User and installation guide
IN STAT⁺ 868 -r
Programmable room thermostat with radio transmission

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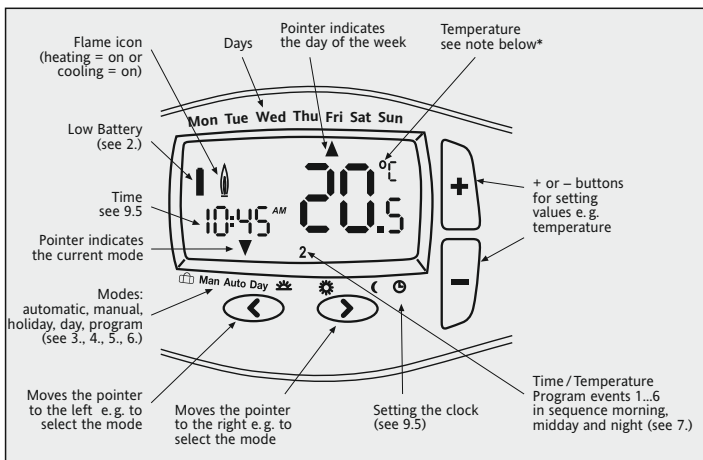
Fig. I

I. User Guide

Operation (Overview)



* **Note:** Temperature displayed is actual room temperature. After pressing + or – button the set temperature is displayed. Once adjustment is complete and after 5 seconds display will show actual room temperature.

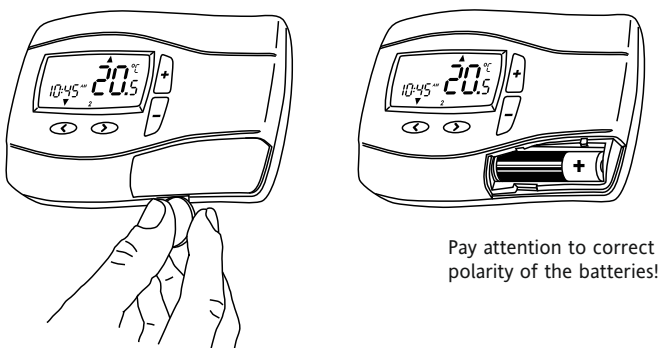
Fig. II

1. Principle of function

The *INSTAT⁺* 868-r is a programmable room thermostat that allows you to set time periods (up to 6 per day) and temperatures to suit your own lifestyle. Once fully installed and powered the device will automatically show the correct time and in auto mode will control your heating system according to pre-set program 1 (see 7.). The temperature is controlled by sensing air temperature, switching on the heating when the air temperature falls below the thermostat setting and switching it off once this set temperature has been reached.
No wiring is necessary, the information will be transmitted via RF to a receiver.
An INSTAT 868-a.... radio receiver is required for operation.

NOTE:
The adjusted values (while programming) will be accepted automatically after ~5 sec.

2. How to Insert / change batteries (2 AA 1,5V Alkaline)



Pay attention to correct polarity of the batteries!

When the batteries start to run low, the battery icon (see I) starts to blink.
The thermostat continues to function normally.
After ~6 months, the device will cease to function and will permanently display the battery icon. Dispose of batteries according to legislation.

3. Automatic mode (AUTO)

In this mode, the room temperature is automatically controlled according to the pre-set program. The pointer indicating the mode is set to AUTO. The number at the bottom right indicates the program event during the day. (Fig. 1)

4. How to change the temperature for a short period of time (override)

When in AUTO mode, you can override the existing temperature setting for a short period of time.

Press the **+** or **–** buttons to change the temperature setting.

While in temperature override the pointer indicates both AUTO and MAN (Fig. 2).

When the next programmed time/temperature event is reached, the device will revert to the AUTO mode.

5. How to set a constant room temperature (manual operation)

In this mode, a constant temperature can be set and the pre-set program is ignored.

The last temperature selected here is chosen as the initial temperature

How to activate this mode

Press the **<** button until the pointer indicates MAN (Fig. 3).
Set the temperature by pressing the **+/–** buttons

Exit the mode

by pressing the **>** button

6. How to set the room temperature for a set time (holiday/party mode)

In this mode, the temperature can be set for periods of time ranging from a few hours up to 199 days, e.g. when you are away from home for longer periods of time (holidays).

