

TDR 26

MICROPROCESSOR-BASED DIGITAL ELECTRONIC FREEZER CONTROLLER



OPERATING INSTRUCTIONS Vr. 01 (I - GB) - cod.: ISTR 01042

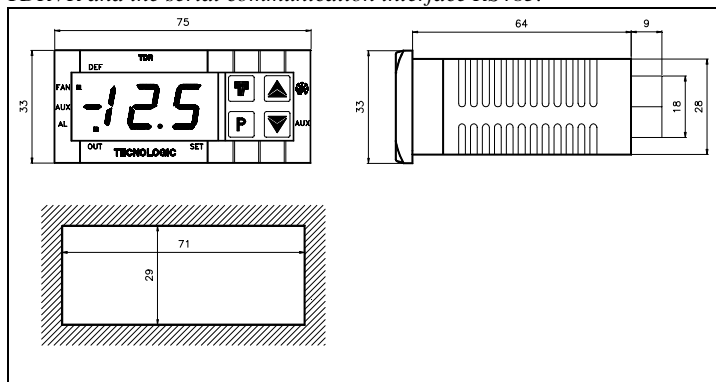
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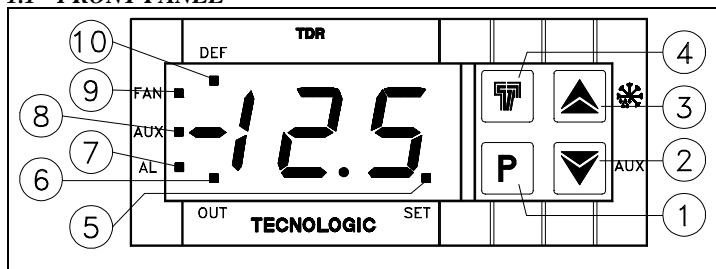
1- GENERAL DESCRIPTION

TDR26 model is a digital microprocessor based controller for refrigeration applications with ON/OFF temperature regulation and with defrosting control at intervals of time or programmed times (Real Time Clock Defrosting) by electric heater or hot gas/reverse cycle. The process temperature is visualised on 3 red displays while the outputs state on led, placed near the display. The instrument is foreseen with up to 4 relay outputs : for the compressor (OUT), for the defroster (DEF), for the evaporator fans (FAN) and a configurable auxiliary output (AUX). Then, it has two probe inputs: for PTC or NTC, one to measure the room temperature and one to measure the evaporator temperature; it has then a configurable digital input and an internal buzzer to signalise the alarms.

Furthermore it can be equipped with an output to connect a remote display TDRVR and the serial communication interface RS485.



1.1 - FRONT PANEL



1 - **Key P** : Used for the programming of the Set Point and of the functioning parameters.

2 - **Key DOWW/AUX** : Used to decrease the programmable values, to select the parameters or to activate, if foreseen, the output AUX.

3 - **Key UP/DEFROST** : Used to increase the programmable values, to select the parameters or to activate manual defrosting.

4 - **Key T (logo TecnoLogic)** : Used to visualise the temperature measured by the evaporator probe or to program the clock (Real Time Clock Defrosting function)

5 - **Led SET** : Indicates the entering in the set point programming (fixed light) or in the parameters programming (light flashing)

6 - **Led OUT** : Indicates the compressor output state : on (fixed light), off (light off) or inhibited (light flashing)

7 - **Led AL** : Indicates the alarm state : on (fixed light), off (light off) and silenced or memorised (light flashing)

8 - **Led AUX** : Indicates the auxiliary output state : on (fixed light) or off (light off).

9 - **Led FAN** : Indicates the fans output state, on (fixed light), off (light off) or inhibited after defrost (light flashing)

10 - **Led DEF** : Indicates the defrosting state on (fixed light), or the dripping state (light flashing).

1.2 - INSTRUMENT CODE

TDR 26 a b c d e f f

a = INPUTS

P : For PTC probes (KTY81-121)

N : For NTC probes (103AT-2)

b = REAL TIME CLOCK DEFROSTING

C : Present

- : Not present

c = OUTPUT FOR TDRVR REMOTE DISPLAY

D : Present

- : Not present

d = RS 485 SERIAL INTERFACE

S : Present

- : Not Present

e = OUTPUT AUX

R : Relay

- : Not Present

f f = SPECIAL CODES

2 - TECHNICAL DATA

ELECTRICAL DATA

Supply: 12 VAC/VDC +/- 10%

Frequency AC: 50/60 Hz

Power consumption: 3 VA approx. (without RS485 and TDR VR), 5 VA approx. (with RS485 and TDR VR)

Input/s: 2 inputs for PTC temperature probes (KTY 81-121 990 Ω at 25 °C) or NTC (103AT-2 10 K Ω at 25 °C) and 1 digital input for free-voltage contacts

Output/s: Up to 4 relay outputs (8A-AC1, 3A-AC3 250 VAC) for compressor (OUT), defroster (DEF), evaporator fans (FAN) and auxiliary output (AUX)

Electrical life for relay output: 100000 operat.

