TM-201A multi-functional electronic thermometer

The TM-201A multi-functional electronic thermometer can be used in all installations where one or two temperature values need to be measured with a subsequent relay closing or opening action. The thermometer is equipped with warning (optical and acoustic) indication. It can be typically used as a protective thermometer, bistable thermostat or difference thermostat.

Figure 1: Front view

1. Thermometer installation

Install the thermometer in such a way as to make it well visible to the user. Do not install it in places where it may be exposed to intensive radiant heat. The thermometer is designed for wall-mounted indoor installation. It can be mounted directly into a common device installation box or on plaster. The bottom part of the housing is always used for this purpose.

1. Remove the top part of the thermometer from the frame (by pushing a screwdriver into the gap between the display and frame at the T2 indicator).
2. Release the bottom housing by pressing the four latches in the corners (figure 2).
3. First, mount the bottom housing and then snap the display frame into it.
4. Connect the supply cables of the sensors to the **T1** and **T2** terminals. Always tighten the terminals with the terminal boards removed. Remove the terminal boards by pulling them towards yourself. Both the temperature sensors are the same and they can be connected with either polarity. If just one sensor is sufficient for the selected function of the thermometer, it should always be connected to the **T1** terminals.
5. The contacts of the controlled device should be connected to the **OUT** terminals. The load capacity of the output is 1 A/250 V and it has safety isolation characteristics. For higher loads use an auxiliary relay or contactor.
6. Connect the 12 V / 50 mA power supply to the + - terminals (observe the correct polarity). As the power supply unit you can use:
   a) LT-089.06 Jablotron.
   b) DE06-12 Jablotron.
7. Switch on the power supply.
8. Use the **UP** ▲ and **DOWN** ▼ control keys to set the operational mode of the thermostat and the required parameters
   (see par. 4, Mode selection, Parameter setting).
9. You can reduce the illumination intensity of the display by connecting the LOW INTENSITY jumper on the thermometer board.
10. Reinsert the top part of the thermometer into the frame.

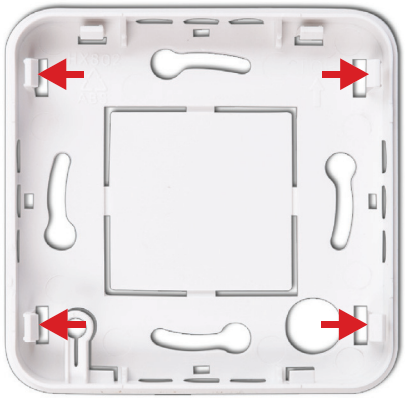


Figure 2: Bottom housing

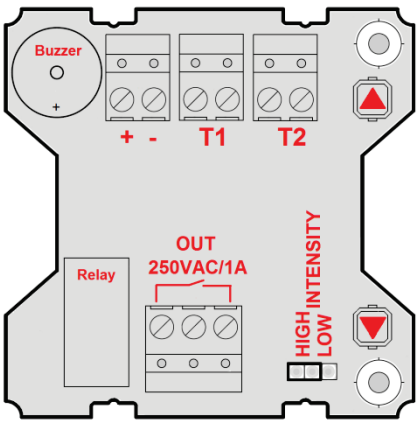


Figure 3: Description of the terminals and boards

2. Installation of the sensors

Install the CP-201T temperature sensors (not included in the delivery) in the place to be measured (e.g. accumulation tank, hot water reservoir etc.). Always ensure sufficient thermal contact (we recommend you to use a commonly available heat-conductive paste). If no pockets are available, attach the sensors to the pipeline using tying tapes with sufficient strength and insulate the sensors to prevent the ambient temperature from biasing the measurement (you are not recommended

JABLOTRON ALARMS a.s.
Pod Skalkou 4567/33 | 46601 | Jablonec n. Nisou
Czech Republic | www.jablotron.com

to use thin cable ties – they get loose with increasing temperatures and the sensor loses contact with the pipe; using metallic tapes or collars is preferred).

