FASAR elettronica

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

FUNCTIONAL SPECIFICATIONS OF THE ELECTRONIC BOARD for LowTemperature SHOWCASE p/n FE1044
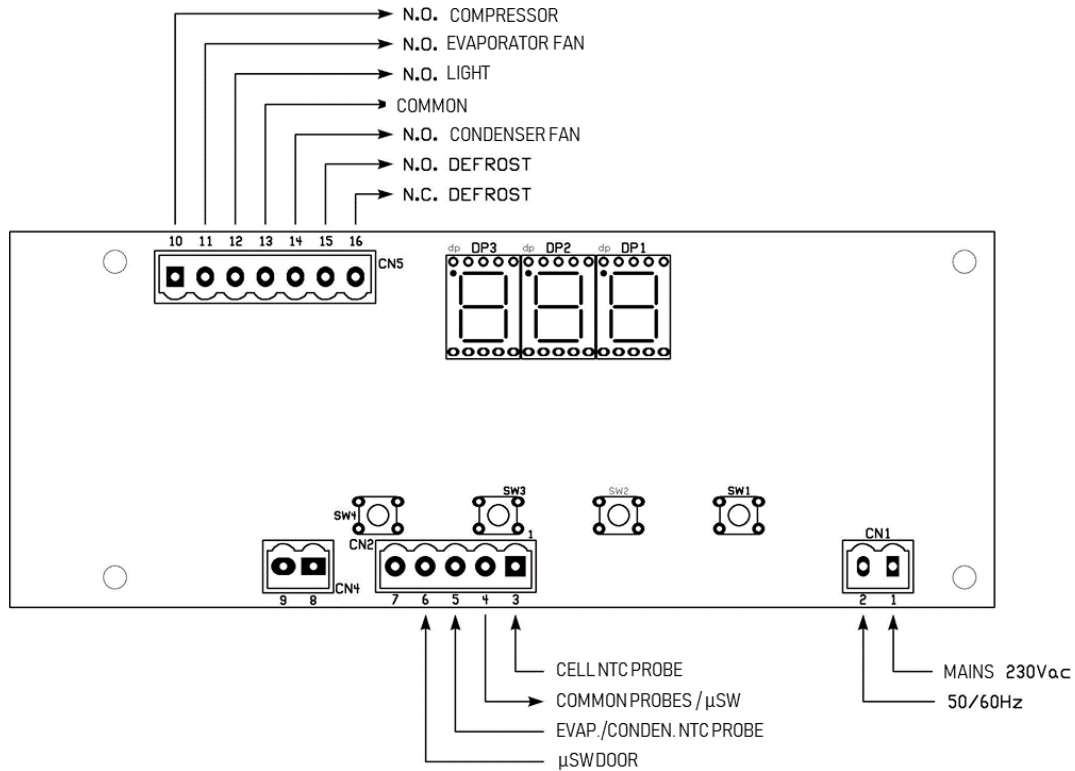
HARDWARE SPECIFICATIONS Electronic Refrigerator board