Protection class against electric shock: Class II for Front panel

Insulation: Reinforced insulation between the low voltage section (relay output) and the front panel; Reinforced insulation between the low voltage section (relay outputs) and the extra low voltage section (supply and inputs); No insulation between supply and inputs

MECHANICAL DATA

Housing: Self-extinguishing plastic, UL 94 V0

Dimensions: 33 x 75 mm, depth 64 mm

Weight: 150 g approx.

Mounting: Flush in panel in 29 x 71 mm hole

Connections: 2,5 mm² screw terminal block

Degree of protection of front panel: IP 65 mounted in panel with gasket

Pollution situation: Normal

Operating temperature: 0 ... 55 °C

Operating humidity: 30 ... 95 RH% without condensation

Storage temperature: -10 ... +60 °C

FUNCTIONAL DATA

Temperature Control: ON/OFF

Defrost control: interval cycles or at programmed times (Real Time Clock Defrosting) by Electric Heating or hot-gas / reverse cycle

Measurement range: PTC: -50...150 °C / -58 ... 199 °F; NTC: -50...50 °C / -58...122 °F

Display resolution: 1 ° in all range or 0.1 ° in range between -19,9 and 19,9

Overall accuracy: +/- 0,5 %fs

Sampling rate: 2 samples per second

Type of serial interface: RS 485 optoinsulated

Communication protocol: MODBUS RTU (JBUS)

Baud rate: Programmable from 1200 ... 9600 baud

Endurance time of the internal clock without power supply: 7 years approx. by internal battery

Action: IC type according to EN 60730-1

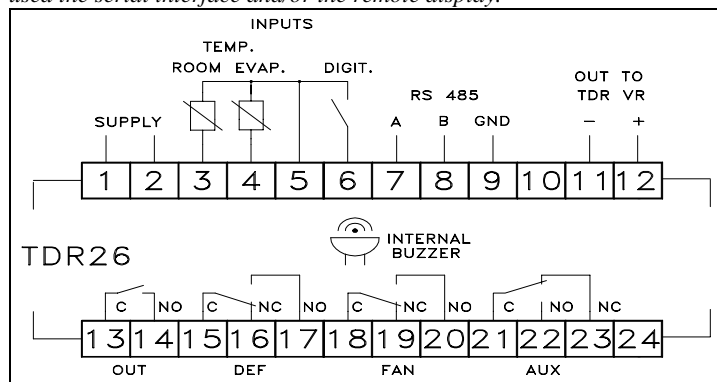
Compliance: ECC directive EMC 89/336 (EN 50081-1, EN 50082-1), ECC directive LV 73/23 and 93/68 (EN 60730-1)

3 - INSTALLATION

MECHANICAL MOUNTING: The instrument, in case 33 x 75 mm, is designed for panel mounting. Make an hole 29 x 71 mm and insert the instrument, fixing it with the provided special bracket. We recommend to mount the gasket to obtain an IP 65 front protection. Avoid to place the instrument in areas with humidity or dirt. Connect the instrument as far as possible from source of electromagnetic noises so as motors, remote control switches, relays, electrovalves, etc.

ELECTRICAL CONNECTIONS: According to the diagram below carry out the electrical wiring connecting only one wire for each terminal, check that the power supply is the same as indicated on the instrument and the loads current is not upper than the maximum current admitted. The instrument, being a built in equipment with permanent connection into a cabinet, is not furnished with internal device protecting from overcurrent: it's recommended, therefore, to properly protect all the electric circuits connected to the instrument, with devices (ex. fuses) proportionate to the circulating currents. It's strongly recommended to use cables with proper insulation, according to the working voltages and temperatures. Furthermore, the input cable of the probe has to be kept separate from line voltage wiring. If the input cable of the probe is screened, it has to be connected on the ground with only one side. It is advisable to check that the parameters are those desired before connecting the outputs to the actuators so as to avoid malfunctioning. Whenever a failure of the instrument could cause dangerous or damaging situations, it should be kept in mind that the plant has to be provided with additional devices to

ensure the safety. It's recommended to supply the instrument using the Tecnologic TCTR transformer or equivalent type, and to use one transformer for each instrument. The nominal power of transformer should be at least 3 VA, if the instrument is not equipped with serial interface and it's not connected with the remote display TDRVR, and at least 5 VA if are used the serial interface and/or the remote display.



4 - OPERATING MODE

4.1 - TEMPERATURE ON/OFF CONTROL

The temperature control mode of the instrument by ON/OFF mode occurs on the output OUT according to the Set point fixed and to the differential switching point (par. "d") programmed. The regulator is intended for cooling applications, for this reason the programmable differential is always positive. The operating mode can be also modified by the "Compressor Protection" function, see the next chapter for this function.

