

# DIFFERENTIAL THERMOSTAT FOR SOLAR SYSTEM WITH CIRCULATION AND TANK HEATER THERMOSTAT

## Model DTLED USER MANUAL

### Description

The unit DTLED can be used to control the operation of circulation pump of a solar system based on temperature difference between solar (boiler, stove, etc) and water tank. Also it can control supplementary heating of water tank up to a preset temperature.



### Features:

1. Frost and overheat protection of solar and tank.
2. Separate outputs for circulation pump and supplementary heater of up to 5A.
3. Monitors two temperatures.
4. Fast and easy programmable - 4 main settings and one user defined parameter.
5. Modes of operation - „Auto” / „Holliday” easily selectable by a slide switch at front panel.
6. „Eco function” – postpones the heater activation if solar is active (if “there is sun” the supplementary heater is switched off) – this mode can be activated/deactivated by user at any time.
7. 2 pcs. PTC temperature probes – silicon cable 0.3m –PTC 1k
8. 2 separate Relay outputs for:
  - P1 – SPDT (N.O. +N.C.) contact. Outputs “live” for pump or valve (on and off) control
  - P2 – SPST (N.O) contact for activation of supplementary heater
9. LED display with 2 digits and 6 additional LEDs for indication.
10. Buttons – 1 pcs.
11. Easy setup – each main setting can be selected among a set of fixed values.
12. Main parameters setting – selectable by changing jumper location:
  - maximal temperature in tank: +65; +75; +85 °C
  - frost protection of solar (forced activation of pump): -25; -10; +5 °C
  - minimal temperature of solar to enable circulation based on dT: +40; +50 °C
13. Setting of dT (differential temperature – solar to tank) by a knob – fine : from 3 to 25°C
14. Setting of tank temperature (supplementary heating) – using push button on front panel: starting +25°C up to maximal temperature allowed in 5°C step;
15. Manual test/activation of pump – holding the push button on front panel.

### ELECTRICAL WIRING



- Power supply 220V AC – internal and pump – term. 21 (Live in “L”) / 18 („N”-neutral)
- Pump output (N.O) – term. 19 (Live output) / 17 („N”-Neutral)
- Supplementary heater (N.O.) – term. 16 and 15 -5A max

\* **Additional external fuse should be connected to term.21 of up to 6A.**

- Sensors
  - TS1 – term.5,6 – tank temperature
  - TS2 – term 7,8 – solar temperature.

### OPERATION

Front panel:



- “1” – LED indicator of temperature (2 digits). Mostly displays tank t° and each 10 sec. displays solar t° for 2 sec. (if tank t° is displayed LED#6 is ON, if solar t° is displayed LED#9 is ON).
- “2” – slide switch for mode selection („Auto” / „HOLLIDAY”)
- “3” – push button
- LED “4” – if “On”, the displayed value is over 100°C. (if display=’25’ and LED#4 is ON means t° =123°C)
- LED “5” – if “On”, negative displayed value (if display=’10’ and LED#5 is ON - t° = -10°C)
- LED “6” – if “On” displayed value is for tank temperature. If blinks – possible probe failure
- LED “7” – if “On” – pump is active
- LED “8” – if “On” – heater is active
- LED “9” – if “On” – displayed value is for solar temperature. If blinks – possible probe failure.
- If LED 9 and LED 8 blinks alternatively – dT value is displayed

### Button operation:

1. When pressed shortly, the following information is displayed sequentially:
  - boiler and solar temperatures - automatically alternating each 3 sec.
  - differential temperature (dT) setting. The temperature is alternated with the symbols "dt";
  - maximal allowed temperature in the tank. The temperature alternates with the symbols "bH";
  - Minimal temperature of solar to enable circulation. The temperature alternates with the symbols "cS" (Collector Start);
  - Temperature setting for anti freezing protection. The temperature is alternated with the symbols "cd" (Collector Defrost);
2. When pressed and held for 3-4 seconds displays/changes the temperature of the tank's thermostat. The temperature alternates with "bt" / "bE" (Standard / Eco tank thermostat);
  - Each subsequent pressing increases the set temperature by 5 degrees. If the set maximum temperature in the tank is exceeded, the value returns to 15 °C.
  - Switching between standard and Eco tank thermostat is cyclical, each time when the maximal tank temperature is exceeded. The symbols change "bt" to "bE" and the mode is changed also.
3. When pressed and held for more than 10 seconds, the pump is manually activated – as long the button is pressed;
  - \* To return to the basic mode leave the device without pressing the button for 1 minute.