- Mains power supply: 230Vac - 50 / 60Hz.
- Electronic control system through microcontroller with flash technology.
- Retention of the operating parameters.
- 3 digit BLUE LED display for time / temperature.
- Controls via 4-button keyboard (On-Standby / Enter, Down, Up, Light).
- 2 analog inputs for NTC thermistor type temperature sensors, 1 digital input for door microswitch management.
- up to 5 digital relay outputs:
    1. compressor relay, NO contact 250Vac - 16A;
    2. fan relay, NO contact 250Vac - 10A;
    3. light relay , NO contact 250Vac - 10A;
    4. defrost relay , NO and NC contacts 250Vac - 10A;
    5. capacitor relay , NO contact 250Vac - 10A.
- Acoustic signals via piezoelectric buzzer.
- Phoenix type connections for removable screw terminals.
- Terminal identification by screen printing on the printed circuit board
- The board is provided with holes for fixing to the panel by means of non-metallic spacers (available on request), minimum distance of 10mm between the printed circuit board and the support base .
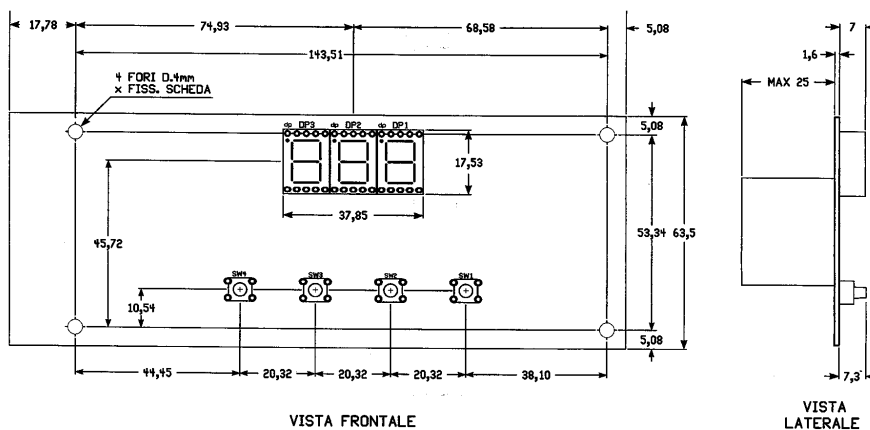
FUNCTIONAL SPECIFICATIONS

- Low Temperature (LT) conservation.
- Manual or automatic defrosting .
- Keypad lock function.
- Access to the configuration menu of the operating parameters (password protected) by pressing 2 keys simultaneously.
- Alarm signaling for chamber, evaporator or condenser probe fail, for open door, for high condensing temperature, for high pressure, for black-out.
- Possibility to reset the factory data through a specific procedure.

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015
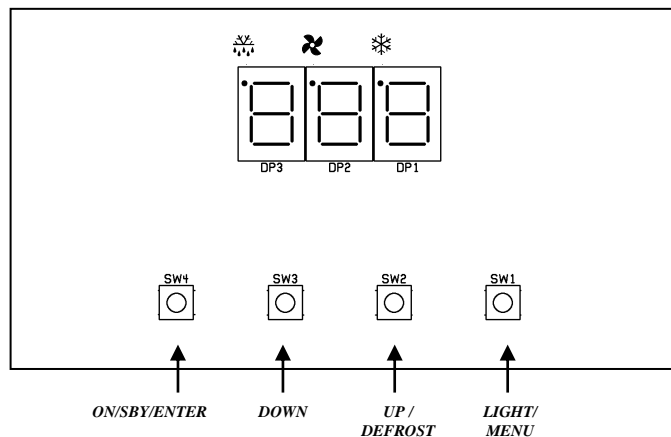
Input-output scheme :

Electronic board dimensions (all dimensions are expressed in mm):

PLEASE NOTE: Read the following instruction manual carefully . The working parameters currently set by default are a standard configuration , check and and eventually configure the parameters appropriately for your application.

SUMMARY OF USER INTERFACE COMMANDS

With the controller in normal operation, the display shows the cell temperature .

SW4 ON / SBY / ENTER button

Pressed and released it allows to switch on the display the reading of the cell probe with the temperature setpoint set : after 3 seconds, the display automatically shows again the temperature in the cell, this is confirmed by three short consecutive beeps of the buzzer.

Pressed for 3 seconds, released when the " **Sby** " label appears on the display , it puts the appliance in stand-by.

With the instrument in stand-by, by pressing the key, the controller switches on. **Note** : The compressor protection time is still observed (parameter C0) .

SW3 DOWN button

In menu mode it allows you to select the label of the parameter to be modified and to decrease its value.

Pressed and released it allows to display the minimum recorded temperature (if available) and any active alarms.

SW2 UP button

In menu mode, it allows you to select the label of the parameter to be modified and increase its value.

