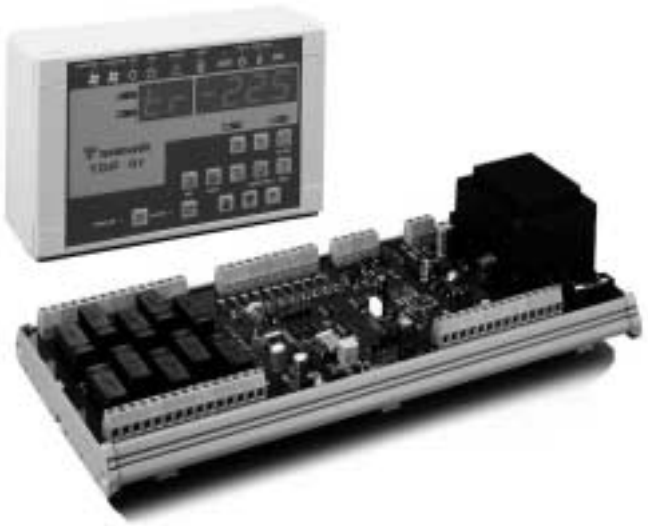
TDC 01 - TDP 01

MICROPROCESSOR-BASED ELECTRONIC FREEZER CONTROL SYSTEM



OPERATING INSTRUCTIONS
Vr. 01 (ENG) - cod.: ISTR 04890

TECNOLOGIC S.p.A.

VIA INDIPENDENZA 56
27029 VIGEVANO (PV) ITALY
TEL.: +39 0381 69871
FAX: +39 0381 698730
internet : http:\\www.tecnologic.it
e-mail: info@tecnologic.it

PREVIOUS STATEMENT

In this manual are contained all the necessary information for a correct installation and the instructions for the use and the maintenance of the product; we recommend, therefore, to read carefully the following instructions. The maximum care has been used in the realisation of this document, anyway TECNOLOGIC S.p.A. does not assume any responsibility deriving from the use of itself. The same consideration has to be done for each person or Company involved in the creation of this manual. The herewith issue is an exclusive property of TECNOLOGIC S.p.A. which forbids any reproduction and divulgation, although partial, if not expressly authorised. TECNOLOGIC S.p.A. reserves the right to execute aesthetically and functional modifications, at any moment and without any notice.

INDEX

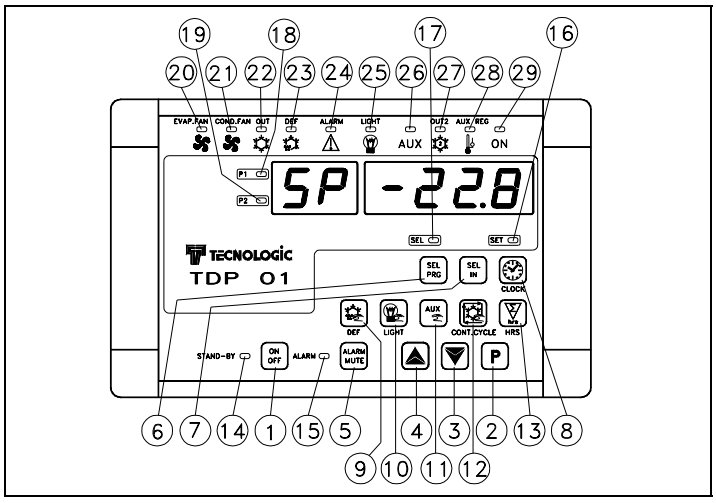
1 - DESCRIPTION

1.1 - GENERAL DESCRIPTION

TDC 01 model is a digital microprocessor based controller for refrigeration applications with ON/OFF temperature control and with defrosting control at intervals of time or programmed times (Real Time Clock Defrosting) by electric heater or hot gas/reverse cycle.

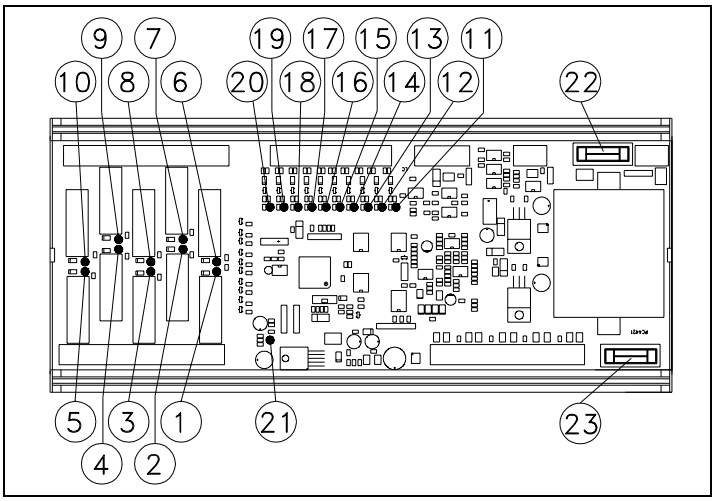
TDC 01 unit is programmable through an operator interface which can be located up to 600 mt. far away from TDC unit to which communicate by means of a 2 poles shielded cable through a serial port CAN type.
TDC control unit is equipped with up to :
- 10 relay outputs (2 of them can be analogue type to control the evaporator and condenser fan speed) : compressor (OUT), defroster (DEF), evaporator fans (EVAP.FAN), condenser fan (COND.FAN), alarm (ALARM), room light (LIGHT), second compressor (OUT2), auxiliary regulator (REG.AUX), auxiliary output (AUX) and controller output on (ON).
- 10 digital inputs: switch on - switch off (ON/OFF), program selection (P1/P2), preheating (PREHEATING), 2 external alarms (ALARM A and B), 2 pressure switch alarms (PRESS. A e B), door room (DOOR), auxiliary output command (AUX) and auxiliary configurable (AUX CFG.)
- 5 inputs for PTC or NTC temperature probes: room (ROOM), evaporator (EVAP.), auxiliary (AUX) and condenser (COND.)
and furthermore it can be equipped with:
- RS485 serial interface, optoisolated
- internal clock to manage the real time defrosting, to automatically switch over two control programs with different functioning parameters (ex. night/day, working days/holidays etc.) and to storage the alarms.
TDC unit can be programmed by a PC and execute the plant control also without the connection to the TDP interface.
TDP operator interface is equipped with : one 6 figures display, 13 keys, 16 signalling led and one internal buzzer for the alarms signalling.

1.2 - TDP 01 PANEL



1 - Key ON/OFF : It's used to switch on (RUN mode) or switch off (STANDBY mode) the controller
2 - Key P : It's used to program the Set Point and the functioning parameters
3 -Key DOWN : It's used to decrease the values to be programmed and to select the parameters
4 - Key UP : It's used to increase the values to be programmed and to select the parameters
5 - Key ALARM MUTE : It's used to silence the current alarm and to visualise the alarms storage in memory
6 - Key SEL PRG : It's used to select the program (P1-P2)
7 - Key SEL IN : It's used to visualise the temperatures measured by the different probes
8 - Key CLOCK : It's used to program the up dated hour and day
9 -Key DEF : It's used to activate manual defrosting cycles
10 -Key LIGHT : It's used to command the door light output
11 - Key AUX : It's used to command the output AUX
12 -Key CONT. CYCLE : It's used to activate the continuous cycle
13 -Key HRS : It's used to visualise the running hours of the compressor (output OUT)
14 - Led STANDBY : It indicates the controller state in STANDBY mode
15 - Led ALARM : It indicates the alarm state on (switch on), off (switch off), silenced (flashing slowly) or memorised (flashing rapidly).
16 - Led SET : It indicates the access to the Set Point programming (switch on), to the programming of visible parameters (flashing slowly) or to the programming of parameters protected by the password (flashing rapidly).
17 - Led SEL : It indicates the access to the SEL mode and then the possibility to select the program (P1 o P2)
18 - Led P1 : It normally indicates that the program P1 is working, while in the parameters programming mode, it indicates whether the parameter is referred to program P1
19 - Led P2 : It normally indicates that the program P2 is working, while in the parameters programming mode, it indicates whether the parameter is referred to program P2
20 - Led EVAP. FAN : It indicates the state of the evaporator fan output on (switched on), off (switched off) or deactivated (flashing)
21 - Led COND. FAN : It indicates the state of the condenser fan output
22 - Led OUT: It indicates the state of the regulation output (compressor) on (switched on), off (switched off) or deactivated (flashing)
23 - Led DEF : It indicates the state of the defrosting cycle (switched on) or the state of the drainage cycle (flashing)
24 - Led ALARM: It indicates the state of the alarm output
25 - Led LIGHT: It indicates the state of the door light output
26 - Led AUX: It indicates the state of the auxiliary output
27 - Led OUT 2: It indicates the state of the second control output (second compressor)
28 - Led AUX REG : It indicates the state of the auxiliary controller output
29 - Led ON : It indicates the state of the controller in RUN mode and of the output ON switched on.

1.3 - TDC 01 CONTROL UNIT



1 - Led EVAP. FAN : It indicates the Evaporator Fans output state
2 - Led COND. FAN : It indicates the Condenser Fans output state
3 - Led OUT : It indicates the OUT (COMP.) output state
4 - Led DEF. : It indicates the Defroster output state
5 - Led ALARM : It indicates the Alarm output state
6 - Led LIGHT : It indicates the Light output state
7 - Led AUX : It indicates the AUX output state
8 - Led OUT2 : It indicates the OUT2 (COMP.2) output state
9 - Led AUX. REG. : It indicates the auxiliary control output state
10 - Led ON : It indicates the ON output state
11 - Led ON/OFF : It indicates the ON/OFF input state
12 - Led P1/P2 : It indicates the P1/P2 input state
13 - Led PREHEATING : It indicates the Preheating input state
14 - Led ALARM A : It indicates the Alarm A input state
15 - Led ALARM B : It indicates the Alarm B input state
16 - Led PRESS. A : It indicates the Press. switch A input state
17 - Led PRESS. B : It indicates the Press. switch B input state
18 - Led DOOR : It indicates the Door switch input state

19 - Led AUX : It indicates the AUX input state
20 - Led AUX CFG. : It indicates the Config. AUX input state
21 - Led Supply : It indicates the Power supply of the unit
22 - Fuse 1 : Power supply fuse (F 315 mA 5x20 for supply. 110/230 VAC; F 1 A 5x20 for supply 24 VAC)
22 - Fuse 2 : TDP supply fuse (F 500 mA 5x20)

2 - PROGRAMMING

2.1 - SET POINT PROGRAMMING

Push key P then release it, led SET will be switched on and the display will show **"SP"** and the set point programmed on the active program (P1 or P2).
To modify it, work on keys UP to increase the value or DOWN to decrease it.
These keys count one digit at a time but if they are pressed for more than two seconds the value increases or decreases in a faster way.
The outgoing from the Set programming mode occurs automatically by not pressing any key for about 5 seconds, thus the display will come back at the normal visualisation.

