

# TDL 52

## MICROPROCESSOR-BASED DIGITAL ELECTRONIC THERMOCONTROLLER WITH DEFROST CONTROL



### OPERATING INSTRUCTIONS Vr. 01 (ENG) - cod.: ISTR 04862

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#### 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.

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#### 1 - INSTRUMENT DESCRIPTION

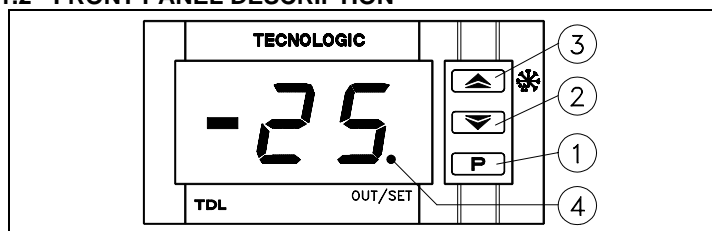
##### 1.1 - GENERAL DESCRIPTION

TDL 52 is a microprocessor-based digital electronic regulator used to control temperature with ON/OFF control and defrost by stopping compressor mode.

The process temperature is visualized on a 2 digit red display while the output state is indicated by a led.

The instrument is equipped with a relay output (8A or 16A) and with an input for NTC probes measuring temperatures.

##### 1.2 - FRONT PANEL DESCRIPTION



**1 - Key P** : It's used to program the Set Point and the functioning parameters

**2 - Key DOWN** : It's used to decrease the programming values or to select the parameters.

**3 - Key UP/DEFROST** : It's used to increase the programming values or to select the parameters and to start manual defrost.

**4 - Led OUT/SET** : It indicates when the output is on (lighted on), off (lighted off) or inhibited (blinking slowly), it furthermore indicates the access into the programming mode (blinking rapidly).

#### 2 - PROGRAMMING

##### 2.1 - SET POINT PROGRAMMING

Pushing key P and keeping it pushed for 1 sec. approx., the display will visualize "SP" and led OUT/SET will blink rapidly.

Releasing the key, on the display will be visualized the programmed Set Point.

To modify it, work on keys UP, to increase the value or on key DOWN, to decrease it.

The outgoing from the set point programming it's automatically obtainable not working on any key for 5 sec. approx.

The display will visualize again the temperature measured by the probe.

## 2.2 – PARAMETERS PROGRAMMING

To have access at the functioning parameters, it's necessary to push key P and keep it pushed for 5 sec. approx. After 1 sec. the display will visualize "SP" and led OUT/SET will blink rapidly, after other 4 sec. will appear the label of the first parameter ("CA").

Now it possible to release key P and it will appear the value programmed for parameter "CA".

To modify this value work on keys UP or DOWN.

Once the desired value has been programmed, pushing again key P the display will show the label of the successive parameter.

Releasing then key P, it will appear the value programmed for that parameter which can be modified working on keys UP and DOWN.

Pushing and releasing key P it's possible to visualize all the parameters labels (when key is pushed) and the relative programming (when key is released) one after the other.

The outgoing from the parameters programming it's obtainable not working on any key for 20 sec. approx.

The display will visualize again the temperature measured by the probe.

Always wait for the outgoing from the programming phase because, if the instrument is switched off before it, all the values programmed in the last session will not be stored.

## 2.3 – PARAMETERS LOCK

It's possible to lock the access at the programming parameters with the following procedure :

Switch off the instrument, push key P and keep it pushed while the instrument is switched on again.

After approx. 5 sec. on the display will appear "uL" (unlock) which indicates that the parameters are accessible.

Keeping pushed key P and pushing key DOWN it will appear "Lo" (lock) which indicates that the parameters are not accessible.

Release key P to exit from this modality.

The display will go back to the normal functioning, the parameters will not be accessible anymore and it will only be possible to modify the Set Point.

To have again access at the parameters, repeat the same procedure pushing key P and selecting "uL" ; finally go out from the parameters lock modality.

## 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

The instrument, into case 33 x 65 mm , is designed for panel mounting.

Make a hole 25 x 58 mm and insert the instrument fixing it with the provided proper brackets.

It's recommended to mount the proper gasket to obtain the declared front protection degree.

Avoid to place the internal part of the instrument 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 instrument 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.

Install the instrument as far as possible from electromagnetic sources as motors, power relay, relays, electrovalves, etc.