Caution - the insulation of the supply cables of the sensors is resistant to a max. of 105 °C. The supply cables of the sensors can be extended with the use of a common cable with copper conductors with a cross-section of at least 0.35 mm^2 (the total length of the supply cable of a sensor should not exceed 30m).

3. Front panel indicators

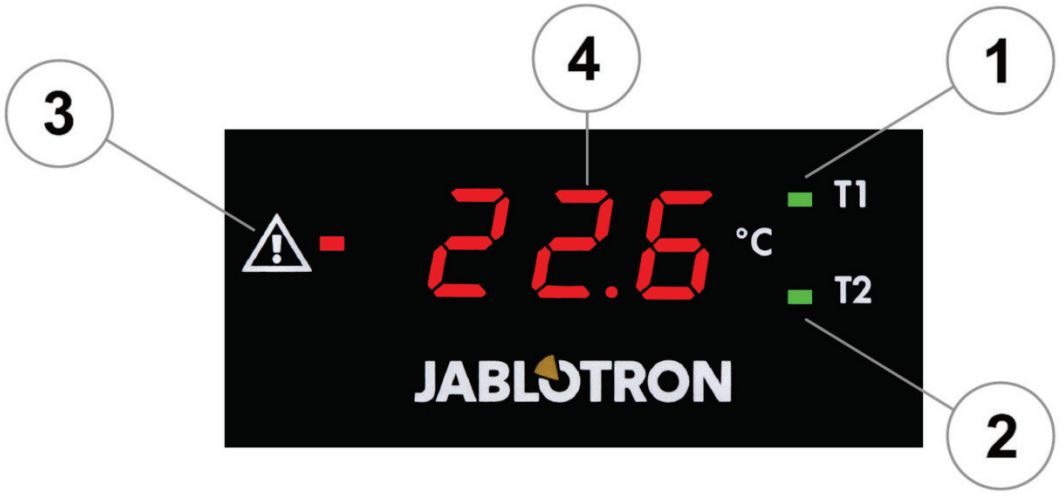


Figure 4: display description: 1 - LED 1 (indicates status of the T1 sensor); 2 - LED 2 (indicates status of the T2 sensor); 3 - LED 3 (warning / closing / opening in the negative logic setting / relay); 4 – Display

4. Mode selection, Parameter setting

The TM-201A thermometer can be used in one of the preset modes (F1 – F5). The selected mode appears on the display for 3 seconds after connection of the power supply. **The F1 operation mode and the values highlighted with bold type are set as default** (in the mode tables see the Default columns).

In the standby condition the TM-201A thermometer shows the temperature measured by the connected sensors (or "**--.-**" if no sensors are connected). If not, briefly disconnect and reconnect the power supply.

At the terminal-board side the thermometer is equipped with two keys that are used to set the operational modes and parameters. The keys are identified with the ▲ (**UP**) and ▼ (**DOWN**) symbols. By pressing a key you make a selection and browse the settings; simultaneous pressing of both the keys is used to enter the setting mode and to confirm a selection. There is a functional delay during the parameter setting mode; if no key is pressed for a minute, the setting mode will be terminated, incl. saving all the parameters.

Selecting and setting an operational mode (F1 – F5)

F1	F2	F3	F4	F5	rES	End
Thermometer with warning indication (1 or 2 sensors)	Heating thermostat (1 sensor)	Cooling thermostat (1 sensor)	Bistable thermostat (2 sensors)	Differential thermostat (2 sensors)	Restoration of the default settings	End without changing the mode

To set an operation mode, follow the points below:

1) Press and hold both the keys ▲ and ▼ for 6 seconds.
2) A short beep will sound and the current operational mode will start flashing on the display (**F1** in the default setting).
3) Press the ▲ or ▼ keys briefly to select the required operational mode (F1 – F5).
4) Confirm the mode by simultaneously pressing the ▲ and ▼ keys for a short time (for less than 2 seconds).
5) Saving the selected operational mode is indicated by its flashing (for approx. 3 seconds) and a continuous acoustic signal (for approx. 2 seconds).
6) Now, the first parameter of the selected operational mode is displayed (the P2.1 parameter in the F2 mode, the P3.1 parameter in the F3 mode etc.) To set the parameters, follow the procedure below.