4.2 - COMPRESSOR PROTECTION FUNCTION

The function "Compressor Protection" is able, for cooling applications, to protect the compressor against "short cycles" by introducing a delay on the output OUT activation. The parameters to be programmed for this function are:

"PS" : Protection type

- 1 - delay before start

- 2 - delay after stop

- 3 - delay between starts

"Pt" : Time delay setting for parameter "PS" (in min.)

The "Compressor Protection" function are automatically disconnected by setting "Pt" = 0.

4.3 - DEFROST CONTROL

The automatic control of defrost occurs according to this parameters:

"dt" - Defrost type

- EL - electric heater type (during defrosting, the compressor output is not activated while the defrosting output is activated)

- in - hot-gas / reverse cycle type (during defrosting the compressor and defrost outputs are activated)

"di" - Interval between defrost cycles (in hrs.). It's the time between two successive automatic defrosting cycles whether it's desired the defrosting by intervals. If the instrument is equipped with Real Time Clock Defrosting function, pls. read the corresponding paragraph.

"dO" : Time delay of automatic defrost start (in min.); it's a delay on the automatic defrosting cycle activation which permits to have defrost intervals with hours and minutes resolution.

"dE" - Maximum length of defrost cycles (in min.). It's the maximum time that lasts a defrosting cycle whether manual or automatic. At the passing by of this time the defrost is interrupted although has not been reached the end defrosting temperature. (par. "tE").

"tE" : Defrost-Stop temperature; it's the temperature value, measured by the probe placed on the evaporator, after which it has to stop the defrost cycle. If the Defrost-Stop temperature wouldn't be reached, defrosting stop would happen at the passing by of the time programmed with "dE" parameter.

"dC" : Defrost interval computation

- ct - based only on compressor running time (output on)

- rt - based on real time (instrument on)

- **cS** - the defrost cycle is activated whenever the output **OUT** is deactivated (every stop of compressor)

"td" : Drainage time (in min.); it's a delay on the compressor and evaporator fans reactivation, after a defrost cycle, in order to allow the coil drainage.

"Sd" : Defrost at Power on; it gives the possibility to have a defrost cycle at start-up of the instrument.

4.4 - REAL TIME CLOCK DEFROSTING FUNCTION

The instrument can be equipped with the Real Time Clock Defrosting function that permits to obtain up to 6 daily defrosting at programmed times. To use this function it's necessary to program par. **"di"** = 0, in order to deactivate the defrosting at time intervals and program then **"d1"**, **"d2"**, **"d3"**, **"d4"**, **"d5"**, **"d6"** with the hours on which it's desired to have the defrosting. To effect defrosting with hour fractions it's possible then to use par. **"dO"** (Delay of automatic defrosting start, expressed in min.). With this modality the defrosting are effected at programmed times and with the same conditions described on previous paragraph.

4.5 - MANUAL DEFROST

To active manual defrost cycle press key **UP/DEFROST**, when you are not in programming mode, and holding it down for about 5 seconds after which the led **DEF** will be on and the instrument will start a defrost cycle.

4.6 - VISUALISATION OF EVAPORATOR TEMPERATURE

It's possible to visualise the temperature, read by the probe placed on the evaporator, pushing and then releasing the key with Tecnologic logo (**T**), the display will show then alternatively message **"tE"** and the measured temperature, for 5 sec., at the passing by of which it will return at the normal functioning, visualising the temperature measured by the room probe.

4.7 - EVAPORATOR FANS CONTROL

Having the probe, on the evaporator, and the fan evaporator output is possible to program :

"FL" : Evaporator fans stop temperature ; it's the temperature above of which the fans are stopped, according to the relative differential programmed on parameter :

"dF" - Evaporator fans stop differential.

Furthermore it's possible to control the fans functioning through the following parameters :

"FC" - Evaporator fans state at compressor off (on - **oF**)

"FE" - Evaporator fans state during defrost (on - **oF**)

"Fd" - Evaporator fans delay time afterward a defrost (in min.).

4.8 - ALARM FUNCTIONS

The instrument is equipped with an internal buzzer used as probes alarm signal, high and low room temperature alarm, external alarm transmitted by the digital input or as open door alarm. The temperature alarm function works depending on the following parameters :

"HA" - Set High temperature alarm (relative to the Set Point)

"LA" - Set Low temperature alarm (relative to the Set Point)

"Ad" - Alarms differential

"PA" - Alarm delay at power on (in hrs.)

"dA" - Alarm delay after defrost (in min.)

The alarm is operating at the end of the delays and will be on when the room temperature goes upper than the value [Set +HA] or goes lower than the value [Set - LA]. The high and low temperature alarm can be deactivated setting the relative parameters **"HA"** or **"LA"** at 0. When the alarm is functioning to stop the buzzer push any of the programming key.

In the mean time of the alarm signalation, although the buzzer is silenced, the instrument signalize the alarm through the **AL** led and it visualizes, during the normal functioning:

- Alternatively **"HI"** and the temperature measure by the room probe in case of high temperature alarm.

- Alternatively **"LO"** and the temperature measure by the room probe in case of low temperature alarm.