The remaining hours/days are shown. Time periods between 1 hour and 23 hours and 1 day and 199 days can be set.

How to activate this mode

Press the **<** button until the pointer indicates the suitcase icon (Fig. 4)

Set the time	by pressing the **+/–** button
Select the temperature	by pressing the **>** button
Set the temperature	by pressing the **+/–** button

Once you have set the temperature, it will flash for 10 seconds and then start the holiday/party period.

To exit this mode, press **<** or **>**.

When hours have been set, the thermostat will return to AUTO mode once the set hours have passed.

When days have been set, the thermostat will return to AUTO mode at midnight of the last day.

Note: the current day (today) must be included in the setting.
e.g. 1 day is set; the thermostat returns to AUTO today at midnight.

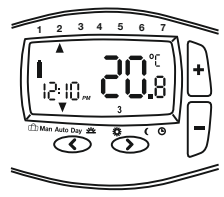


Fig. 1

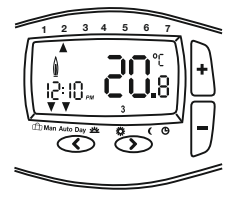


Fig. 2

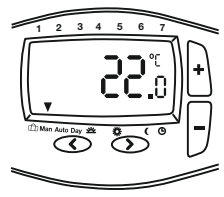


Fig. 3

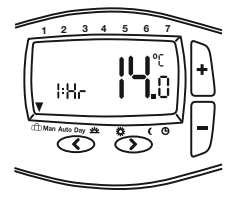


Fig. 4

7. Pre-set programs

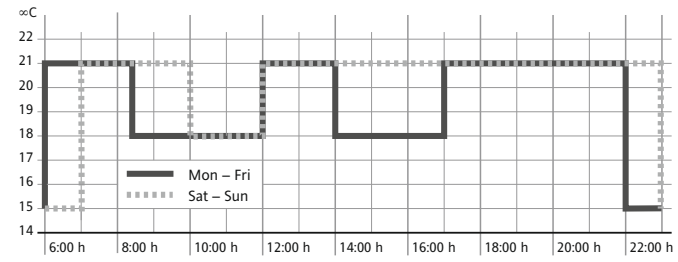
There are 3 pre-set time/temperature programs which are already available in the thermostat. Pre-set program 1 (as shown below) is the default. Therefore, if pre-set program 1 is the best program to suit your lifestyle, you do not need to change the time/temperature settings on the device.

To select an other program see 9.2

The following diagrams are related to "Product programme type" = 7 days see table 2 option 1

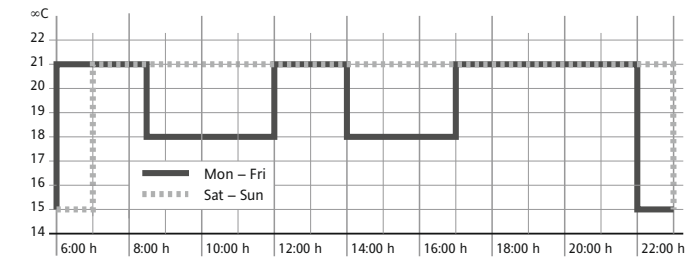
Program 1 (home during the day)

Monday to Friday						
Events	1	2	3	4	5	6
Time	6:00	8:30	12:00	14:00	17:00	22:00
Temperature °C	21,0	18,0	21,0	18,0	21,0	15,0
Saturday and Sunday						
Events	1	2	3	4	5	6
Time	7:00	10:00	12:00	14:00	17:00	23:00
Temperature °C	21,0	18,0	21,0	21,0	21,0	15,0