2.2 - HOUR AND DAY PROGRAMMING

When the instrument is equipped with the internal real time clock it's necessary to program it with hour and day as follows :
Push key CLOCK and keep it pushed for 5 sec., afterwards the display will show **"CL"** and the actual hour with the decimal point to separate hours and minutes.
Pushing keys UP and DOWN, during the hour visualisation is then possible to modify it to program the current hour.
Pushing again the key CLOCK within 10 sec., the display wil show **"dy"** and the current day of the week (1=Sunday, 2=Saturday...).
Pushing keys UP and DOWN, during the day visualisation is then possible to modify it to program the current day.
To go out from the clock programming mode, do not work on any key for about 10 sec.; the instrument will automatically return to the normal visualisation mode.
If the instrument is not equipped with the clock and it's tried to get into the hour programming mode, the display will show **"noCL"**.

2.3 - PARAMETERS PROGRAMMING

To accede to the instrument operating parameters it is necessary to press key P , keep it pressed for about 5 seconds, afterwards the led SET will flash and the code of the first parameter will be visualised on the 2 figures display, while on the 4 figures display it will be visualised the value of that parameter.
Now, key P can be released and, pressing key UP or DOWN , the desired parameter can be selected.
The parameter reference to program P1 or P2, it's signalled by the lighting of led P1 or P2.
Whether the parameter is referred to both programs, both led will be lighted off.
Once the parameter on which we intended to operate has been selected to modify it press P, than 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 programmed, press and than release key P and the display showing the selected parameter label will stop flashing.
Pressing keys UP or DOWN it is therefore possible to choose another parameter and modify it as previously described.
To outgoing from the programming mode do not work on any key for about 20 seconds, the instrument will automatically return to the normal functioning mode.

2.4 - RESTORATION OF THE ORIGINAL CONFIGURATION

Whenever it's desired to restore the instrument to the values of visibility and programming of the original parameters (programmed at the factory) it's possible to do it following the next procedure :
Program 481 on parameter "PP", pushing then key P it will appear parameter **"rS"** , programmed = oF.
Programming this parameter = on and pushing key P, it will be restored the original configuration and the instrument will come back to the parameters programming phase.

3 - INSTALLATION AND USE ADVICES

3.1 – USE ALLOWED

The instrument has been projected as measure and control device, built according to EN61010-1 rule.
The use of the instrument for applications not expressly allowed by the above mentioned rule has to foreseen proper protection devices.
The instrument CAN'T be used in environments with dangerous atmosphere (flammable or explosive) without a proper protection.
It has to be reminded that the user has to take care that the electromagnetic rules are being respected also after the instrument installing, eventually using proper filters.
Whenever a failure or a bad functioning of the instrument may cause dangerous situations or damage to people, things or animals it has to be reminded that the plant has to be equipped with additional electromechanical devices in order to grant the safety.

3.2 - MECHANICAL MOUNTING

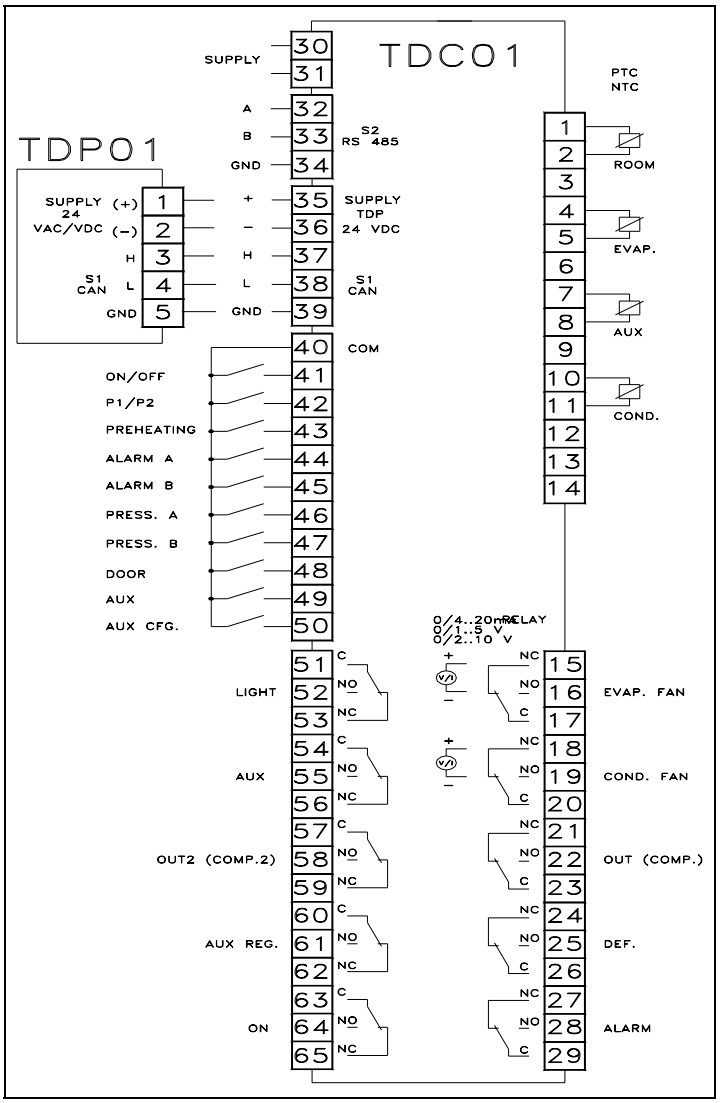
TDC instrument is studied to be mounted backboard on OMEGA DIN RAIL, while TDP interface is foreseen to be wall mounted or in flush panel.
It's advisable to mount the apposite gasket and to use proper connections to connect TDP panel in order to obtain the IP65 protection degree.
Avoid to place the TCD unit into environments with high humidity or dirt, which may create condensation or contact with conductive substances.
It's advisable to assure an adequate ventilation to the instruments and to avoid the installation into box where are placed devices which may overheat the instrument and make it work at higher temperatures than what declared.
Do install both devices as far as possible from generators of electromagnetic noises so as motors, power relays, relays, electrovalves, etc.

3.3 - ELECTRICAL CONNECTIONS

Carry out the electrical wiring according to the following diagram, connecting only one wire for each terminal, checking that the power supply is the same as indicated on the instrument label and that the load current is not upper than the maximum current admitted.
TDC unit, although is a built in equipment with permanent connections into a cabinet, is equipped with internal devices protecting from overcurrent (fuses) as regard his supply and supply output to TDP panel.
It's recommended then, to properly protect all the electric circuits connected to the instruments through the outputs, with devices (ex. fuses) proportionate to the circulating currents.
The instrument, being a built in equipment with permanent connection into a cabinet, is not equipped with internal devices protecting from overcurrent: the installation shall, therefore, employ a two-phase switch, placed as near as possible to the instrument, located in a position easily reachable by the user and marked as instrument disconnecting device.
Furthermore, it's recommended 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 in order to avoid electromagnetic noises infiltration.
If the input cable of the probe is screened, it advisable to connect it on the ground with one side only.
If the connecting cable between TDP and TDC units is short and the supply to TDP panel is given by TDC unit (through terminals 35-36) to communicate are enough only 2 wires not shielded (H-L).
Otherwise, if the units are far away one from the other, it's advisable the connection with a 2 pole shielded cable (or 4 poles if it's desired to comprehend the supply as well) with the braid connected to GND

terminal from one side only. If, instead, the supply to TDP panel is not given by TDC unit, it's necessary the connection between the units with 3 wires (H-L-GND) and if they are far away it's better to use a 3 poles shielded cable with the braid connected to GND terminal from one side only, or a 2 poles shielded cable (H-L) with the braid connected to GND terminal from both sides.
For the eventual separate supply of TDP panel it's recommended to use the apposite transformer TCTR of minimum 3VA, or others with similar features, and to use the transformer to supply exclusively the panel.
Finally, it is advisable to check that the parameters are those desired before connecting the outputs to the actuators in order to avoid plant anomalies which may cause injuries to people, things or animals.
Tecnologic S.p.A. and its legal representatives are not responsible for any eventual damages to people, things or animals deriving from the instrument violation, not proper or wrong use or in any case not in accordance with the instrument features.

3.4 - ELECTRICAL CONNECTION DRAWING



4 - OPERATING MODE

Here following are indicated and described the functions of the complete system control (TDC01-TDP01), whenever the operator interface (TDP) is not present, the control board (TDC) actuates, in any case, all the control functions herewith described.

4 .1 - ON/OFF (RUN/STANDBY)

Once supplied, the system can assume 2 different conditions :
- ON (RUN) : this means that the controller activates all the control functions. TDP interface presents then all displays and led activated, except led Standby (switched off).
- OFF (STANDBY) : this means that the controller does not activate any control function, except the door light command.

TDP interface presents then display and led switched off, except led Standby (switched on) and obviously except the led relative to the door light output, if this is activate.
When the system starts, if the digital input ON/OFF is closed, the controller is always in the ON state.
If the digital input remains closed it's possible to turn the control into the OFF state by pushing the ON/OFF key, located on TDP interface and successively come back into the ON state, always by pushing the same key, and so on.
If instead, the digital input is opened, the system is in the OFF state and to turn it into the ON state, it's necessary to close the input.
In case of power failure then, when the power comes back, the system will be in the same condition it had before the interruption.
When the controller is in the ON state it's activated also the ON output, which is deactivated only when the controller is in the OFF state, in case of power failure or in case of a general anomaly of the instrument.

4.2 - OUTPUT DELAY AT POWER ON

With parameter **"od"** (Delay at power on, express. in min.) it's possible to delay the output activation (except the door light which can be activated, in any case, also in the off state) at power on (more precisely with the passage into the run state).
The delay state is indicated by the display which shows, during the delay, alternatively **"od"** and the temperature measured by the room probe.
All the eventual inhibitions (preheating, alarms, etc.) or commands (defrosting at power on, etc.) are then delayed at the end of "od" delay.

4.3 - MEASURE AND VISUALISATION OF THE TEMPERATURES

Normally the operator interface shows **"tr"** and the temperature measured by the cold room probe.
It's possible to visualise the temperatures measured by the other probes (if presents and activated by param. **"EP"**, **"AP"** and **"CP"**) pushing and then releasing the key of probe visualisation selection (SEL IN); on the display will be then shown :
- at the first pressure : **"tE"** and the temperature measured by the evaporator probe
- at the second pressure (within 5 sec.) : **"tA"** and the temperature measured by the auxiliary probe
- at the third pressure (within 5 sec.) : **"tC"** and the temperature measured by the condenser probe

After 5 sec. of inactivity of the display key, it comes back the normal functioning, visualising the room probe temperature.
The unit of measurement can be modified through par. **"ru"** as °C or °F.
The modification of this parameter involves just the display visualization, but not the Set Point or the other parameters, which have to be modified manually (for example : if the Set Point was 50°C and the unit of measurement is changed, it will become 50°F).
Additionally, through par. **"Cr", "CE", "CA, "CC"** it's possible to program a positive or negative offset whose value is added to the values read by the ralative probes from which is depending the control functioning.
These parameters can be used to recalibrate the instrument according to the application requirement.

4.4 - STORAGE OF THE MAXIMUM AND MINIMUM ROOM TEMPERATURE (PEAKS)

When the room probe measures a temperature equal to the programmed Set Point, the instrument begins to storage the maximum and minimum temperature peaks.
The measure of the temperature peaks occurs also in conditions of defrosting, independently of what programmed on param. "dL".
It's possible to visualise the maximum and minimum room temperature peaks according to the following modalities :

- pushing for 3 sec. key "UP", while we are in the normal visualisation mode, the display will show **"tH"** and the maximum cold room temperature peak storage
- pushing for 3 sec. key "DOWN", while we are in the normal visualisation mode, the display will show **"tL"** and the minimum cold room temperature peak storage

After 5 sec. the display comes back to the normal functioning.
In this modality, if the room temperature has not yet reached the Set Point value, the display D2 shows **"---".**
The maximum and minimum peaks values are erased in case of a power failure or when, after the standby positioning of the unit, the cold room temperature goes upper than the maximum temperature peak storage.