- Alternatively **"AL"** and the temperature measure by the probe in case of external alarm activated by digital input (see paragraph relative to **"FO"** function = 3).

- Alternatively **"AP"** and the temperature measure by the room probe in case of open door alarm (see paragraph relative to **"FO"** functions = 4 or 5

The instrument offer, furthermore, on par. **"tA"** - Alarm memory - the possibility to memorise the alarm. If **"tA"** is programmed as **"oF"**, the instrument cancels the alarm signal at cessation of the alarm conditions, if instead it's programmed as **"on"**, as well on the cessation of the alarm conditions it keeps **"AL"** led flashing, to indicate that occurred an alarm condition. To cancel this alarm memory signalling is then enough to push any key. It's possible furthermore to have an alarm output signal through the **AUX** output, suitably configured (see paragraph relative to **"FO"** functions = 1 and 2).

4.9 - DIGITAL INPUT

Furthermore the instrument is equipped with a programmable digital input. The digital input action is delayable using par. :

"ti" - Delay of digital input action (in sec.)

The digital input works depending on the following parameters:

"FI" - Digital input function

0 - Not active

1 - End defrost: when the input intervenes during a defrost cycle the defrost ends and the defrost is inhibited

2 - Start defrost: when the input intervenes it's activated a defrost cycle. With the input signal activated the instrument is always in defrost state.

3 - External alarm signalation: when the input intervenes the internal buzzer is activated and the display shows alternatively **"AL"** and the temperature measured by the room probe.

4 - Opening of door with fans stop : when the digital input intervenes, the fans are stopped and the display shows alternatively message **"AP"** and the temperature measure by the room probe. Furthermore in this functioning mode the digital input action do active, as well, the time programmable on par. **"oA"**, at the passing by of which it's activated the alarm to signalise that the door remained opened.

5 - Opening of door with compressor and fans stop : when the digital input intervenes, the compressor and the fans are stopped and the display shows alternatively message **"AP"** and the temperature measure by the room probe. Furthermore in this functioning mode the digital input action do active as well the time programmable on par. **"oA"**, at the passing by of which it's activated the alarm to signalise that the door remained opened.

6 - Remote control of the auxiliary output **AUX** : the digital input it's used to drive the auxiliary output **AUX** as described in the functioning mode **"FO"** = 3 of the auxiliary output.

"LI" - Digital input logic mode

on - Contact normally opened: the programmed function of **"FI"** parameter works when the digital input contact is closed.

oF - Contact normally closed : the programmed function of **"FI"** parameter works when the digital input contact is opened.

4.10 - AUXILIARY OUTPUT

The instrument can be equipped with a programmable auxiliary output (**AUX**). The auxiliary output works depending on the following parameters:

"FO" - Auxiliary output function

0 - No functions

1 - Silently alarm : **AUX** output it's activated on the same time of the buzzer when there are alarms conditions and, as well as the buzzer, it's deactivated when it's pressed one of the keys.

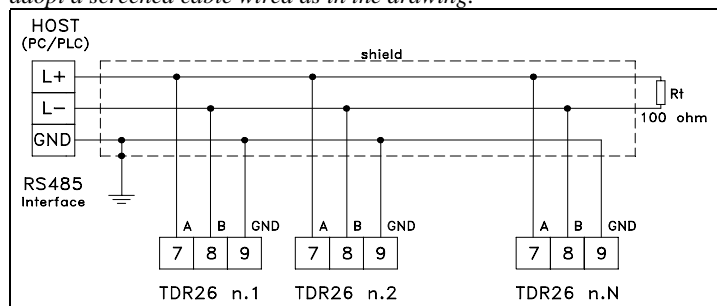
2 - Not silently alarm : **AUX** output it's activated on the same time of the buzzer when there are alarms conditions and it remains activated until these conditions are happening.

3 - Activation by using key **DOWN/AUX** or by digital input : the output it's activated when it's pressed key **DOWN/AUX**, if par. **"Fb"** is programmed = 1 or through the activation of digital input if par. **"FI"** is = 6. These controls have a bistable functioning, this means that at the first pressure of the key the output is activated while on the second it's deactivated. With this modality the **AUX** output can be switched off automatically, after a time programmable on par. : **"tu"** - Activation time of the auxiliary output with **"FO"** = 3 (in min.). With **"tu"** = 0 the output is activated and deactivated only manually by means of the digital input, otherwise the output, once activated, is automatically switched off after the programmed time. This functioning can be used, for example, to drive the light on the room or to drive the resistance against mist.

4 - Control output delayed : the auxiliary output is activated with delay programming on par. : "to" - Delay of the auxiliary output activation with "FO" = 4 (in sec.) referred to OUT output. The output AUX will be switched off at the same time as the deactivation of OUT output. This functioning mode can be used to drive an additional compressor or to drive other devices working on the same conditions of OUT output, but delayed in comparison of the compressor switching on, to avoid excessive current absorption.

