THERMOSTAT

terneo ax

simple control of heating

Wi-Fi thermostat

the new generation
of the more smart thermoregulators

the operation of warmth
by means of internet

essential economy
and the possibility of control
of energy consumption

Technical datasheet

Installation instructions

Low Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU

Purpose

Thermoregulator terneo ax can be controlled remotely from any Smartphone, tablet, desktop with Internet access.

Currently, there are two options for the remote management:

— **terneo app for Android;**

GET IT ON Google Play

*The application is supported on **Android 4.1 and above** operating systems. Except for the function of binding new heat controllers, which is only supported on Android, versions 5 and above.*

— account in **my.terneo.ua**

The settings and the schedule are stored in the non-volatile memory of the thermostat. In the absence of the internet, the thermostat continues to operate according to the set schedule. If there is a short-term absence of the Internet, the temperature statistics is written into the memory of the thermostat, and when the connection is restored, it is transferred to the cloud.

The thermostat can be blocked for changes from the cloud; in such case the cloud will only perform the role of accumulating statistics.

With the help of a set of special functions and a schedule, significant energy savings are achieved.

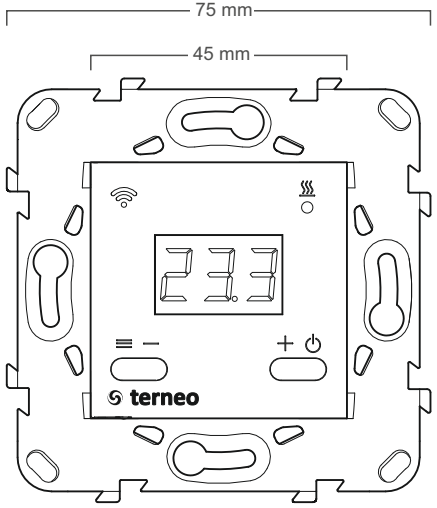
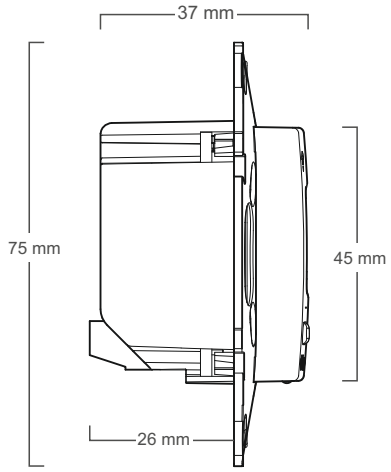


Figure 1. Overall dimensions

Technical data

№ p/p	Parameter	Value
1	Adjustment range	5...45 °C
2	Maximum load current	16 A
3	Rated load capacity	3 000 VA
4	Input voltage	230 V ±10 %
5	Weight in the complete set	0,18 kg ±10 %
6	Temperature sensor	NTC thermo-resistor 10K OM at 25 ° C
7	The length of the sensor connected cable	3 m
8	Number combinations under heat, at least	100 000 cycles
9	Number of combinations without heating, no less than	20 000 000 cycles
10	Temperature hysteresis by floor	1...10 °C
11	Wireless Networking Standard	802.11 b/g/n
12	Wi-Fi power output	+20 dBm
13	Minimum recommended speed of Internet connection	128 kb / s
14	Operating frequency range	2400-2483,5 MHz
15	Minimal Internet traffic	20–30 MB / ms.
16	Measured temperature range	–28...+75 °C



Supply package

Thermostat, frame	1 piece
Temperature sensor with connected sensor	1 piece
Warranty certificate and card	1 piece
Technical passport, installation instructions	1 piece
Operating Instructions	1 piece
The packing box	1 piece

Wiring

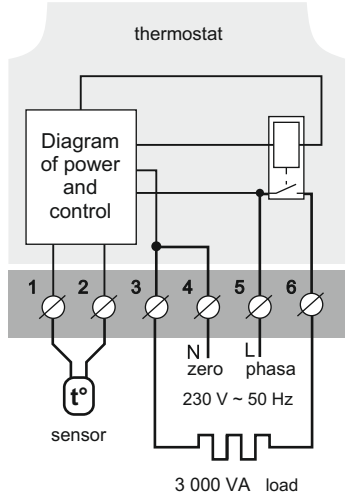
Thermoregulator supports two types of sensors: analog sensor (thermal resistor) or digital sensor (DS18B20).