4.5 - PROGRAM SELECTION (P1-P2)
The control board can execute the outputs control following 2 different programs in memory.
Actually the program executed is always the same , but with different functioning parameters (Set Point, differential, defrost interval, defrost-stop temperature, etc.).
This function permits to storage on the board the parameters relative to different uses of the controlled room (ex.: for the conservation at negative or positive temperature) or to different room control conditions (ex.: working days / holidays, day /night functioning, winter / summer functioning, etc.)
Two led P1 and P2 indicate the program in execution.
The selection of the program to be executed can be actuate in three ways :
1) Through the digital input of the program selection (P1/P2), which, if opened, activate program P1, if closed, activate program P2. To the digital input can be then connected a clock contact or a simple switching by means of which it's possible to manage the execution of the desired program.
2) When the digital input is opened, the selection can be activated also through TDP interface, with the following procedure :
pushing and releasing key SEL PRG, led SEL will switch on; to select the desired program work then on keys UP or DOWN.
Not pushing any key, after 5 sec., led SEL will switch off, the display will come back to the normal visualisation mode and will be then executed the selected program.
If the program in execution is P2, as the selection digital input is closed, and it's tried to change the program into P1 through the panel, the display will show **"Err"**, because the digital input command has priority on the panel one.
3) When the digital input is opened, the selection can be also activated automatically at programmed hours and days (maximum is admitted 1 cycle of daily commutation), programmed by using the following parameters :
"e1" : Ending hour of program P2 automatic execution Sunday
"b1" : Beginning hour of program P2 automatic execution Sunday
"e2" : Ending hour of program P2 automatic execution Monday
"b2" : Beginning hour of program P2 automatic execution Monday
"e3" : Ending hour of program P2 automatic execution Tuesday
"b3" : Beginning hour of program P2 automatic execution Tuesday
"e4" : Ending hour of program P2 automatic execution Wednesday
"b4" :Beginning hour of program P2 automatic execution Wednesday
"e5" : Ending hour of program P2 automatic execution Thursday
"b5" : Beginning hour of program P2 automatic execution Thursday
"e6" : Ending hour of program P2 automatic execution Friday
"b6" : Beginning hour of program P2 automatic execution Friday
"e7" : Ending hour of program P2 automatic execution Saturday
"b7" : Beginning hour of program P2 automatic execution Saturday
The range of this parameters is: (oF- 0.00 ... 23.59).

For example :

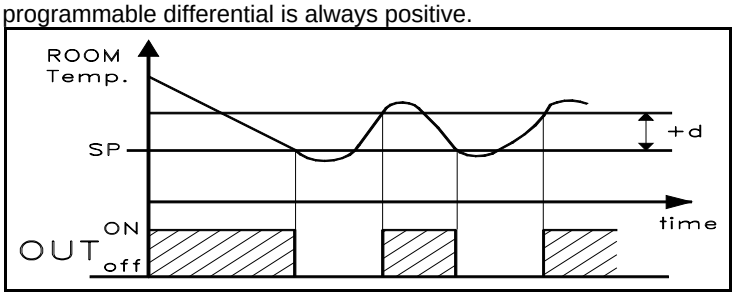
Parameters		**Day**	**P2 in execution**
e1 = oF	b1 = oF	Sunday	P2 all the time
e2 = 10.00	b2 = 21.30	Monday	end of P2 at 10.00 and beginning of P2 at 21.30
e3 = 6.00	b3 = 21.30	Tuesday	end of P2 at 6.00 and beginning of P2 at 21.30
e4 = 6.00	b4 = 21.30	Wednesday	end of P2 at 6.00 and beginning of P2 at 21.30
e5 = 6.00	b5 = 21.30	Thursday	end of P2 at 6.00 and beginning of P2 at 21.30
e6 = 6.00	b6 = 21.30	Friday	end of P2 at 6.00 and beginning of P2 at 21.30
e7 = 6.00	b7 = 22.00	Saturday	end of P2 at 6.00 and beginning of P2 at 22.00

So, program P2 will start every day at 21.30 and will finish at 6.00 of the next day, except Sunday when the program will start at 22.00 on Saturday and will finish at 10.00 on Monday.

Remarks : obviously, when it's programmed a beginning execution hour for P2 program and at that hour the program P2 is already running, because it has been started up the day before, program P2 remains activated.
Whether has been programmed the automatic execution of program P2 and manually, through the interface panel, is changed the program, the selected program remains active until when will start the new automatic execution.
In the following paragraphs the functioning mode is described generically, the effective action will behave depending on the active parameter (of program P1 or P2).

4.6 - VISUALISATION OF THE COMPRESSOR RUNNING HOURS
Pushing and releasing key HRS, the display will visualise **"hc"** and the hours (/10) of the compressor functioning (i.e. the hours tens during which the output OUT worked).
The instrument storage up to 9999(0) running hours (i.e. approx. 11 years of uninterrupted functioning) and afterwards it will erase automatically starting again from 0.
Whenever is desired to manually erase this counter (because the compressor has been substituted, a maintenance operation has been done, the control system is mounted on a new plant, etc.) it's possible to do it keeping pushed key HRS for 5 sec.; during the visualisation of the compressor running mode, the display will show 0000 flashing to indicate that the counter is nearly to be erased.
To erase it then, push within 5 sec., key DOWN keeping it pushed for 5 sec. and the counter will be effectively erased.
Obviously, keeping the key pushed for a time minor then 5 sec. the counter is not erased. After 5 sec. of inactivity of the keys , the display comes back to the normal functioning mode.
The running hours storage is always active, anyway the instrument is able to keep in memory the number of the functioning hours also without power supply only if it's present the internal clock.
If the internal clock is not present, in case of power failure, the counter is erased.

4.7 - ON/OFF TEMPERATURE CONTROL
The temperature control mode of the instrument is ON/OFF type and it occurs on the compressor output (OUT) according to the temperature measured by the room probe (ROOM), to the Set point ("SP") and to the differential switching point ("d") programmed.
The regulator is intended for cooling applications, for this reason the programmable differential is always positive.



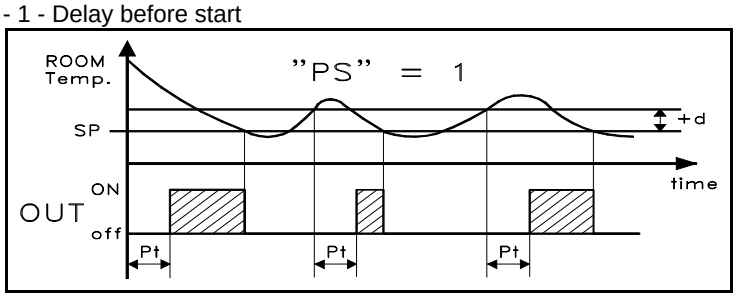
Furthermore, the operating mode can be also modified by the "Compressor Protection" function and continuous cycle function , here following described.

4.8 - CONTINUOUS CYCLE FUNCTION
The continuous cycle function, when activated, turn the control output OUT (compressor) into the ON mode, independently by the

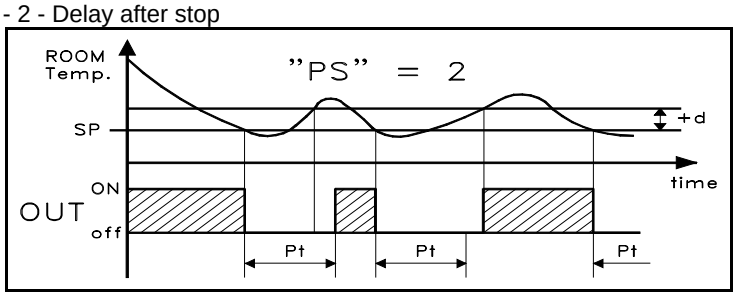
temperature controller conditions, for the time programmed on parameter :
"tC": continuous cycle duration (in min.)
During this period the defrosts are inhibited and the temperature alarms are deactivated up to the expiring of time programmed on parameter
"dS" - Time delay of temperature alarms from continuous cycle (in min.) (see also paragraph relative to the temperature alarms).
The activation of the continuous cycle can be obtained by pushing, for 5 sec. approx., key CONT.CYCLE or by the digital input configuration (AUX CFG) properly programmed as FI=3.
The continuous cycle working is signalled by the display with label **"CC"** and can be stopped by an additional action (so as done for the activation) on the key or on the digital input.
The function is deactivated during defrost.
Programming "tC" = 0, the continuous cycle function is deactivated.
This function (called also "supercold" or "quick-chill") can be used for the fast freezing of the products or to prepare the room to receive new products.

4.9 - COMPRESSOR PROTECTION FUNCTION

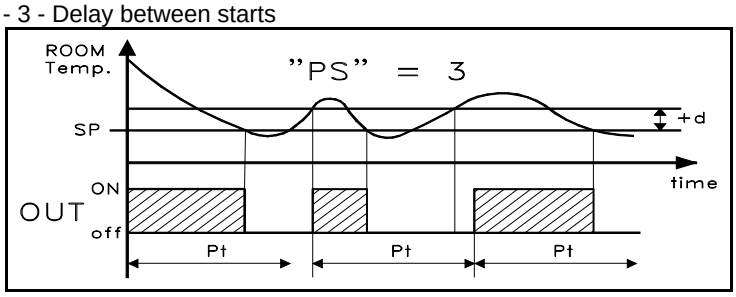
The function "Compressor Protection" is used to protect the compressor against "short cycles" by introducing a delay on the compressor output (OUT) activation.
The parameters to be programmed for this function are:
"PS" : Protection type
- 1 - Delay before start



- 2 - Delay after stop



- 3 - Delay between starts

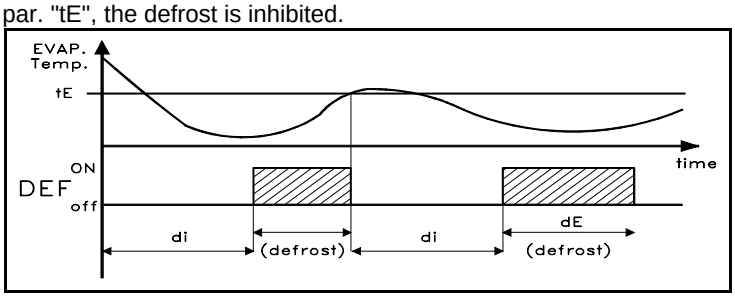


"Pt" : Time delay setting for parameter "PS" (in min.)
The "Compressor Protection" function are automatically disconnected by setting "Pt" = 0.

