efc equipos frigoríficos compactos

SECMATIC-970 CONTROLLER

EN

Self-contained and centralized Dryers and Thawing units.

INSTALLATION AND USER'S MANUAL

ISO 9001 TÜV MANAGEMENT SERVICE ISO 14001

CE

MI 970 0700
Cod. 0814819

❑ GENERAL TABLE OF CONTENTS

❑ 1st. PART

RECOMMENDATIONS ON WIRING

SECMATIC – 970

GENERAL RECOMMENDATIONS ON WIRING

Wiring is to be classified in three different levels.

Level 1: Low level analogical and digital signals.

- Analogical inputs: ambient probes,
- Analogical outputs: 0-10 volt.
- Digital inputs: thermal relay safeties, pressure switches,
- Computer network communications.

Level 2: Alternating current supply and operation.

- Digital outputs: command of contactors, solenoids, servomotors, relays ...
- Controller supply.

Level 3: Large power motor and equipment supply.

Cables of the same level can be assembled in trunkings or conduits, except for controller supply that is to be laid separately in another conduit.

Controller supply will be as much straight as possible from general supply, from a star distribution by means of either a separate hose per machine (parallel supply of several machines is to be avoided) or from three terminals specially prepared for that purpose in electric panel of each dryer.

Minimum gap between trunkings will be 20 cm. If this is not possible, cables should be laid in a common trunking with three compartments which have to be separated by means of a grounded metal barrier.

Conduits enclosing level 1 cables must not be laid parallel to conduits with level 3 cables at a distance smaller than 1.5 m.

If cables of different levels have to intersect, keep them at 90-degrees angles.

When these recommendations are difficult to be met, parallel runs must not be longer than 1.5 m.

All level 1 cables (low level) should be shielded.

WIRING IN CONTROLLER

Level 1 cables (low level) and level 2 cables reach the controller. These cables have to arrive separately in three trunkings or compartments.

All cables of probes, safeties, analogical outputs and communications (level 1) will reach the controller in the same conduit. Controller supply hose (level 2) will be laid in another conduit and digital outputs hose (level 2) in a different one.

Supply hose (three wires: L1, L2/N, Ground) will get into the cabinet through the first packing gland on the left. Within cabinet and fixed to available fastenings on side wall, it will be taken up to supply connector. Ground wire of this hose will be the only grounding entering controller and its only point of attachment will be the supply connector. The cabinet can be grounded through anchor fastening screws. Controller box is fitted with a screw with ground symbol (right side wall) that will not be used to ground but to connect all shields of level 1 cables.

Controller supply must have a ferrite, B64290-K82-X830 (Siemens), 7 to 8 turns or spirals (on the 3 wires); this ferrite can be located in its trunking or in the corner near the packing gland through which the hose gets inside, taking into account that the nearer the control the more efficient the performance.

Digital outputs hose will enter the cabinet through the second packing gland on the left.

All level 1 cables will arrive in different shielded hoses depending on their provenance: ambient probes, distribution box probes, safeties, analogical outputs and communications. All these hoses will distribute their entry into the cabinet through the three packing glands located more towards the right.

Shields of level 1 cable hoses will be connected to controller metal cabinet at ground terminal (screw showing the ground symbol on right side wall). Length of cable to be left without shield should be minimized. Shield junction should be the best and shortest possible. The other end of shield (in distribution box, etc.) must not be connected to ground or to any frame.

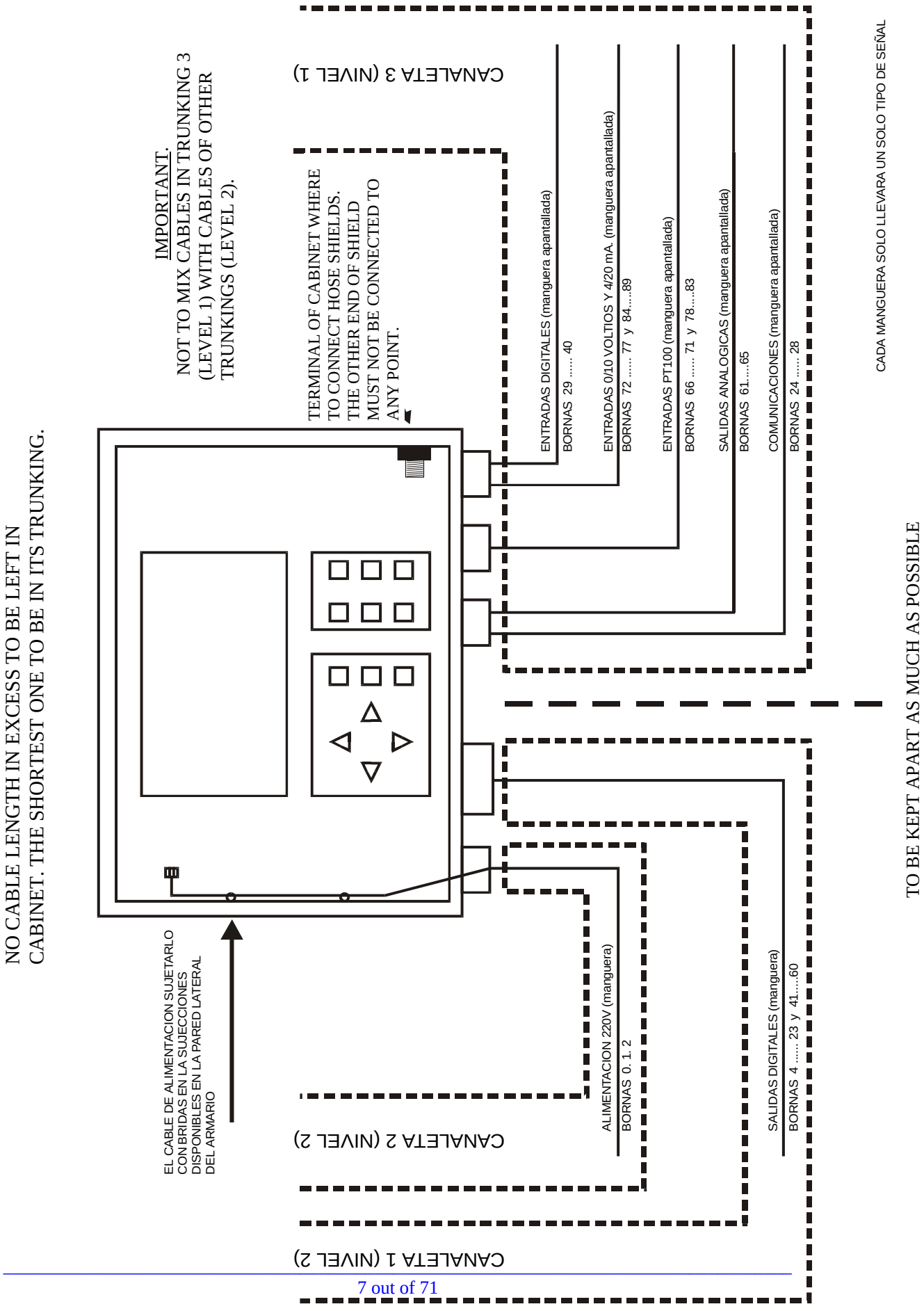
Inside cabinet, length of cables up to their connectors should be minimized to avoid cable in excess within cabinet and to prevent level 1 cables from getting near or joining level 2 cables. If it is considered necessary to leave cable in excess, this should be kept in its own trunking.

WIRING BETWEEN CONTROLLER AND DISTRIBUTION BOX, ELECTRIC PANEL AND AMBIENT PROBE BOX

All the aforementioned recommendations have to be taken into account too when making this wiring, always avoiding joining or mixing cables of different level or controller supply.

Two separate hoses leave ambient humidity and temperature probe box: one of them shielded, with ambient humidity and temperature probes, towards controller, the other with two wires of maximum and minimum safety thermostats to electric panel. Path in common of these two hoses should be minimized and, if possible, these hoses should be kept separated from probe box itself.

Shields of hoses leaving distribution box towards controller have to be insulated in this end as they are grounded in controller.


NO CABLE LENGTH IN EXCESS TO BE LEFT IN CABINET. THE SHORTEST ONE TO BE IN ITS TRUNKING.
IMPORTANT.
NOT TO MIX CABLES IN TRUNKING 3 (LEVEL 1) WITH CABLES OF OTHER TRUNKINGS (LEVEL 2).
TERMINAL OF CABINET WHERE TO CONNECT HOSE SHIELDS. THE OTHER END OF SHIELD MUST NOT BE CONNECTED TO ANY POINT.
CANALETA 3 (NIVEL 1)
ENTRADAS DIGITALES (manguera apantallada)
BORNAS 29 40
ENTRADAS 0/10 VOLTIOS Y 4/20 mA. (manguera apantallada)
BORNAS 72 ..... 77 y 84....89
ENTRADAS PT100 (manguera apantallada)
BORNAS 66 ..... 71 y 78....83
SALIDAS ANALOGICAS (manguera apantallada)
BORNAS 61.....65
COMUNICACIONES (manguera apantallada)
BORNAS 24 28
CADA MANGUERA SOLO LLEVARA UN SOLO TIPO DE SEÑAL
TO BE KEPT APART AS MUCH AS POSSIBLE
EL CABLE DE ALIMENTACION SUJETARLO CON BRIDAS EN LA SUJECCIONES DISPONIBLES EN LA PARED LATERAL DEL ARMARIO
CANALETA 2 (NIVEL 2)
ALIMENTACION 220V (manguera)
BORNAS 0. 1. 2
SALIDAS DIGITALES (manguera)
BORNAS 4 ..... 23 y 41.....60
CANALETA 1 (NIVEL 2)

WIRING IN DRYER (DISTRIBUTION BOX)

Use the distribution box only for low level signals (level 1). Therefore, the two-wire hose of maximum and minimum safety thermostats must not be taken to this box but directly to electric panel. If this hose is to share a trunking with ambient humidity and temperature probes, it would be advisable to add a ferrite in these two wires just outside the electric panel, to avoid any interferences of this line being induced on probe cables (Siemens B64290-K82-X830 ferrite with at least 7 or 8 turns or spirals).

Shields of hoses coming from probes of compressor discharge and suction temperature, of suction and discharge pressure switches and of contacts of micro relays should be attached at unit frame directly at distribution box inlet with the best and shortest possible junction. Under no circumstances can the other end of shield be in contact with frame or ground.
There must not be a connection with a ground cable between the electric panel and distribution box. This connection already exists through frame.
.

WIRING IN DRYER (ELECTRIC PANEL)

Install RC filters in all coils of contactors, relays and micro relays. These filters are to be those recommended by manufacturer of each actuator. Otherwise, a filter with the following characteristics is to be used:
RC : Condenser 220nF X type.
Winded resistance, 3W, 47 to 220 ohm. Other type of resistance could be pierced and this would eliminate filter efficiency.
Filters must be installed in micro relays also, although usually they are not in operation, nevertheless, all of them make a connection at the same time whenever there is a voltage start.

WIRING IN DRYER (MACHINES)

Cables of probes (like those of compressor suction and discharge temperature, etc.) must be prevented from joining or fastening to level 2 cables (like valve operations, etc.). They must be kept apart as much as possible.

All valves have to be fitted with RC filters.

WIRING FOR COMMUNICATIONS BETWEEN SEC-970 AND COMPUTER.

Communication cable between controller and computer must be a four-wire shielded cable, two wires for transmission and two for reception, and interlaced in twos, separate shields for each couple and one shield common for both couples.

This communication cable transmits an RS-422 signal that by means of a converter becomes an RS-232 signal to enter computer.

Converter recommended by E.F.C. is WESTERMO MA-45.

❑ 2nd. Part

CONTROL

TABLE OF CONTENTS

1. DESCRIPTION

The SECMATIC-970 controller is a microprocessor-based equipment consisting of several modules, specially designed to manage drying rooms or thawing rooms. It allows either the indefinite automatic operation or a programmed operation with the possibility of setting and storing ten programmes of more than 15 phases each.

It is fitted with many types of control, among which the most important are:

- Drying control: (not available in thawing units):
    - By Humidity.
    - By Humidity_GV.
    - By Time.
    - By Humidity and Time.

- Wet curing control: (not available in thawing units)

- Storage room control.

- Outside air utilization (not available in thawing units)

- Air renewals (not available in thawing units)
- Thawing control: (not available in dryers)
    - Standard
    - By probes

All drying controls are fitted with a temperature control during process.

A liquid crystal display (LCD) allows the following values of dryer, among others, to be seen:

- Ambient values.
- Setpoint values.
- Type of control and of mode (automatic or programmed).
- Signalling of activations.
- Failures and alarms, including history.
- Graphs of last two hours.

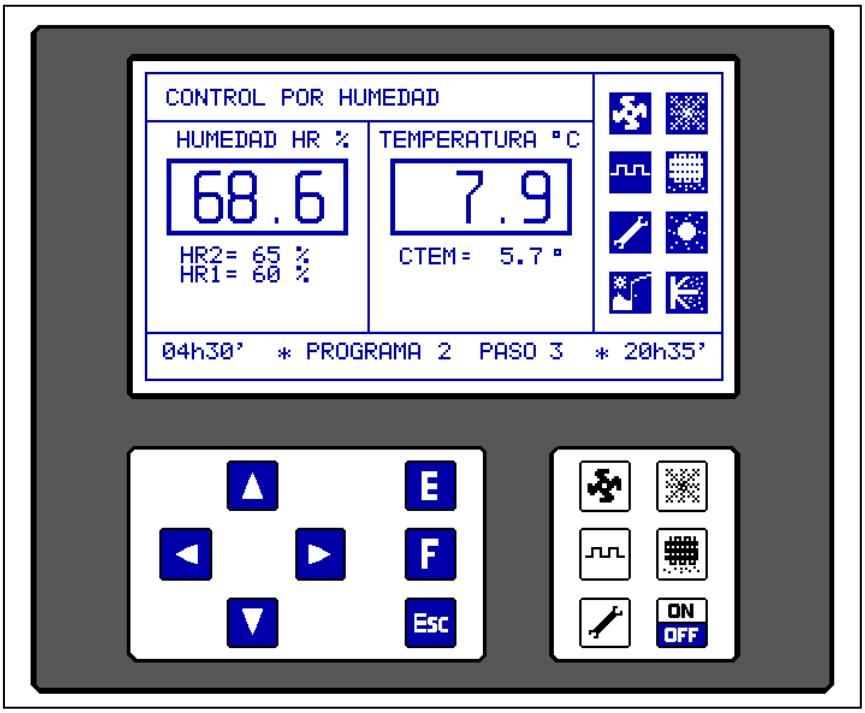
2. GETTING IN CONTACT WITH YOUR SECMATIC-970

Control panel of SECMATIC-970 controller is divided into three main sections:

- Liquid crystal display (LCD).