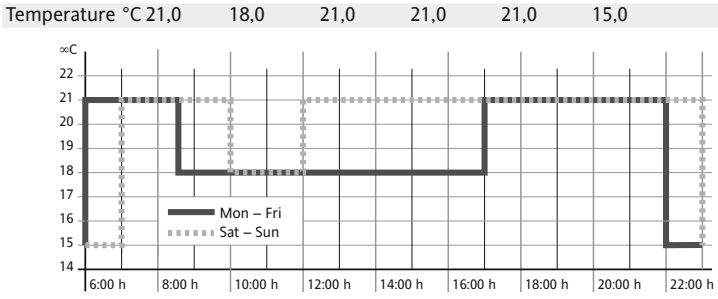
Program 2 (home for lunch and on weekends)

Monday to Friday						
Events	1	2	3	4	5	6
Time	6:00	8:30	12:00	14:00	17:00	22:00
Temperature °C	21,0	18,0	21,0	18,0	21,0	15,0
Saturday and Sunday						
Events	1	2	3	4	5	6
Time	7:00	10:00	12:00	14:00	17:00	23:00
Temperature °C	21,0	21,0	21,0	21,0	21,0	15,0



Program 3 (at work all day)

Monday to Friday						
Events	1	2	3	4	5	6
Time	6:00	8:30	12:00	14:00	17:00	22:00
Temperature °C	21,0	18,0	18,0	18,0	21,0	15,0
Saturday and Sunday						
Events	1	2	3	4	5	6
Time	7:00	10:00	12:00	14:00	17:00	23:00
Temperature °C	21,0	18,0	21,0	21,0	21,0	15,0



8. How to adjust the pre-set time/temperature program to suit personal needs

Select the day function	by pressing the **>** button up to position "Day"
Select the day	by pressing the **+/–** button
Set the times for this day	
Select the event (1...6)	by pressing the **>** button
Set the time	by pressing the **+/–** button
Select the temperature	by pressing the **>** button
Set the temperature	by pressing the **+/–** button

The **>** button must be pressed to accept a setting.

If you wish to change other events or days, repeat the actions described above. To return to the auto mode, press the **<** button several times.

If operating mode "7 days" is chosen (see installer options, option 1), the days can be selected as blocks or individual days (Fig. 5 to 8).
The blocks are selected by repeatedly pressing the **>** button.

Note: To facilitate programming, blocks of days with the same times/temperatures can be formed before starting.

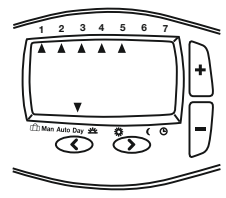


Fig. 5:
Monday to Friday as one block (working days)

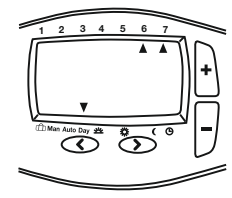


Fig. 6:
Saturday and Sunday as one block (days off)

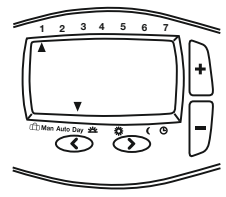


Fig. 7:
Each day is individual day

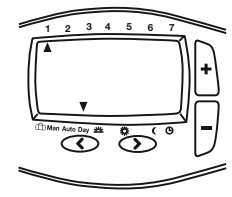


Fig 8:
Monday to Sunday as one block (all days)

9. How to change user options

The thermostat offers a number of options that can be changed by the user (see Table 1.).

To activate the menu,	in AUTO Mode press the **<** and **>** buttons simultaneously for 3 seconds , USEr00 will be displayed.
Select an option	by pressing the **<** or **>** button
Change an option	by pressing the **+/–** button

Press **>** to accept each change.
Press **<** to cancel a setting without saving
To exit the menu, press the **<** and **>** buttons simultaneously for 3 seconds.
If no button is pressed within 2 minutes, the device will return to the auto mode.

9.1 How to change from 24h to 12h clock (option 1, table 1)

Shows the time as 24 hours or 12 hours

9.2 How to change to another pre-set program (option 2, table 1)

Selection of a pre-set program to be used for programming events (see 7.).

9.3 How to change the number of events per day (option 3, table 1)

2, 4 or 6 time/temperature events can be selected for all days according to individual need (unused events will be skipped). If there is no need for 6 events, choosing 4 makes programming easier.