4.10 - DEFROST CONTROL

The automatic control mode of defrost occurs according to the following parameters:
"dt" - Defrost type
- EL - electric heater type (during defrost, the compressor output is not activated while the defrost output is activated)
- in - hot-gas / reverse cycle type (during defrost the compressor and defrost outputs are activated)

"di" - Interval between defrost cycles (in hrs. and min.). It's the time between two successive automatic defrost cycles whether it's desired the defrost by intervals. If the instrument is equipped with Real Time Clock Defrosting function, pls. read the corresponding paragraph.
"dE" - Maximum length of defrost cycles (in min. and sec.). It's the maximum duration time of a defrost cycle whether manual or automatic. At the passing by of this time the defrost is interrupted although has not been reached the end defrost temperature. (par. "tE").
"tE" : Defrost-Stop temperature. It's the temperature value, measured by the probe placed on the evaporator (EVAP), after which it has to stop the defrost cycle. If the Defrost -Stop temperature is not reached, defrost stop occurs at the passing by of the time programmed on par. "dE". Furthermore, if the temperature measured on the evaporator is upper than the one programmed on par. "tE", the defrost is inhibited.



"dC" : Defrost interval computation mode
- ct - it counts only the time of compressor running time (output OUT on)
- rt - it counts only the total running time (instrument on)
- cS - the instrument activate a defrost cycle to every compressor stop (i.e. to every deactivation of the output OUT)
"td" : Drainage time (in min.); it's a delay on the compressor and evaporator fans activation, after a defrost cycle, in order to allow the evaporator coil drainage.
"Sd" : Defrost at Power on; it gives the possibility to have a defrost cycle at the start-up of the instrument. Whether the defrost type mode is cycle / hot-gas ("dt" = in) and, during the defrost or at the start-up, intervenes a pressure controller or preheating alarm signal, the cycle is interrupted or is not activated.

4.11 - REAL TIME CLOCK DEFROSTING FUNCTION

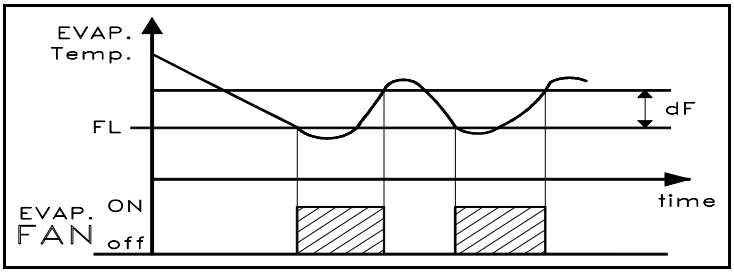
The instrument can be equipped with the Real Time Clock Defrosting function which permits to obtain up to 6 daily defrosts at programmed times.
To use this function it's necessary to program par. **"di" = 0**, in order to deactivate the defrosts at time intervals and program then **"d1", "d2", "d3", "d4", "d5", "d6"** with the hours (and minutes) on which it's desired to have the defrosts.
With this modality the defrosts are effected at programmed times and with the same conditions described on previous paragraph.
Obviously the instrument with this function is equipped with an internal clock and it's necessary therefore to program the updated hour, as indicated on paragraph about clock programming.

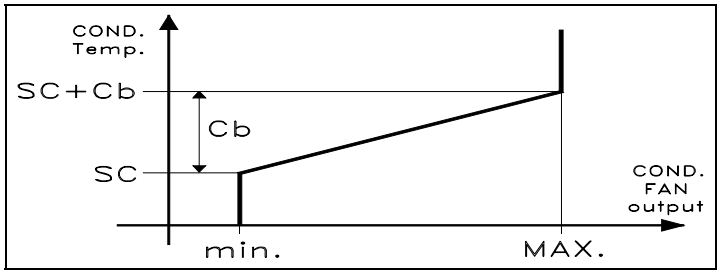
4.12 - MANUAL DEFROSTS

To active manual defrosts, through TDP interface, push key MAN DEF and keep it pushed for about 5 sec. after which the instrument will start a defrost cycle.
Or work on the digital input AUX if the function programmed is FI = 2.

4.13 - EVAPORATOR FANS WITH ON/OFF CONTROL

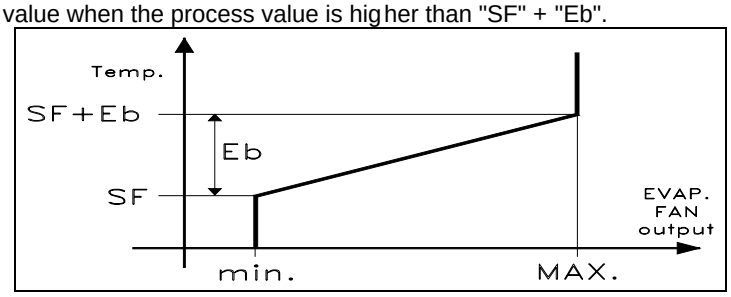
Thanks to the presence of the probe to be placed on the evaporator and to the fan evaporator output (evap. fan) it's possible to program:
"FL" : Evaporator fans stop temperature ; it's the temperature above which the fans are stopped, according to the relative differential programmed on parameter :
"dF" - 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 after a defrost (in min.).

4.14 - EVAPORATOR FANS WITH PROPORTIONAL CONTROL
If the evaporator fans control is done in proportional mode (speed control), additionally to the analogue output EVAP. FAN and to the parameters already seen on previous paragraph, are also available the following parameters :
"tF" - Evaporator fans with proportional control mode
1 : with process value as room probe temperature (ROOM)
2 : with process value as evaporator probe temperature (EVAP)
3 :with process value as room probe temperature - evaporator probe temperature (ROOM - EVAP)
"SF" - Beginning value of proportional control mode for evaporator fans
"Eb" - Proportional band for evaporator fans
The analogue output will have the minimum value when the process temperature is lower than "SF", a proportional value when the process value is between "SF" and "SF"+"Eb", and the maximum value when the process value is higher than "SF" + "Eb".



The parameters seen for the evaporator fans with ON/OFF control mode (included those for fans-stop function) are always existing and active.
The OFF condition for the fans, controlled in proportional mode, results to be the minimum value of the analogue output.
The proportional control mode of the evaporator fans has generally the meaning to optimise the cold room temperature and the evaporation temperature.

4.15 - CONDENSER FANS WITH ON/OFF CONTROL
The condenser fans can be switched on/off through the output COND. FAN, depending on the following parameters :
"Co" - Condenser fans state at compressor off (on - oF)
"Cd" - Condenser fans state during defrost (on - oF)

4.16 - CONDENSER FANS WITH PROPORTIONAL CONTROL
If the condenser fans control is done in proportional mode (speed control), additionally to the analogue output COND. FAN, to the condenser probe input (COND.) and to the parameters already seen on previous paragraph, are also available the following parameters :
"SC" - Beginning value of proportional control mode for condenser fans
"Cb" - Proportional band for condenser fans
The process value is always the temperature measured by the condenser probe.
Therefore, the analogue output will have the minimum value when the process temperature is lower than "SC", a proportional value when the process value is between "SC" and "SC"+"Cb", and the maximum value when the process value is higher than "SC" + "Cb".
The parameters seen for the condenser fans with ON/OFF control mode are always existing and active.
The OFF condition for the fans, controlled in proportional mode, results to be the minimum value of the analogue output.
The proportional control mode of the condenser fans has generally the meaning to maintain constant the condensation pressure and to avoid its reduction (if the condenser is too cold).

4.17 - ALARM FUNCTIONS
TDC operator interface is equipped with an alarm output ALARM which is used : as alarm signalling for probes error, as high and low temperature alarm for the room, as external alarm transmitted by the digital inputs A and B , as pressure controller alarms A and B or also as door opened alarm.
Furthermore, TDP unit is equipped with an internal buzzer which signalise the alarm condition and with a led ALARM which indicates the active alarm state (switched on, fixed) or silenced (flashing slowly) or in memory (flashing rapidly).
When the alarm is activated, to silence the buzzer it's necessary to push key ALARM MUTE.
Here following are described all the alarm conditions; in case of alarm function for probes errors, see paragraph relative to error signalling.
Whenever are present contemporarily several alarm conditions, the display will show alternatively the labels referred to the alarm conditions and to the temperature measured by the room probe.

4 4.17.1 - TEMPERATURE ALARMS
The temperature alarm function works depending on the following parameters :
"rA" - Temperature alarms delay (in sec.)
"HA" - Set High temperature alarm (relative to the Set point)
"LA" - Set Low temperature alarm (relative to the Set point)
"Ad" - Alarms differential
"PA" - Alarms delay at power on (in hrs. and min.).
This delay is active only if ,at the power on ,the instrument is in condition of temperature alarm and is, consequently, erased when the instrument is not in condition of temperature alarm.
"dA" - Alarm delay after defrost (in min.)
"dS" - Alarm delay after continuous cycle (in min.)
"dd" - Alarm delay after door opened (in min.)
The temperature alarm is activated at the end of the delay times, when the temperature measured by the room probe rises up than the value [Set Point + HA] or decrease under the value [Set Point - LA] or the time programmed on par. "rA".
The high and low temperature alarms can be deactivated programming the relative parameters "HA" or "LA" = 0.
Contemporary to the alarm signalling, although the buzzer is silenced, TDP panel signalise the alarm by switching on led ALARM and it shows on the display :
- Alternatively **"HI"** and the temperature measured by the room probe in case of high alarm
- Alternatively **"HO"** and the temperature measured by the room probe in case of low alarm
The intervention of the temperature alarms, anyway, does not cause any consequence on the control operations.

4.17.2 - PRESSURE SWITCH ALARMS
The pressure switch alarms are activated by the intervention of the digital inputs A (PRESS.A) or B (PRESS.B) depending on the logic of activation programmed on parameters :
"La" : Logic of activation for the pressure switch alarm A (on - oF)
"Lb" : Logic of activation for the pressure switch alarm B (on - oF)

for the times programmed on the relative parameters :
"aP" : Alarm delay pressure switch A (in sec.)
"bP" : Alarm delay pressure switch B (in min.)
Contemporary to the alarm signalling, although the buzzer is silenced, the display signalise the alarm by switching on led ALARM and it shows during the normal functioning :
- Alternatively **"aP"** and the temperature measured by the room probe in case of alarm caused by the digital input pressure switch A
- Alternatively **"bP"** and the temperature measured by the room probe in case of alarm caused by the digital input pressure switch B
The intervention of the pressure controller alarm A or B has the immediate consequence to deactivate the compressor output (OUT) and the second compressor output (OUT2).
The eventual start up of the compressor after a pressure controller alarm is, in any case, subordinated to the compressor protection function.

4.17.3 - GENERIC EXTERNAL ALARMS
The external alarms are activated by the intervention of the digital inputs external alarms A (ALARM A) and B (ALARM B) depending on the logic of activation programmed on parameters :
"aL" : Logic of activation for the external alarm A (on - oF)
"bL" : Logic of activation for the external alarm B (on - oF)
for the time programmed on the relative parameters :
"aA" : Alarm A delay (in sec.)
"bA" : Alarm B delay (in min.)
Contemporary to the alarm signalling, although the buzzer is silenced, TDP panel signalise the alarm by switching on led ALARM and it shows on the display :
- Alternatively **"aA"** and the temperature measured by the room probe in case of alarm caused by the input A
- Alternatively **"bA"** and the temperature measured by the room probe in case of alarm caused by the input B
The intervention of the external alarms does not cause any action on the other outputs.