4.11 - RS 485 SERIAL INTERFACE

The instrument can be equipped with an RS 485 serial communication interface, by means of which it's possible to connect the regulator with a net on which are connected other instruments (regulators or PLC) all depending typically on a personal computer used as plant supervisor. Through personal computer it's possible to acquire all the functioning information and to program all the instrument configuration parameters. The software protocol adopted for TDR series is a derivative from MODBUS RTU or JBUS protocol (AEG Schneider Automation, Inc. Trade Mark) widely used in several PLC and supervision programs available on the market (TDR series protocol manual is available on request). The interface circuit is mounted with CMOS components that presents weak pull up/down currents absorbed and therefore allows to connect till 100 TDR instruments on the same line. To maintain the line on rest conditions it's required the connection with a 100 Ohm resistance (Rt) at the end of the line. The instrument is equipped with two terminals called A(L+) and B(L-) that have to be connected with all the namesake terminals of the net. For the wiring operation it's enough then to interlace a double cable (telephonic type) and to connect on ground all the GND terminals. Anyway, particularly when the net results very long or noised and being present potential differences between the GND terminals, it's advisable to adopt a screened cable wired as in the drawing.



Adopting this electrical drawing and having care that the total capacity of the line would not be higher than 200 nF, the total length of the line can reach a maximum of 1500 meters. If the instrument is equipped with the serial interface, the parameters to be programmed are the following :

"dn" : Address of the station. Set a different number for each station, from 1 to 199.

"br" : Transmission speed (baud-rate), set as 0 (1200 baud), 1 (2400 baud), 2 (4800 baud), 3 (9600 baud). All the stations have to be the same transmission speed.

"SE" : Programming access. If programmed as "L-" this means that the instrument is programmable only from the keyboard, if programmed as "Lr" it's programmable both from the keyboard and serial line and if programmed as "r-" this means that the instrument is programmable only from serial line. In this last case if it's tried to get into the programming on the display will appear "rO" to indicate that the access is denied. When is tried to accede to programming from the keyboard while is having place a communication through the serial interface, the instrument visualise "bS" to indicate the busy state.

5 - PROGRAMMING

5.1 - PROGRAMMING OF SET-POINT

Press key P then release it, led SET will on and the SET value will be shown on display. To modify press key UP so as to increase value or DOWN so as to decrease it. These keys count one digit at a time but if the keys are pressed for over one second the value increases or decreases fast so as to reach the desired value immediately. The outgoing from the Set programming mode occurs automatically by not pressing any key for about 5 seconds, thus the room temperature value will again be displayed.

5.2 - PROGRAMMING OF PARAMETERS

To accede to the operating parameters it is necessary to press key P holding it down for about 5 seconds, after which the led SET will flash and the code of the first parameter will be visualized on the display. At this point key P can be released and by pressing UP or DOWN the desired parameter can be selected. Once the parameter on which we intended to operate has been selected to modify it press P, then released it, the set of the parameter will show up. To modify this value press UP or DOWN so as to increase or decrease the value. Once the desired value has been set press and then release P and the selected parameter code can be read on the display. By pressing UP or DOWN it is therefore possible to choose another one and modify it as previously mentioned. To outgoing from the programming mode no key is to be pressed for about 20 seconds, the instrument will automatically return to normal functioning mode, visualizing the room temperature value.

5.3 - CLOCK PROGRAMMING (REAL TIME CLOCK DEFROSTING FUNCTION)

When the instrument is equipped with the Real Time Clock Defrosting function, it's necessary to program the internal clock with the updated hour, as follows : Push key with Tecnologic logo (T) and keep it pushed for 5 seconds, after this time the display will show alternatively "H", the actual hour, "P" and the actual minutes. Pushing keys "UP" or "DOWN" during the visualisation of the hour or the minutes is then possible to modify them to program the updated hour. To go out from the programming of the clock do not touch any key for about 10 sec., the instrument will automatically turn into the normal functioning, visualising the temperature measured by the room probe.

6 - DESCRIPTION OF PARAMETERS

Here following are described all the instrument parameters; pls. note that some of them could do not appear because are according to the kind of used instrument.

CC - FIXED PARAMETER

MEASURE AND VISUALIZATION

CA - ROOM PROBE CALIBRATION : Positive or negative offset which is calculated on probe reading before visualizing and to which the control functioning is also connected.

CE - EVAPORATOR PROBE CALIBRATION : Positive or negative offset which is calculated on probe reading before visualizing and to which the end defrost functioning by temperature and fans stop temperature is also connected

ru - UNIT OF MEASUREMENT: Determines the visualization of the temperature in Centigrade or Fahrenheit degree. It is to be remember that the change of this parameter modifies the visualization but not the Set and the Set limit ("LS" and "HS") programmed (eg. if the Set was -10°C and the unit changes, the Set will rest -10°F).

dP - DECIMAL POINT : Allows the insertion of the decimal point on the display and therefore to determine resolution of the reading value in the range from -19.9 to 19.9 (on= with decimal point, oF= without decimal point)

TEMPERATURE CONTROL

d - DIFFERENTIAL SWITCHING POINT: Value between starting and stopping of output OUT .