- Control keyboard.

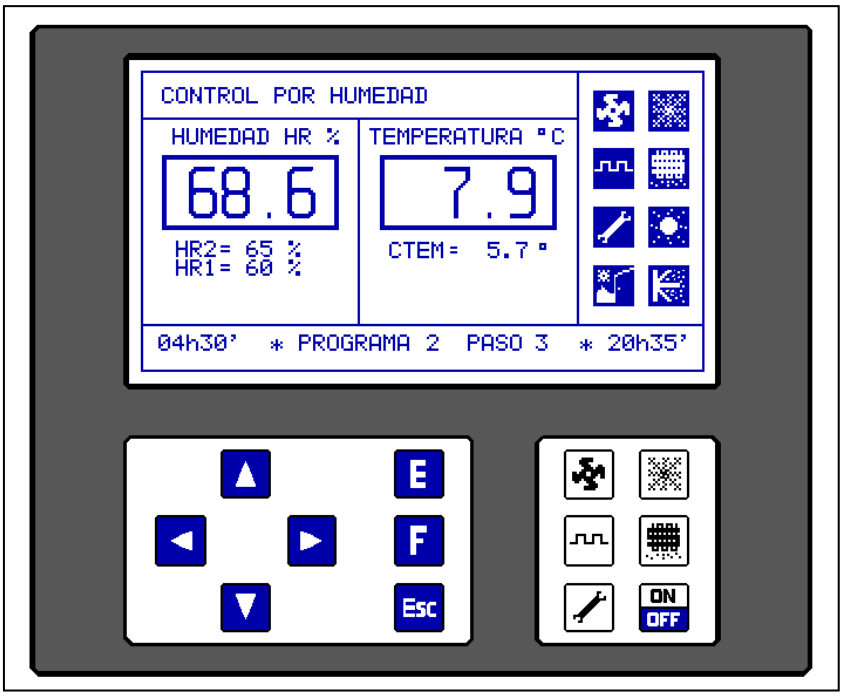
- Signal lamps including the run / stop lit pushbutton.



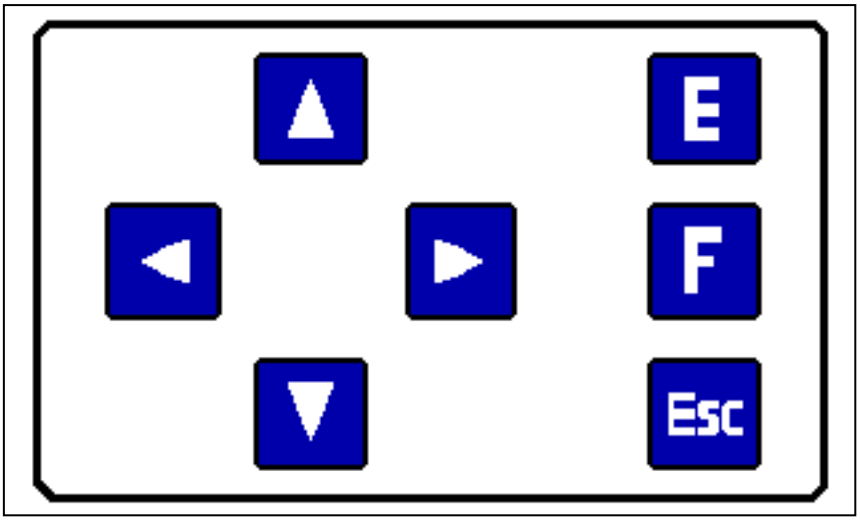
2.1 Liquid crystal display (LCD)

It allows the display and control of parameters, setpoints and message from unit and dryer.

Main display



2.2 Control keyboard



Up Arrow ⇧ :

It allows moving upwards in menus to select the different options.

It allows increasing numerical values of setpoints.

Down arrow ⇩ :

It allows moving downwards in menus to select the different options

It allows decreasing numerical values of setpoints.

Right arrow ⇨ :

Once the setpoint to be modified has been selected, it allows moving to numerical field to modify it.

Left arrow ⇦ :

It allows returning from numerical field of modified setpoint.

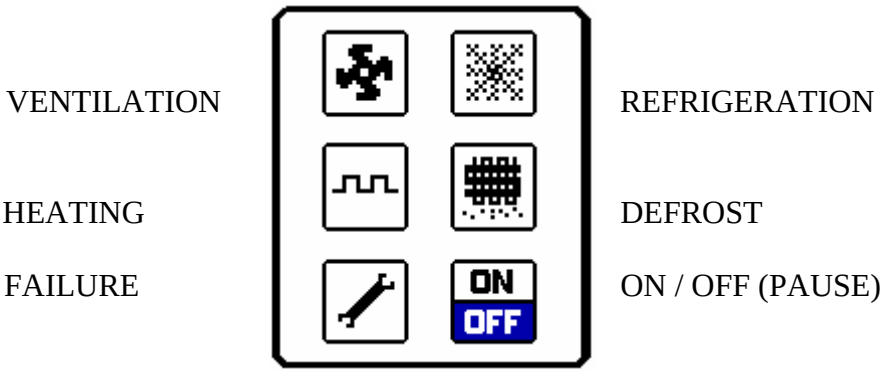
<E> key :

It allows validating or entering one of the options in menus.
It allows validating value of a modified setpoint.

<F> key: It allows access to main menu from main display.

<Esc> key: It allows getting out (Escape) from any point to main display.

2.3. Signal lamps and key ON/OFF.



Ventilation: It shows that fan is in operation.

Refrigeration: It shows that unit is under refrigeration process to recover set temperature.

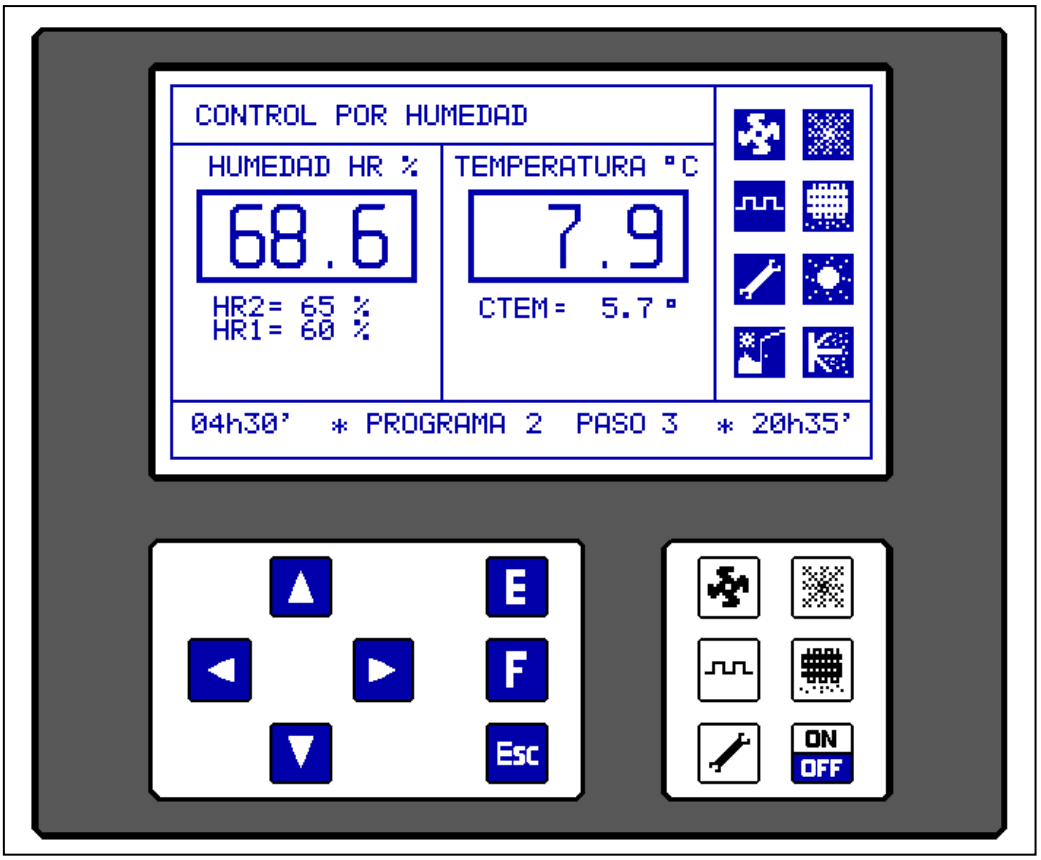
Heating: It shows that unit is under heating process to recover set temperature.

Defrost: It shows that unit is defrosting.

Failure: It shows that there is a failure in unit or dryer.

ON / OFF (Pause) : Connection / disconnection of all digital outputs.

3. MAIN DISPLAY



Essential information for unit control is contained in main display.

To have access to main display it is enough to press <Esc> key from any menu of controller.

Display is divided into five areas:

1. Control type

Type of control that rules dryer is displayed here.

2. Humidity control

Ambient humidity and drying setpoints are displayed here.

3. Temperature control.

Ambient temperature and its setpoint are displayed here.

4. Failures and alarms.

There are two types of indications during normal operation:

a.- If control is automatic, it indicates time elapsed since process start-up.

b.- If control is programmed, it shows:
- Number of current programme.
- Number of current phase.
- Time elapsed in current phase.
- Remainder time for the new phase to start.

If there is a failure in operation, it is shown in this area of display. Failure alarm will not disappear until any key of control keyboard is pressed.

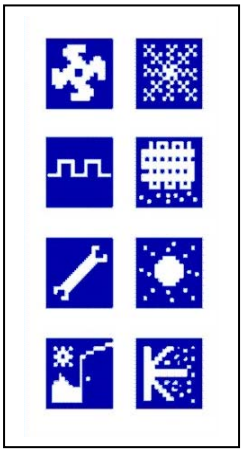
5. Signalling

VENTILATION

HEATING

FAILURE

AIR RENEWAL



REFRIGERATION

DEFROST

DRYING (not available in thawing units)

HUMIDIFICATION

Ventilation: It means that fan is in operation.

Refrigeration: It means that unit is under refrigeration process to recover set temperature.

Heating: It means that unit is under heating process to recover set temperature.

Drying: It means that unit is in the drying cycle.
(not available in thawing units)

Humidification: It means that unit is in humidification cycle.

Defrost: It means that unit is defrosting**.**

Unfreezing: It means that unit is in unfreezing cycle. (Not available in dryers)

Failure: It means that there is a failure in unit or dryer.

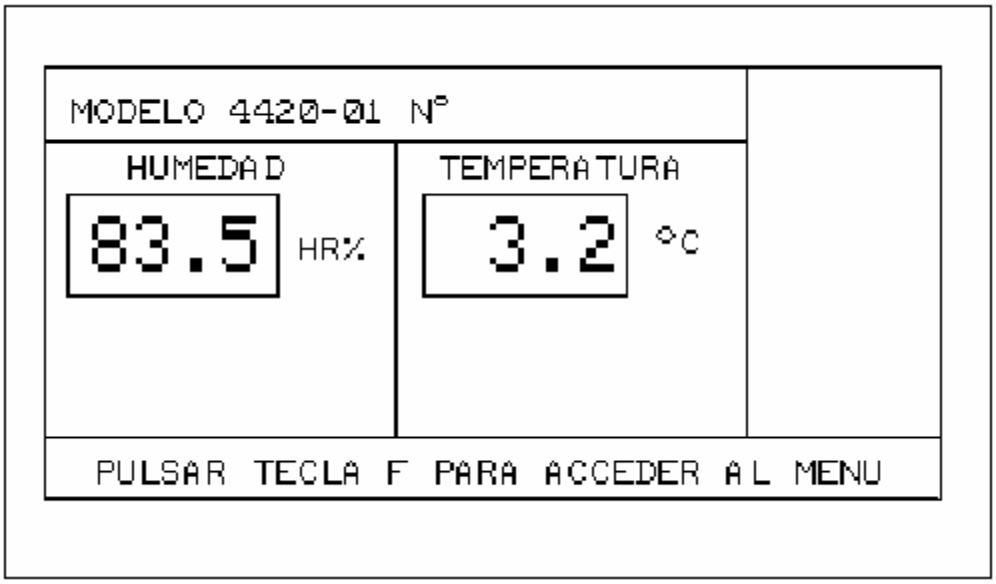
Outside air / renewal: If this signal is enabled together with drying signal, it means that drying cycle is being carried out with outside air. Otherwise, it means that air in room is being renewed. (Outside air is not available in thawing units)

REMARK:

Upon placing controller under voltage, the display shown below appears, where we can see ambient temperature and humidity, reference of controller and a message requiring us to press <F> key to have access to main menu

This display will also appear when there is no control started in controller.

.



4. MAIN MENU

MAIN MENU	
Automatic control	
Programmed control	
Inputs / Outputs status	
Graphs	
Failures	
*Energy saving	
Activate Defrost cycle	
*Permit outside air	(1)
Permit cyclic renewal	(2)
Activate forced renewal	(2)
Permit limited renewal	(2)
*Display of losses	

*) Not available in thawing units

Main menu allows access to unit different controls.

To have access to main menu, press <F> key from main display.

We can see that AUTOMATIC CONTROL appears automatically selected in reverse video.

With <Up arrow> and <Down arrow> we can move on menu to select the desired option, afterwards we will press <E> key that will allow us to validate the option chosen.

1. Automatic control.

From this option there is access to changes of control type and setpoints.

2. Programmed control

It allows the design and execution of programmes that permit changes of setpoints in time.

3. Inputs/outputs status

It allows us to know whether the different controller inputs or outputs are enabled (solenoids, contactors, ...)

4. Graphs

It makes possible to see a graph of ambient humidity and temperature for the last two running hours.

5. Failures

It contains a history of failures showing moments, referred to an hour counter, when the different anomalies occurred and where repaired.

6. Energy saving. (Not available in thawing units)

7. Activate / deactivate defrost cycle

It allows:

- activating manual defrost
- deactivating a defrost cycle in operation.