Analog sensor (R10) is connected to terminals 1 and 2. Wires colors are of no importance.

Digital sensor (D18) is connected to terminal 1 using white wire and to terminal 2 using blue wire. If a thermoregulator pass into accidental regime of work of offloading by timer (Operating Instructions page 7), try connecting to terminal 2 using blue wire and to terminal 1 using white wire. If, at both attempts, the thermostat does not see the sensor, contact the Service Center.

Power voltage (230 V ± 10 %, 50 Hz) is supplied to terminals 4 and 5, at that phase (L) is determined by indicator and is connected to terminal 5, and neutral (N) — to terminal 4.

Load (connecting wires from heating element) is connected to terminals 3 and 6.



Wiring 1. Wiring and simplified internal circuit

Installation

After installation make sure that external sensor and mains voltage are connected correctly. In the case of incorrect wiring, is possible failure of the thermostat.

The thermostat is designed for indoor installation. The ingress risk of moisture or liquid into the place of installation must be minimized. When installed in a bathroom, toilet, kitchen, swimming pool the thermostat should be installed at the place out of reach of casual spraying.

It is important to remember, that is desirable to place a thermoregulator in an inner wall of the accomodation and it is not recommended to expose it to the impact of the incoming solar beams and draughts (the Figure 2).

The ambient temperature during installation must be between –5 ... + 45 °C.

The installation height of the thermostat should be in the range 0.4...1.7 m above the floor level.

The thermostat is mounted and connected after the installation and load testing.

To protect against short-circuit in the load circuit the circuit breaker (CB) has to be installed before installing the thermostat. The circuit breaker is installed in the gap of phase conductor, as shown in the Wiring 2. It should be designed for not more than 16 A.

To protect a people against electric shock leakage is installed the SSD (safety shutdown device). This event is obligatory when installing floor heating in wet areas. For working of SSD the heating cable screen must be grounded (connected to the protective conductor PE) or, if there is two-wire network, it is necessary to make protective neutral earthing. That is to connect the screen to a zero before SSD. In Wiring 2 protective neutral earthing is shown with dotted line.

The thermostat is mounted in the standard mounting box 60 mm in diameter, with mounting screws.

For installation you must:

— make a hole in the wall for box mounting and wall chase for power wires and the sensor;

— take the power wires of the heating system and the sensor to the mounting box;

— perform the compounds according to the passport data;

— fix the thermostat in the mounting box. To this a front frame must be removed. Put the thermostat in the mounting box and tighten the mounting screws.

The thermostat terminals are designed for a wire with section not more than 2.5 mm^2. To reduce the mechanical loads on the terminals it is desirable to use a soft wire. The ends of the wires must be cleaned and crimped with ferrules with insulation. The wires are tightened in the terminals using a screwdriver **with a blade width no more than 3 mm**. The screwdriver with a blade width more than 3 mm can cause mechanical damage to the terminals. This may result in the loss of right for warranty. The terminals should be tighten with torque 0,5 N·m.

