.
- F099 FAULT EEPROM**
 Do not exitate to contact our technical office.

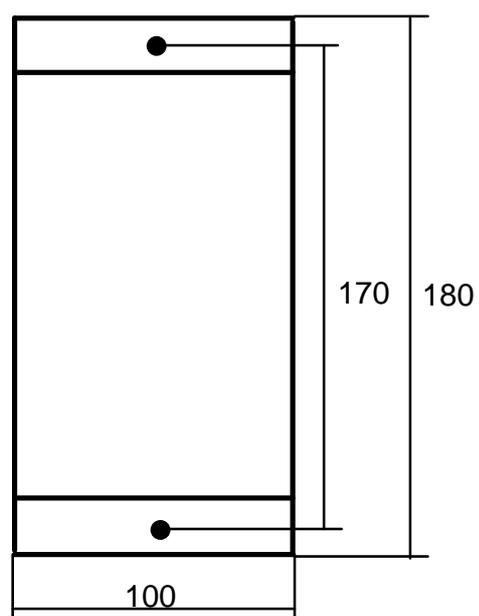
ANNEX E – DIMENSIONS

THERMOREGULATOR DIMENSIONS

SIDE VIEW

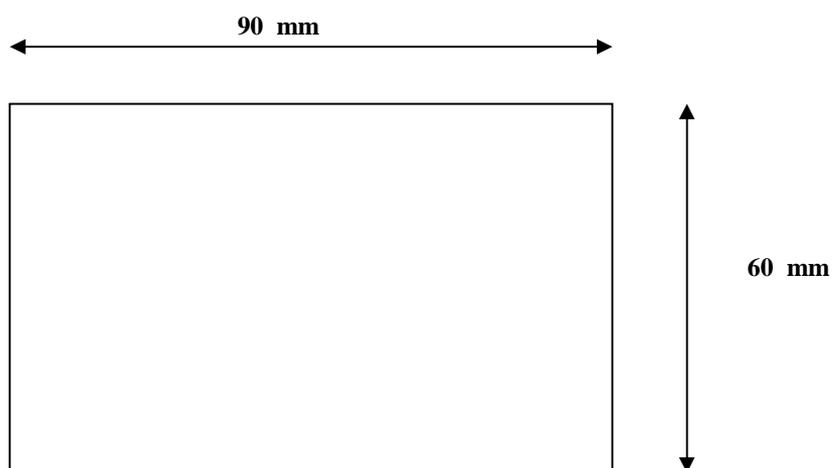


FRONT VIEW

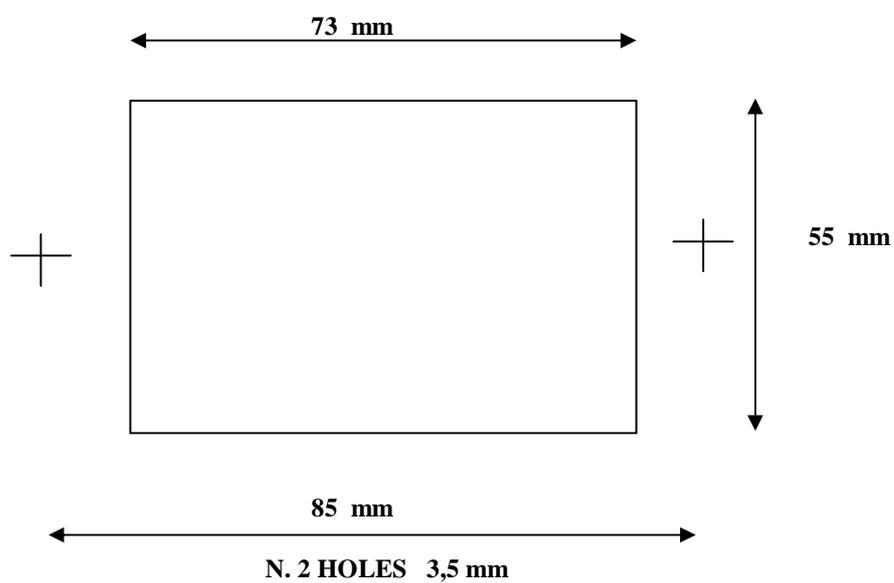


PANEL DIMENSION

FRONT VIEW



HOLE PLAIN



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”

TRANSFORMER 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%

INSTANTANEOUS APPARENT POWER: 2.1 the rated power

(Supplied for a short time with c.d.t. 5% e $\cos\phi=0.5$)

PRIMARY PROTECTION: “D” type circuit breaker with I_n = active supply current

THERMIC CLASS: F

INSULANCE CLASS MATERIALS: F

MAXIMUM AMBIENT TEMPERATURE: 40°C

VACUUM TEST: $\cos\phi_0 = 0.11$ $P_0 = 18$ W $I_0 = 0.4$ A +/- 30% a 230 V

SHORT CIRCUIT TEST: $\cos\phi_{cc} = 0.94$ $P_{cc} = 75$ W $V_{cc}\% = 5.7\%$

ADDITIONAL LEAKAGE: $P_{add} = 10$ W

TOTAL LEAKAGE: $P_p = P_{cc} + P_0 + P_{add} = 103$ W

EFFICIENCY A $\cos\phi = 1$: $\eta = 92.5\%$

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 1400VA/50V/60A**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:** 1400 VA**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%**INSTANTANEOUS APPARENT POWER:** 2.1 the rated power(Supplied for a short time with c.d.t. 5% e $\cos\phi=0.5$)**PRIMARY PROTECTION:** “D” type circuit breaker with I_n = active supply current**THERMIC CLASS:** F**INSULANCE CLASS MATERIALS:** F**MAXIMUM AMBIENT TEMPERATURE:** 40°C**VACUUM TEST:** $\cos\phi_0 = 0.11$ $P_0 = 18$ W $I_0 = 0.4$ A +/- 30% a 230 V**SHORT CIRCUIT TEST:** $\cos\phi_{cc} = 0.94$ $P_{cc} = 75$ W $V_{cc}\% = 5.7\%$ **ADDITIONAL LEAKAGE:** $P_{add} = 10$ W**TOTAL LEAKAGE:** $P_p = P_{cc} + P_0 + P_{add} = 103$ W**EFFICIENCY A $\cos\phi = 1$:** $\eta = 92.5\%$ **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:

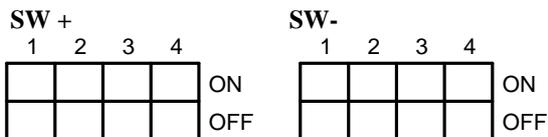
APPLICATION NOTE

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]

TECNICAL NOTE

RESISTANCE OF THE SEALING = _____ [Ω]
RATED CURRENT OF THE THERMOSALD = _____ [30/60/90 A]
SECONDARY VOLTAGE OF THE TRANSFORMER = _____ [V]
MODEL OF THE THERMOSALD = _____ [UPSCR_M_V4_.....]

DIP SWITCH TABLE



USE FACTOR = _____

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

ANNEX G – START UP CARD – PAG. 2