4.17.4 - DOOR OPENED ALARM
The door opened alarm intervenes when the door room input (DOOR) remains activated, depending on the logic programmed on parameter :
"Ld" - Logic of activation door input (on - oF) (see also description of room door input)
for the time programmed on parameter :
"oA" - Alarm delay with door opened (in min.)
Contemporary to the alarm signalling, although the buzzer is silenced, the display signalise the alarm by switching on led ALARM and it shows during the normal functioning :
- Alternatively **"AP"** and the temperature measured by the room probe in case of door opened alarm (see also paragraph relative to the room door digital input and note that AP message is present also at the opening of the door and therefore also before the alarm intervention)
The intervention of the door opened alarm does not cause any action on the control operations.

4.17.5 - ALARMS MEMORY
The instrument offers furthermore, through parameter :
"tA" - Alarms memory
the possibility to storage the last alarms signalling (on) or not (oF).
So, if "tA" is programmed as "oF" the instrument erases the alarm signalling at the end of the alarm conditions; instead, if the parameter is programmed as "on" at the end of the alarm, the instrument storage the alarm and maintain the led ALARM rapidly flashing, in order to indicate that an alarm occurred.
If the instrument is equipped with the internal clock it's possible to storage, in addition to the alarm type, also the day and hour of the happening, the day and hour in which the alarm is finished and if the alarm has been silenced or not.
If instead, the instrument has no internal clock, the alarms are storage without indication of day and hour.
When the led ALARM is rapidly flashing to indicates that an alarm has been storage, pushing key ALARM MUTE, the 2 figures display will show for 10 sec. the code of the last alarm occurred and storage (LO, Aa, etc.) while the 4 figures display will show alternatively "ondx" (where x is the day of the week of the alarm happening) and the hour of the alarm event.
Pushing key DOWN within 10 sec., the 2 figures display will still show the alarm code while the 4 figures display will show alternatively "oFdx" (where x is the day of the week of the alarm ending) and the hour of the alarm ending.
Pushing again, within 10 sec., key DOWN the displays will show, with the same modalities, the last but one alarm storage (first when it began and then when it finished).
During these visualisations led ALARM will flash slowly, if that alarm has been silenced or flashing rapidly has not been silenced, and so on until the display will show all the alarms storage in the last week (maximum 20).
With this modality it is possible, pushing key UP, to run over all the alarms storage also backwards up to the last one.
Not pushing any key for 10 sec. the display will come back to the normal conditions, so as led ALARM which will erase then all the alarm memory signalling (i.e. no more flashing rapidly).
If the instrument is not equipped with the clock the modality are the same, but it's not present the indication of day and hour.
Whenever is not present the alarm memory signalling and it's desired to accede to the visualisation of the storage alarms it's possible to do it pushing and keeping pushed, for 3 sec. at least, key ALARM MUTE.
The display will show the last alarm storage ; with keys UP and DOWN it will be possible to run over the different alarms, as already described, with the addition of the active alarms on that moment, signalised by led ALARM switched on fixedly and with the visualisation of the day and hour of alarm beginning, while the day and hour of the alarm ending are substituted by the word **"Act"** (the same thing will happen also if the clock is not present with the exception of day and hour.)
The output from the storage alarms mode will happen after 10 sec. of the keys inactivity.
If the instrument is not equipped with the clock, are remaining storage the last 20 alarms events; if, instead, it's equipped with the clock are remaining storage maximum the last 20 alarms occurred in the last week.
The alarms storage are erased only in case of power failure, while if the instrument is turned into mode they remain storage.

4.18 - PREHEATING INPUT
The preheating input is activated depending on what programmed on parameter :
"LP" - Logic of activation for preheating input (on - oF)
it causes the inhibition of the compressor output (OUT) and consequently of the second compressor (OUT2)
The preheating input is typically used with the meaning to give the necessary time at the oil heater to heat the lubrication oil, before then start on the compressor/s.
During the activation of the input the led relative to the compressor output is flashing to indicate the output inhibition, so as in the case of the compressor protection, and the display shows normally **"PH"** and the temperature of the room probe.
The input is active in every moment (not only at the start up) and it can be then used also as stop compressor function, in similar way as the pressure switch alarms.
The eventual start up of the compressor is in any case subordinated to the compressor protection function.

4.19 - DOOR ROOM DIGITAL INPUT
To this digital input (DOOR) has to be connected the stroke-end of the door room and the action, which depends on parameter :
"Ld" -Logic of activation for door room input (on - oF)
is programmable on parameter. :
"Id" - Function of door room digital input
0 - No function (except the door opened alarm which is always active in all the functioning mode)
1 - Light room activation : at the opening of the contact is activated the light room output (OUT 6) at the closing it's switched off. If the output LIGHT is already activated manually by the panel, through key LIGHT, the input state has no effect (the output have to be switched off through the key)

2 - Light room and evaporator fans lock activation: additionally to what described as in mode 1, at the opening of the digital input and after the time programmed on par. "it", the evaporator fans are stopped.
3 - Light room and evaporator fans + compressor/s lock activation: additionally to what described as in mode 1, at the opening of the digital input and after the time programmed on par. "it", the evaporator fans and the compressor/s (OUT/OUT2) are stopped.
The eventual start up of the compressor, after the door closing, is in any case subordinated to the compressor protection function.
In the functioning mode 2 and 3, the fans lock action or the fans and compressor/s lock action is delayed respect to the digital input action, with a value time programmable as on parameter :
"it" - Lock delay of uses (evap. fans and compr.) and delay of temperature alarms deactivation with door opened (in sec.).
This delay can be useful to avoid the compressor/s and fans stop and the temperature alarms deactivation when the door is opened for a while or accidentally.
In fact, at the passing by of the time "it", the temperature alarms are deactivated for the time programmed on parameter :
"dd" - Delay of temperature alarms with door opened (in min.) (see also temperature alarms paragraph)
Furthermore, the input intervention causes the activation of the time programmed on parameter :
"oA" - Delay of door opened alarm (in min.)
at the passing by of which it's activated the alarm to signalise that the door remained opened (see door opened alarm paragraph). During the room door opening, the display shows alternatively **"AP"** and the temperature measured by the room probe.

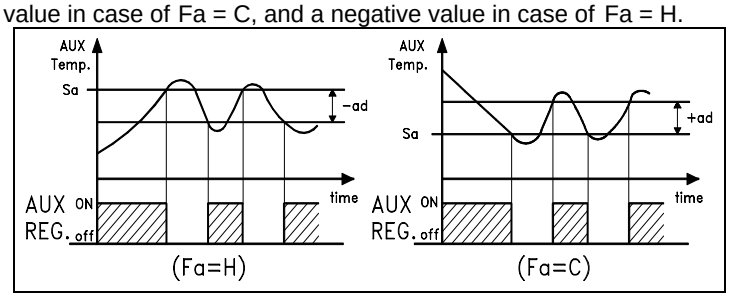
4.20 - PROGRAMMABLE DIGITAL INPUT
The action of the programmable digital input (AUX CFG) is depending on what programmed on parameter :
"LI" - Programmable digital input logic mode (on - oF)
and it's delaiable through parameter :
"ti" - Delay of the programmable digital input action (in sec.)
As regard the functioning, the digital input works depending on the following parameters :
"FI" - Digital input function
0 - Not active
1 - End defrost command : at the intervention of the input, the defrost terminates, if it is working, or it is inhibited.
2 - Start defrost command : at the intervention of the input, it's activated a defrost cycle if it's not already working. With the input active the instrument remains in defrost conditions.
3 - Continuous cycle command: the digital input is used to command the continuous cycle exactly as through key CONT.CYCLE.

4.21 - LIGHT ROOM OUTPUT
The output it's always actionable also when the controller is in OFF mode (standby) through the key LIGHT or through the door room digital input (DOOR) if properly programmed on parameter "Id" (see door room digital input).

4 4.22 - AUXILIARY OUTPUT AUX
The output is activated through key AUX or through the digital input AUX. These commands have a bistable functioning, which means that at the first key pressure the output is activated while on the second it's deactivated.
The output AUX can be also automatically deactivated after a certain time programmed on parameter :
"tu" - Activation time of output AUX (in min.)
With "tu" = 0 the output is activated and deactivated only manually by using key AUX or the digital input AUX, otherwise, the output, once activated, is automatically deactivated after the programmed time "tu".
This functioning can be used, for example, as to control heating elements against steam, for the motorised curtains descent or other.

4.23 - DELAIED CONTROL OUTPUT (SECOND COMPRESSOR)
The second compressor output OUT2, is activated with a delay programmable on parameter :
"to" - OUT2 Activation delay (in sec.) respect to the compressor output (OUT).
The output will be then deactivated at the same time of the compressor output deactivation.
The output is subjected then to all the conditions (compressor protection, coil drainage , preheating, etc.) to which is subjected the compressor output.
This functioning mode can be used as a second compressor command or for other uses functioning with the same features of the output OUT, but with a delay respect to the compressor start up, to avoid excessive current peaks.

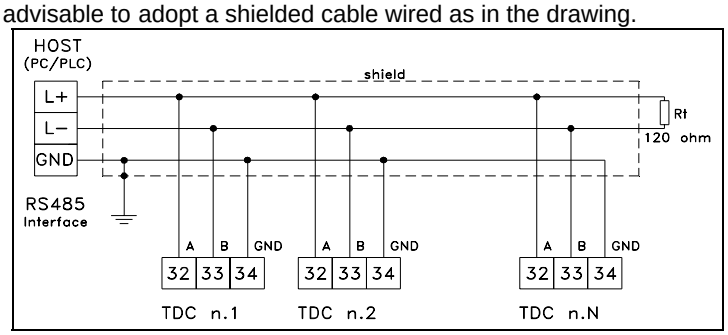
4.24 - AUXILIARY CONTROLLER OUTPUT
The behaviour is the same as the ON/OFF controller auxiliary output, in cooling/direct action (C) mode or in heating/reverse action (H) mode, depending on the programming of parameter :
"Fa" - Functioning mode of the controller auxiliary output (H-C)
The output will work depending on the temperature measured by the auxiliary probe (AUX), on the Set programmed on par. **"Sa"** and on the intervention differential programmed on par. **"ad"**.
It has to be underlined that the differential has to have a positive value in case of Fa = C, and a negative value in case of Fa = H.



Furthermore, in case of auxiliary probe in error, the output will work as programmed on parameter :
"ra" - Controller auxiliary output mode in case of auxiliary probe error
The auxiliary controller can be used, for example :
- to command the second fan of the condenser, as alternative to a pressure switch or to the proportional speed control, placing the auxiliary probe on the condenser and obviously connecting the output in serial line respect to the condenser fans output.
- to command a second fan of the evaporator, as alternative to the proportional speed control, placing the probe where desired on the room or on the evaporator and obviously connecting the output in serial line respect to the evaporator fans output.
- to command the heating of the lubrication oil placing the probe on the oil container, using the output to command the heating resistances (and eventually sending again the output signal to the preheating input, through an external interface)
- as high or low alarm, placing the probe where desired, for example in the heart of a sample product storage in the room.
And so on with other different applications where it's necessary to have an additional ON/OFF controller.

4.25 - RS 485 SERIAL INTERFACE
The instrument can be equipped with an optoisolated 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 the personal computer it's possible to acquire all the functioning information and to program all the instrument configuration parameters.
The software protocol adopted for TDC 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 (TDC series protocol manual is available on request).
The interface circuit allows to connect up to 32 TDC instruments on the same line.
To maintain the line on rest conditions it's required the connection with a 120 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 shielded 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. Program a different number for each station, from 1 to 255.
"br" : Transmission speed (baud-rate), programmable 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 or if is having place a communication through the RS485 serial port, if it's tried to get into the programming on the display will appear **"buSy"** to indicate that the access is denied.