8. Permit / prohibit outside air (only if validated) (Not available in thawing units)

Drying by means of outside air used to reduce energy consumption is either permitted or prohibited.

9. Permit / prohibit cyclic renewal (only if validated)

Operation of cyclic renewals during processes is either permitted or prohibited
.

10. Permit / prohibit forced renewal (only if validated)

The immediate air renewal is either permitted or prohibited

11. Permit / prohibit limited renewal (only if validated)

Limitation in air renewals depending on temperature difference between outside air and temperature set in dryer is either permitted or prohibited

5. AUTOMATIC CONTROL

The automatic control of dryer can be carried out in different ways:

- Drying control:
  - By Humidity.
  - By Humidity_GV.
  - By Time
  - By Humidity and time.
- Control of wet curing.
- Control of storage room.

The automatic control of thawing unit can be carried out in different ways:

- Control of standard thawing
- Control of thawing by probes
- Control of storage room

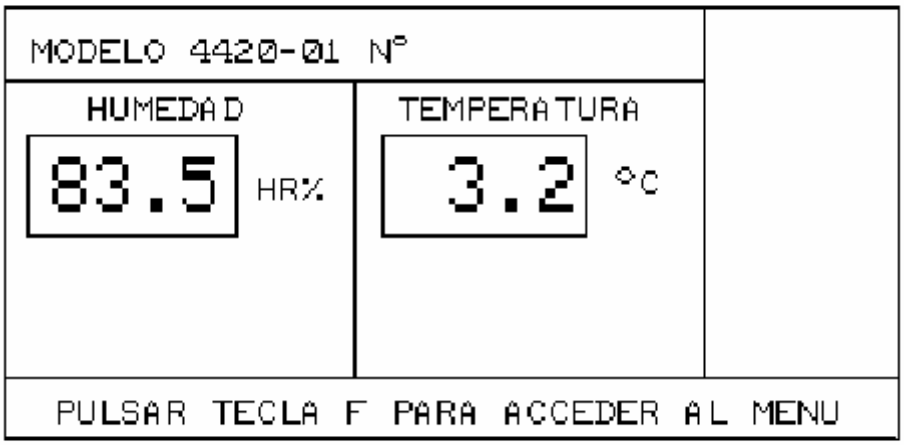
As this is the most commonly used control we will explain in depth drying controlled by humidity. Starting up of dryer with remaining types of controls is carried out in a similar way.

5.1. Start-up of dryer controlled by humidity.

5.1.1 Access to main menu

If there is any control started, main display is to be accessed firstly by pressing <Esc> key.

If no control is started or when controller is being put under voltage, the following display appears where we can see ambient temperature and humidity, controller reference and a message requesting us to press <F> key to have access to main menu.



When pressing <F> key we have access to main menu.

MAIN MENU	
Automatic control.	
Programmed control	
Inputs / outputs status	
Graphs	
Failures	
Energy saving	
Activate defrost cycle	
Permit outside air	(1)
Permit cyclic renewal	(2)
Activate forced renewal	(2)
Permit limited renewal	(2)
Display of losses	

5.1.2. Selection of automatic operation

We can see that AUTOMATIC CONTROL appears automatically selected in reverse video.

With up arrow and down arrow we can move on menu and select an option. Then, we press <E> key what will allow us to validate the option chosen.

In main menu we select the option AUTOMATIC CONTROL and validate it by pressing the <E> key. A display similar to the following will appear:

AUTOMATIC CONTROL			
Control type			Humidity
Temperature setpoint		CTEM	3.0º
High humidity limit	HR2		85.2%
Low temperature limit	HR1		80.0%
Cyclic time			
Start-up control			

The sentence CONTROL TYPE will appear selected.

With <Right arrow> key we can move to field which will allow us to select control type as required.

AUTOMATIC CONTROL			
Control type.		Humidity	
Temperature setpoint		CTEM	3.0º
High humidity limit	HR2		85.2%
Low humidity limit	HR1		80.0%
Cyclic time			
Start-up control			

5.1.3. Selection of control type by humidity

With <Up arrow> and <Down arrow> keys control type with which we want dryer to be managed is selected.

These control types are as follows:

- Drying control:
  - By humidity.
  - By humidity_GV.
  - By time.
  - By Humidity and time.

- Wet curing control. (only if validated)

- Storage room control.

We choose control by humidity and we press <E> key.

Setpoints necessary for operation will appear automatically.

Finally, we press <Left arrow> key to go back to text fields.

5.1.4. Selection and change of setpoints

Having selected control by humidity we have to enter the following setpoints:

- CTEMP Temperature
- HR2 High humidity limit.
- HR1 Low humidity limit.
- VVE Fan speed.(1 or 2) (Not available)
- TVM Fan running cyclic time.
- TVP Fan stop cyclic time.
- TRM Air renewal running cyclic time.
- TRP Air renewal stop cyclic time.

Air renewals are possible only if there are the necessary dampers and in addition they are permitted from main menu.

The way to enter the different setpoints is similar to the one described to enter control type.

In numerical fields, if <Up arrow> or <Down arrow> key is kept held down, increase or decrease of digits will be quicker.

To have access to cyclic time menu, firstly we have to select the option CYCLIC TIMES and then validate it with <E> key.

AUTOMATIC CONTROL		
Control type.		Humidity
Temperature setpoint	CTEM	3.0º
High humidity limit	HR2	85.2%
Low humidity limit	HR1	80.0%
Cyclic time		
Start-up control		

From cyclic time menu it is possible to return to previous menu by selecting the option SETPOINTS.

Cyclic time		
*Fan speed	VVE	1
Fan running time	TVM	1'00''
Fan stop time	TVP	10'00''
Renewal running time	TRM	5'00''
Renewal stop time	TRP	24H'00'
Setpoints		
Start-up control		

* (Not available)

5.1.5. Control start-up

Dryer start-up will be carried out by selecting and validating the option CONTROL START-UP and then pressing <ON /OFF> key located next to signal lamps.

Once unit has been started-up we press <Esc> key to return to main display.

AUTOMATIC CONTROL			
Control type.		Humidity	
Temperature setpoint		CTEM	3.0º
High humidity limit	HR2		85.2%
Low humidity limit	HR1		80.0%
Cyclic time			
Start-up control			

5.2. Start-up of dryer controlled by humidity_GV-

The difference between this control and the previous one is just that if humidity decreases 4 points with respect to low humidity setpoint, the humidification and ventilations outputs are enabled until humidity has reached the low humidity setpoint plus 1 point.

If HRroom <= HRmin – 4% until HRroom > HRmin + 1%
V and GV are enabled

For that purpose, the following steps are to be taken:

1. Main menu is to be accessed.
2. Select and validate the automatic control.
3. Select and validate control type by Humidity_GV.
4. Enter setpoints necessary for operation
   - CTEMP Temperature
   - HR2 High humidity limit.
   - HR1 Low humidity limit.
   - VVE Fan speed.(1 or 2, if it is a two-speed motor) (Not available)
   - TVM Fan running cyclic time.
   - TVP Fan stop cyclic time.
   - TRM Air renewal running cyclic time.
   - TRP Air renewal stop cyclic time.
5. Start-up control.

5.3. Start-up of dryer controlled by time

1. Main menu is to be accessed
2. Select and validate the automatic control.
3. Select and validate control type by time.
4. Enter setpoints necessary for operation
   - CTEMP Temperature
   - TSM Drying running time.
   - TSP Drying stop time.
   - VVE Fan speed. (Not available)
   - TVM Fan running cyclic time.
   - TVP Fan stop cyclic time.
   - TRM Air renewal running cyclic time.
   - TRP Air renewal stop cyclic time.
5. Start-up control.

5.4. Start-up of dryer controlled by humidity and time

1. Main menu is to be accessed
2. Select and validate the automatic control.
3. Select and validate control type by humidity and time.
4. Enter setpoints necessary for operation
   - CTEMP Temperature
   - HR2 High humidity limit.
   - HR1 Low humidity limit.
   - TSM Drying running time.
   - TSP Drying stop time.
   - VVE Fan speed. (Not available)
   - TVM Fan running cyclic time.
   - TVP Fan stop cyclic time.
   - TRM Air renewal running cyclic time.
   - TRP Air renewal stop cyclic time.
5. Start-up control.

5.5. Start-up of dryer as a wet curing room.

1. Main menu is to be accessed
2. Select and validate the automatic control.
3. Select and validate control type as a curing room.
4. Enter setpoints necessary for operation
   - CTEMP Temperature
   - HR2 High humidity limit.
   - HR1 Low humidity limit.
   - VVE Fan speed. (Not available)
   - TVM Fan running cyclic time.
   - TVP Fan stop cyclic time.
   - TRM Air renewal running cyclic time.
   - TRP Air renewal stop cyclic time.
5. Start-up control.

5.6. Start-up of dryer as a storage room

1. Main menu is to be accessed
2. Select and validate the automatic control.
3. Select and validate control type as a storage room.
4. Enter setpoints necessary for operation
   - CTEMP Temperature
   - VVE Fan speed. (Not available)
   - TVM Fan running cyclic time.
   - TVP Fan stop cyclic time.
5. Start-up control.

5.7. Start-up of dryer controlled by standard thawing.

1.- Main menu is to be accessed
2.- Select and validate the automatic control.
3.- Select and validate control type by standard thawing.
4.- Enter setpoints necessary for operation
- CTEMP Temperature
- HR2 High humidity limit (if humidifier is available)
- HR1 Low humidity limit. (if humidifier is available)
- TVM Fan running cyclic time.
- TVP Fan stop cyclic time.

5.- Start-up control.

5.8. Start-up of dryer controlled by probe thawing

1.- Main menu is to be accessed
2.- Select and validate the automatic control.
3.- Select and validate control type by humidity and time.
4.- Enter setpoints necessary for operation
- CTEMP Temperature
- HR2 High humidity limit (if humidifier is available)
- HR1 Low humidity limit. (if humidifier is available)
- CTSP Product surface temperature.
- CTIP Product internal temperature.
- TVM Fan running cyclic time.
- TVP Fan stop cyclic time.

5.- Start-up control.

6. PROGRAMMED CONTROL

6.1 Selection of programme number

From main menu we select the option PROGRAMMED CONTROL and validate it by pressing <**E**> key.

Automatic control
Programmed control
Inputs/outputs status
Graphs
Failures
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal

Then, we select number of programme we want to create, modify or edit by means of <**Up arrow**> or <**Down arrow**> keys . Then, we validate with <**E**> key.

PROGRAMME = **01**

6.2 Selection of number of step and its length.

PROGRAMME = **1**	STEP =O1	LENGTH= 00h00’
Control type	Humidity	
Temperature setpoint	CTEM	13.2 º
High humidity limit	HR2	80.0 %
Low humidity limit	HRl	76.0 %
Cyclic time		
Start-up control		

We select step to be modified and then its length by always pressing <E> key after any modification.

A length of time equal to zero will mean that this step is the last one of programme and that dryer will remain running indefinitely with the setpoints of the said step.

It is possible to create 9 programmes of 25 steps each.

Once number of programme, number of step and length have been chosen, we move onto PROGRAMME and by means of <Down arrow> key we go over setpoints we want to modify. Modification of setpoints is similar to the one in AUTOMATIC CONTROL.

PROGRAMME = 1	STEP =**O1**	LENGTH= 00h00’
Control type	Humidity	
PROGRAMME = 1	STEP =O1	LENGTH= **00h00’**
Control type	Humidity	
PROGRAMME = 1	STEP =O1	LENGTH= 00h00’
Control type	Humidity	

6.3 Application of programmed control in Thawing unit.

The best way to carry out a controlled thawing process is to use the "Thawing control by probes" and to create a programme with the steps considered necessary depending on type of product, load, speed, etc. (see 5.8)

A standard thawing process is described below (values mentioned are a reference and user must modify them depending on his requirements):
- CTEMP 16ºC (this value should decrease in successive steps as thawing progresses)
- CTSP 4ºC (this value can be kept in all steps)
- CTIP 1ºC (this value can be kept in all steps)

And a last step (time=0= indefinite), of "Storage control" (see chapter 5.6), to store unfrozen products at, for example, 3ºC.

Times to be set to carry out thawing should be adjusted depending on mass, product and several other factors, (it is usual to operate in thawing processes with times adding up between 24 and 72 hours, depending on the above mentioned factors, but "each person has his own way of thinking" and this point is not binding).

This “control of thawing by probes”, has two essential characteristics. The first one is that as soon as CTSP or CTEM are reached machine stops providing heat. The second one is that as soon as CTIP is reached by product internal Temperature, step is considered finished and with no need to wait for step total time to elapse, it will automatically jump to the following step that in last control would be "control of storage". This means that as soon as thawing has finished it goes directly to storage without waiting for timed fixed to elapse.

7. INPUTS AND OUTPUTS STATUS

7.1 Self-contained unit

From main menu we select the option INPUTS AND OUTPUTS STATUS and we validate it by pressing the <E> key.

Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Then, a display where status, enabled or not, of different outputs of controller, is accessed.

OUTPUTS STATUS					
01	Alarm	Yes/**No**	11	GV	Yes/**No**
02	Fan	**Yes**/No	12	CP2A 0%	Yes/**No**
03	CP1A 60%	Yes/No	13	CAEI	Yes/**No**
04	CP1C	**Yes**/No	14	CAE2	Yes/**No**
05	VSD	Yes/**No**	15	VSE-CI	Yes/**No**
06	Compressor	**Yes**/No	16	Vl	Yes/**No**
07	VSL	**Yes**/No	17	V2	Yes/**No**
08	VSCI	**Yes**/No	18	V3	Yes/**No**
09	VSCE	Yes/**No**	19	CP2C	Yes/**No**
10	VSC	Yes/**No**	20	VSE-CE	Yes/**No**
Analogical inlets <F>					

By pressing <F> key, we reach a display with all values of analogical inputs.

ANALOGICAL INPUTS	
01 Ambient Temperature	35.8º
02 Ambient humidity .:	75.7%
03 Outside Temperature :	-4.6º
04 Outside Humidity :	48.5%
05 Compressor suction pressure.	15.4k
06 Compressor discharge pressure	14.4k
07 Compressor suction temp.	34.8º
08 Compressor discharge temp.	34.6º
09 Sample weight	9.45 kg
10 Auxiliary inlet	7.5%
Analogical inputs <F>	

By pressing <F> key again we will have access to display of Product surface temperature and Product internal temperature probes.