LS - MINIMUM SET: Minimum possible Set point value or lower limit of Set point .

HS - MAXIMUM SET: Maximum possible Set point value or higher limit of Set point.

rP - OUT OUTPUT STATE IN CASE OF ERROR ROOM PROBE:

It permits to decide how has to behave the output OUT in case of room probe error. (of = output deactivated ; on = output activated and deactivated cyclically, depending on the times programmed on par. "t1" and "t2"). If it's desired to have output OUT always activated in case of room probe error, program par. "rP" = on and par. "t2" = 0.

t1 - ACTIVATION TIME OF THE OUTPUT OUT IN CASE OF ERROR ROOM PROBE: Whether par. rP is programmed as on, in case of error room probe, the output OUT will be activated for the time programmed on this par. (expressed in min.) to remain then deactivated for the time programmed on par. "t2" and so on.

t2 - DEACTIVATION TIME OF THE OUTPUT OUT IN CASE OF ERROR ROOM PROBE: Whether par. rP is programmed as on, in case of error room probe, the output OUT will be activated for the time programmed on par. "t1" to remain then deactivated for the time programmed on this par. (expressed in min.) and so on.

DEFROST CONTROL

dt - DEFROST TYPE: Selects the type of defrost (EL = with electric heater, in = hot-gas / reverse cycle).

di - DEFROST INTERVAL: Automatic defrost frequency. This time is calculated based on the selection of par. "dC" and is intended in hrs. Set di = 0 to use the Real Time Clock Defrosting function .

d1, d2, d3, d4, d5, d6 - TIMES ON WHICH HAVE TO BE EFFECTUATED THE DEFROSTINGS (REAL TIME CLOCK DEFROSTING) : Do program on these par. the hours (0..23) in a day, on which it's desired to have the defrostings. When it's not desired to have all 6 defrostings, do program the par. not used = "oF".

dO - TIME DELAY AUTOMATIC DEFROST START: It's a delay on the automatic defrosting cycle activation expressed in min.. This parameter can be utilized for a defrost interval with resolution of hrs (par. "di") and min., or to effect defrosting with hour fractions in Real Time Clock Defrosting mode.

dE - MAXIMUM LENGHT OF DEFROST CYCLES: Determines the maximum lenght of a manual or automatic defrost cycle and is intended in min.. After this time the defrost is stopped although has not been reached the defrost stop temperature.

tE - DEFROST STOP TEMPERATURE: Determines the temperature, measured by the evaporator probe, at which the defrost has to end.

Et - DIFFERENTIAL DISPLAY UNLOCK AFTER DEFROST : Temperature differential to unlock the display after the defrost. If it's utilized the option of "dL" parameter display lock during defrost, the display, after defrost will come back to visualize the temperature measured by the probe when it will be gone under the value [Set + Et] or is ended the time programmed to par. "dA".

EP - EVAPORATOR PROBE PRESENCE: This parameter can be utilized when the evaporator probe is not used (on = used probe, oF = not used probe)

dC - DEFROST INTERVAL COMPUTATION: Select the type of computation for defrost interval as based on total compressor running time (ct), as based on real time instrument functioning (rt) or if a defrost cycle is activated whenever the output OUT is deactivated (every stop of compressor) (cS).

td - DRAINAGE TIME: Compressor and fan start delay after a defrost cycle to allow coil drainage, intended in min.. During drainage time the led DEF flashing.

Sd - DEFROST AT POWER ON: It gives the possibility to have a defrost cycle at start-up of the instrument. (oF = no defrost at power on, on = start defrost cycle at power on).

dL - DEFROST DISPLAY LOCK: Pemits the display visualization lock on the last temperature reading (on) during all the defrost cycle until, at the end of defrost, the room temperature has not reached the value [Set + Et] (see par. "Et") or is ended the time setted on par. "dA". Or it permits the visualization of label "dF" (Lb) during the defrost cycle and, after the defrost, of label "Pd" until, at the end of defrost, the temperature has not reached the value [Set + Et] (see par. "Et") or is ended the time setted on par. "dA". The display will otherwise continue to visualize the temperature measured by the room probe during the defrost cycle (oF).

EVAPORATOR FANS CONTROL

FC - EVAPORATOR FANS STATE AT COMPRESSOR OFF : Selects the evaporator fans state when the compressor is off (on = fan on, oF= fan off).

FE - EVAPORATOR FANS STATE DURING DEFROST: Determines the state of the fans during the defrost (on = fan on, oF = fan off).

FL - EVAPORATOR FANS STOP TEMPERATURE: Setting of temperature, measured by the evaporator probe, above which the fans is always off.

dF - EVAPORATOR FANS STOP DIFFERENTIAL: Value between starting and stopping of fan stop temperature (par. "FL")

Fd - EVAPORATOR FANS DELAY AFTER DEFROST: Fan delay time after a defrost cycle, expressed in min..