Figure 5. Example of setting the F3 mode after activation of the thermometer

Restoring the default settings and exiting without saving the changes

1) If you want to restore the default settings of the thermometer, browse to the **rES** item and simultaneously press the ▲ and ▼ keys to confirm it.
2) You can exit the setting mode without changing the mode any time by selecting and confirming the **End** item, or by pressing the ▲ and ▼ keys simultaneously for a long time (6 seconds).

Selecting and setting individual parameters.

To set the parameters of an operational mode, follow the points below:

1) Briefly press the ▲ or ▼ key.
2) A short beep will sound and the first parameter of the operational mode will appear on the display (the P2.1 parameter in the F2 mode etc.).
3) Use the ▲ or ▼ keys to select the parameter you want to set.
4) Press the ▲ and ▼ keys simultaneously to enter the parameter setting mode. A short beep will sound and the currently set value will start flashing. Briefly press (or hold) the ▲ or ▼ key to set the required parameter value.
5) Briefly press the ▲ and ▼ keys simultaneously to confirm the parameter setting. Saving is confirmed by a short beep and displaying the number of the set parameter.
6) Repeat points 3 - 5 to set the other parameters of the particular mode.
7) Exit the setting mode by selecting and confirming the End item. You can also exit the setting mode any time by allowing a time-out or by simultaneously pressing the ▲ and ▼ keys for a long time. After the termination of the setting mode the TM-201A thermometer will return to the standby condition.

Figure 6. Example of setting the P2.3 parameter after activation of the thermometer and with the F2 operation mode selected

4.1. F1 mode – Thermometer with warning indication

A protective thermometer with a warning indication and relay switching, and protection from overheating or freezing.

Parameter	Description	Range	Default
P1.1	**Lower limit** - a temperature drop below this limit switches the relay and warning indication. The hysteresis for relay opening is 3 °C.	-20 °C to +105 °C	**5 °C**
P1.2	**Upper limit** - a temperature increase above this limit switches the relay and warning indication. The hysteresis for relay opening is 3 °C.	-20 °C to +105 °C	**90 °C**
P1.3	**Siren** - activation/deactivation of acoustic indication.	ON / OFF	**ON**
P1.4	**T2 sensor** - temperature sensor connected to the T2 terminals.	ON / OFF	**ON**
P1.5	**LED 3 indication** – indicates closing (opening in the negative logic) of the relay.	ON / OFF	**ON**
P1.6	**Negative relay logic** - reversed logic of the relay function (permanently closed in the standby condition).	ON / OFF	**OFF**
P1.7	**Minimum relay closing time** - used to limit too frequent switching on and off of the connected device. If this parameter is active, the relay will be closed for at least this time period, regardless of the measured temperature.	OFF, 1 to 15 min	**OFF**
P1.8	**Minimum pause time** - used to limit too frequent switching on and off of the connected device. If this parameter is active, the relay will only be closed after expiration of this minimum pause period. It is considered from the last closing of the relay, it is not applied at the first activation of the thermometer.	OFF, 1 to 15 min	**OFF**
End	**Exiting the setting mode**		