ANALOGICAL INPUTS	
11 Product surface temperature	3.8º
12 Product internal temperature:	-2.7%
Digital inputs <F>	

We press <F> key again to have access to status of digital inputs.

DIGITAL INPUTS	
01 Compressor pressure switch.	Yes/**No**
02 Failure in Fan thermal relay	Yes/**No**
03 Room thermostat	Yes/**No**
04 Air-cooled cond. thermal relay	Yes/**No**
05 Compressor thermal relay	Yes/**No**
06 Oil lacking in compressor	Yes/**No**
07 Compressor klixon	Yes/**No**
Analogical outputs <F>	

Finally, by pressing again <F> key, we can see display of output analogical values.

ANALOGICAL OUTPUTS	
Analogical output 1	52.5%
Analogical output 2	10.0º
Analogical output 3	0.0%
Analogical output 4	100%
Return to Main menu <Esc>	

From any of above displays it is possible to return to main display by pressing <Esc> key.

7.2 Centralized unit

From main menu we select the option INPUTS AND OUTPUTS STATUS and we validate it by pressing the <E> key.

Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Then, a display where status, enabled or not, of different outputs of controller, is accessed.

OUTPUTS STATUS			
01 Alarm	Yes/**No**	11 GV	Yes/**No**
02 FaN	**Yes**/No	12 SH	Yes/**No**
03 CPB1	Yes/No	13 CAEI	Yes/**No**
04 CPB2	**Yes**/No	14 CAE2	Yes/**No**
05 VSD	Yes/**No**	19 Aux.fan	Yes/**No**
06 SGF1	**Yes**/No		
07 SGF2	**Yes**/No		
08 SGC1	**Yes**/No		
09 SGC2	Yes/**No**		
10 SWC	Yes/**No**		
Analogical inputs <F>			

By pressing <F> key, we reach a display with all values of analogical inputs.

ANALOGICAL INPUTS	
01 Ambient temperature	3.2º
02 Ambient humidity	83.5%
03 Outside temperature	15.1º
04 Outside humidity	80.3%
07 Cooling battery inlet temp.	-9.3º
08 Cooling battery outlet temp.	-6.2º
09 Sample weight	9.2 kg
10 Auxiliary inlet	0.0%
Analogical inputs <F>	

By pressing again <F> key we will have access to display of Product surface temperature and Product internal temperature probes.

ANALOGICAL INPUTS	
11 Product surface temperature	3.8º
12 Product internal temperature:	-2.7%
Digital inputs <F>	

We press <F> key again to have access to status of digital inputs.

DIGITAL INPUTS	
02 Failure of fan thermal relay	Yes/**No**
03 Room thermostat	Yes/**No**
08 Engine room locking	Yes/**No**
Analogical outputs <F>	

Finally, by pressing again <F> key, we can see display of output analogical values.

ANALOGICAL OUTPUTS	
Analogical output 1	52.5%
Analogical output 2	10.0º
Analogical output 3	0.0%
Analogical output 4	100%
Return to Main menu <Esc>	

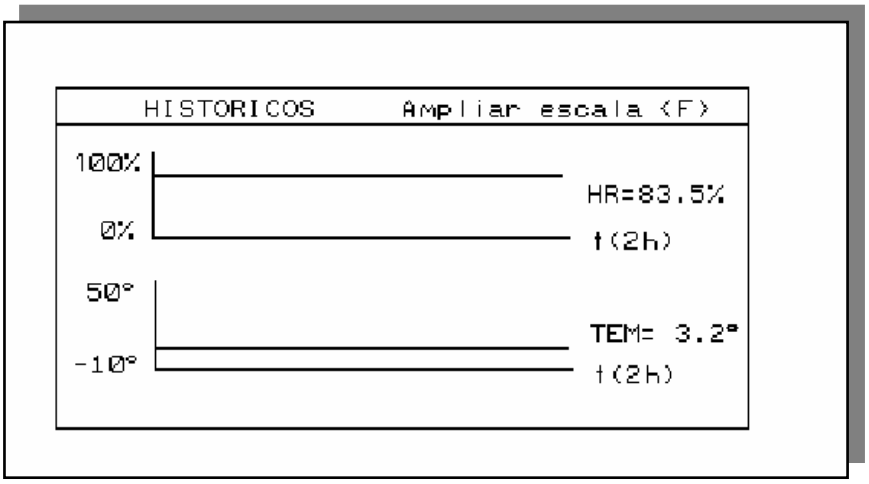
From any of above displays it is possible to return to main display by pressing <Esc> key

8. GRAPHS

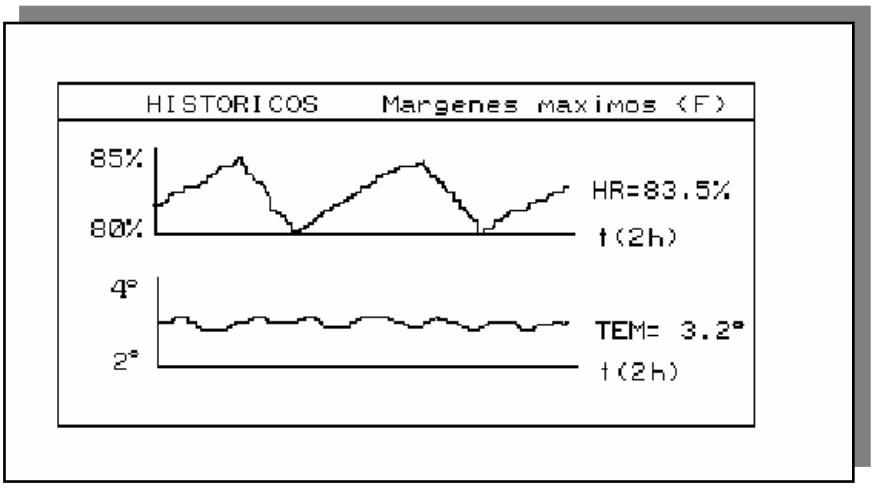
From main menu we select the option GRAPHS and we validate it by pressing the <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Permit forced renewal
Permit limited renewal
Display of losses

We have access then to display of maximum bands that on large scale shows, in two graphs, ambient humidity and temperature existing in dryer for the last 2 hours.



By pressing <F> key, scale of above graphs can be enlarged to the utmost.
From this point, we either press <F> key to return to previous display (Maximum bands) or we press <Esc> key to have access to main display.



9.- FAILURES

From main menu we select the option FAILURES and validate it by pressing the <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Display of failure history is then accessed.

FAILURES	Machine hours 23782	
Al.Ambient temp.	23782	23782
A2.Ambient humidity	11719	12345
A3.Outside temp.	3459	4534
A4.Outside humidity	659	1244
*A5.Comp. suction pressure	319	0
*A6.Comp. discharge press.	123	145
A7.Comp. suction temp.	89	89
A8.Comp. discharge temp.	19	19
A9.Sample weight	19	0
*D1.Compressor pressure switch	17	19
Previous Failures <F>		

FAILURES	Machine hours 23782	
D2.Fan thermal relay	12	12
D3.Room thermostat.:	11	15
*D4.Aircooled cond.thermal relay	8	0
*D5.Compressor thermal relay	8	9
*D6.Oil lacking in compr.	5	5
*D7.Klixon Compressor :	1	2
**D8 Engine room locking	8	0
Return to Main menu <Esc>		

*) Not available in centralized units
**) Not available in self-contained units

Display contains the last 10 failures occurred.

Failures are ordered in reverse chronological order.

In right top part there is an hour counter. This is enabled whenever SECMATIC-970 controller is under voltage.

By pressing <F> key, we can obtain up to four displays with 10 failures each, this means that a history with the last 40 failures occurred is available.

Failure and its code are shown, followed by appearance and disappearance moment referred to hour counter of unit operation.

9.1. Failures and codes

Al Failure in ambient temperature probe.
A2 Failure in ambient temperature humidity.
A3 Failure in outside temperature probe.
A4 Failure in outside humidity probe.
A5* Failure in compressor suction pressure probe.
A6* Failure in compressor discharge pressure probe.
A7 Failure in compressor suction temperature probe or
Failure in cooling battery inlet temperature probe.
A8 Failure in compressor discharge temperature probe or
Failure in cooling battery outlet temperature.
A9 Failure in sample weight probe.
A11 Failure in product surface temperature.
A12 Failure in product internal temperature.

D1* Compressor high and low pressure switch enabled.
D2 Fan thermal relay enabled.
D3 Room temperature safety thermostats enabled.
D4* Air-cooled condenser thermal relay enabled.
D5* Compressor thermal relay enabled.
D6* Oil pressure switch enabled.
D7* Compressor klixon enabled.
D8** Engine room locking enabled.
D9 Damper closing safety enabled.
D10 High temperature failure.

*) Not available in centralized units.
**) Not available in self-contained units

10. DEFROST ENABLING / DISABLING

Defrost cycle is automatic.

However, if, at any time, it is advisable to carry it out at once, we will select the option ENABLE DEFROST CYCLE from main menu and we will validate it by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Enable defrost cycle
Permit outside air
Permit cyclic renewal
Enable forced renewal
Permit limited renewal
Display of losses

Whenever defrosting is being carried out, it is possible to end it by hand from main menu.
The option DISABLE DEFROST CYCLE is selected and then it is validated with <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Disable Defrost Cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

11. PERMIT / PROHIBIT OUTSIDE AIR

(Not available in thawing units)

Only if your controller is fitted with the possibility of drying with outside air.

The option of outside air allows saving energy provided there are good conditions when drying cycle takes place with outside air instead of with machine.

From main menu, the option PERMIT OUTSIDE AIR is selected and then it is validated by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air.
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

If, after the option of operation with outside air has been selected, we wish to cancel it to carry out drying with machine, we have to select, from main menu, the option PROHIBIT OUTSIDE AIR and validate it by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Prohibit outside air.
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

12. PERMIT / PROHIBIT RENEWALS

12.1. Permit cyclic renewal .

It is possible to renew air of dryer in a cyclic way. For that purpose, in the first place, this operation is to be permitted.

From main menu we select the option PERMIT CYCLIC RENEWAL and we validate it by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Once the cyclic renewal has been permitted, it is possible to prohibit it from main menu. We select the option PROHIBIT CYCLIC RENEWAL and we validate it with <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Prohibit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

12.2. Forced renewal.

It is possible to renew the air in dryer in a forced way.

From main menu we select the option PERMIT FORCED RENEWAL and we validate it by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Once the forced renewal has been permitted, it is possible to prohibit it from main menu. We select the option PROHIBIT FORCED RENEWAL and we validate it with <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Activate cyclic renewal
Prohibit forced renewal
Permit limited renewal
Display of losses

12.3. Permit limited renewal.

It is possible to limit air renewals, both cyclic and forced, by making them enable only if outside temperature is close to set temperature in dryer.

If, after limited renewal has been permitted, we try to renew air while outside temperature is out of range, outside air signalling will remain blinking.

.

From main menu we select the option PERMIT LIMITED RENEWAL and we validate it by pressing <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Energy saving
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

Once the limited renewal has been permitted, it is possible to prohibit it from main menu. We select the option PROHIBIT LIMITED RENEWAL and we validate it with <E> key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Prohibit limited renewal
Display of losses

13. DISPLAY OF LOSSES

Several data concerning product losses can be displayed.

From main menu we select the option DISPLAY OF LOSSES and press the **<E>** key.

MAIN MENU
Automatic control
Programmed control
Inputs / outputs status
Graphs
Failures
Activate defrost cycle
Permit outside air
Permit cyclic renewal
Activate forced renewal
Permit limited renewal
Display of losses

The following display is shown when Losses are displayed.

Display of losses	
Accumulated loss	20.6%
Loss speed per day	0.08% / D
Reference initial weight	8.6S k
Reference current weight	7.58 k

- Total loss since process start-up.
- Loss speed for the last 24 hours.
- Weight at process start-up.
- Current weight.

14. AIR DISTRIBUTION DAMPERS

Distribution dampers have to be adjusted at start-up.

The adjustment has to result in the correct air distribution or sweeping within room. (This is essential to achieve the best homogeneity in product.)

There are different systems to properly adjust these dampers, for example, with an anemometer, etc.

Whenever fan is running, air distribution dampers have to be running.

Their running philosophy is as follows:

Running is exactly the same in all types of controls (Self-contained, centralized or tandem).

Configuration of the following data will be made in "Distribution and defrost" display:

- Percent. of CP1 minimum opening CP1 (%MIN_CP1)
  Range of edition = 0 – 50%
  Value of load by default = 17%
- Percent. of CP1 maximum opening (%MAX_CP1)
  Range of edition = 50 – 100%
  Value of load by default = 100%
- Percent. of CP2 minimum opening (%MIN_CP2)
  Range of edition = 0 – 50%
  Value of load by default = 17%
- Percent. of CP2 maximum opening CP2 (%MAX_CP2)
  Range of edition = 50 – 100%
  Value of load by default = 100%
- Time of total run
  Range of edition = 0´30” – 4´00
  Value of load by default = 2´30”
- Time of stop at each end
  Range of edition = 1” – 60”
  Value of load by default = 2”

There are 4 available outputs to enable damper opening and closing:

- Opening CP1 (CP1A)
- Closing CP1 (CP1C)
- Opening CP2 (CP2A)
- Closing CP2 (CP2C)

- The basic purpose intends to carry out the following:

  To have the possibility of balancing the air as much as possible (unbalance can be the result of conduit laying and other reasons), by limiting each damper maximum and minimum opening, so that flow is limited.

- The basic running intends to carry out the following:

  Assuming different opening values in both dampers and a stroke time for both servomotors, basic running must make CP1 close while CP2 opens and conversely. Shortest closing time damper must meet some waiting time for synchronization to be correct.

Display of damper running status:

<Left arrow> + <Down arrow>

By holding down at the same time <Left arrow> + <Down arrow> keys from main synoptic chart we reach a display where damper running status can be seen.

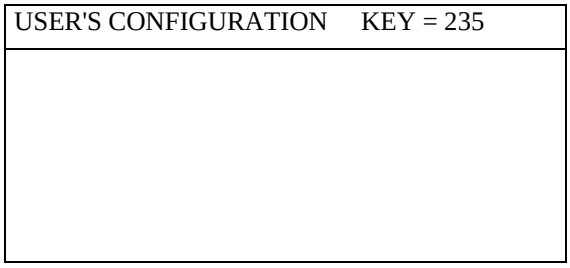
It shows how positioning is being made.
On which side positioning is taking place (side 1 or side 2)
Whether it is a standard operation, a readjusting operation or initial adjusting.