9.4 How to switch on/off the automatic daylight savings time/standard time change (option 4, table 1)

You can select whether or not you want the time change to be carried out automatically. If it is not carried out automatically, the time has to be adjusted manually (see 9.5).

9.5 How to change the time, day, month and year (option 5 table 1)

The thermostat comes with a pre-set clock, that also automatically switches from daylight savings time to standard time.

There should be no need to change these settings. However, should the need arise, the settings can be changed in the following way.

Press button **>** until 5 will be displayed	, dAtE can be read.
Press button **+** Year is blinking	**+/–** button to change
Press button **>** Month is blinking,	**+/–** button to change
Press button **>** Day is blinking,	**+/–** button to change
Press button **>** Time is blinking,	**+/–** button to change

During setting date and time, a pointer to the ◷ Symbol will be visible

9.6 How to change the temperature display (option 6, table 1)

The temperature display can be adjusted to individual needs, e.g. 0:3 = +0,3°; -1:5 = -1,5°.

9.7 How to restore the built in time temperature programs (option 7, table 1)

Restores the active program to its original factory settings.

9.8 Access protection lock / child lock (option 8, table 1)

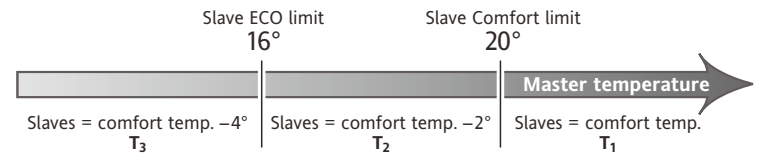
When this function is set to ON, all buttons will be locked.
To switch off the protection lock, set this option to OFF.

9.9 Master/Slave (option 13, 14, table 1)

The INSTAT+ 868-r can be used as Master-thermostat; it is a time master. With the time Master, rooms controlled from simple transmitters INSTAT 868-r1 (slaves) will set back or set up its temperature according the time info from the Master. The temperature limits can be set with option 13 and 14.

Note: If option 13 and 14 are set to the same value, then the slave rooms will only be controlled to its comfort temp. and comfort temp. -4°. The area comfort temp. -2° is not available.

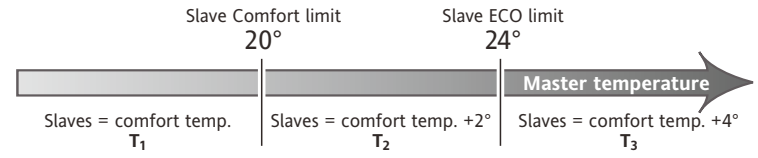
For Heating



As compare values, the lower temperature from the active program and (Auto, temporary override, Man and Holiday) will be used

E.g. Active program = 21°, Man = 12°
12° will be used, the slave's rooms will set back the temp by 4°

For Cooling



As compare values, the higher temperature from the active program and (Auto, temporary override, Man and Holiday) will be used

E.g. Active program = 21°, Man = 25°
25° will be used, the slave's rooms will set up the temp by 4° (the slaves need to be set to cooling mode)

Table 1 User options (In AUTO Mode press the < and > buttons simultaneously for 3 seconds , USEr00 will be displayed)

User Option	Title	Min.	Max.	Factory setting
1	Clock Option	12	24	24
2	Pre-set programme selected	1	3	1
3	Number of events per day	2	6	6
4	Automatic Summer/Winter-Time change over	On	Off	On
5	Set clock/date			
6	Temperature offset	-5.0°C	+5.0°C	0
7	Restore pre-set programme	On	Off	Off
8	Access protection lock	Off	On	Off
9	Create Radio Link automatically	Off	On	Off
10	Create Radio Link manually	0	4094	actual
11	Relay ON/OFF (in the receiver)	Off	On	Off
12	Transmission test	Off	On	Off
13	Slave Eco limit	5.0 °C	< Comfort	16°C for heating / 24°C for cooling
14	Slave Comfort limit	> Set-back	32.0	20°C for heating / 20°C for cooling

Setting Slave ECO limit

press button **>** until option 13 is displayed
xx:x °C will be displayed; xx:x = actual value
press button **+ / –** to change

Setting Slave low limit

press button **>** until option 14 is displayed
xx:x °C will be displayed; xx:x = actual value
press button **+ / –** to change

10. How to switch off the thermostat

When switched off, the programmable thermostat no longer controls the room temperature and the room is not heated. The display will show OFF, and the buttons will not function.
In the installer options (see Installation Guide 3.2) you can select whether or not frost protection will be activated when the thermostat is in OFF state (heating if temperature falls below 5°C).