Pressed and released it allows to display the maximum recorded temperature (if available) and any active alarms.

Press for just over 3 seconds to access the manual defrosting function.

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

SW1 LIGHT button

Pressed and released it activates / deactivates lighting.

DEFROST LED
Led on : defrosting in progress

Flashing Led : delayed activation of defrosting or dripping in progress

High frequency flashing Led : alarm recorded in memory

FAN LED
Led on: cell fan activated

Flashing Led: delayed activation of fans

COMPRESSOR LED
Led on: cell compressor activated

Flashing Led: delayed activation of compressor

TEMPERATURE SETPOINT SETTING AND MODIFICATION

By pressing and releasing the On / Sby / Enter key , the display flashes the temperature setpoint for 5 seconds.

While flashing, use the Up and Down keys to increase or decrease the desired temperature setpoint.

Press the On / Sby / Enter key again to confirm the new setpoint: confirmation of the new set value is signaled by 3 consecutive short beeps.

KEYBOARD LOCK

Press the Up and Down buttons simultaneously for more than 3 seconds.

The display shows the " **Loc** " label , press the On / Sby / Enter key to confirm the choice and activate the function.

After 30 seconds the function is exited if it is not confirmed.

With the keyboard locked, pressing any key, the machine emits a long beep and displays the label " **Loc** " .

To unlock the keyboard, press the Up and Down keys simultaneously for more than 5 seconds, the display shows

the flashing " **UnL** " label and you will hear an acoustic signal of 3 consecutive short beeps.

MODIFICATION OF RELATIVE HUMIDITY

Press the Down button for more than 3 seconds to change the percentage of relative humidity in the cell.

The flashing temporary confirmation label " **F_C** " corresponds to a lower relative humidity.

The flashing temporary confirmation label " **F__** " corresponds to a higher relative humidity.

The flashing confirmation label " **FtE** " corresponds to the relative humidity expected by the manufacturer.

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

PARAMETERS CONFIGURATION

- Press the Up and Down keys simultaneously for more than 3 seconds to enter the Parameter configuration menu.

- The flashing label " **Loc''** is displayed.

- Use the Up and Down keys to display the " **PAr** " label .

- Press the On / Sby / Enter key to enter the parameter configuration mode (after 30 seconds the function is exited if it is not confirmed)

- The access password is requested: the display shows " **00 ''** , use the Up and Down keys to select the PW " **05 ''** . Press the On / Sby / Enter button to confirm your choice.

- If the inserted Pw is correct, the first parameter of the configuration list is displayed.

- Use the Up and Down keys to scroll through all the parameters of the controller.

- Press the On / Sby / Enter key to confirm the choice of parameter

- Use the Up and Down keys to select the new parameter value.

- Press the On / Sby / Enter key to confirm your choice.

- Press the Up and Down keys simultaneously for more than 3 seconds to exit the Parameter configuration menu. After 30 seconds of inactivity, the function is automatically exited.

USER PARAMETERS CONFIGURATION - PROBE READING

- Press the Up and Down keys simultaneously for more than 3 seconds.

- The flashing label " **Loc''** is displayed.

- Use the Up and Down keys to scroll the probe reading and the user parameters.

- Press the On / Sby / Enter key to confirm the choice and enter the probe reading or parameter modification mode.

- The current value is displayed in flashing mode .

- Use the Up and Down keys to select the new value, only if a parameter is changed.

- Press the On / Sby / Enter key to exit the probe reading or confirm the choice of the new parameter value: the setting no longer flashes.

COMPRESSOR CONTROL

The compressor control is of the ON / OFF type . Thermostat control is carried out on the basis of the cell probe temperature with respect to the setpoint .

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

CONTROL OF THE EVAPORATOR FANS

The evaporator fan control is parameterized and the following cases can be configured:

• evaporator probe absent (J2 = 0 and J 2 = 2) and fans always on during storage, not related to the compressor (F3 = 1) ;

• evaporator probe absent (J2 = 0 and J2 = 2) and evaporator fans managed in parallel with the compressor (F3 = 2) : on if the compressor is ON and off if the compressor is OFF.