In addition, percents of opening of both dampers (closing, opening or stopped) are shown at any time. Counter of number of operations since last readjustment is shown as well.

15. TEMPERATURE ALARM AND ACCESS PERMIT TO MODIFICATIONS.

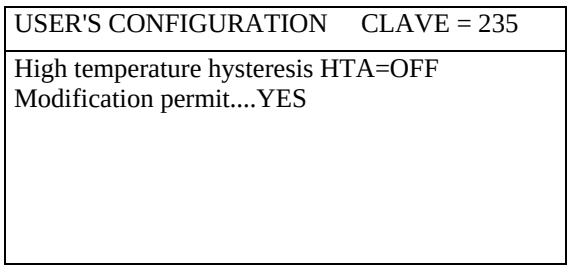
15.1 - Temperature alarm and access permit to modifications by user

This alarm and this permit are configured in display 'USER'S CONFIGURATION' that can be accessed from main display by holding down at the same time <Left arrow> + <Right arrow> keys.



Before the possible configuration options appear it is necessary to enter user's key. This key is different from the one for general configuration. If a faulty key is entered, control returns to main display.

Once correct key has been entered:



With <Down arrow> key we move onto 'Hysteresis..." line and then its status can be modified by pressing <Up arrow> and <E> keys.

In case of OFF, no high temperature failure control is carried out; if there is any value, this value would be of hysteresis over temperature setpoint and in the case room temperature is higher than CTEM + HTA, we will receive a failure alarm but this will NOT stop machine.

With <Down arrow> key we move onto 'Modification permit...' line. Its status is modified by pressing <E>key.

If 'Modification permit .....NO', no data can be modified, no action whatsoever, like start or stop a control, can be carried out, not even <ON/OFF> key would have any effect. It will be possible to increase or decrease data but these values cannot be validated by pressing <E> key.

15.2 - Energy saving (off-peak hours).

From 'USER'S CONFIGURATION' display, by holding down <F> key:

USER'S CONFIGURATION KEY = 235
High temperature hysteresis HTA=OFF Modification permit....YES Energy saving....NO

If we change to → 'Energy saving...YES', in main menu, a new line → 'Energy saving' will appear that will permit access to the following display:

ENERGY SAVING			
Hour / Day	12h45' /	Wednesday	
Monday	7-10	12-15	17-19
Tuesday	7-10	12-15	17-19
Wednesday	7-10	12-15	17-19
Thursday	7-10	12-15	17-19
Friday	7-10	12-15	17-19
Saturday	7-10	12-15	17-19
Sunday	7-10	12-15	17-19
Temperature safety band	+/- 3.0º		
Humidity safety band	4.0%		

Display includes:

- Current hour and day.
- Weekly table for saving hours.
- Safety bands.

Value of current hour and day is not controlled by a clock that will keep running during supply cuts, therefore, hour can be delayed with respect to actual hour a period of time equivalent to the time unit has been kept without supply. Any installation fitted with a commercial computer will avoid this problem since from time to time computer will update hour as well as day, saving table and bands.

Programming of a day, in the hour table, consists of 3 sections or intervals where energy saving it to be carried out; thus, a section 7-15 means that the energy saving will start at 7 o'clock and will end at 15 o'clock.
In the hour table a value of 0 to 24 h can be edited as well as xx that will mean that this interval does not exist.

Safety bands are limits that if exceeded, will make saving stop. Value of these temperature limits is equal to value of temperature setpoint ± temperature safety band.

Actually, humidity safety band is not a true band as it is just a limit over high humidity setpoint (HR2) in drying controls (humidity, humidity and time, and losses) or under low humidity setpoint (HR1) in curing and thawing unit controls.

With <Up arrow> and <Down Arrow> keys we move over the different line headings. With <Right arrow> key edition fields are accessed. Once inside one of these fields value will be modified with <Up arrow> and <Down arrow> keys and it will be validated with <E> key. In edition fields of hour table, if <Right arrow> key is kept held down, all table fields will scroll quickly.

The edition of several days with the same intervals can be carried out by making a copy of intervals of the day before. For that purpose, it is necessary to go onto heading of the day on which we wish to make a copy and hold down <E> key for 1 sec. Thus copy of intervals of day of previous line is made.

Evidence of saving being carried out is by means of the quick blinking of <ON/OFF> key.

Energy saving operation:

Control will begin saving process provided the following conditions exist:
- Current hour within a saving interval.
- Temperature and humidity within safety bands.
- Humidity > HR2 - 2 ºC (drying controls) or
- Humidity < HR1 (curing or thawing controls).

Control will stop saving when the following conditions exist:
- Current hour out of a saving range.
- Temperature or humidity out of safety bands.

If control has discontinued saving because temperature or humidity are out of safety bands, the unit will resume saving as soon as temperature reaches its setpoint and humidity is < HR2 - 2 ºC (drying controls) or humidity is > HR1 (curing or thawing controls).

In time and storage control types only the temperature safety band it to be taken into account.

The evidence that saving is in process is given by the quick blinking of <ON/OFF> key. If control is stopped or on stand-by but within a saving interval, blinking will also take place.

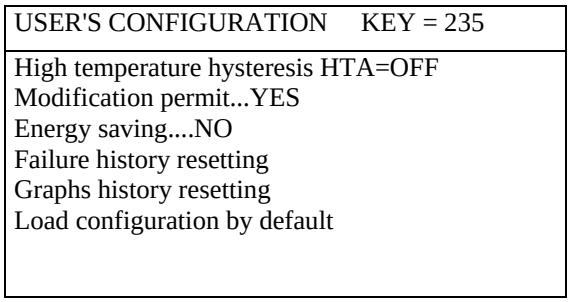
During saving process, actuations will be shown in display, although actually they will not take place as long as the saving condition is maintained, unless it is question of fan running by cyclic times or a cyclic or forced air renewal.

During saving process, fan will be running by cyclic times and cyclic or forced renewals can be made.

While saving is being carried out, the use of outside air is not permitted. However, it will be permitted, if while being in a saving interval, saving has been discontinued because it is out of safety bands.

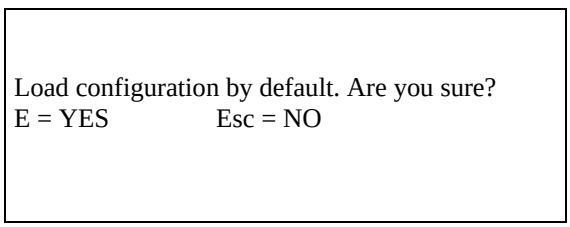
15.3 - To load configuration by default or reset history from 'USER'S CONFIGURATION' display.

Press <F> key 4 times:

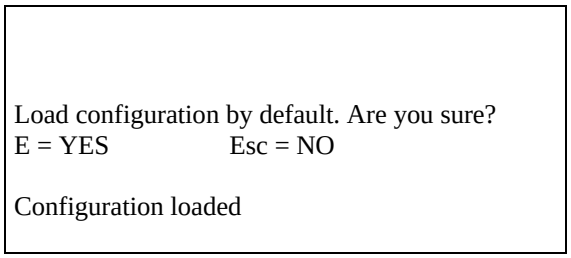


The operation will be carried out when positioning cursor on history resetting lines and pressing <E> key .

By positioning cursor on loading line and pressing <E> key:



By pressing <E> key:



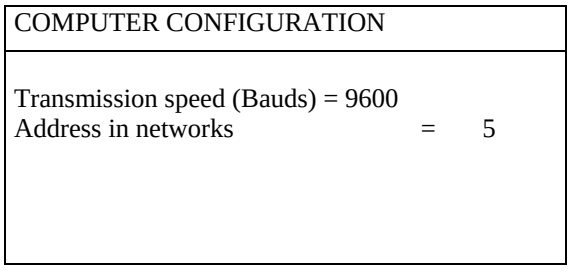
Load is carried out in the same way as load in general configuration except for the following values (that keep their value):

Serial line speed, Address
General configuration key. User's key.
Machine hours, compressor or cooling battery running hours, heating battery running hours.

Code of machine (year, purchase order number and machine number, except number of version which is actually loaded)
Language
Automatic or programmed programmes.
Energy saving: hour, day, table and safety bands.
Reset counters

When making this load, the following configurations remain configured as:
Modification permit... YES
Energy saving...NO
Consequently, if we wish not to permit modifications or validate energy saving, we should enter again user's configuration to modify its status.

By pressing <E> key:



These two values can be modified if incorrect.

By pressing <Esc> key it will initiate and control will show main display.

15.4 - Modification of values by default of access keys to general configuration and to user's configuration.

Values of keys will be as follows:

	General configuration key	User's configuration key
Value with which keys will initiate when loading from general configuration or when changing of version or when memory is lifted or when holding down memory delete pushbutton for some seconds. .	Check with E.F.C.	235

When load is made from user's configuration, none of values of keys is changed.

16. CHANGE OF LANGUAGE.

To change language press <Arrow down> key together with <Esc> key. Every click will mean the change to a new language.

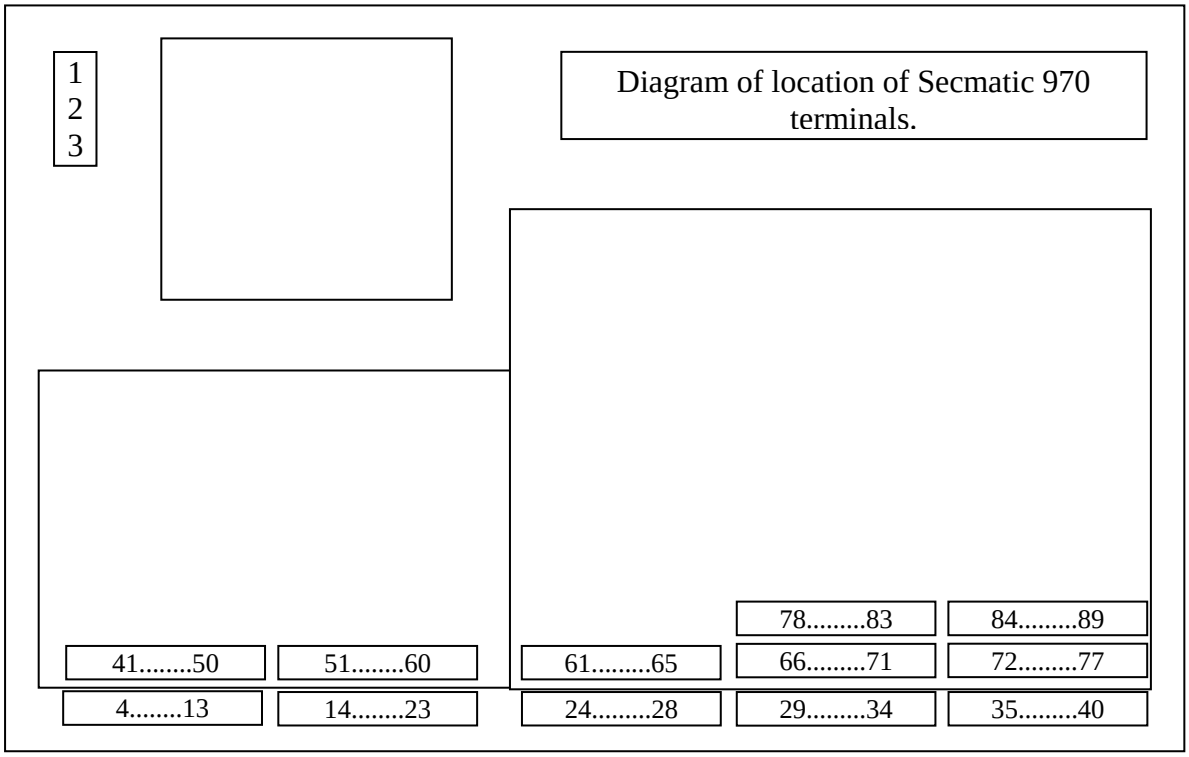
❑ 3rd. PART

MISCELLANEOUS

MISCELLANEOUS

INDEX

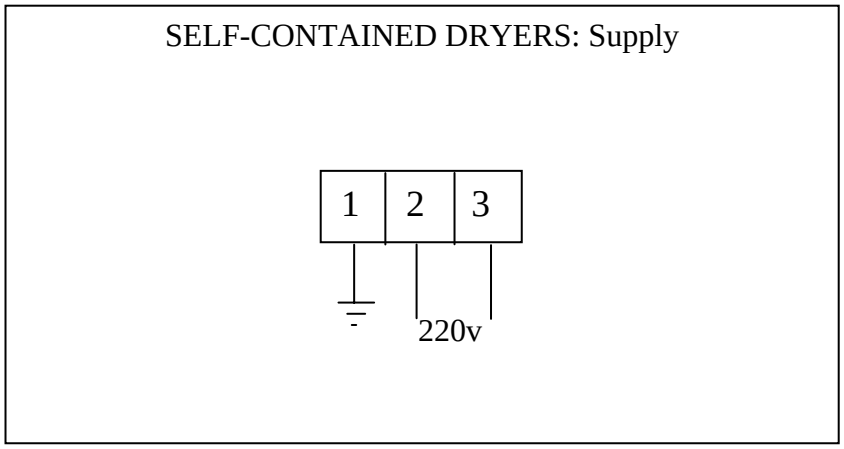
CONTROLLER TERMINAL HOLDERS.



SUPPLY

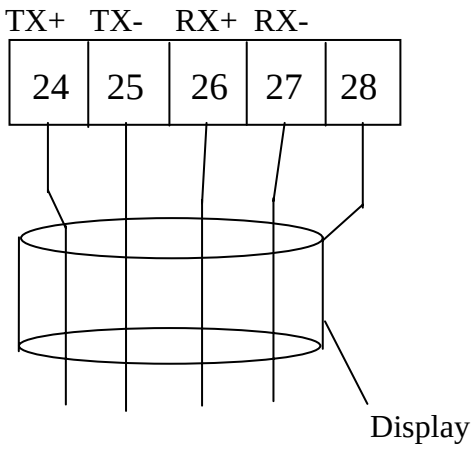
TERMINALS	SYMBOL	DESCRIPTION
1		Controller ground.
2-3	220v (+/-10%)	Controller supply at 220v alternating.