Switching OFF

Press button **+** and **–** simultaneously for 5 sec. -> OFF will be displayed

Switching ON

Press button **+** and **–** simultaneously for 5 sec. -> OFF disappears

II. Installation Guide

This thermostat can be used in all EU and EFTA countries.

The manufacturer herewith declares that the thermostat complies with the essential requirements of the R&TTE Directive 1999/5/EC and all other relevant regulations. The declaration of conformity can be downloaded from „www.funk868MHz.de“.

CE

Note: The transmission frequency used in this control is used extensively in Europe, for similar applications. The transmitting power is very low. It is far below the power of a mobile telephone. Moreover, the transmitter is activated only every 10 minutes The transmission quality is enhanced by employing special test procedures and repeating transmissions. Transmitter and receiver are tuned to each other by making use of the “learning mode”.

1. Applications:

The electronic room thermostat *INSTAT+ 868-r* can be used for temperature control together with:

- Actuators of floor heating systems or radiators
- Oil and gas warm water heating
- Circulating pumps
- Heat pumps
- Electric radiators

An INSTAT 868-a.... radio receiver is required for operation.

2. Installation:

Installation location:

The device should be installed in a location in the room which:

- is easily accessible for operation
- is free from curtains, cupboards, shelves etc.
- enables free air circulation
- is free from direct sun light influence
- is free from draughts (e.g. opening of windows and doors)
- is not affected directly by heat sources
- is not located on an external wall
- is located approx. 1,5 m above floor level
- allows safe radio transmission
- is not in the vicinity of eg. a radio receiver, a television set or a radio transmitter
- is not in the vicinity of metal parts eg. metal doors, metal cupboards, mirrors or steel reinforced concrete
- if unsure, check radio transmission before installation (see receiver instructions, section “Radio range test”), look for suitable position if necessary.

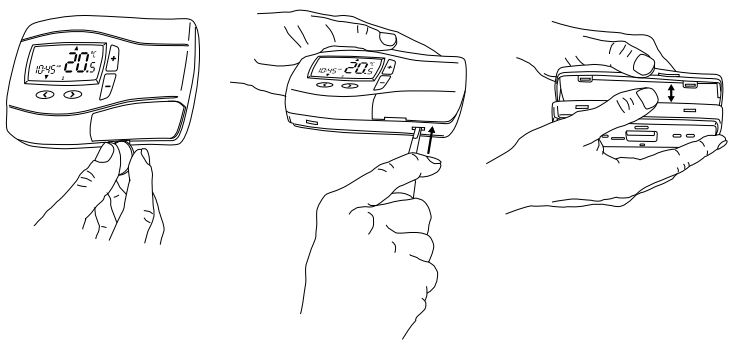
Note:

In some rare cases it may not be possible to establish a permanent radio link between the radio transmitter and the radio receiver. We therefore recommend to check the reliability of operation at the specific location.

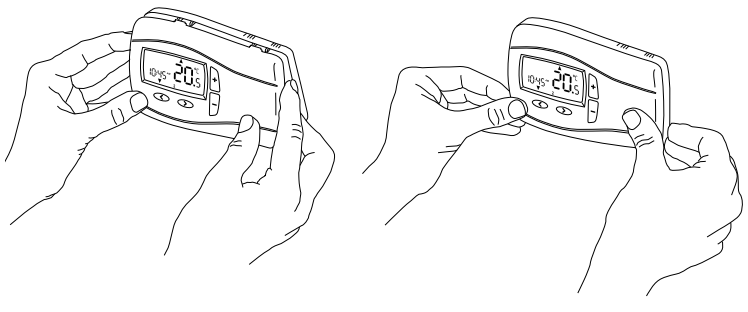
In order to establish longer transmission distances (up to 90 m) or in case of critical locations, the RF repeater INSTAT 868-rep can be used.