• evaporator probe present (J2 = 1) and evaporator fans managed in ON / OFF mode (F3 = 3) , thermostated according to the value read by the evaporator probe in relation to the setpoint that can be set by parameter (F1 and F2) .

• evaporator probe present (J2 = 1) and evaporator fans OFF when the compressor is OFF (F3 = 4) : the fans, being linked to the state of the compressor and the temperature of the evaporator probe, can be activated, if required by the evaporator probe value, only if the compressor is active.

• evaporator fans always OFF (F3 = 0) regardless of whether or not the evaporator probe is present.

DEFROSTING MANAGEMENT

Defrosting can be manual, operated from the keyboard, or automatic, activated at regular time intervals that can be set by parameter (d0) .

Press the Up button for 4 seconds to start the **MANUAL DEFROST .**

Defrost ends due to timeout (d3) or, if the evaporator probe is present, when it reaches the temperature value set by parameter (d2).

It is possible to manually end the defrosting by pressing the Up button again for 4 seconds. The deactivation is signaled with the flashing " **ndF** " label .

Manual defrosting can be _by ventilation, resistance or hot gas_ : the type of defrosting is selected with parameter d1.

During manual defrosting, based on the value set in parameter d6, the display can show:

    a) the actual cell temperature

    b) the temperature of the cell blocked instantly before the activation of the defrost

    c) the label "dEF"

Manual defrost by resistance:

Case A :

d1 = 0

F4 = 0 - evaporator fans not active during defrost and F5 = delay in activating fans after dripping .

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

Case B :

d1 = 0

F4 = 1 - evaporator fans active during defrosting or activated according to F3 .

Manual defrosting by hot gas:

Case A :

d1 = 1

F4 = 0 - evaporator fans not active during defrost and F5 = delay in activating fans after dripping

Case B :

d1 = 1

F4 = 1 - evaporator fans active during defrosting or activated according to F3

Manual defrost by ventilation:

d1 = 0 and F4 = 1: it is possible to carry out the defrost by ventilation without using the resistance. There is no dripping.

The **AUTOMATIC DEFROST** is performed automatically during storage at regular intervals d0.

For dE = 0 the defrost interval is given by the actual hours of operation of the machine.

For dE = 1 only the compressor ON hours are counted.

Automatic defrost ends due to timeout (d3) or, if the evaporator probe is present, when it reaches the temperature value set by parameter (d2).

It is possible to manually end the defrosting by pressing the Up button again for 4 seconds. The deactivation is signaled with the flashing " **ndF** " label .

The automatic defrost can be *ventilation, resistance or hot gas* : the type of defrost is selected with parameter d1.

During automatic defrosting, based on the value set in parameter d6, the display can show:

    a) the actual cell temperature

    b) the temperature of the cell blocked instantly before the activation of the defrost

    c) the label " **dEF** "

Automatic defrost by resistance :

Case A :

d1 = 0

F4 = 0 - evaporator fans not active during defrost and F5 = delay in activating fans after dripping .

Case B:

d1 = 0

F4 = 1 - evaporator fans active during defrosting or activated according to F3 .

FASAR elettronica

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

Automatic defrosting by hot gas:

Case A :

d1 = 1

F4 = 0 - evaporator fans not active during defrost and F5 = delay in activating fans after dripping .

Case B:

d1 = 1

F4 = 1 - evaporator fans active during defrosting or activated according to F3 .

Automatic defrost by ventilation:

d1 = 0 and F4 = 1: it is possible to carry out the defrost by ventilation without using the resistance. There is no dripping.