SELF-CONTAINED DRYERS: Supply

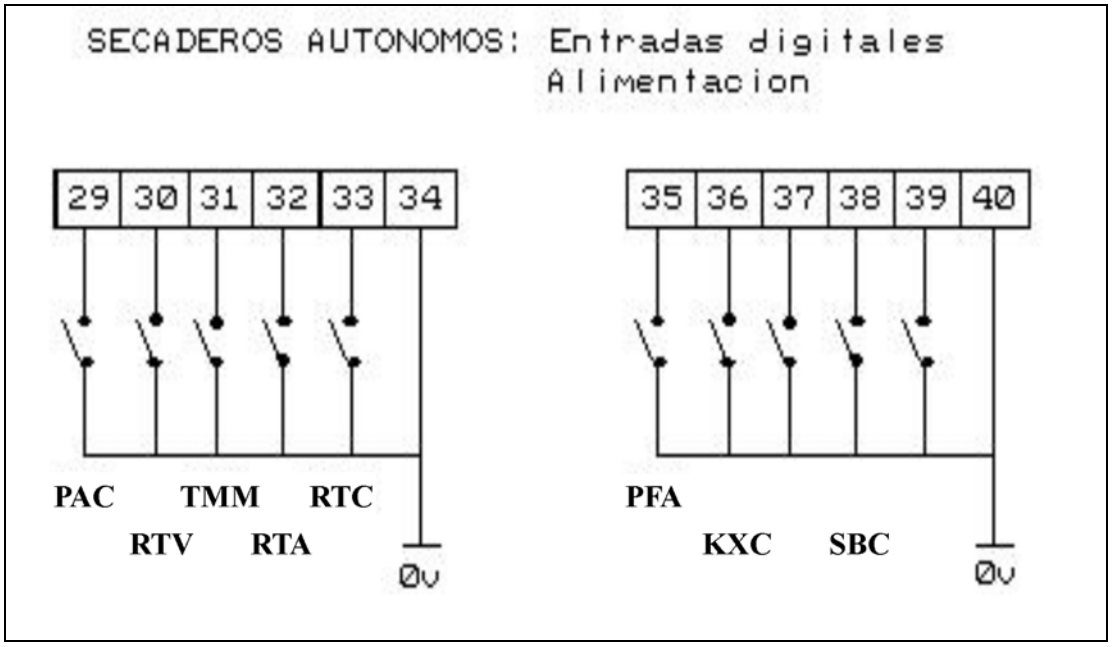


SERIAL LINE OF COMMUNICATIONS

SELF-CONTAINED DRYERS: Serial Line

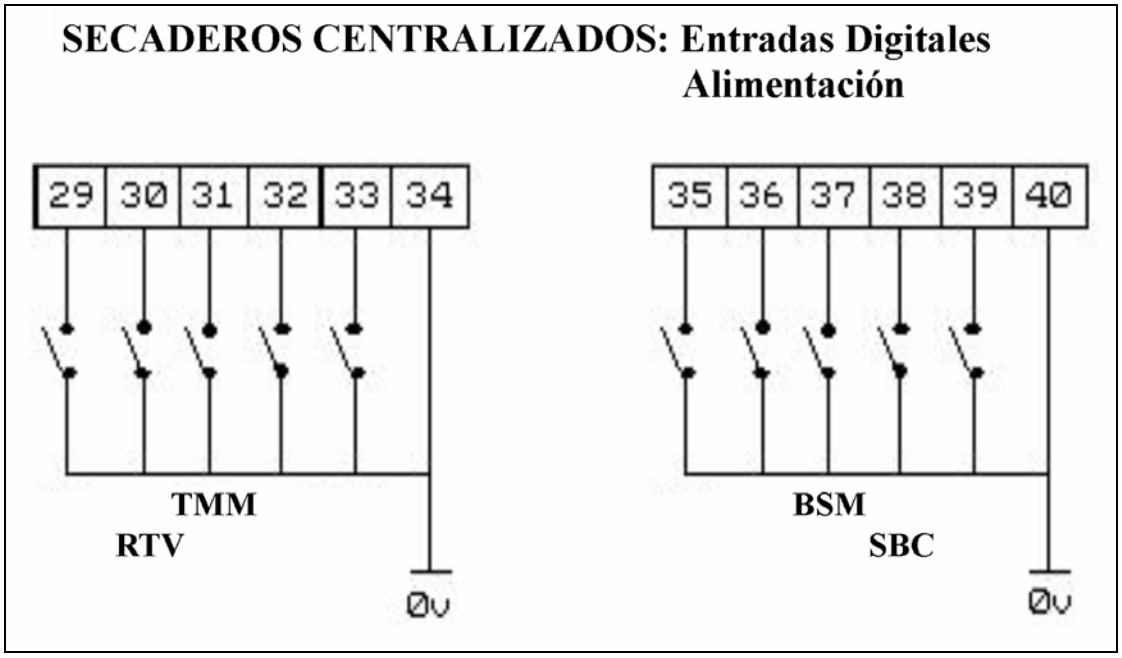


DIGITAL INPUTS SELF-CONTAINED UNITS



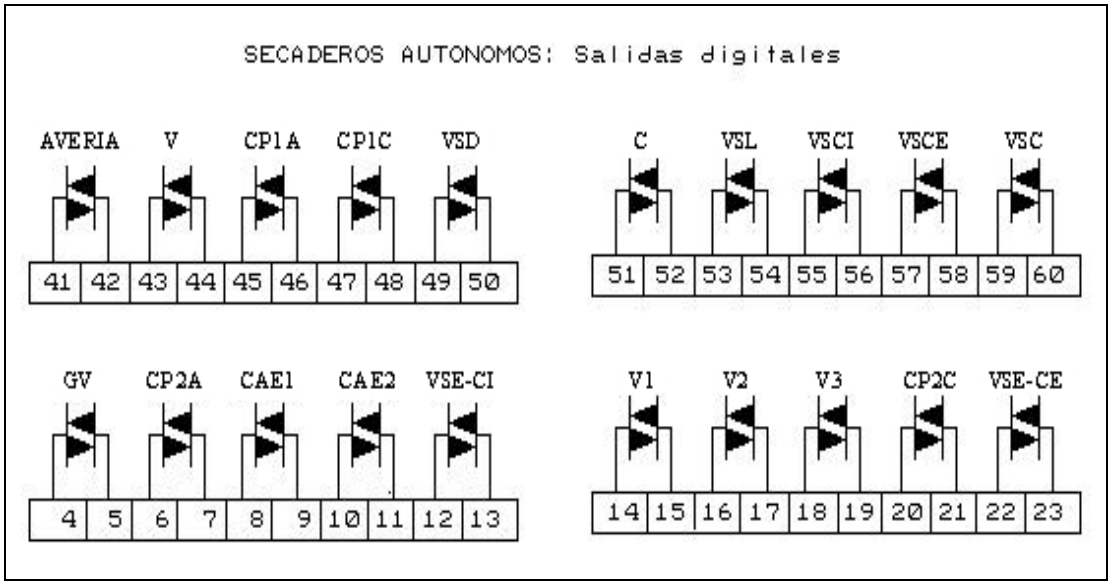
TERMINALS	SYMBOL	DESCRIPTION
34-29	PAC	Safety high and low pressure switch.
34-30	RTV	Centrifugal fan thermal relay.
34-31	TMM	Safety maximum and minimum thermostat.
34-32	RTA	Air-cooled condenser thermal relay.
34-33	RTC	Compressor thermal relay.
40-35	PFA	Compressor oil pressure switch.
40-36	KXC	Compressor Klixon.
40-37		Free.
40-38	SBC	Damper locking safety.
40-39		Free.

DIGITAL INPUTS - CENTRALIZED UNITS



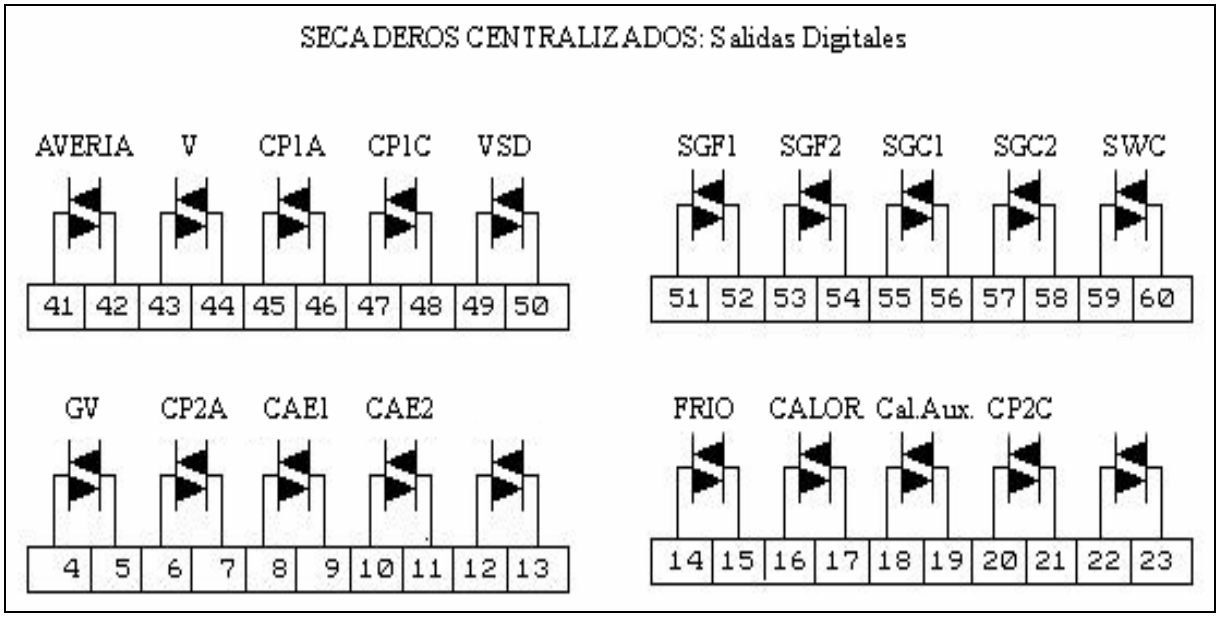
TERMINALS	SYMBOL	DESCRIPTION
34-29	---	---.
34-30	RTV	Centrifugal fan thermal relay.
34-31	TMM	Safety maximum and minimum thermostat.
34-32	---	---.
34-33	---	---.
40-35	---	---.
40-36	---	---.
40-37	BSM	Engine room locking.
40-38	SBC	Damper locking safety.
40-39	---	---.

DIGITAL OUTPUTS - SELF-CONTAINED UNITS



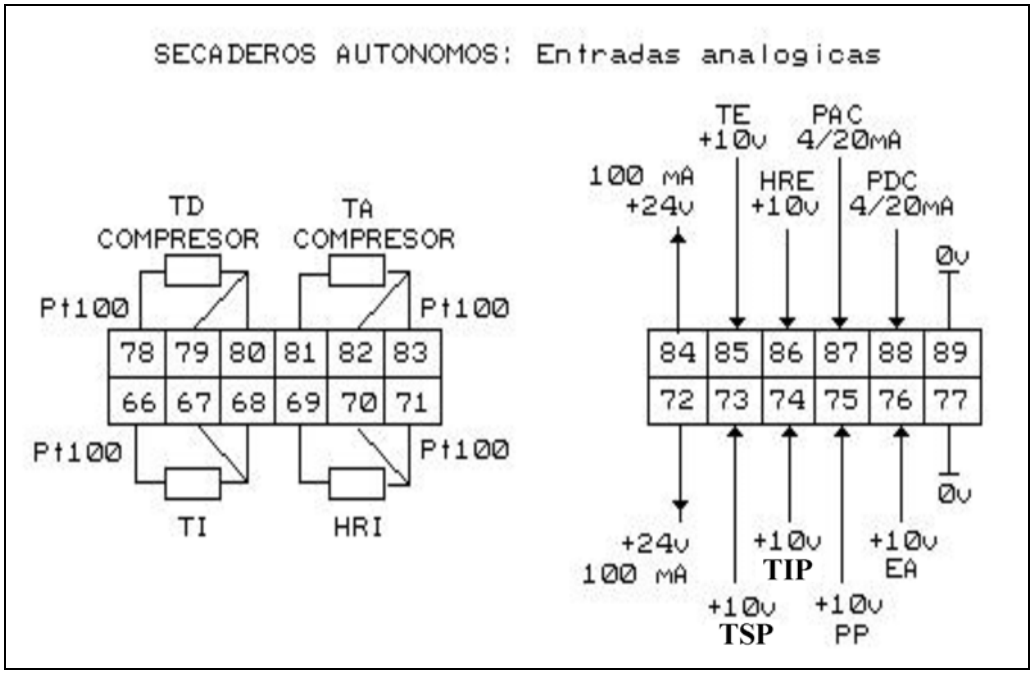
TERMINALS	SYMBOL	DESCRIPTION
41-42	AVERIA	Failure output .
43-44	V	Centrifugal fan.
45-46	CP1A	Opening of distribution damper 1.
47-48	CP1C	Closing of distribution damper 1.
49-50	VSD	Defrost solenoid valve.
51-52	C	Compressor.
53-54	VSL	Liquid solenoid valve.
55-56	VSCI	Internal-con solenoid valve.
57-58	VSCE	Outside-con solenoid valve.
59-60	VSC	Heating solenoid valve or Heaters.
4-5	GV	Steam generator.
6-7	CP2A	Opening of distribution damper 2.
8-9	CAE1	Opening of air dampers.
10-11	CAE2	Closing of outside air dampers.
12-13	VSE-CI	Internal cond. balance solenoid valve.
14-15	V1	Fan 1 of air-cooled condenser.
16-17	V2	Fan 2 of air-cooled condenser.
18-19	V3	Fan 3 of air-cooled condenser.
20-21	CP2C.	Closing of distribution damper 2.
22-23	VSE-CE	Ext-Cond balance solenoid valve.