### Choosing an operation mode

- for normal operation "Auto mode" - move the slider to the "left" to position “Auto”
- to operate in holiday mode “vacation” mode - move the slider to the "right"

**Faulty sensor alarm** - the corresponding indicator "6" or "9" blinks rapidly.

To change most settings, you need to remove the product's cover

## USAGE

### Function Differential thermostat

Monitors the temperatures in the tank and collector, controls output "R1 - circulation pump"

#### „Auto” mode

Monitoring  $t^{\circ}$  in the tank and collector

When both  $[t^{\circ}\text{collector} > t^{\circ}\text{tank} + dT + 2^{\circ}\text{C}]$  and  $[t^{\circ}\text{collector} > T.\text{CollectorStart}]$  are true, the circulation pump is activated till  $[t^{\circ}\text{collector} > t^{\circ}\text{tank} + dT - 2^{\circ}\text{C}]$  or  $t^{\circ}$  collector falls below the T.CollectorStart.

#### „Vacation” mode

- During enough sunshine – it operates same way as in "Auto" mode
- Activation of Circulation when  $[t^{\circ}\text{collector} < t^{\circ}\text{tank} - 10^{\circ}\text{C}]$  to cool the tank up to  $40^{\circ}\text{C}$

#### **Build in Protections:**

- Freezing of collector: when the  $t^{\circ}\text{collector}$  is lower than T.collector Defrost -  $2^{\circ}\text{C}$ , the pump is activated to raise the  $t^{\circ}\text{collector}$  above T.collector Defrost +  $2^{\circ}\text{C}$ , but only if the  $t^{\circ}\text{tank} > 8^{\circ}\text{C}$
- Overheating of the tank: when the  $[t^{\circ}\text{tank} > T.\text{Boiler Max}]$  is reached, the circulation is disabled – unconditionally
- Overheating of collector: when  $[t^{\circ}\text{collector} > 100^{\circ}\text{C}]$  and  $[t^{\circ}\text{tank} < T.\text{BoilerMax}]$  are reached, the pump is activated until  $t^{\circ}\text{collector}$  falls below  $100^{\circ}\text{C}$
- High temperature (overheat recovery): When  $t^{\circ}\text{collector}$  reaches a range of  $110\text{-}140^{\circ}\text{C}$  and  $t^{\circ}\text{tank} < T.\text{Boiler MAX}$ , the circulation is activated at short intervals of 1 sec. every 20 seconds - to slowly reduce the collector temperature. If  $t^{\circ}\text{collector}$  exceeds over  $140^{\circ}\text{C}$ , the circulation is strictly forbidden to protect the system from heat shock.
- Pump blockage: automatic forced activation for 60 sec. every 7 days of inactivity

Monitors temperatures in the tank and controls the output "R2 - Heater"

#### „Auto”mode

If  $t^{\circ}$  tank  $< T.\text{Boiler Thermostat}$ , the output "R2 - Heater" is activated

"Tank thermostat and Eco function is OFF"

"R2-Heater" output is activated once it is necessary.

"Tank thermostat – and Eco function enabled"

#### **Eco function:**

During enough sunshine and operation of the pump, the activation of the "R2 -Heater" output is postponed for 15 minutes after the last activation of the pump.

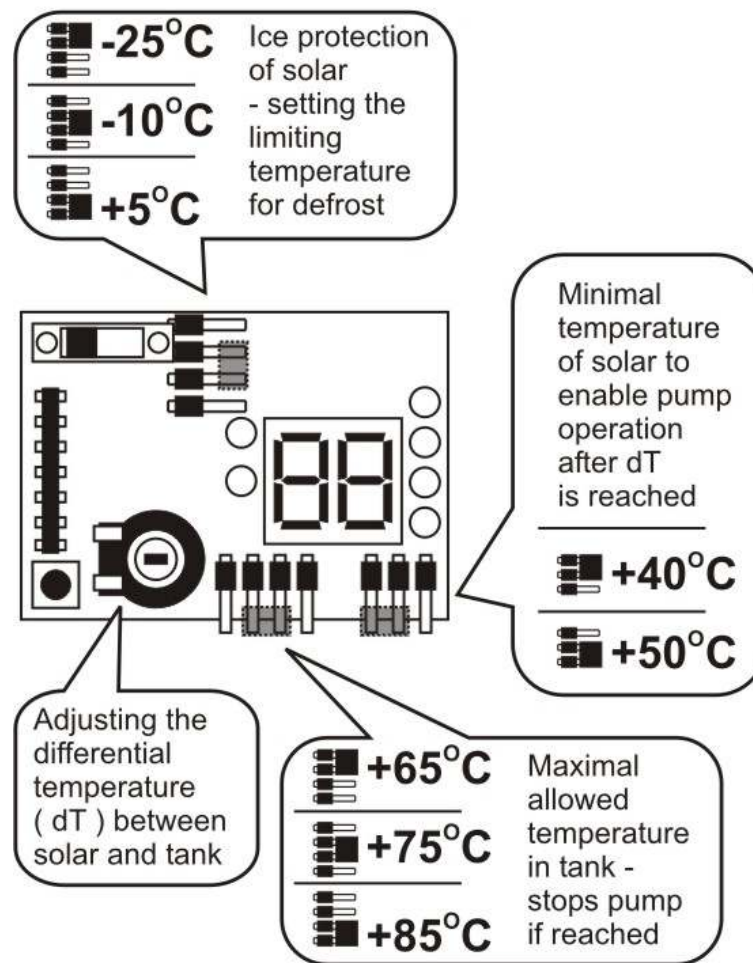
#### „Vacation” mode

The "R2 - Heater" output is not activated except for frost protection

#### **Protection:**

of freezing of the tank: if  $t^{\circ}\text{tank}$  goes below  $8^{\circ}\text{C}$ , the "R2 -Heater" output is activated to heat up the tank