CONDENSER FAN CONTROL

The control of the condenser fans is parameterized and the following cases can be configured:

• condenser probe absent (J2 = 0 and J2 = 1) and condenser fans always on during storage (F8 = 1) ;

• condenser probe absent (J2 = 0 and J2 = 1) and condenser fans managed in parallel with the compressor (F8 = 0) : on if the compressor is ON and off if the compressor is OFF.

• condenser probe present (J2 = 2) and condenser fans managed in ON / OFF mode (F8 = 1) , thermostated according to the value read by the condenser probe in relation to the setpoint that can be set by parameter (F6 and F7) .

• condenser probe present (J2 = 2) and condenser fans OFF when the compressor is OFF (F8 = 0) : the fans, being linked to the state of the compressor and the temperature of the condenser probe, can be activated, if required by the probe value condenser, only if the compressor is active (F6 and F7) .

In the event of a high condensing temperature alarm, indicated on the display by the " **HtC** " label , the condenser fans are always active until the alarm returns.

In the event of a high pressure alarm, reported on the display by the label " **HP** ", the condenser fans always remain active until the board reset.

DOOR OPENING MANAGEMENT

The opening of the door is signaled to the user by the flashing " **doo** " label on the display alternating with the current display. With the door open the evaporator fan is deactivated.

When the door is closed again, the fan restarts and the " **doo** " label disappears from the display .

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

ALARM MANAGEMENT

HIGH TEMPERATURE ALARM

If the temperature in the cell is higher than the set setpoint + the compressor hysteresis value + the value of a parameter A2 , after the time A6 has elapsed, the display shows the label " **AH** " alternating with the high temperature reached in the cell.

An intermittent acoustic signal is also activated for the time set with A5, if parameter A4 = 1 .

If A4 = 0 the buzzer will sound continuously for the duration of the alarm.

If the alarm is active, the compressor continues to operate.

LOW TEMPERATURE ALARM

If the temperature in the cell is lower than a value equal to the set setpoint + the value of a parameter A1 , after the time A6 has elapsed, the " **AL** " label appears on the display alternating with the low temperature reached in the cell.

An intermittent acoustic signal is also activated for the time set with A5, if parameter A4 = 1.

If A4 = 0 the buzzer will sound continuously for the duration of the alarm.

If the alarm is active, the compressor is turned off.

In both alarm cases , the visual alarm signal remains until the critical temperature returns to normal.

The acoustic signal can be silenced by pressing the On / Sby / Enter key.

When the alarm returns, the user will know that a high or low temperature alarm has occurred because the defrost LED flashes at a very high frequency.

In this situation, pressing the On / Sby / Enter key gives:

- the first time: the type of alarm recorded is flashing (" **AL "** or " **AH "**);
- the second time: the recorded temperature flashes;
- the third time: the duration of the alarm event expressed in minutes flashes;
- the fourth time: the operation of the defrost led returns to its normal state, " **rES** " appears on the display .

BLACK OUT ALARM

In the event of a mains power failure, a Black Out alarm is activated when the board is turned on again .

The event is indicated on the display by the flashing defrost led at a very high frequency.

In this situation, by pressing the O n / Sby / Enter key you have:

- the first time: the " **bLo** " label is displayed ;

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

- the second time: the maximum temperature recorded in the cell is displayed;
- the third time: the alarm is reset , " **rES** " appears on the display and there is an acoustic signal of a long beep.

DOOR OPEN ALARM

If the door remains open for a time longer than a certain value established by parameter J7, the open door alarm is activated, indicated on the display by the flashing label " **dA** " alternating with the current display.

The alarm resets when the door is closed again and is recorded in the memory (high frequency flashing defrost LED).

HIGH CONDENSATION TEMPERATURE ALARM

If during the operation of the machine the condenser probe reads a temperature higher than a certain threshold value (set from the parameter FA), the high condensing temperature alarm is activated, signaled on the display by the label " **HtC** " (alternating to the temperature of cell) , to indicate that the condenser is dirty.

An intermittent acoustic signal is also activated for the time set with A5, if parameter A4 = 1.