COMPRESSOR PROTECTION AND DELAY AT POWER ON

PS - COMPRESSOR TYPE PROTECTION: Select the type of protection for the compressor against "short cycle". The possibles selections are:

1 = delay before start

2 = delay after stop

3 = delay between starts

Pt - TIME DELAY COMPRESSOR PROTECTION: Time delay setting for parameter "PS" intended in min.

od - OUTPUTS DELAY AT POWER ON: Time delay of outputs activation after power on and expressed in min. During this time the display show alternatively "od" and the measured room temperature.

HA - HIGH ALARM: Temperature value in respect with Set point above at which the alarm will be on (The alarm will be on when the room temperature will be upper then the value Set + HA).

LA - LOW ALARM: Temperature value in respect with the Set point below at which the alarm will be on (The alarm will be on when the room temperature will be lower then the value Set - LA).

Ad - TEMPERATURE ALARMS DIFFERENTIAL: Value between starting and stopping of temperature alarm signal (par. HA and LA).

tA - ALARM MEMORY : It permits to decide if the instrument has to cancel the alarm signal at the end of the alarm conditions (oF), or it has to keep the led "AL" flashing to indicate that occurred an alarm (on). To cancel the alarm memory signal it's then enough to push one of the keys.

PA - TEMPERATURE ALARMS DELAY AT POWER ON: Time delay after power on during which the temperature alarms will not be activated (expressed in hrs).

dA - TEMPERATURE ALARMS DELAY AND UNLOCK DISPLAY DELAY AFTER DEFROST : Time delay after a defrost cycle during which the temperature alarms will not be activated and during which the display (see par. "dL") is locked (expressed in min.).

oA - ALARM ACTIVATION DELAY IN CASE OF DOOR OPENED : When the digital input is used as door opening ("FI" = 4 or 5) it's possible to program on this par. the time, expressed in min., at the passing by of which it's activated the alarm, signalling that the door remained opened.

DIGITAL INPUT

FI - DIGITAL INPUT FUNCTION: It establish which function has to realize the digital input.

0 = No function

1 = End defrost

2 = Start defrost

3 = External alarm

4 = Opening of door with fans stop

5 = Opening of door with compressor and fans stop

6 = Remote control of the auxiliary output AUX

LI - DIGITAL INPUT LOGIC MODE: It establish if the digital input causes the activation of the programmed function on par. "FI" when it's closed (on) or when it's opened (oF).

ti - DIGITAL INPUT DELAY: Activation delay of the digital input function, expressed in sec.

AUXILIARY OUTPUT

FO - AUXILIARY OUTPUT FUNCTION: It establish which function has to realize the auxiliary output.

0 = No function

1 = Silently alarm

2 = Not silently alarm

3 = Activation by using key DOWN/AUX (Fb = 1) or by digital input (FI = 6).

4 = Control output delayed

Fb - DOWN/AUX KEY FUNCTON : It establish the functioning of key DOWN/AUX :

0 - Only as key DOWN, in the programming mode

1 - As activation of output AUX, in the normal mode and as key DOWN, in the programming mode

tu - ACTIVATION TIME OF THE AUXILIARY OUTPUT WHEN "FO" = 3 : It permits to decide the activation time, expressed in min., of the auxiliary output, when it's driven by the key DOWN/AUX or by a digital input. When "tu" = 0 the output is activated and deactivated only manually by using key DOWN/AUX or by the digital input, otherwise the output, once activated, is automatically switched off after the programmed time.

to - ACTIVATION DELAY OF AUXILIARY OUTPUT WHEN FO = 4 :

It permits to decide the delay, expressed in sec., of the output AUX activation, referred to output OUT when "FO" = 4.

SERIAL COMMUNICATION

dn : STATION ADDRESS FOR SERIAL COMMUNICATION : It's used to define the instrument address in the communication net. Set a different number for each station, from 1 to 199.

br : TRANSMISSION SPEED (BAUD-RATE) : Set the data transmission speed (Baud-rate) of the net on which it's connected the instrument. This parameter is setting as 0 (1200 baud), 1 (2400 baud), 2 (4800 baud) or 3 (9600 baud). All the stations must have the same transmission speed.

SE : PROGRAMMING ACCESS THROUGH SERIAL LINE : If programmed as "L-" this means that the instrument is programmable only from the keyboard, if programmed as "Lr" it's programmable both from the keyboards and serial line, if programmed as "-r" it's programmable only from serial line.