## INSTRUCTIONS FOR INITIAL SETUP



**TECHNICAL DATA**

Power supply: 230V±10% /50Hz. ≤ 2VA  
 Enviroment: -25T45, RH80%  
 Storage and transportation -30/+60 ° C  
 Sensors: durability 200 °C  
 Measurement and display: -40°C÷199 °C;  
 Accuracy ±1°C in range (-5°C ÷ +100 °C);  
 ±4°C not in range

Installation on DIN rail 35mm; to be incorporated  
 Overall dimentions 68x85x58 mm.  
 Protection casing IP20  
 Outputs:  
 -Relay R1 - 220V - 5A or 180W/AC3 (motor)  
 -Relay R2 - 220V - 5A or 180W/AC3 (motor)

Two independent relay contacts!

**Installation and commusioning**

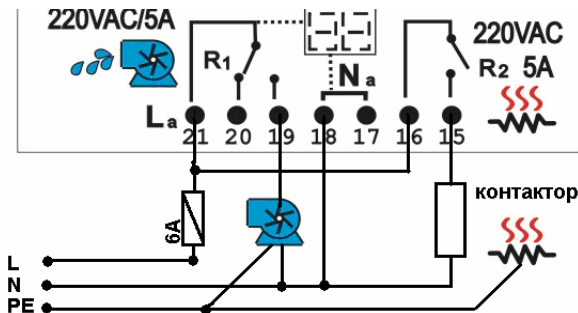
**Attention!**  
**Danger of electric shock!**  
**All activities involving installation and commisioning should be done while electric power is off**

This device is designed to be incorporated in apartment electrical box with size of 4 or more poles or a cabinet and can be attached on 35mm DIN rail. Assembly outside of the board is unacceptable.

Initial setup routine:

1. Turn off the power supply
2. Open the top of the body of the product by pushing the locking tabs on both sides of the base.
3. Adjust the basic parameters according to the enclosed instruction.
4. Place the top cover until it is fully attached to the base

**Attention! To control tank's heater it is necessary to add an external commutator (powerfull relay) controlled by the thermostat's output and to keep all the protective and switching elements provided by the tank manufacturer (switch, thermostat, thermal protection)!**  
**DTLED is not a protective device within the meaning of EN60730-1-Annex**



**Attention!**  
**The supply of the "Phase-La" power supply to the device is carried out through a fuse: Class B 6A max. on terminals no. 21 and no. 16**

**WARRANTY THERMS AND CONDITIONS:**

The warranty period of the product is 24 months from the day of sale or installation by the installer but no more than 30 months from the date of manufacture. The warranty covers defects attributable to the manufacturer (manufacturing defects or defective materials). They are not subject to warranty defects in the product or damage to other equipment as a result of improper or unskilled installation, improper workflow selection and / or adjustment, unauthorized change of the product, natural disasters, non-standard power supply, improper storage or transportation.

**Warranty card**

**Please completely fill this card for valid guarantee**

**Manufacturer: Proxel Engineering Ltd**      **Type: Temperature controller DTLED**  
 Plovdiv, Bulgaria, office@proxel-bg.com

**Serial number:** .....      **Data of manufacture:** .....

**Seller/Installer:**.....

**Address:** .....

**Date of (sale) Instalation:** .....

**Installer/ seller :**.....  
 (name and signature)

**Instalation is made by**     **Installer**     **Client**  
 (please mark the true one)

2004/108/EC  
2006/95/EC

Table for diagnostic of temperature inputs

Temperature-resistance-voltage table of sensor inputs KTY81-1K													
T°C	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
R - [Ω]	567	602	624	653	684	714	747	780	815	849	886	922	961
U <sub>BX</sub> -[V]	1.37	1.43	1.47	1.52	1.57	1.61	1.66	1.71	1.76	1.81	1.86	1.90	1.95
T°C	25	30	35	40	45	50	55	60	65	70	75	80	85
R- [Ω]	1000	1040	1081	1122	1165	1209	1254	1299	1346	1392	1441	1490	1541
U <sub>BX</sub> -[V]	2.00	2.05	2.09	2.14	2.19	2.23	2.28	2.32	2.36	2.41	2.45	2.49	2.53
T°C	90	95	100	105	110	115	120	125	130	135	140	145	150
R- [Ω]	1591	1643	1696	1750	1806	1861	1915	1970	2023	2075	2124	2172	2211
U <sub>BX</sub> -[V]	2.57	2.61	2.65	2.69	2.73	2.77	2.80	2.84	2.87	2.90	2.93	2.96	2.98