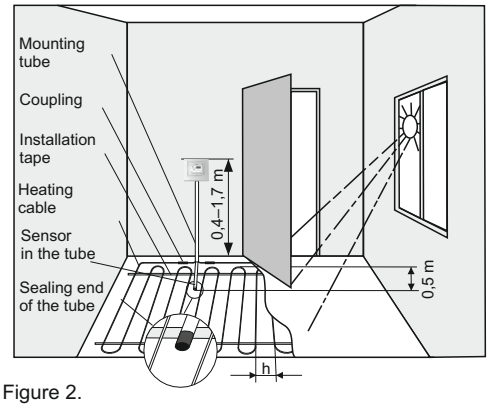
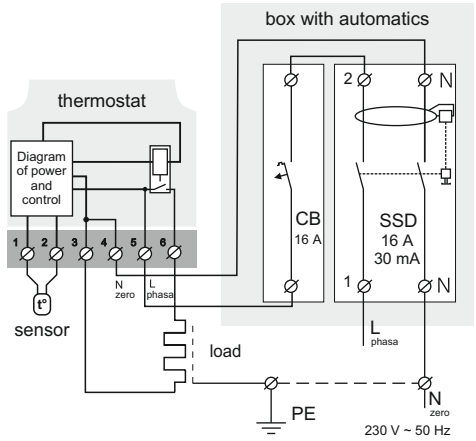
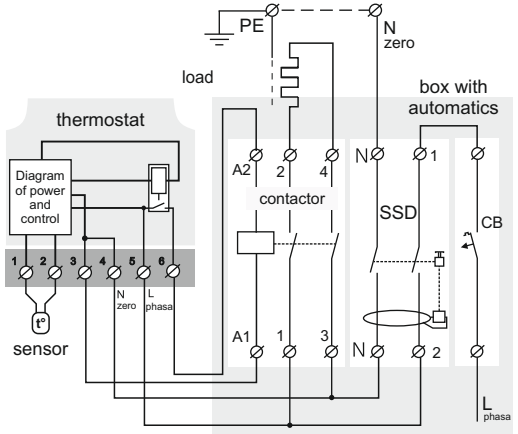


Figure 2.
Mounting the thermostat and «warm floor» system



Wiring 2. Connection of the circuit breaker and SSD



Wiring 3. Wiring and simplified internal circuit.

When the heater is an electrical heating cable, it must be provided with a transition joint. This must be done in order to avoid the thermal loads on the thermostat terminals. The couplings with heating wire are poured in the screed.

Mounting of the sensor must be performed so that it was possible to easily replace it (figure 2).

From the mounting box with thermostat the mounting tube (metal tube Ø 16 mm) is put into a zone heated by about 0.5 m. The curves and the length of the tube should ensure smooth movement of the sensor. The end of the pipe introduced into the zone, which is heated, must be carefully sealed to avoid ingress of the solution, for example, with a tape.

The sensor is introduced into the pipe after solidifying of screed.

If necessary is acceptable reduction and increasing (up to 20 m) of sensor connecting wires. Near the sensor connecting wires should not be the power cables, they may be interfere.

It is necessary that the thermostat commutes the current not more than 2/3 of the maximum power specified in the passport. If the exceeds 2/3 of the maximum current specified in the data sheet, the heating cable must be connected with a contactor (magnetic starter, power relay), which is designed for this current (wiring 3).

Pay attention to!

Our company reserves the right to make changes to its firmware, cloud interface and applications for Android for improving the energy efficiency of the device and for optimizing its operation.

The firmware version, recommendations for setting up a Wi-Fi connection and work in the application and the cloud are described in the *Operating Instructions*.

Safety precautions

To avoid injuring or damage of the device, carefully read and understand for yourself these instructions.

Connecting the device must be carried out by a qualified electrician.

Before installation (dismantling) and connection (disconnection) disconnect the power supply, and act in accordance with the «Rules for Electrical Installation».

Do not switch the nonassembled device to the network.

Keep away from humidity.

Do not expose to extreme temperatures (above +45 ° C or below –5 ° C).

Not clean the device using chemicals such as benzene and solvents.

Do not store or use the device in dusty places.

Do not try to disassemble and repair the device.

Do not exceed the limit values for current and power.

For protection against overvoltage caused by lightning strikes use surge arresters.

Do not immerse the sensor with a connecting wire in the liquid medium.

Do not burn or dispose the device with household waste.

The used device must be disposed in accordance with current law.

The products are transported packed, ensuring the safety of the product.

The device is transported by any type of vehicle (rail road, auto, marine, air transport).

The date of manufacture is indicated on the back side of the device.