5 - PROGRAMMABLE PARAMETERS

Here following are described all the instrument parameters; pls. note that some of them could do not appear or because are according to the kind of used instrument or because are automatically disable, because they're not necessary.

5.1 - PARAMETERS TABLE

Par.			Description	Range	Def.	Note
MEASURE AND VISUALISATION						
1		**Cr**	Room probe calibration	-19.9 ...19.9 °C/°F	0.0	
2		**CE**	Evaporator probe calibration	-19.9 ...19.9 °C/°F	0.0	
3		**CA**	Auxiliary probe calibration	-19.9 ...19.9 °C/°F	0.0	
4		**CC**	Condenser probe calibration	-19.9 ...19.9 °C/°F	0.0	
5		**EP**	Evaporator probe presence	oF - on	on	
6		**AP**	Auxiliary probe presence	oF - on	on	
7		**CP**	Condenser probe presence	oF - on	on	
8		**ru**	Unit of measurement	C - F	on	
9		**dP**	Decimal point	oF - on	on	
ROOM TEMPERATURE CONTROL						
11	**P1**	**d**	Differential switching point P1	0.0 .. 19.9 °C/°F	2.0	
12	**P2**	**d**	Differential switching point P2	0.0 .. 19.9 °C/°F	2.0	
13	**P1**	**LS**	minimum Set P1	-58...HS °C/°F	-50	
14	**P2**	**LS**	minimum Set P2	-58...HS °C/°F	-50	
15	**P1**	**HS**	Maximum Set P1	LS... 199 °C/°F	50	
16	**P2**	**HS**	Maximum Set P2	LS... 199 °C/°F	50	
17		**rP**	output OUT state in case of room probe error	oF - on	oF	
18	**P1**	**t1**	Activation time of output OUT in case of room probe error and rP=on P1	1 .. 999 min.	10	
19	**P2**	**t1**	Activation time of output OUT in case of room probe error and rP=on P2	1 .. 999 min.	10	
20	**P1**	**t2**	Deactivation time of output OUT in case of room probe error and rP=on P1	0 .. 999 min.	10	
21	**P2**	**t2**	Deactivation time of output OUT in case of room probe error and rP=on P2	0 .. 999 min.	10	
CONTINUOUS CYCLE FUNCTION						
22	**P1**	**tC**	Continuous cycle duration	0 .. 999 min.	0	
23	**P2**	**tC**	Continuous cycle duration	0 .. 999 min.	0	
DEFROST CONTROL						
24		**dt**	Defrost type	EL - in	EL	
25	**P1**	**di**	Defrosts interval	0.00...36.00 hrs / min.	06.00	
26	**P2**	**di**	Defrosts interval	0.00...36.00 hrs / min.	06.00	
27	**P1**	**d1**	Hour start defrost 1	oF- 0.00 ... 23.59 hrs	oF	
28	**P2**	**d1**	Hour start defrost 1	oF- 0.00 ... 23.59 hrs	oF	
29	**P1**	**d2**	Hour start defrost 2	oF- 0.00 ... 23.59 hrs	oF	
30	**P2**	**d2**	Hour start defrost 2	oF- 0.00 ... 23.59 hrs	oF	
31	**P1**	**d3**	Hour start defrost 3	oF- 0.00 ... 23.59 hrs	oF	
32	**P2**	**d3**	Hour start defrost 3	oF- 0.00 ... 23.59 hrs	oF	
33	**P1**	**d4**	Hour start defrost 4	oF- 0.00 ... 23.59 hrs	oF	
34	**P2**	**d4**	Hour start defrost 4	oF- 0.00 ... 23.59 hrs	oF	
35	**P1**	**d5**	Hour start defrost 5	oF- 0.00 ... 23.59 hrs	oF	
36	**P2**	**d5**	Hour start defrost 5	oF- 0.00 ... 23.59 hrs	oF	
37	**P1**	**d6**	Hour start defrost 6	oF- 0.00 ... 23.59 hrs	oF	
38	**P2**	**d6**	Hour start defrost 6	oF- 0.00 ... 23.59 hrs	oF	
39	**P1**	**dE**	Maximum length of defrost cycle	0.00...99.59 min. / sec.	30.00	
40	**P2**	**dE**	Maximum length of defrost cycle	0.00...99.59 min. / sec.	30.00	
41	**P1**	**tE**	Defrost stop temperature	-58 ... 199 °C/°F	8	
42	**P2**	**tE**	Defrost stop temperature	-58 ... 199 °C/°F	8	
43		**Et**	Differential display unlock after defrost	0 ... 50 °C/°F	2	
44		**dC**	Defrost interval computation	rt - ct - cS	rt	
45		**td**	Drainage time	0 ... 999 min.	0	
46		**Sd**	Defrost at power on	oF - on	oF	
47		**dL**	Defrost display lock	on - oF - Lb	oF	
EVAPORATOR FANS CONTROL						

48		**FC**	Evaporator fans state at compressor off	oF - on	on	
49		**FE**	Evaporator fans state during defrost	oF - on	oF	
50	**P1**	**FL**	Evaporator fans stop temperature	-58 ... 199 °C/°F	2	
51	**P2**	**FL**	Evaporator fans stop temperature	-58 ... 199 °C/°F	2	
52		**dF**	Evaporator fans stop differential	1 ... 50 °C/°F	2	
53		**Fd**	Evaporator fans delay after defrost	0 ... 999 min.	10	
54		**tF**	Evaporator fans with proportional control mode	1 - 2 - 3	1	
55	**P1**	**SF**	Beginning value of proportional control mode for evaporator fans	-58 ... 199 °C/°F	-20	
56	**P2**	**SF**	Beginning value of proportional control mode for evaporator fans	-58 ... 199 °C/°F	-20	
57		**Eb**	Proportional band for evaporator fans	0 ... 199 °C/°F	10	
58		**1S**	Beginning scale of the analogue output for evaporator fans	0 - n0	0	
CONDENSER FANS CONTROL						
59		**Co**	Condenser fans state at compressor off	oF - on	on	
60		**Cd**	Condenser fans state during defrost	oF - on	oF	
61	**P1**	**SC**	Beginning value of proportional control mode for condenser fans	-58 ... 199 °C/°F	35	
62	**P2**	**SC**	Beginning value of proportional control mode for condenser fans	-58 ... 199 °C/°F	35	
63		**Cb**	Proportional band for condenser fans	0 ... 199 °C/°F	10	
64		**2S**	Beginning scale of the analogue output for condenser fans	0 - n0	0	
COMPRESSOR PROTECTION						
65		**PS**	Compressor protection type	1 - 2 - 3	1	
66		**Pt**	Compressor time protection	0 ... 999 min.	0	
OUTPUT DELAY AT POWER ON						
67		**od**	Output delay at power on	0 ... 999 min.	0	
TEMPERATURE ALARMS						
68		**rA**	Temperature alarms delay	0 ... 999 sec.	0	
69		**HA**	High relative alarm	0 ... 50 °C/°F	10	
70		**LA**	Low relative alarm	0 ... 50 °C/°F	10	
71		**Ad**	Alarms differential	1 ... 50 °C/°F	1	
72		**PA**	Alarms delay at power on	0.00...36.00 hrs / min.	02.00	
73		**dA**	Alarms delay and display lock after defrost	0 ... 999 min.	60	
74		**dS**	Alarms delay after continuous cycle	0 ... 999 min.	60	
75		**dd**	Alarms delay after door opened	0 ... 999 min.	10	
PRESSURE SWITCH ALARM						
76		**La**	Logic of activation for the pressure switch alarm A	oF - on	on	
77		**Lb**	Logic of activation for the pressure switch alarm B	oF - on	on	
78		**aP**	Alarm delay of pressure switch A	0 ... 999 sec.	0	
79		**bP**	Alarm delay of pressure switch B	0 ... 999 min.	0	
GENERAL EXTERNAL ALARMS						
80		**aL**	Logic of activation for the external alarm A	oF - on	on	
81		**bL**	Logic of activation for the external alarm B	oF - on	on	
82		**aA**	Activation delay of external alarm A	0 ... 999 sec.	0	
83		**bA**	Activation delay of external alarm B	0 ... 999 min.	0	
ALARMS MEMORY						
84		**tA**	Alarms memory	oF - on	oF	
PREHEATING DIGITAL INPUT						
85		**LP**	Logic of activation for preheating input	oF - on	on	
DOOR ROOM DIGITAL INPUT						
86		**Id**	Door room function	0 - 1 - 2 - 3	0	
87		**Ld**	Logic of activation for door room input	oF - on	on	
88		**it**	Lock delay of uses and delay of temperature alarms deactivation with door opened	0 ... 999 sec.	10	
89		**oA**	Delay of door opened alarm	0 ... 999 min.	10	
PROGRAMMABLE DIGITAL INPUT						
90		**FI**	Digita input function	0 - 1 - 2 - 3	0	
91		**LI**	Programmable digital input logic mode	oF - on	on	
92		**ti**	Delay of digital input action	0 ... 999 sec.	2	
AUXILIARY OUTPUT AUX						
94		**tu**	Activation time of the auxiliary output	0 ... 999 min.	0	
CONTROL OUTPUT OUT 2						
95		**to**	Activation delay of output OUT2 in comparison to output OUT	0 ... 999 sec.	10	
AUXILIARY CONTROL OUTPUT						
96	**P1**	**Sa**	Auxiliary controller Set	-58 ...199 °C/°F	0	
97	**P2**	**Sa**	Auxiliary controller Set	-58 ...199 °C/°F	0	
98	**P1**	**ad**	Auxiliary controller differential	0 ... 50 °C/°F	1	
99	**P2**	**ad**	Auxiliary controller differential	0 ... 50 °C/°F	1	
100		**Fa**	Functioning mode of the auxiliary controller	H - C	H	
101		**ra**	Controller auxiliary output mode in case of auxiliary probe error	oF - on	oF	
RS485 SERIAL COMMUNICATION						
102		**dn**	Station address	1 ... 255	1	
103		**br**	Baud rate	0 - 1 - 2 - 3	3	
104		**SE**	Programming access through serial port	Lr / L- / -r	Lr	
P1/P2 AUTOMATIC EXECUTION BY CLOCK						
107		**e1**	Ending hour of P2 autom. execution Sunday	oF- 0.00 ... 23.59 hrs	oF	
108		**b1**	Beginning hour of P2 autom. exec. Sunday	oF- 0.00 ... 23.59 hrs	oF	
109		**e2**	Ending hour of P2 autom. execution Monday	oF- 0.00 ... 23.59 hrs	oF	
110		**b2**	Beginning hour of P2 autom. exec. Monday	oF- 0.00 ... 23.59 hrs	oF	
111		**e3**	Ending hour of P2 autom. execution Tuesday	oF- 0.00 ... 23.59 hrs	oF	

112		**b3**	Beginning hour of P2 autom. exec. Tuesday	oF- 0.00 ... 23.59 hrs	oF	
113		**e4**	Ending hour of P2 autom. execution Wednesday	oF- 0.00 ... 23.59 hrs	oF	
114		**b4**	Beginning hour of P2 autom. exec. Wednesday	oF- 0.00 ... 23.59 hrs	oF	
115		**e5**	Ending hour of P2 autom. execution Thursday	oF- 0.00 ... 23.59 hrs	oF	
116		**b5**	Beginning hour of P2 autom. exec. Thursday	oF- 0.00 ... 23.59 hrs	oF	
117		**e6**	Ending hour of P2 autom. execution Friday	oF- 0.00 ... 23.59 hrs	oF	
118		**b6**	Beginning hour of P2 autom. exec. Friday	oF- 0.00 ... 23.59 hrs	oF	
119		**e7**	Ending hour of P2 autom. execution Saturday	oF- 0.00 ... 23.59 hrs	oF	
120		**b7**	Beginning hour of P2 autom. exec. Saturday	oF- 0.00 ... 23.59 hrs	oF	
TEMPERATURE CONTROL SET POINT						
121	**P1**	**SP**	Set Point	LS...HS °C/°F	0.0	
122	**P2**	**SP**	Set Point	LS...HS °C/°F	0.0	
PASSWORD						
123		**PP**	PASSWORD request	0 ... 999		

5.2 - PARAMETERS DESCRIPTION

MEASURE AND VISUALISATION

Cr -ROOM PROBE CALIBRATION : Positive or negative offset which is added to the value measured by the room probe before the visualisation to which is connected the control functioning.