## 3.3 – ELECTRICAL CONNECTIONS

Carry out the electrical wiring connecting one wire only for each terminal, according to the following diagram, checking that the power supply is the same as indicated on the instrument and the loads current is not higher than the maximum current admitted.

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.

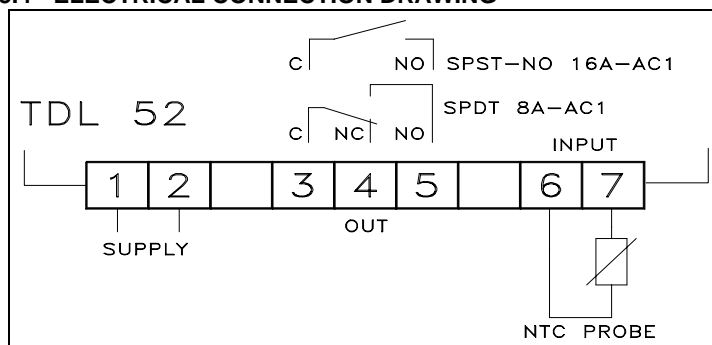
If the input cable of the probe is screened, it advisable to connect it on the ground with one side only.

Whether the instrument is 12 V version it's recommended to use an external transformer TCTR, or with equivalent features, and to use only one transformer for each instrument because there is no insulation between supply and input.

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

### 4.1 – MEASURE AND VISUALIZATION

At the instrument start up, before than displaying the measured temperature, it's appearing, for approx. 5 sec., the programmed unit of measurement, which 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).

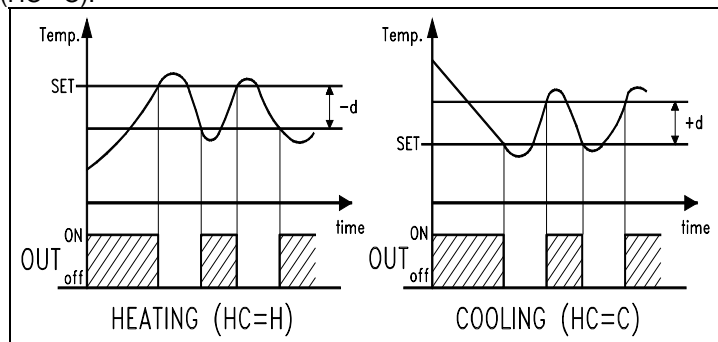
Additionally, through par. "CA" it's possible to program a positive or negative offset whose value is added to the value read by the probe from which is depending the control functioning.

This parameter can be used to recalibrate the instrument according to the application requirement.

#### 4.2 – TEMPERATURE CONTROL

The instrument control is ON/OFF type and works on the output OUT depending on the probe measure, on the Set Point "SP", on the differential "d" and on the functioning mode "HC".

Depending on the functioning mode programmed on parameter "HC" the differential is automatically considered by the regulator as negative for Heating control (HC=H) or positive for Cooling control (HC=C).



In case of broken probe, it's possible to have the output working with pause-working mode, depending on the times programmed on parameters "t1" (activation time) and "t2" (deactivation time), expressed in min.

In case of probe failure, the instrument activates the output for the time "t1" and then deactivates it for time "t2" and so on until the error conditions are occurring.

Programming "t1" = 0, in case of probe error, the output will remain always deactivated.

Programming "t1" with a certain value and "t2"= 0, in case of probe error, the output will remain always activated.

The regulator functioning can be additionally modified through the "Compressor Protection" function, here following described.

#### 4.3 - COMPRESSOR PROTECTION FUNCTION AND DELAY AT POWER-ON

The "Compressor Protection" function has the meaning to avoid compressor "short cycles" for refrigeration applications; this function is also active for heating applications ("HC"=H).

This function allows a control by time on the output OUT activation, independently by the temperature control request.

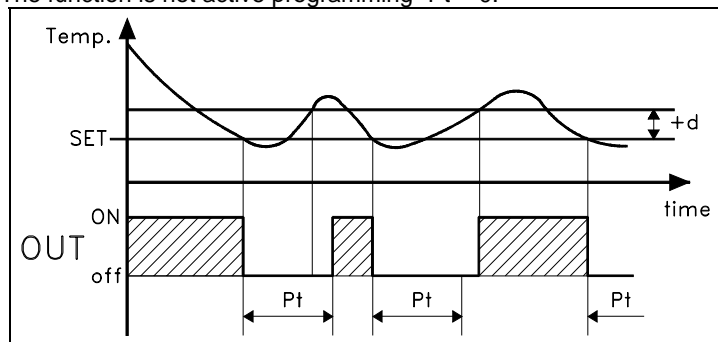
The protection is a "delayed after deactivation" type.