If you have any questions or something will not be clear for you, call please the telephone center services listed below.

v170901

Manufacturer: DS electronics LLC
Address: 04136, Ukraine, Kiev city, str. North Syretskaya, 1-3
Telephone: +38 (044) 485-15-01
e-mail: support@terneo.ua www.terneo.ua

THERMOSTAT

terneo ax

simple control of heating

Operating Instructions

is of current interest
for the version of the insertion F2.1

The condition of Status indicator

Red	lights	Load Enabled
Blue mode Wi-Fi and the connection with the server	lights	There is a connection with the cloud
	does not light	No Wi-Fi connection or Wi-Fi off
	2 times / s	Mode Access Point (AP)
	1 time / 3 s	The mode Client is a Wi-Fi, but there is no connection to the cloud
Purple — download on overlay of red and blue colors		

The thermostat is designed to control a warm floor based on an electrical heating cable or a heating film.

The temperature is controlled at the location where the external sensor is located. The temperature is controlled at the location where the external sensor is located. Without the sensor, the thermostat pass into accidental regime of work of offloading by timer (page 7).

Control from the buttons

Enabling / disabling

Hold the **«+»** button for 4 seconds (3 dashes will appear on the display one by one) before appearing on the display **«on»** or **«oFF».**

After switching on the thermostat will start to display the sensor temperature. If it is below the current set temperature, voltage is applied to the load. The indicator starts to glow red.

After disconnecting the thermoregulator goes into sleep mode. For a complete shutdown, it is necessary to disconnect the circuit breaker.

Button blocking

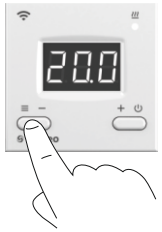
(child and public protection)

In order to enable (disable) button blocking press the **«+»** and **«–»** buttons at the same time for 6 sec till up to appearance in indicator **«Loc»** or running line **(«unLoc»).**

Preset temperature

Pressing **«+»** or **«–»** will display the type and value of the current set point, the following pressings will change.

Functional menu



Use the **«≡»** button to navigate through the Function menu (see Table 1).

Then change the parameter with the **«+»** and **«–»** buttons.

5 seconds after the last push of the buttons, there is a return to the temperature display.

Table 1. Navigating through the Function menu

Menu section	Hold time «≡»	Screen	Factory setting	State	Notes
Robot mode	3 s	rEG	hnd	hnd Sch oFF	«hnd» — Hand mode «Sch» — Schedule mode «oFF» — to disconnect the mode Away
Floor temperature correction (correction)	6 s	Cor	0.0	±9,9 °C, step 0,1 °C	If necessary, it is possible to make correction to the floor temperature at Indicator of the thermostat.
The brightness in the mode of waiting (brightness), if the buttons are not used	9 s	bri	6	0...9	With 0 in the screen only points will be displayed: left – indicator of the presence of the tension of the power supply; middle – is reflected state of loading; right – is reflected state of Wi-Fi net;
PIN-code for registration in the cloud or local IP	12 s	Pin IP	When connected to the cloud, it outputs a PIN-code for registration. When you connect to Wi-Fi, but the lack of communication with the cloud will output your local IP address. When Wi-Fi is turned off, the item is unavailable.		
Operating mode Wi-Fi	15 s	APC	CLi	AP CLi oFF	AP — Access point mode. CLi — Client mode. oFF — Wi-Fi is turned off.
Control lock from the cloud (bloking)	18 s	bLc	oFF	on oFF	Blocks the control of the thermoregulator from the cloud, then the cloud will be Only to accumulate statistics.
Firmware version	27 s	F2.1	It allows to understand, whether the given instruction is actual for the current version of the firmware in the thermoregulator.		
Reset to factory settings	30 s	dEF	Reset all settings to factory settings (except Wi-Fi settings).		

The modes of work

For the viewing of the current mode of work press **«≡».** How to elect another mode watch Table 1.