CE - EVAPORATOR PROBE CALIBRATION :Positive or negative offset which is added to the value measured by the evaporator probe before the visualisation to which is connected the defrost ending functioning for temperature and the temperature control and the evaporator fans speed control.

CA - AUXILIARY PROBE CALIBRATION : Positive or negative offset which is added to the value measured by the auxiliary probe before the visualisation to which is connected the auxiliary control functioning.

CC - CONDENSER PROBE CALIBRATION: Positive or negative offset which is added to the value measured by the condenser probe before the visualisation to which is connected the condenser fans speed control functioning.

EP - EVAPORATOR PROBE PRESENCE: It permits to exclude the evaporator probe if not used (on = probe present, oF = probe not present).

AP - AUXILIARY PROBE PRESENCE: It permits to exclude the auxiliary probe if not used (on = probe present, oF = probe not present).

CP - CONDENSER PROBE PRESENCE: It permits to exclude the condenser probe if not used (on = probe present, oF = probe not present).

ru - UNIT OF MEASUREMENT: It determines, for temperature measures, the visualisation in Centigrade or Fahrenheit degree. It has to be underlined that the change of this parameter modifies the display visualisation but not all the parameters programmed with temperature measure unit , which have to be then manually modified. For example, if the Set was -10°C and the unit is changed, the Set will be -10°F).

dP - DECIMAL POINT : It allows the insertion of the decimal point on the display and therefore to determine resolution of the reading value (1° or 0,1°) (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 - OUTPUT OUT STATE IN CASE OF ROOM PROBE ERROR: 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 ROOM PROBE ERROR: 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 ROOM PROBE ERROR: 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.

CONTINUOUS CYCLE FUNCTION

tC - CONTINUOUS CYCLE DURATION: Duration time of a continuous cycle expressed in minutes.

DEFROST CONTROL

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

du - UNIT OF MEASUREMENT PARAMETER "di" : It establish if param."di" is expressed in hours (H) or minutes (P).

di - DEFROST INTERVAL: It's the time passing between two automatic defrost frequency. This time is calculated based on the selection of par. "dC" and is intended in hrs. ("du" = H) or minutes ("du" = P).If it's used the Real Time Clock Defrosting function, do program "di" = 0.

d1, d2, d3, d4, d5, d6 - TIMES ON WHICH HAVE TO BE EFFECTUATED THE DEFROSTING (REAL TIME CLOCK DEFROSTING) : Do program on these par. the hours (0..23) in a day, on which it's desired to have the defrosting. When it's not desired to have all 6 defrosting, 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 used 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 LENGTH OF DEFROST CYCLES: It determines the maximum length 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: It 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 used the option of parameter "dL" which lock the display during defrost (on or Lb), the display, after defrost, will come back to visualise the temperature measured by the probe when it will be gone under the value [Set Point + Et] or is ended the time programmed to par. "dA".

dC - DEFROST INTERVAL COMPUTATION: It establishes if the interval time between defrosts (par."di") has to be counted as total functioning time of the instrument (rt), as output OUT activation time (compressor running time) (rt) or if the instrument has to effect a defrost cycle 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 is flashing.

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

dL - DEFROST DISPLAY LOCK: It permits the display visualisation 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 programmed on par. "dA". Or it permits the visualisation 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 programmed on par. "dA". The display will otherwise continue to shows the temperature measured by the room probe.

EVAPORATOR FANS CONTROL

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

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

FL- EVAPORATOR FANS STOP TEMPERATURE: It establishes the temperature, measured by the evaporator probe, above which the fans have to stop.

dF - EVAPORATOR FANS STOP DIFFERENTIAL: It's the value between starting and stopping of fan stop temperature (par. "FL")

Fd - EVAPORATOR FANS DELAY AFTER DEFROST: It's the fan delay time after a defrost cycle, expressed in min..

tF - EVAPORATOR FANS WITH PROPORTIONAL CONTROL MODE : It establishes with which process value has to work the proportional controller :

1 : with process value as room probe temperature

2 : with process value as evaporator probe temperature

3 :with process value as room probe temperature - evaporator probe temperature

SF - BEGINNING VALUE OF PROPORTIONAL CONTROL MODE FOR EVAPORATOR FANS: It establishes the lower set limit of the proportional band, to control the evaporator fans.

Eb - PROPORTIONAL BAND FOR EVAPORATOR FANS: It establishes the width of the proportional band, to control the evaporator fans.

1S - SCALE BEGINNING OF THE ANALOGUE OUTPUT FOR EVAPORATOR FANS: It establishes if the analogue output which control the evaporator fans has beginning at 0 as 0 mA or 0 V (0) or a at a value different from 0 as 4 mA, 1V or 2V (n0).

CONDENSER FANS CONTROL

Co - CONDENSER FANS STATE AT COMPRESSOR OFF: It permits to decide if the condenser fans have to work with compressor off (on) or have to stop when the compressor stops (oF).

Cd - CONDENSER FANS STATE DURING DEFROST: It permits to stop (oF) or to make work (on) the condenser fans, during the defrost.

SC - BEGINNING VALUE OF PROPORTIONAL CONTROL MODE FOR CONDENSER FANS: It establishes the lower set limit of the proportional band, to control the condenser fans.

Cb - PROPORTIONAL BAND FOR CONDENSER FANS: It establishes the width of the proportional band, to control the condenser fans.

2S - SCALE BEGINNING OF THE ANALOGUE OUTPUT FOR CONDENSER FANS: It establishes if the analogue output which control the condenser fans has beginning at 0 as 0 mA or 0 V (0) or a at a value different from 0 as 4 mA, 1V or 2V (n0).

COMPRESSOR PROTECTION

PS - COMPRESSOR PROTECTION TYPE: It permits to decide how have to work the protection from compressor short cycles. The possible selections are :

1 = delay before start

2 = delay after stop

3 = delay between starts

Pt - COMPRESSOR TIME PROTECTION: It's the delay time referred to par. "PS", expressed in min.

OUTPUT DELAY AT POWER ON

od - OUTPUT ACTIVATION DELAY AT POWER ON: It's the delay time of the output activation at the instrument power on, expressed in min. During this time the instrument shows the message "od".

TEMPERATURE ALARMS

rA - TEMPERATURE ALARMS DELAY: It's the delay of the temperature alarms activation, expressed in sec.

HA - HIGH TEMPERATURE ALARM : It's the temperature value relative to the Set Point at the upper of which intervenes the alarm signal (The alarm is activated when the room temperature goes upper than the value SET + HA).

LA - LOW TEMPERATURE ALARM : It's the temperature value relative to the Set Point at the under of which intervenes the alarm signal (The alarm is activated when the room temperature goes under than the value SET - LA).

Ad - ALARMS DIFFERENTIAL: It's the differential between the activation and deactivation in comparison the temperature alarms set (par. "HA" and "LA").

PA - ALARMS DELAY AT POWER ON : It's the delay of the temperature alarms intervention, counted starting from the instrument power on. This delay is active only if, at the power on ,the instrument is in condition of temperature alarm and is, consequently, erased when the instrument is not in condition of temperature alarm..

dA - ALARMS DELAY AND DISPLAY LOCK AFTER DEFROST: It's the delay of the temperature alarms intervention and the maximum time of display lock (if locked), counted starting from the end of a defrost, expressed in min.

dS - ALARMS DELAY AFTER CONTINUOUS CYCLE : It's the delay of the temperature alarms intervention counted starting from the end of a continuous cycle, expressed in min.

dd - ALARM DELAY AFTER DOOR OPENED: It's the delay of the temperature alarms intervention, expressed in min., counted starting from the door opening, for the time "it".

PRESSURE SWITCHES ALARMS

La - LOGIC OF ACTIVATION FOR THE PRESSURE SWITCH ALARM A: It establishes if the digital input activates the function at its closing (on) or at its opening (oF).

Lb - LOGIC OF ACTIVATION FOR THE PRESSURE SWITCH ALARM B: It establishes if the digital input activates the function at its closing (on) or at its opening (oF).

aP - ALARM DELAY OF PRESSURE SWITCH A: It's the activation delay of the input function, expressed in sec.

bP - ALARM DELAY OF PRESSURE SWITCH B: It's the activation delay of the input function, expressed in sec.

GENERAL EXTERNAL ALARMS

aL - LOGIC OF ACTIVATION FOR THE EXTERNAL ALARM A: It establishes if the digital input activates the function at its closing (on) or at its opening (oF).

bL - LOGIC OF ACTIVATION FOR THE EXTERNAL ALARM B: It establishes if the digital input activates the function at its closing (on) or at its opening (oF).

aA - ACTIVATION DELAY OF EXTERNAL ALARM A: It's the activation delay of the input function, expressed in sec.

bA -ACTIVATION DELAY OF EXTERNAL ALARM B: It's the activation delay of the input function, expressed in min.

ALARMS MEMORY

tA - ALARMS MEMORY: It permits to decide if the instrument has not to storage the alarms and then to erase the alarm signalling at the end of the alarm conditions (oF), or if it has to storage the alarms occurred and, at the end of the alarms conditions, to maintain the led "ALARM" flashing, in order to indicates that an alarm occurred. (on)

PREHEATING DIGITAL INPUT

LP - LOGIC OF ACTIVATION FOR PREHEATING INPUT: It establishes if the digital input causes the function activation at its closing (on) or at its opening (oF).

DOOR ROOM OPENED INPUT

Id - DOOR ROOM FUNCTION: It permits to decide which function has to active the door room input signal :

0 - No function (except the door opened alarm which is always active in all the functioning mode)

1 - Light room activation

2 - Light room and evaporator fans lock activation

3 - Light room and evaporator fans + compressor/s lock activation

Ld - LOGIC OF ACTIVATION FOR DOOR ROOM INPUT : It establishes if the digital input causes the function activation at its closing (on) or at its opening (oF).

it - LOCK DELAY OF USES AND DELAY OF TEMPERATURE ALARMS DEACTIVATION WITH DOOR OPENED: It's the delay time of uses (evap. fans and compr.) and temperature alarms deactivation delay with door opened (in sec.). This delay can be

useful to avoid the compressor/s and fans stop and the temperature alarms deactivation when the door is opened for a while or accidentally.

oA - DELAY OF DOOR OPENED ALARM: It's the delay time, expressed in min., counted starting from the activation of the door room input, at the end of which it's activated the alarm signalling that the door remained opened.