If A4 = 0 the buzzer will sound continuously for the duration of the alarm.

The acoustic signal can be silenced by pressing the On / Sby / Enter key.

The signal remains on the display until the measured temperature drops to the given value (FA).

HIGH PRESSURE ALARM

If during the operation of the condenser probe reads a certain temperature higher than a certain threshold value set by the parameter Fb, the high pressure alarm is activated, signaled on the display by the label " **HP** " (alternating to the temperature of cell), to indicate that the condensation temperature value has reached a critical limit for the operation of the refrigerator.

An intermittent acoustic signal is also activated for the time set with A5, if parameter A4 = 1.

If A4 = 0 the buzzer will sound continuously for the duration of the alarm.

The acoustic signal can be silenced by pressing the On / Sby / Enter key.

The signaling remains on the display until the board is reset by going through stand by and then on again.

Alternatively, it is possible to disconnect the power supply directly: in this case, a blackout alarm will be signaled when it is switched on again.

If the " **HP** " signal persists, it means that the cause that generated the alarm still persists.

In the presence of this alarm, the controller deactivates the compressor and evaporator fan relay outputs, while the condenser fans remain active until the board is reset.

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

FAULTY CELL PROBE ALARM

If the cell probe is broken or the relative connection is interrupted, the faulty cell probe alarm is activated and signaled on the display with the label " **E0''.**

In this case, the compressor continues to operate during storage based on the times established by parameters in the parameter list (C5 and C6) .

The internal fan continues to operate according to the value assigned to parameter F3.

If the cell probe is broken and / or interrupted during the defrost phase, the defrost ends regularly.

The display shows the string of parameter d6 and the label " **E0 ''** alternately .

FAULTY EVAPORATOR PROBE ALARM

If the evaporator probe is broken or its connection is interrupted , the faulty evaporator probe alarm is activated, indicated on the display with the label " **E1** ".

In the case of F3 = 3 or F3 = 4, the internal fan will operate continuously regardless of the temperature on the evaporator.

In this case, a possible defrost in progress ends due to timeout.

The display shows the string of parameter d6 and the label " **E1 ''** alternately.

FAULTY CONDENSER PROBE ALARM

If the condenser probe is broken or the relative connection is interrupted , the faulty condenser probe alarm is activated, indicated on the display with the label " **E2** ".

In this case the condenser fans operate regardless of the temperature on the condenser.

The display shows the string of parameter d6 and the label " **E2 ''** alternately .

Note: if all the probes are broken or interrupted, " **E0** " , " **E1** " and " **E2** " will be shown on the display sequentially.

FACTORY PARAMETERS RESET

When the machine is turned on, it performs a test phase in order to check the inputs and outputs: if during this phase the On / Sby / Enter key is pressed 3 times in succession, all the parameters are reset to the values set in the factory.

The display shows the label " **rLd** " to highlight the board reset operation.

PARAMETERS LIST

The operation of the entire device is regulated by parameters contained in a list preloaded in the processor memory and completely customizable.

FASAR ELETTRONICA S.r.L.
Strada della Marina, 9/6
60019 Senigallia (AN)
Tel.: 071.6609805
Fax: 071.6611573
E-mail: info@fasar.it
www.fasar.it