DIGITAL OUTPUTS - CENTRALIZED UNITS



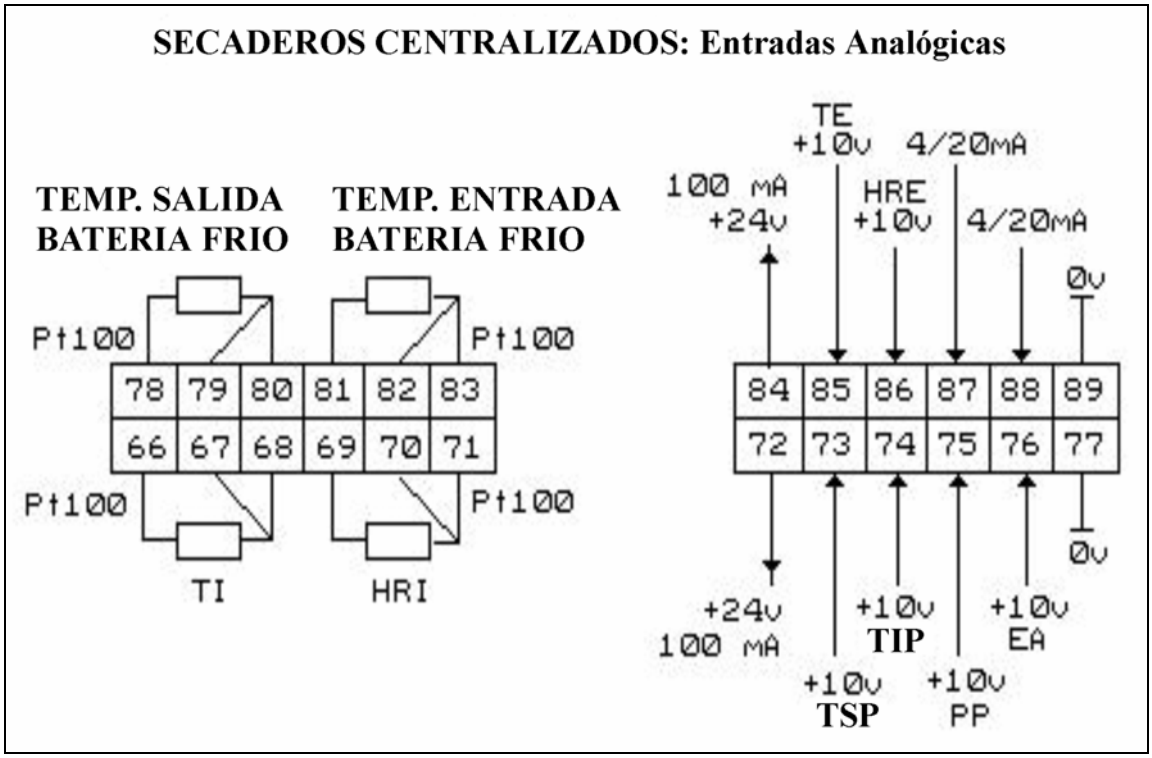
TERMINALS	SYMBOL	DESCRIPTION
41-42	AVERIA	Failure output.
43-44	V	Centrifugal fan.
45-46	CP1A	Opening of distribution damper 1.
47-48	CP1C	Closing of distribution damper 1.
49-50	VSD	Defrost solenoid valve.
51-52	SGF1	Cold glycol solenoid valve 1.
53-54	SGF2	Cold glycol solenoid valve 2.
55-56	SGC1	Hot glycol solenoid valve 1.
57-58	SGC2	Hot glycol solenoid valve 2.
59-60	SWC	Hot water solenoid valve or Heaters.
4-5	GV	Steam generator.
6-7	CP2A	Opening of distribution damper 2.
8-9	CAE1	Opening of air dampers.
10-11	CAE2	Closing of outside air dampers.
12-13		
14-15	FRIO	SGF1(6)+SGF2(7).
16-17	CALOR	SGC1(8)+SGC2(9)+SD(5).
18-19	Cal.Aux.	SWC(10).
20-21	CP2C.	Closing of distribution damper 2.
22-23		

ANALOGICAL INPUTS - SELF-CONTAINED UNITS



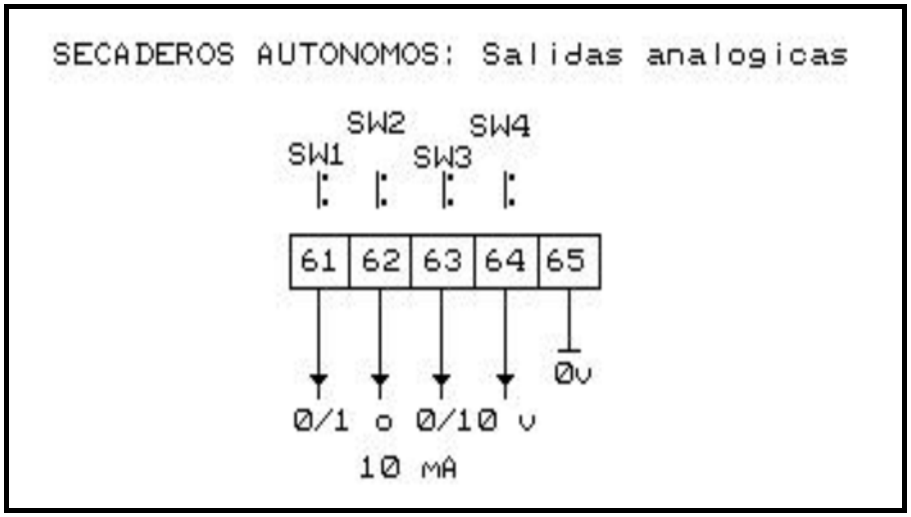
TERMINALS	SYMBOL	DESCRIPTION
66-67-68	TI	Room temperature (Pt100)
69-70-71	HRI	Room relative humidity (Pt100)
72		24v/100mA output
73	TSP	Product surface temperature (0/10v ó 2/10v)
74	TIP	Product internal temperature (0/10v ó 2/10v)
75	PP	Sample weight (0/10v)
76	EA	Auxiliary input (0/10v)
77		Common
78-79-80	TD	Compressor discharge temperature (Pt100)
81-82-83	TA	Compressor suction temperature (Pt100)
84		24v/100mA output
85	TE	Outside temperature (0/10v)
86	HRE	Outside relative humidity (0/10v)
87	PAC	Compressor suction pressure (4/20mA)
88	PDC	Compressor discharge pressure (4/20mA)
89		Common

ANALOGICAL INPUTS - CENTRALIZED UNITS



TERMINALS	SYMBOL	DESCRIPTION
66-67-68	TI	Room temperature (Pt100)
69-70-71	HRI	Room relative humidity (Pt100)
72		24v/100mA Output
73	TSP	Product surface temperature (0/10v or 2/10v)
74	TIP	Product internal temperature (0/10v or 2/10v)
75	PP	Sample weight (0/10 V)
76	EA	Auxiliary input (0/10v)
77		Common
78-79-80	TSBF	Cooling battery outlet temperature (Pt100)
81-82-83	TEBF	Cooling battery inlet temperature (Pt100)
84		24v/100mA output
85	TE	Outside temperature (0/10v)
86	HRE	Outside relative humidity (0/10v)
87	---	---
88	---	---
89		Common

ANALOGICAL OUTPUTS - SELF-CONTAINED UNITS

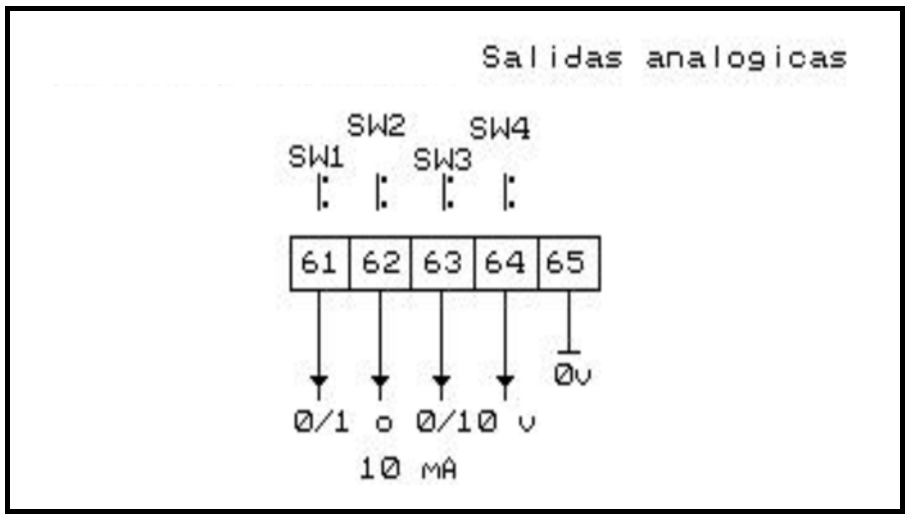


TERMINALS	SYMBOLS	DESCRIPTION
61	Free.	
62	Free.	
63	Free.	
64	Free.	
65	Common.	

Analogical outputs will be 0/10 V with jumpers (SW1, SW2, SW3, SW4) installed and 0/1 V with jumpers removed

Analogical outputs will be assigned by configuration to any of analogical inputs.

ANALOGICAL OUTPUTS - CENTRALIZED UNITS

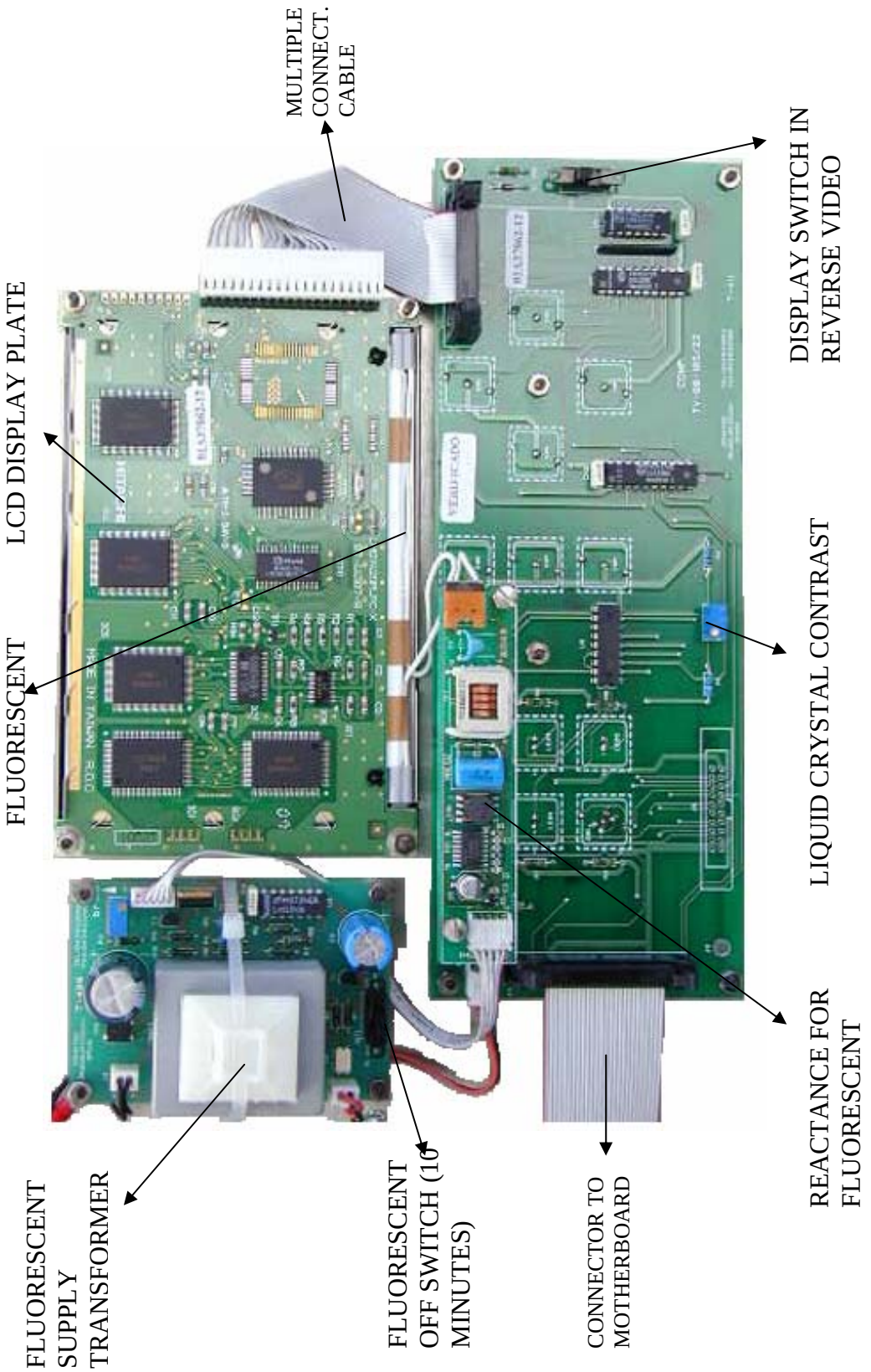


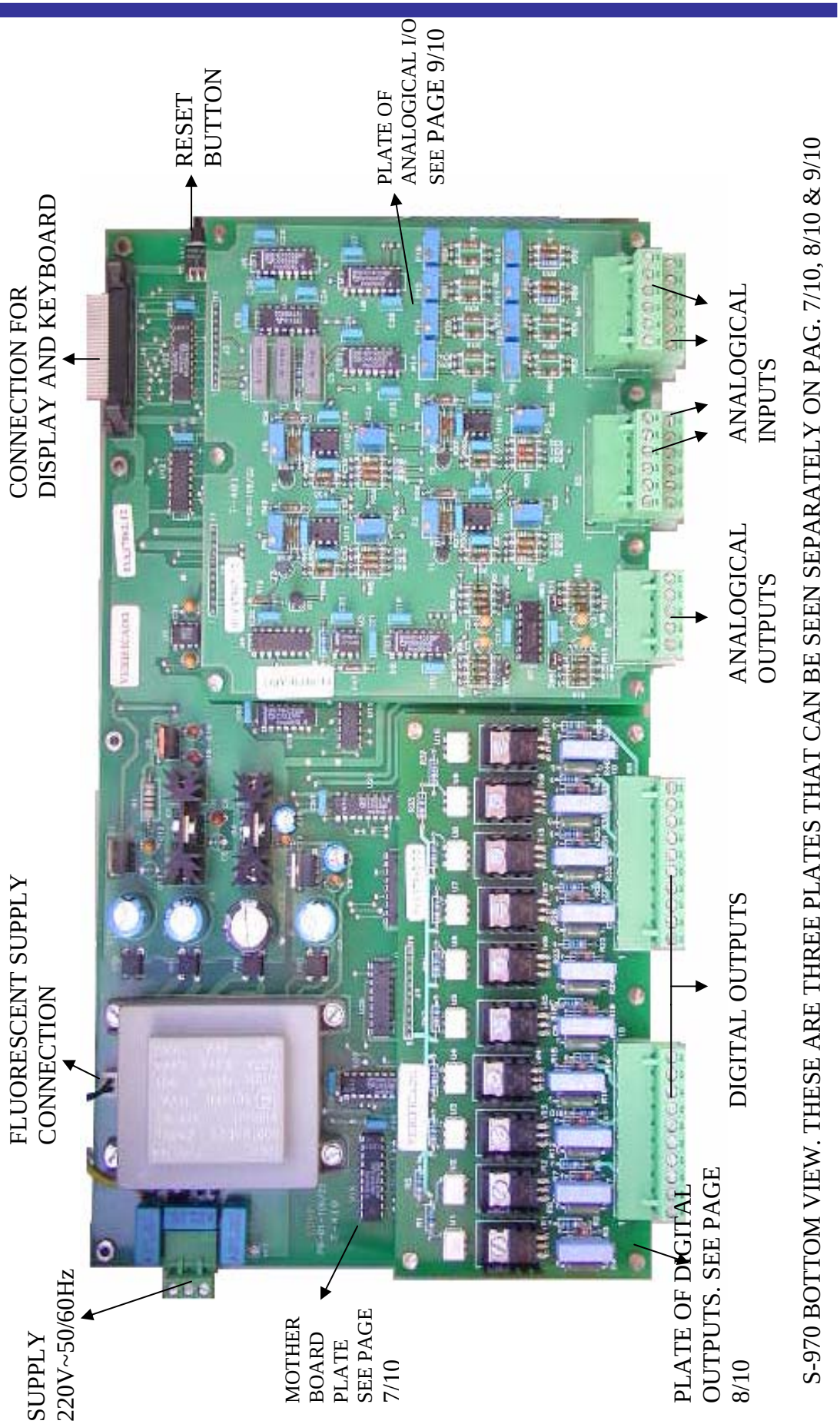
TERMINALS	SYMBOL	DESCRIPTION
61		Free.
62		Free.
63		Free.
64		Free.
65		Common.