PROGRAMMABLE DIGITAL INPUT

FI - DIGITAL INPUT FUNCTION: It establishes which function has to realise the digital input :
0 = No function
1 = End defrost command
2 = Start defrost command
3 = Continuous cycle command

LI - PROGRAMMABLE DIGITAL INPUT LOGIC MODE: It establishes if the digital input causes the activation of the function programmed on par."FI" at its closing (on) or at its opening (oF).

ti - DELAY OF THE DIGITAL INPUT ACTION: It's the activation delay of the digital input function, expressed in sec.

AUXILIARY OUTPUT AUX

tu - ACTIVATION TIME OF OUTPUT AUX : It permits to decide the time, expressed in min., of the auxiliary output activation, commanded by the key AUX or by the digital input. With "tu" = 0 the output is activated and deactivated only manually by using key AUX or the digital input AUX, otherwise, the output, once activated, is automatically deactivated after the programmed time "tu".

CONTROL OUTPUT OUT 2

to - ACTIVATION DELAY OF OUTPUT OUT 2: It permits to decide with which delay, expressed in sec., has to be activated the output OUT2, in comparison with output OUT.

AUXILIARY CONTROL OUTPUT

Sa - AUXILIARY CONTROLLER SET: Set Point value of the auxiliary controller.

ad - AUXILIARY CONTROLLER DIFFERENTIAL: It's the value between activation and deactivation in comparison to the auxiliary controller Set ("Sa").

Fa - FUNCTIONING MODE OF THE AUXILIARY CONTROLLER: It establishes if the auxiliary controller output has to work with reverse action (ex. Heating, Humidification, etc.) or with direct action (ex. Refrigeration, Dehumidification, etc.) (H=reverse, C=direct).

ra - CONTROLLER AUXILIARY OUTPUT MODE IN CASE OF AUXILIARY PROBE ERROR: It permits to establish in which conditions has to work the auxiliary controller output in case of auxiliary probe error (oF= output deactivated; on=output activated).

RS485 SERIAL COMMUNICATION

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

br : TRANSMISSION SPEED (BAUD-RATE) : Do program the data transmission speed (Baud-rate) of the net on which it's connected the instrument. This parameter is programmed 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.

P1/P2 AUTOMATIC EXECUTION BY CLOCK

e1 - ENDING HOUR OF P2 AUTOM. EXEC. SUNDAY
b1 - BEGINNING HOUR OF P2 AUTOM. EXEC. SUNDAY
e2 - ENDING HOUR OF P2 AUTOM. EXEC. MONDAY
b2 - BEGINNING HOUR OF P2 AUTOM. EXEC. MONDAY
e3 - ENDING HOUR OF P2 AUTOM. EXEC. TUESDAY
b3 - BEGINNING HOUR OF P2 AUTOM. EXEC. TUESDAY
e4 - ENDING HOUR OF P2 AUTOM. EXEC. WEDNESDAY
b4 - BEGINNING HOUR OF P2 AUTOM. EXEC. WEDNESDAY
e5 - ENDING HOUR OF P2 AUTOM. EXEC. THURSDAY
b5 - BEGINNING HOUR OF P2 AUTOM. EXEC. THURSDAY
e6 - ENDING HOUR OF P2 AUTOM. EXEC. FRIDAY
b6 - BEGINNING HOUR OF P2 AUTOM. EXEC. FRIDAY
e7 - ENDING HOUR OF P2 AUTOM. EXEC. SATURDAY
b7 - BEGINNING HOUR OF P2 AUTOM. EXEC. SATURDAY

TEMPERATURE CONTROL SET POINT

SP - SET POINT : Control Set Point value.

PASSWORD

PP - PASSWORD REQUEST : It's the request of the password to accede to the parameters programming or to restore the original configuration.

6 - PROBLEMS, MAINTENANCE AND WARRANTY

6.1 - ERRORS SIGNALLING

The panel displays are used to visualise also error conditions of the instrument showing the following messages :

Error	Cause	Action
"E1" "-E1" Room probe Error	The probe may be interrupted or in short-circuit or may read a value outside of the allowed range	Verify the correct connection between probe and instrument and finally verify the correct functioning of the probe itself
"E2" "-E2" Evaporator probe Error		
"E3" "-E3" Condenser probe Error		
"E4" "-E4" Aux probe Error		
"EE"	Internal memory error	Verify and, if necessary, reprogram the parameters.
"noCL"	The instrument is not equipped with the Clock and it's tried to get into the clock programming.	No action. If you want the clock is necessary to order a new instrument
"oFFL"	There is no communication between TDC and TDP units.	Verify the correct connection between units and finally verify the correct functioning of units.
"busy"	It's happening the programming through the serial door (RS 485) and it's tried to get into the programming from TDP panel interface.	Waiting the end of remote programming session.

6.2 - CLEANING

It's raccomanded to clean TDP only with a cloth welted with water or with a detergent neither abrasive nor containing solvents and to clean TDC only with a dry cloth.

6.3 - 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.

7 - TECHNICAL DATA

7.1 - ELECTRICAL DATA

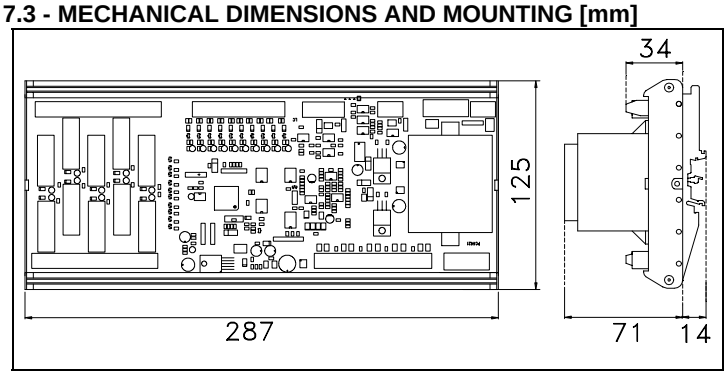
Power supply TDC: 24, 110, 230 VAC +/- 10%
Power supply TDP: 24 VAC/VDC +/- 10%

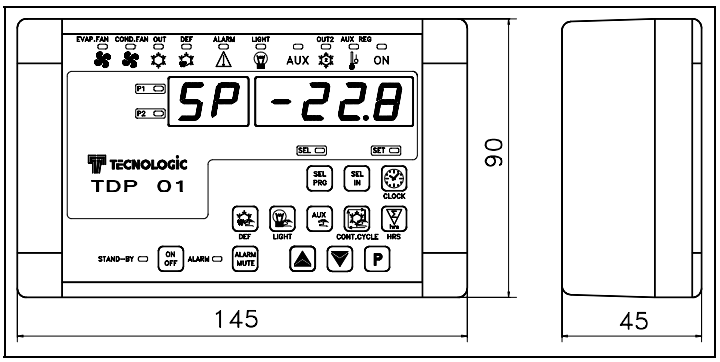
Frequency AC: 50/60 Hz
Power consumption: Max. 15 VA approx.
Fuse power supply TDC: F 315 mA 5x20 for supply 110/230 VAC; F 1 A 5x20 for supply 24 VAC
Fuse supply TDP by TDC: F 500 mA 5x20
Input/s: up to 4 inputs for PTC temperature probes (KTY 81-121 990 Ω at 25° C) or NTC temperature probes (103AT-2 10 KΩ at 25 °C) and 10 digital inputs free-voltage contacts
Output/s : up to 10 relay outputs (8A-AC1, 3A-AC3 250 VAC) of which 2 can be analogue type 0/4...20 mA, 0/1 ... 5 V or 0/2 ... 10 V (EVAP. FAN and COND. FAN)
Electrical life for relay outputs: 100000 operations
Installation Category (Overvoltage Cat.) : II
Protection class against electric shock TDP: Class III
Insulation TDC: Reinforced insulation between the low voltage section (supply and relay outputs) and the extra low voltage section (inputs, analogue outputs and communication ports); No insulation between inputs, digital inputs and analogue outputs.

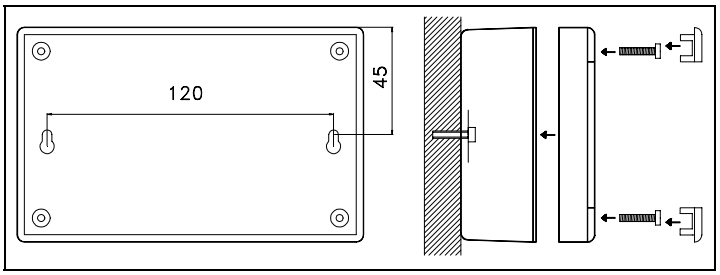
7.2 - MECHANICAL DATA

Housing TDC: Self-extinguishing plastic UL 94 V1 (Din/rail housing) - V0 (fixing devices)
Housing TDP: Self-extinguishing plastic
Dimensions TDC : 287 x 125 mm, high 84 mm
Dimensions TDP: 145 x 90 mm, dept 45 mm
Weight TDC : 1150 g approx.
Weight TDP : 210 g approx.
Mounting TDC: backboard on OMEGA DIN RAIL
Mounting TDP: Wall mounting or flush in panel
Connections: 2,5 mm^2 screw terminal block
Protection degree of front panel TDP: IP 54 with gasket
Pollution Degree : 2
Operating temperature: 0 ... 55 °C
Operating humidity: 30 ... 95 RH% without condensation
Transport and storage temperature: -10 ... +60 °C

7.3 - MECHANICAL DIMENSIONS AND MOUNTING [mm]







7.4 - 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° or 0,1°
Overall Accuracy: +/- 0,5 % fs
Sampling rate: 2 samples per second
Type of serial interface: RS485 optoisolated
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
Display: Red h 13 mm, 4 Digit (measure/value) + 2 Digit (Param. label)
Compliance: ECC directive EMC 89/336 (EN 50081-1, EN 50082-1), ECC directive LV73/23 and 93/68 (EN 61010-1)

7.5 - INSTRUMENT CODE

TDC 01 a b c d e f g h ii

a = POWER SUPPLY
A: 24 VAC
C: 110 VAC
D: 230 VAC

b = INPUTS
P: For PTC probes (KTY81-121)
N: For NTC probes (103AT-2)

c = EVAPORATOR FANS OUTPUT
R : Relay
C : Analogue 0/4 ... 20 mA
V : Analogue 0/1 ... 5 V
W : Analogue 0/2 ... 10 V

d = CONDENSER FANS OUTPUT
R : Relay
C : Analogue 0/4 ... 20 mA
V : Analogue 0/1 ... 5 V
W : Analogue 0/2 ... 10 V
- : Not Present

e = OUT 2 CONTROL OUTPUT
R : Relay
- : Not Present

f = AUX AND AUX REGULATOR OUTPUTS
R : Both Relay
A: AUX output Relay only
B: AUX REG. output Relay only
- : Not Present

g = CLOCK
C : Present
- : Not Present

h = RS 485 SERIAL INTERFACE
S : Present
- : Not Present

ii = SPECIAL CODES