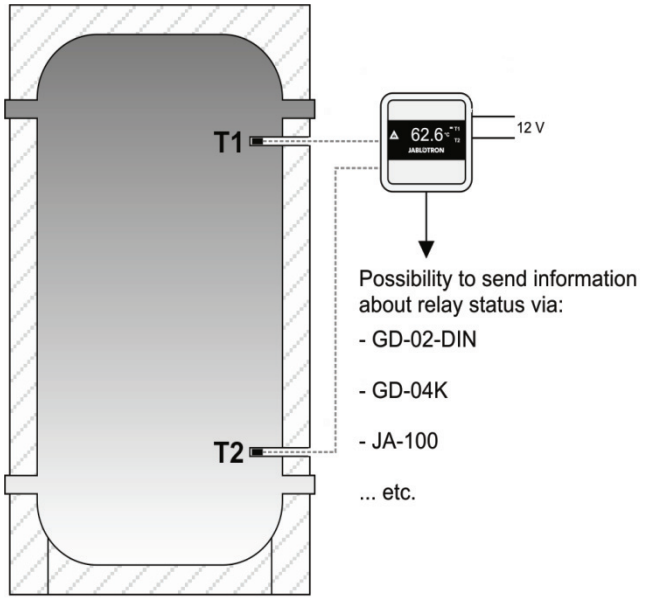
JABLOTRON ALARMS a.s.
Pod Skalkou 4567/33 | 46601 | Jablonec n. Nisou
Czech Republic | www.jablotron.com

Example of using the F1 mode

The thermometer only contains one relay; therefore, only use the relay switching in the F1 mode for monitoring of the minimum (P1.1) or maximum temperature (P1.2).

The relay will be closed if the temperature drops below the minimum value or if it exceeds the maximum value. The closing of the relay can activate remote notification of the user via an external device. It may also be accompanied by an acoustic indication (P1.3).

Only one T1 sensor or both the T1 and T2 sensors can be used (P1.4). If both the sensors are used, the set limit is monitored by both the sensors (T1 and T2).



4.2. F2 mode – Thermostat (heating)

Parameter	Description	Range	Default
P2.1	**Heating temperature** - the required temperature of the heating (T1 sensor)	-20 °C to +105 °C	**25 °C**
P2.2	**Hysteresis** – the temperature drop for heating reactivation.	0.1 °C to 10 °C	**1 °C**
P2.3	**LED 3 indication** – indicates closing (opening in the negative logic) of the relay.	ON / OFF	**ON**
P2.4	**Negative relay logic** - reversed logic of the relay function (permanently closed in the standby condition).	ON / OFF	**OFF**
P2.5	**Minimum relay closing time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.7.	OFF, 1 to 15 min	**OFF**
P2.6	**Minimum pause time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.8.	OFF, 1 to 15 min	**OFF**
End	**Exiting the setting mode**		

4.3. F3 mode – Thermostat (cooling)

Parameter	Description	Range	Default
P3.1	**Cooling temperature** - the required temperature of the cooling (T1 sensor)	-20 °C to +105 °C	**20 °C**
P3.2	**Hysteresis** – the temperature increase for cooling reactivation.	0.1 °C to 10 °C	**1 °C**
P3.3	**LED 3 indication** – indicates closing (opening in the negative logic) of the relay.	ON / OFF	**ON**
P3.4	**Negative relay logic** - reversed logic of the relay function (permanently closed in the standby condition).	ON / OFF	**OFF**
P3.5	**Minimum relay closing time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.7.	OFF, 1 to 15 min	**OFF**
P3.6	**Minimum pause time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.8.	OFF, 1 to 15 min	**OFF**
End	**Exiting the setting mode**		

4.4. F4 mode – Bistable thermostat

In this mode the thermostat can be typically used to control preferential heating from an accumulation tank.

Parameter	Description	Range	Default
P4.1	**Relay closing temperature by T1** - The T1 sensor is always used to close the relay that is closed when the set temperature is exceeded.	-20 °C to +105 °C	**65 °C**
P4.2	**Relay opening temperature by T2** - The T2 sensor is always used to open the relay that is opened when the temperature drops below the set value.	-20 °C to +105 °C	**35 °C**

P4.3	**LED 3 indication** – indicates closing (opening in the negative logic) of the relay.	ON / OFF	**ON**
P4.4	**Negative relay logic** - reversed logic of the relay function (permanently closed in the standby condition).	ON / OFF	**OFF**
P4.5	**Minimum relay closing time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.7.	OFF, 1 to 15 min	**OFF**
P4.6	**Minimum pause time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.8.	OFF, 1 to 15 min	**OFF**
End	**Exiting the setting mode**		

If an installation requires it, the value of the P4.2 parameter can be higher than that of P4.1.