Sch SCHEDULE

Is tuned only by means of the application «terneo» or browser in *my.terneo.ua*.

hnd HAND

Mode, in which the Schedule mode is disabled and the thermostat maintains the constant set temperature.

AUY AWAY

Is tuned only by means of the application «terneo» or browser in *my.terneo.ua*.

For the cancellation of the mode Away withhold the **«+»** button during 4 seconds to the apparition of «oFF» in the indicator. After release of the button the thermoregulator will return in the acting mode before beginning of the period of the Away.

tPr TEMPORARY

If to change the temperature of the setting in the mode Schedule to the timetable, the thermoregulator will support it until the end of the current period. The outcome from the temporary mode under: the return of the setting back, the shutdown of the supply, turning on of the period of the leaving.

Table 2. Symbols on the screen

Meaning	Symbol
On/ Off	on / oFF
Blocking the button (locking)	Loc/unLoc
Internal heating (overheat)	oht
Plugging in regime of the access point every 5 sec (connektion)	con
Correction of the floor sensor (Correction)	Cor
Operation mode Wi- Fi	APC
Access point (Access Point)	AP
Client (Client)	CLi
Wi-Fi Off	oFF
Blocking control through the Internet	bLc
Reset to factory settings (default)	dEF
Firmware version	F2.1
Fault of sensor of the internal heating	Ert
Local IP address	IP
PIN-code for registering in the cloud	Pin
Low charge of internal power supply	Lbt
Sensor breakage (open circut)	OC
Sensor closure (short circut)	SC

Connecting to the Cloud

If to say in brief, the cloud is intended for the safe keeping of the data in the net Internet, comfortable and safe long-distance connection and operation.

For the connection of the thermoregulator to the cloud elect the mode The Point of access **«AP»**. In the mode the Point of access the thermoregulator will create it`s Wi-Fi net and will wait the settings from the application «terneo» or browser for the connection to your Wi-Fi net.

When you first turn on, thermostat will be 5 minutes in the mode of the Access point. If, during this time, the connection to the thermostat was missing, the automatic return to the thermostat in the mode of Client will take place.

For the purpose of the manual transition to the mode Point of access use the Table 1.

If the connection is held to the thermostat in the mode of Point of Access the message **«con»** (connection) will display in the screen every 5 seconds.

If earlier you already connected the thermostat to your Wi-Fi net and you want to use these settings – select the mode Client **«CLı»**.

The connection using the terneo app for Android

GET IT ON Google Play

*The application is supported on **Android 4.1 and above** operating systems. Except for the function of binding new heat controllers, which is only supported on Android, versions 5 and above.*

— Download the free app «terneo» on Google Play and install it.

— Launch the application.

— Register or log in with the help of your Facebook account, VK or Google account.

— Turn the thermostat to the Access point mode (watch Table.1).

— In the application press **«+»** or **« ≡ »**, further «Add the thermostat».

— Select the Wi-Fi network created by the thermostat (for example, terneo ax_A68FDB).

— Enter the password from your Wi-Fi.

After setting up Wi-Fi, in the presence of the internet, the thermostat will be added to the main application screen and registered in the cloud (when you sign in to my.terneo.ua, the thermostat will be available for control on the main page).

Connecting through a browser

If you do not have an Android device, Wi-Fi connection can be configured through the browser.

— Connect to the Wi-Fi network created by the thermostat (for example, terneo ax_A68FDB).

— Enter the password DSEXXXXXX, where XXXXXX — six ultimate symbols in the name of net (for example: DSEA68FDB). In case of absence of settings of net the password will be absent.

— In the address bar of the browser, type **192.168.0.1**

— On the thermostat page, select your Wi-Fi network and enter its password.

— Click the «Connect» button.

— The thermostat during one minute will generate the connection to your Wi-Fi net. During this in the screen will flash on points in turns.

— After the successful connection the screen of the thermostat will display PIN-code, necessary for the connection to cloud.

— In the address bar of the browser, enter **my.terneo.ua**

— Sign up and sign in to your account.