This protection permits to avoid the output activation for a time programmable on par. "Pt" (expressed in min.); the output activation will occurs only after the elapsing of time "Pt".

The time programmed on parameter "Pt" is counted starting from the last output deactivation.

Obviously, whether during the time delay caused by the compressor protection function, the regulator request should stop, the output activation foreseen after time "Pt" would be erased.

The function is not active programming "Pt" =0.



The stopping of the output activation can be determined also by the switch on delay function.

It's then possible to avoid the output activation after the instrument switch on for a time programmable on par. "od" (expressed in min.) although the regulator requires an intervention.

The function is not active programming "od" =0.

The led OUT/SET blinks during all the phases of output activation delay, caused by "Compressor Protection" function or switch on delay function.

#### 4.4 – DEFROST CONTROL

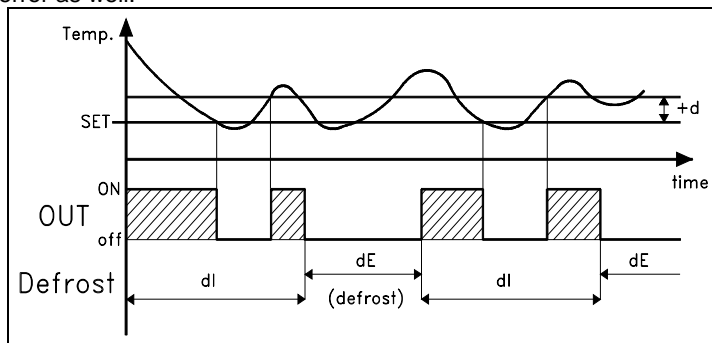
The automatic defrost control, which is by stopping compressor type, works depending on the following parameters :

"dl" : Interval between defrost cycles (in hrs).

"dE" : Defrost duration (in min.)

The instrument switch off the output for the time "dE" each "dl" hours of functioning.

This function works both in case of cooling control ("HC"=C) or heating control ("HC" =H), furthermore it's operate in case of probe error as well.



The occurring defrost cycle is signaled by the label "dF" appearing on the display.

Through par. "dL" it's possible to define the display behaviour during defrost.

The instrument is able to visualize alternatively the label "dF" and the temperature read by the probe (dL = oF) or just the label "dF" (dL = Lb).

In this last case and in refrigeration applications, at the end of a defrost, on the display will be visualized the temperature read by the probe only whether this is lower than value [SP+d], otherwise it will be visualized "Pd" until when the temperature will be lower than this value.

#### 4.5 – MANUAL DEFROST

To obtain manual defrosts push key UP/DEFROST, when outside of the programming mode.

Keeping it pushed for approx. 5 sec. the instrument will realize a defrost cycle.

The manual defrost duration is always defined by par. "dE".

The manual defrost command is active also in case of probe error.

### 5 - PROGRAMMABLE PARAMETERS

#### 5.1 - PARAMETERS TABLE

Par.	Description	Range	Default	Note
<b>MEASURE AND VISUALIZATION</b>				
1	CA	Calibration	-20...+20 °C/°F	0
2	ru	Unit of measurement	°C - °F	°C
<b>TEMPERATURE CONTROL</b>				
3	d	Differential	1 ...20 °C/°F	2
4	LS	Minimum Set	- 40 ... HS °C/°F	-40
5	HS	Maximum Set	LS ... 99 °C/°F	60
6	HC	Output functioning mode	H - C	C
7	t1	Output activation time in case of probe error	0 ... 99 min.	0
8	t2	Output deactivation time in case of probe error	0 ... 99 min.	0

COMPRESSOR PROTECTION AND DELAY AT SWITCH ON				
9	Pt	Compressor protection time	0 ... 99 min.	0
10	od	Delay at power on	0 ... 99 min.	0
DEFROST CONTROL				
11	dl	Interval between defrost cycles	0 ... 99 hrs	10
12	dE	Defrost duration	0 ... 99 min.	15
13	dL	Defrost Display lock	oF - Lb	oF
SET POINT				
14	SP	Set Point	LS ... HS °C/°F	0

## 5.2 – PARAMETERS DESCRIPTION

**MEASURE AND VISUALIZATION PARAMETERS:** They permit to define the visualization modalities of the temperature measured by the probe.