If both the values (T1 and T2) are achieved, the relay will remain closed (T1 takes priority).

Example of using the F4 mode

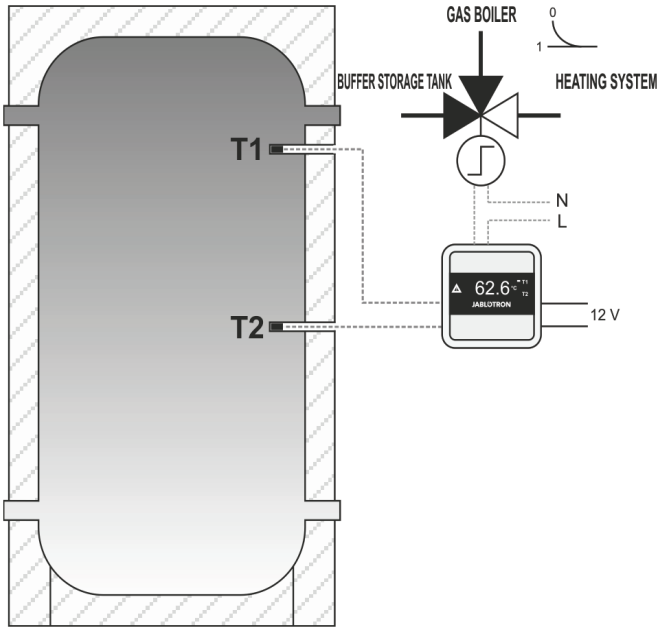
The thermometer monitors the priority of the accumulation tank

- T1 for closing (P4.1) – the tank takes priority
- T2 for opening (P4.2) – the boiler takes priority

The relay is closed when the set temperature is achieved at the T1 sensor and it is opened on cooling at the T2 sensor.

Auxiliary relay(s) can be used not only to switch a valve (hydraulic switch), but also to block or switch a gas (electric) boiler.

The relay logic can be reversed (P4.4) depending of the type of the valve used (normally closed/open).



4.5. Mode F5 – Differential thermostat

Parameter	Description	Range	Default
P5.1	**Closing difference** - determines the temperature difference of the T1 – T2 sensors to close the relay.	1 °C to 30 °C	**10 °C**
P5.2	**Opening difference** - determines the temperature difference of the T1 – T2 sensors to open the relay.	1 °C to 30 °C	**3 °C**
P5.3	**Minimum T1 sensor temperature** – determines the temperature at the T1 sensor at which the relay will be closed if the switching difference condition of P5.1 is met at the same time.	-20 °C to +105 °C	**30 °C**
P5.4	**Maximum T1 sensor operation temperature** – if this temperature is exceeded, the relay will be opened (protective function).	OFF/ -20 °C to +105 °C	**OFF**
P5.5	**Maximum T2 sensor operation temperature** – if this temperature is exceeded, the relay will be opened (protective function).	OFF/ -20 °C to +105 °C	**OFF**
P5.6	**LED 3 indication** – indicates closing (opening in the negative logic) of the relay.	ON / OFF	**ON**
P5.7	**Negative relay logic** - reversed logic of the relay function (permanently closed in the standby condition).	ON / OFF	**OFF**
P5.8	**Minimum relay closing time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.7.	OFF, 1 to 15 min	**OFF**
P5.9	**Minimum pause time** - used to limit too frequent switching on and off of the connected device. Parameter description, see P1.8.	OFF, 1 to 15 min	**OFF**
End	**Exiting the setting mode**		

The actual possible range of the differences depends on the settings of the limits. Example: If the closing difference is set to 15°C, the setting range of the opening difference will be 1 °C – 14 °C.