Analogical outputs will be 0/10 V with jumpers (SW1, SW2, SW3, SW4) installed and 0/1 V with jumpers removed.

Analogical outputs will be assigned by configuration to any of analogical inputs.

PLATES


MULTIPLE CONNECT. CABLE
DISPLAY SWITCH IN REVERSE VIDEO
LCD DISPLAY PLATE
FLUORESCENT
LIQUID CRYSTAL CONTRAST
REACTANCE FOR FLUORESCENT
FLUORESCENT SUPPLY TRANSFORMER
FLUORESCENT OFF SWITCH (10 MINUTES)
CONNECTOR TO MOTHERBOARD



S-970 BOTTOM VIEW. THESE ARE THREE PLATES THAT CAN BE SEEN SEPARATELY ON PAG. 7/10, 8/10 & 9/10

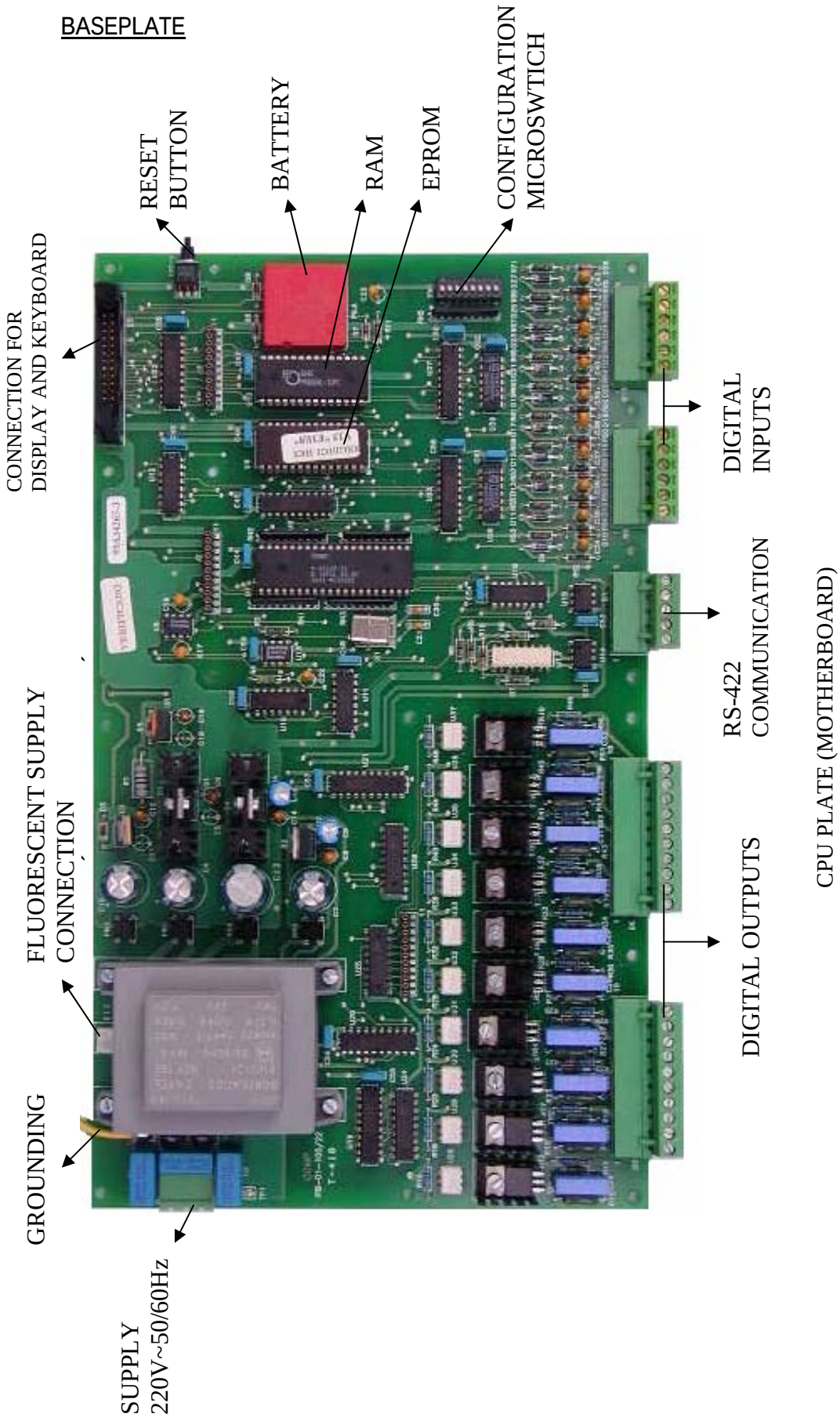

BASEPLATE
RESET BUTTON
BATTERY
RAM
EPROM
CONFIGURATION MICROSWTICH
CONNECTION FOR DISPLAY AND KEYBOARD
DIGITAL INPUTS
RS-422 COMMUNICATION
DIGITAL OUTPUTS
CPU PLATE (MOTHERBOARD)
FLUORESCENT SUPPLY CONNECTION
GROUNDING
SUPPLY 220V~50/60Hz

PLATE OF DIGITAL OUTPUTS

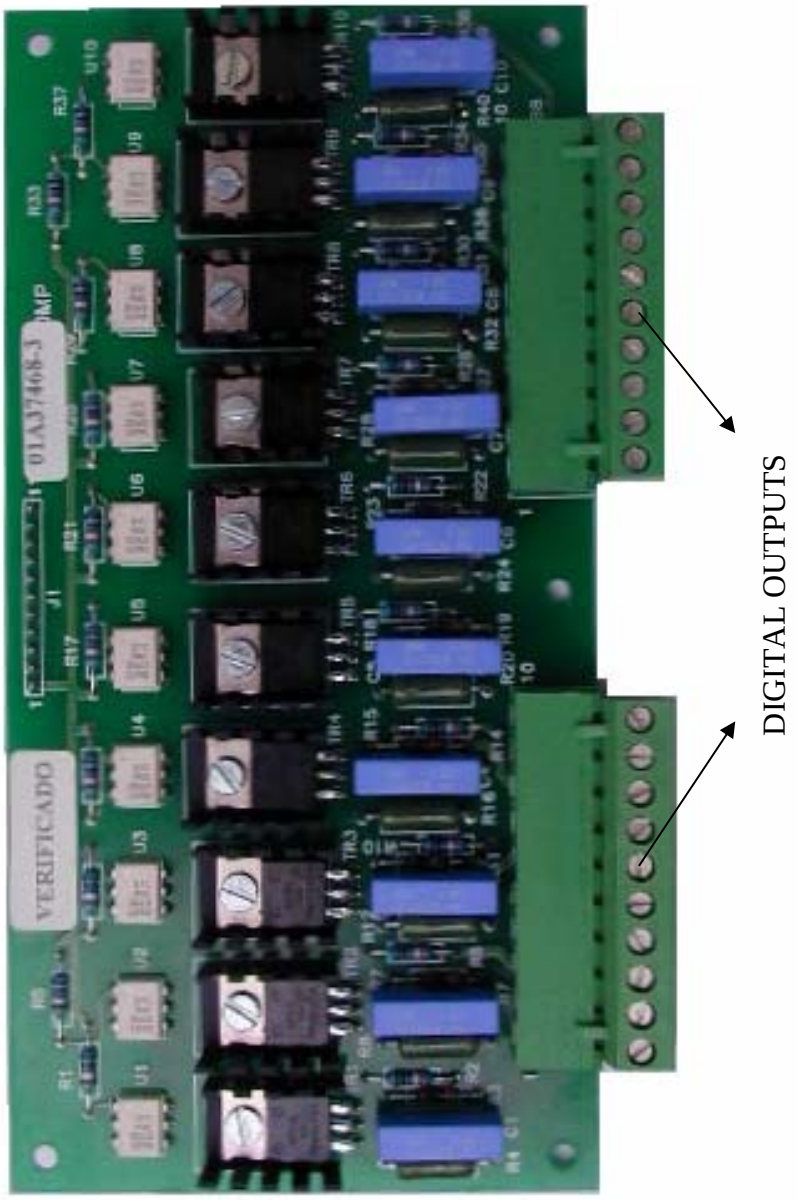
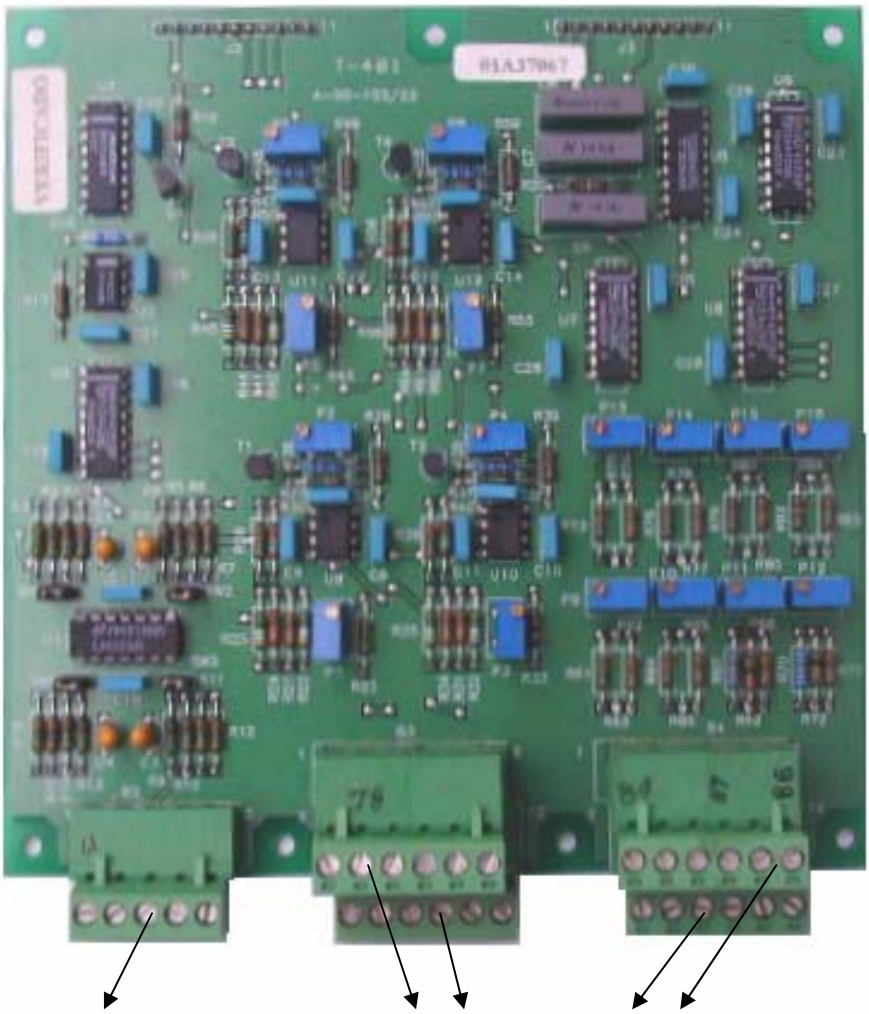


PLATE OF ANALOGICAL INPUTS AND OUTPUTS



ANALOGICAL OUTPUTS ANALOGICAL INPUTS

PERSONNEL TRAINING

TRAINING OF PERSONNEL RESPONSIBLE FOR THE START-UP , MAINTENANCE AND REPAIR.

Given the electric power used and how unit operates, personnel who is going to carry out above operations must be familiar with both the electrical system and the refrigeration system. This knowledge has to be confirmed by training courses or recognised specific knowledge.

SAFETY MATERIAL TO BE USED DURING THE OPERATIONS OF START-UP, MAINTENANCE AND REPAIR.

It will be necessary to tell apart operations in electrical system and in refrigeration system. In any case, material used must be in accordance with system to be checked. Likewise, the exacting compliance of safety measures concerning electric contacts and protections, is required.

RESIDUAL RISKS

Given unit construction and how they are delivered, it is assumed that there are no risk areas, taking into account particularly, that personnel responsible for any intervention must be familiar with unit. Nevertheless and as they are important, the following should be mentioned:
Fan and its transmission are covered with a metal housing that can be removed with the appropriate tool, in that case it is necessary to remove voltage and to take care not to introduce any extremities or sharp objects into fan, motor or transmission.

The electric panel, in its condition as a power supply centre, must be handled without voltage and with total lack of sharp objects.
To handle it, use indicators of unit status to avoid the accidental start-up.