**CA - CALIBRATION:** Positive or negative offset whose value is added to the value read by the probe from which is depending the control functioning.

**ru – UNIT OF MEASUREMENT:** It defines whether the visualization is expressed in Celsius or Fahrenheit degrees. The modification of this parameter involves just the display visualization, but not the Set Point or the limits ("HS" and "LS"), 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).

**SET LIMITS PARAMETERS:** They permit to limit the Set programming into a desired range, in order to avoid Set values which may damage the controlled plant.

**LS – MINIMUM SET:** Minimum value programmable as Set Point.

**HS – MAXIMUM SET:** Maximum value programmable as Set Point.

**TEMPERATURE CONTROL PARAMETERS:** They permit to define the temperature regulator functioning and the output control in case of probe error.

**SP - SET POINT :** Temperature control Set Point value.

**d - DIFFERENTIAL :** It's the output OUT activation and deactivation value respect to the Set Point.

**HC – OUTPUT FUNCTIONING MODE :** It defines whether the output OUT has to control and Heating or a Cooling process (H=Heating, C= Cooling).

**t1 – OUTPUT OUT ACTIVATION TIME IN CASE OF PROBE ERROR :**

**t2 - OUTPUT OUT DEACTIVATION TIME IN CASE OF PROBE ERROR :**

In case of probe failure, the instrument activates the output OUT for the time programmed on par. "t1" and then deactivates it for time programmed on par. "t2" and so on until the error conditions are occurring. Programming "t1" = 0, in case of probe error, the output will remain always deactivated. Programming "t1" with a certain value and "t2" = 0, in case of probe error, the output will remain always activated. (times are expressed in min.).

**COMPRESSOR PROTECTION AND DELAY AT SWITCH ON:** They permit to introduce eventual delays at the output OUT activation in order to avoid compressor short cycles in the refrigeration applications or at each instrument start. When the output has to be activated but it's inhibited by these functions the led OUT/SET blinks.

**Pt – COMPRESSOR PROTECTION DELAY TIME:** The delay time is counted starting from the last output switch on during which the output is kept in off state. The output will be switched on when the temperature regulator requires it at this time is elapsed. The function in deactivated programming "Pt" = 0.

**od – OUTPUT DELAY AT POWER ON:** It's the delay time of the output activation at power on, expressed in min.

**DEFROST CONTROL PARAMETERS:** They permit to define defrosts control and display functioning during defrost.

**dl – INTERVAL BETWEEN DEFROSTS:** It's the time passing between two automatic successive defrosts, expressed in hours.

**dE – DEFROSTS DURATION:** It defines the duration of each manual or automatic defrost cycle, expressed in min.

**dL – DEFROST DISPLAY LOCK:** It defines the display visualization during defrost. The instrument is able to visualize alternatively the label "dF" and the temperature read by the probe (dL = oF) or just the label "dF" (dL = Lb). In this last case and in refrigeration applications, at the end of a defrost, on the display will be visualized the temperature read by the probe only whether this is lower than value [SP+d], otherwise it will be visualized "Pd" until when the temperature will be lower than this value.

## 6 - PROBLEMS, MAINTENANCE AND WARRANTY

### 6.1 - ERROR SIGNALLING

Error	Cause	Action
--	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

In probe error condition the output behaves itself as programmed on parameters "t1" and "t2".

### 6.2 – CLEANING

It's recommended to clean the instrument only with a cloth wetted with water or with a detergent neither abrasive nor containing solvents.

### 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 automatic 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:** 12 VAC/VDC, 24, 110, 230 VAC+/- 10%

**AC Frequency:** 50/60 Hz

**Consumption:** 2 VA approx.

**Input:** For temperature probes NTC type (103AT-2; 10 KΩ a 25 °C)

**Output:** Relay SPDT 8A-AC1 (3A-AC3) 250 VAC or SPST-NO 16A-AC1 (6A-AC3) 250 VAC

**Electrical life for relay outputs:** 100000 oper. (8A relay); 30000 oper. (16A relay)

**Installation Category (Overvoltage Cat.):** II

**Protection class against electrical shock:** Front panel Class II

**Insulation:** Reinforced insulation between the low voltage part (power supply 110 or 230 V and relay output) and front panel; Reinforced insulation between the low voltage section (Supply 110 or 230 V and relay output) and the extra low voltage section (input); Reinforced between power supply and relay; No insulation between supply 12 V and input.