TEMPERATURE SET POINT

SP - SET POINT : Set point value

6.1 - PARAMETERS TABLE

Par.	Description	Range	Def.	Notes
CC	Fixed parameter	-		
MEASURE AND VISUALIZATION				
CA	Room probe calibration	-15.0 .. +15.0 °C/°F	0.0	
CE	Evaporator probe calibration	-15.0 .. +15.0 °C/°F	0.0	
ru	Unit of measurement	C - F	C	
dP	Decimal point	on - oF	on	
TEMPERATURE CONTROL				
d	Differential	0.0 .. 15.0 °C/°F	2.0	
LS	Minimum Set	-58...HS °C/°F	-50	
HS	Maximum Set	LS..199 °C/°F	50	
rP	OUT output state in case of error room probe	on - oF	oF	
t1	OUT activation time in case of error room probe	1 .. 25 min.	1	
t2	OUT deactivation time in case of error room probe	0 .. 25 min.	0	
DEFROST CONTROL				
dt	Defrost type	EL - in	EL	
di	Defrost interval	0 ... 31 hrs	6	
d1	Hour start defrost 1	oF - 0 .. 23 hrs	oF	
d2	Hour start defrost 2	oF - 0 .. 23 hrs	oF	
d3	Hour start defrost 3	oF - 0 .. 23 hrs	oF	
d4	Hour start defrost 4	oF - 0 .. 23 hrs	oF	
d5	Hour start defrost 5	oF - 0 .. 23 hrs	oF	
d6	Hour start defrost 6	oF - 0 .. 23 hrs	oF	
dO	Time delay automatic defrost start	0 ... 59 min.	0	
dE	Maximum lenght of defrost cycles	1 ... 99 min.	30	
tE	Defrost stop temperature	-58 ... 199 °C/°F	8	
Et	Differential display unlock after defrost	0 ... 20 °C/°F	2	
EP	Evaporator probe presence	on - oF	on	
dC	Defrost interval computation	rt - ct - cS	rt	
td	Drainage time	0 ... 99 min.	0	
Sd	Defrost at power on	on - oF	oF	
dL	Defrost display lock	on - oF - Lb	oF	
EVAPORATOR FANS CONTROL				
FC	Evaporator fans state at compressor off	on - oF	on	
FE	Evaporator fans state during defrost	on - oF	oF	
FL	Evaporator fans stop temperature	-58 ... 199 °C/°F	2	
dF	Evaporator fans stop differential	1 ... 20 °C/°F	2	

Fd	Evaporator fans delay after defrost	0 ... 99 min.	10	
COMPRESSOR PROTECTION AND DELAY AT POWER ON				
PS	Compressor type protection	1 - 2 - 3	1	
Pt	Time delay compressor protection	0 ... 31 min.	0	
od	Outputs delay at power on	0 ... 99 min.	0	
ALARMS				
HA	Relative high alarm	0 ... 50 °C/°F	10	
LA	Relative low alarm	0 ... 50 °C/°F	10	
Ad	Temperature alarms differential	1 ... 20 °C/°F	1	
tA	Alarm memory	on - oF	oF	
PA	Temperature alarms delay at power on	0 ... 15 hrs.	2	
da	Temperature alarms delay and unlock display delay after defrost	0 ... 99 min.	60	
oA	Alarm activation delay in case of door opened	0 ... 99 min.	10	
DIGITAL INPUT				
FI	Digital input function	0-1-2-3-4-5-6	0	
LI	Digital input logic mode	on - oF	on	
ti	Digital input delay	0 ... 99 sec.	2	
AUXILIARY OUTPUT				
FO	Auxiliary output function	0 - 1 - 2 - 3 - 4	0	
Fb	DOWN/AUX key function	0 - 1	0	
tu	AUX activation time when FO=3	0 ... 99 min.	0	
to	AUX activation delay when FO=4	0 ... 25 sec.	10	
SERIAL COMMUNICATION				
dn	Station address for serial communication	1 ... 199	1	
br	Baud rate serial port	0 - 1 - 2 - 3	3	
SE	Programming access through serial port	Lr / L- / -r	Lr	
TEMPERATURE SET POINT				
SP	Set Point	LS...HS °C/°F	0.0	

7 - PROBLEMS, MAINTENANCE AND WARRANTY

ERRORS SIGNALLING: The instrument display it's used to visualise instrument error conditions, showing the following messages : "E1" or "E2" - Room probe error (E1) or evaporator probe error (E2) interrupted or in short-circuit.

"o1" - "o2" - "u1" - "u2" - Room probe input (1) or evaporator probe input (2) in overrange (o) or in underrange (u).

In these cases verify the correct connection of the probes with the instrument and successively proceed verify itself.

"EE" - Memory error, in this case verify, and if necessary, re-program the functioning parameters.

"bS" - When is happening a serial communication trough serial port and it's tried to enter into the programming phase.

"rO" - When the instrument is foreseen to be programmed only by serial port and it's tried to enter into the programming phase.

"nC" - When the instrument is not equipped with the Real Time Clock Defrosting and it's tried to enter into the clock programming.

WARRANTY AND REPAIRS: The instrument is under warranty against construction vices or defected material, noticed within 12 months from delivery date. The warranty is limited to the repairs or to the substitution of the instrument. The eventual opening of the housing, the violation of the instrument or the wrong use and installation of the product means the automatically decay of the warranty. In case of defected instrument, noticed in warranty period or out of warranty, do contact our sales department to obtain the shipment authorisation. The defected product must be shipped to TECNOLOGIC with the detailed description of the failures found and without any fees or charge for Tecnologic, safe different agreements.