JABLOTRON ALARMS a.s.
Pod Skalkou 4567/33 | 46601 | Jablonec n. Nisou
Czech Republic | www.jablotron.com

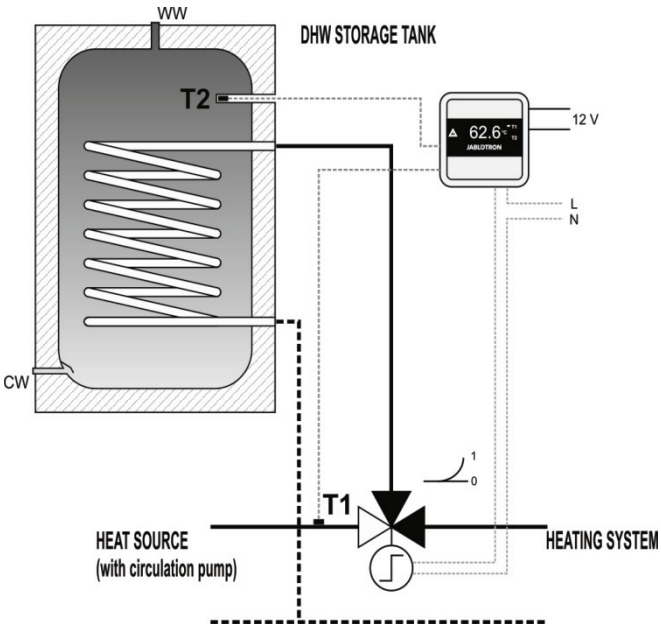
Example of using the F5 mode

The thermometer monitors charging of the hot water reservoir (e.g. in a circuit with a solid fuel boiler)

The relay will be closed if the T1 temperature of the heating water is higher than the T2 temperature in the reservoir by the required number of degrees (P5.1, switching difference).

The relay will be opened if the difference of the T1 – T2 temperatures decreases to the set value (P5.2, opening difference), or if the maximum set hot water temperature in the reservoir (P5.5) is achieved.

Thus, the settings of the closing and opening difference can be used to control exceeding the heating water temperature. You can also set the minimum T1 operation temperature to avoid cooling the boiler during the power increase stage (P5.3).



5. Warning indication

A missing temperature sensor that is required by the selected function is indicated by flashing of **LED 3** and the respective **LED 1** or **LED 2**. If only one sensor can be connected in a particular mode, it must always be connected to the **T1** terminal. In the F1 mode the warning indication is active on exceeding the limit values. The acoustic indication can be deactivated with the P1.3 parameter. If in the F1 mode no sensor is connected to the T2 terminals, the P1.4 parameter must be set to OFF. In the F2 – F5 modes lighting of LED 3 may indicate closing/opening of the relay (if indication of the relay status is activated by the respective parameter).

6. Technical parameters

TM-201A thermometer

Supply voltage	11 V to 17 V DC
Standby consumption/maximum consumption	20 mA/50 mA
Measuring range	-40 °C to 125 °C
Temperature sensor type	NTC 10 kΩ, B25/100 = 3455 K
Operating temperature range	-10 °C to +40 °C
Seasonal space heating energy efficiency	η_S = 1 % (acc. Regulation (EU) No. 813/2013)
Temperature control class	I. (acc. Regulation (EU) No. 813/2013)
OUT output	switching contact, max. 1 A/250 V, resistance load 6 A, protection class II
Acoustic/optical indication	Siren/LED
Ingress protection class	IP 41 (in accordance with EN 60529)
In conformity with	EN 60730-1, EN 61000-6-1, EN 61000-6-3, EN 50581

Recommended temperature sensor

Type	CP-201T Jablotron (NTC 10 kΩ, B25/100 = 3455 K)
Measuring range	-25 °C to 105 °C
Sensor accuracy	± 1% at 25 °C, ± 2 °C in the range of -25 °C to 105 °C
Specifications	CP-201T Manual (NW) MNC52900

JABLOTRON ALARMS a.s. hereby declares that the TM-201A is in a compliance with the relevant Union harmonisation legislation: Directives No: 2014/35/EU, 2014/30/EU, 2009/125/ES, 2011/65/EU. The original of the conformity assessment can be found at www.jablotron.com - Section Downloads.

Note: Although this product does not contain any harmful materials we suggest you return the product to the dealer or directly to the producer after use.