### 7.2 – MECHANICAL DATA

**Housing:** Self-extinguishing plastic UL 94 V0

**Dimensions:** 33 x 65 mm, depth 50 mm

**Weight:** 105 g approx.

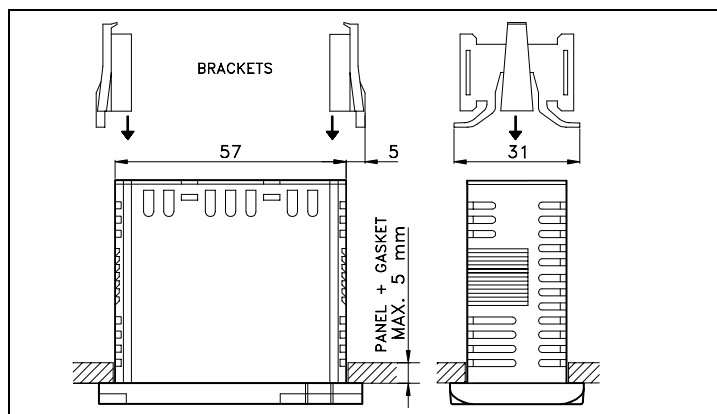
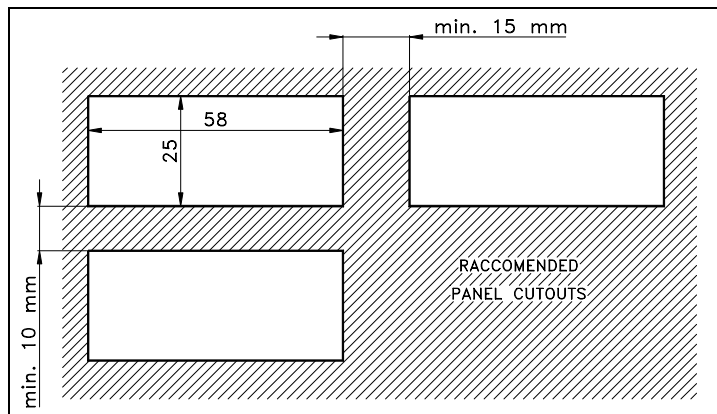
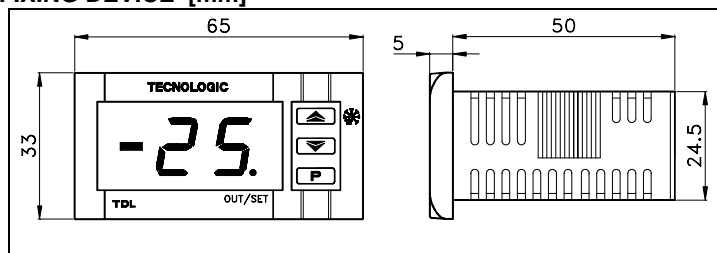
**Installation:** Flush in panel (thickness 5 mm max.) in hole 25 x 58 mm

**Connections:** 2,5 mm<sup>2</sup> screw terminal block

**Front panel protection :** IP 65 with gasket

Pollution degree: 2  
 Operating temperature: 0 ... 55 °C  
 Operating humidity: 30 ... 95 RH% without condensation  
 Storage temperature: -10 ... +60 °C

### 7.3 – MECHANICAL DIMENSIONS, PANEL CUT OUT AND FIXING DEVICE [mm]



### 7.4 – FUNCTIONAL DATA

Temperature control: ON/OFF  
 Defrost control: at intervals by stopping-compressor  
 Measurement Range : -40...60 °C / -30...99 °F  
 Display resolution: 1°  
 Overall accuracy: +/- 1 % fs  
 Sampling rate: 1 sample per second  
 Display: Red h 14 mm, 2 Digit with sign"-"  
 Compliance: ECC directive EMC 89/336 (EN 50081-1, EN 50082-1),  
 ECC directive LV 73/23 and 93/68 (EN 61010-1)

### 7.5 – INSTRUMENT CODE:

**TDL 52 a b cc**

**a : POWER SUPPLY**

F = 12 VAC/VDC

A = 24 VAC

C = 110 VAC

D = 230 VAC

**b : RELAY**

L = SPDT 8A-AC1

H = SPST-NO 16A-AC1

**cc : SPECIAL CODES**