AZIENDA CERTIFICATA UNI EN ISO 9001: 2015

LIST OF CONFIGURATION PARAMETERS

Param.	Description	Default	min	MAX
	MEASUREMENT INPUTS			
J 1	Cell probe calibration (the parameter is expressed in eighths of a degree)	8 (eighth ° C)	-40	+99
J 2	Evaporator / condenser probe enabling (0 = absent, 1 = evaporator probe, 2 = condenser probe)	1	0	2
J6	Digital input configuration (0 = contact open ; 1 = contact closed)	1	0	1
J7	Delay time for door open alarm (0 = excluded)	120 sec	0	240
JE	Cell probe reading display management (0 = normal, 1 = upper limited by r0)	1	0	1
JF	Defrost relay management in defrost (0 = de-energized when the value set with d2 is reached on the evaporator, 1 = de-energized when time d7 expires)	1	0	1
Pr	Cell probe reading	- ° C	-	-
Pd	Evaporator/ defrost probe reading	- ° C	-	-
Pc	Condenser probe reading	- ° C	-	-
	COMPRESSOR ADJUSTMENT			
r0	Regulator hysteresis (differential)	+ 3 ° C	1	15
r1	Minimum settable working setpoint	-22 ° C	-40	r2
r2	Maximum settable working setpoint	+ 5 ° C	r1	+99
	COMPRESSOR PROTECTION			
C0	Compressor activation delay at machine ignition	1 min	0	240
C2	Minimum time delay between deactivation of the compressor and the next start	3 min	0	240
C5	Compressor ignition cycle time in the event of cell probe alarm	10 min	1	240
C6	% of C5 in which the compr. is activated in case of cell probe alarm	7 0%	0	100
	DEFROST			
d0	Defrost interval (0 = automatic defrost excluded)	4 hours	0	99
d1	Defrost type (0 = by resistance, 1 = by hot gas)	1	0	1
d2	Defrost end temperature (referred to evaporator temperature)	+ 12 ° C	-40	+99
d3	Maximum defrosting duration (0 = defrosting has no duration; 255 = defrosting has infinite duration)	20 min	0	255
d6	Display labels in defrost (0 = actual cell temperature, 1 = locked cell temperature, 2 = DEF label)	1	0	2
d7	Dripping time	4 min	0	15
dE	Defrost interval counting type (0 = real hours; 1 = compressor ON hours)	1	0	1
	ALARM MANAGEMENT			
A0	Alarm hysteresis (differential)	+ 2 ° C	1	15
A1	Minimum alarm relating to the work setpoint (0 = excluded)	-2 ° C	-40	0
A2	Maximum alarm relating to the work setpoint (0 = excluded)	+ 15 ° C	0	+99
A3	Alarm returning time after machine ignition	120 mins	0	240
A4	Buzzer activation mode (0 = always; 1 = timed)	1	0	1
A5	Beep time limit of the alarm buzzer (only if A4 = 1)	1 min	0	240
A6	Temperature alarm returning time (only if A1 and / or A2 ≠ 0)	15 min	0	240
A7	Temperature alarm returning time post evaporator and fan stop (for A1 and / or A2 ≠ 0)	60 min	0	240
	EVAPORATOR AND CONDENSER FAN ADJUSTMENT			
F1	Temperature above which the evaporator fan is turned off (only if F3 = 3 or 4)	-1 ° C	-40	+99
F2	Differential evaporator fans (relative to F1, only if F3 = 3 or 4)	+ 2 ° C	1	15
F3	Evaporator fan operation during normal operation (0 = OFF, 1 = ON, 2 = parallel to the compressor, 3 = established with F1 and F2, 4 = established with F1 and F2 with compressor ON and OFF with compressor OFF)	4	0	4
F4	Evaporator fan operation on defrost and dripping (0 = OFF, 1 = ON, 2 = stable with F3)	0	0	2
F5	Evaporator fan stopping time after dripping	3 min	0	15

F6	Temperature under which the condenser fan is turned off in cooling	1 0 ° C	-40	+99
F7	Condenser fans Differential (relative to F6)	+ 3 ° C	1	25
F8	Condenser fan operation during cooling (0 = parallel to the com p r., 1 = ON); see also F6 and F7	0	0	1
F9	Condenser fan operation during defrost and dripping (0 = OFF, 1 = ON, 2 = ON above 26 ° C, OFF below 25 ° C)	2	0	2
DOES	Critical temperature for high condensing temperature signaling	46 ° C	-40	+99
F b	Critical temperature for high pressure alarm	55 ° C	-40	+99

Rev. 00 01/2020