— For correct operation of statistics, graphs and schedules, please enter your time zone. In the future, the thermoregulator will automatically update the date and time via the Internet.

— Click «+ Add» – Device» and enter a name (for example, «Bedroom») and a pin-code. (in case of the absence of the PIN-code in the screen of the thermoregulator watch the Table 1).

In this case, the indicator status of the connection with Wi-Fi will burn constantly.

The operation of thermostat

During operation, the thermostat constantly synchronizes with the cloud, performs its commands, receives the latest settings and sends the telemetry about its status.

In the absence of the Internet, the thermoregulator will continue its operation according to the latest settings from the cloud. With the buttons it is possible to change the set point of temperature of the current timetable period or use Manual mode.

In the absence of voltage, all the settings of the thermostat will be stored in non-volatile memory, and the course of the clock will continue from the internal power source within 3 days.

If the supply voltage had been absent for more than 3 days, the stroke of the internal clock is knocked down and the thermoregulator automatically switches to Manual mode, if previously worked on a schedule, and when you press the control buttons, on the display, before the menu items, will output **«Lbt»** indicating the discharge of the internal power supply.

When restoring the Wi-Fi connection of the thermostat with the cloud, all settings are synchronized (the priority of synchronization in the cloud)

COMMON TROUBLES, REASONS AND REMEDIES

If you have any inconsistencies in the description of the work and adjustment of the thermostat, check its firmware version.

Possible reason: The thermoregulator has independently updated the firmware version to the latest and the attached part of the instruction did not correspond to all the changes made.

It is necessary: Check the firmware version of the thermoregulator. If it does not match the version specified in the manual, download from the website *www.terneo.ua.* Operating Instructions (part 2) of the required version.

The thermoregulator passed in the mode of emergency work according to timer

The possible reason: the incorrect connection, the disconnection, the short circuit of the inductor or the temperature pushed the limits of the measurable temperatures (see the Technical data page 2).

It is necessary to: test the place of the connection of inductor of the temperature with the thermoregulator and it`s line (Table 3), the absence of the mechanical damages throughout the length of the connecting wire, and as well the absence of the power leads, that are traversed closely.

Regime of emergency application by timer
(factory settings 15 minutes)

In the utmost left discharging of display the symbol **«t»** will flash on and off, and display remaining time for the next switch on/ switch off of charging. Herewith, once in 5 seconds the reason of misfunctioning of indicator displays **«OC»** (open circut) or **«SC»** (short circut).

The user elects the time of the work of the applied force, the rest time in the 30 – minutes cyclic interval the applied force will be switched off. The time of the work of the applied force can be installed in the range oFF, 1...29 minutes, on. For the purpose that applied force will work constantly elect **«on»**, for the purpose to switch off it completely select **«oFF»**.

Neither indicator nor display light up upon thermoregulator switch-on.

Possible reason: no power supply voltage.

Required: check availability of power supply voltage using a voltmeter. If power supply voltage is available then contact the Service center please

The internal overheating protection

If the temperature inside the frame exceeds 80 °C, the emergency power cutoff will take place. The indicator will show the **«oht»** (overheat) sign once per second. The pressing on any button will type-out the temperature of interior inductor.

When the temperature inside the frame falls below 75 °C, the thermoregulator will turn on the load and restart its work.

After the protection is activated more than 5 times in a raw, the terneo will be blocked till a button will be activated and the temperature inside the frame falls below 75 °C.

In the case of internal overheating sensor breakout or short-circuiting the device will continue functioning in the normal mode, but each 5 seconds the **«Ert»** sign (a problem with sensor) will be displayed. In this case the internal overheating control will be disabled.

Table 3.
The resistance of the sensor at different temperatures

The temperature, (°C)	Resistance of the sensor, (Ω)
5	25339
10	19872
20	12488
30	8059
40	5330

CE

v170901

Manufacturer: DS electronics LLC
Address: 04136, Ukraine, Kiev city, str. North Syretskaya, 1-3
Telephone: +38 (044) 485-15-01
e-mail: support@terneo.ua www.terneo.ua