Installation of the thermostat directly onto the wall.

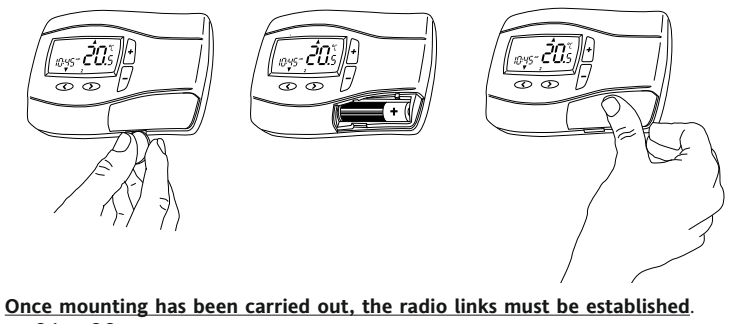
1. Remove battery cover using a coin, then remove batteries.
2. Remove the front cover using a flat screwdriver and separate from back plate.



3. Mount the back plate to a suitable location using suitable wall plugs and screws.
4. Replace the front cover by pushing it fully onto the back plate.



5. Install the 2 AA batteries provided.
6. Reattach the battery cover.



Once mounting has been carried out, the radio links must be established.
see 2.1 oe 2.2

Then the thermostat is ready to work and will automatically start to control the room temperature according to the pre-set program 1 (refer to User Guide).

All important functions were pre-set in the factory. If you wish to change any of the settings, please refer to the options in the User Guide section 9.

2.1 Establish radio link address automaticaly (option 9, table 1)

With this option, a radio link between transmitter and receiver can be created

1. Activate "learning mode” on the receiver (see receiver instructions).
2. Activate "learning mode” on this transmitter as follows:
   Activate USER-SETTINGS, see 9. on page before, and then:

a) press button **>** until option 9 is displayed.

b) press button **+** LErn will be displayed
   press button **>** LErn is blinking, ON is visible; Learn-Mode is now active

When the connection has been created successfully, the indicator lamp on the receiver extinguishes (after ~1 minutes)

c) press button **>** on the transmitter to terminate Learn Mode
   press buttons **<** and **>** simultaneously for 3 seconds in order to activate AUTO

Note: Activating learning mode will create a new address, all receivers linked to this transmitter need to be re-learnt. The transmitter exits the learning mode after 10 minutes

2.2 Establish radio link, address manually (option 10, table 1)

Choose a unique number as address (room number) that is

not repeated throughout the whole building. Make a note of this number

1. Activate "learning mode” on the receiver (see receiver instructions).
2. Activate "learning mode” on this transmitter as follows:
   Activate USER-SETTINGS, see 9. on page before, and then:

a) press button **>** until option 10 is displayed.

b) press button **+** xxxx = actual address will be displayed
   press button **+ / –** to change digit of address (max address = 4094)
   press button **>** for the next digits; on last digit
   press button **>** the address is blinking, ON is visible; Learn-Mode is now active

When the connection has been created successfully, the indicator lamp on the receiver extinguishes (after ~1 minutes)

c) press button **>** on the transmitter to terminate Learn Mode
   press buttons **<** and **>** simultaneously in order to activate AUTO

See note at 2.1 c

2.3 Test the radio transmission See 2.4

Alternative 1: Adjust Temperature to 32 °, the receiver channel will switch on
Adjust Temperature to 5 °, the receiver channel will switch off

Alternative 2: Remove batteries for a few seconds after inserting , the output of the receiver’s channel will flash twice.

2.4 Manually switching ON/OFF the receiver (option 11, table 1)

This function can be used to make some voltage measuring on receiver. The output remains active for 10 minutes.

To access this function, the USER-SETTINGS need to be activated, see 9. on page before, then:

Press button **>** until option 11 is displayed
Press button **+** Receiver channel will switch ON
Press button **–** Receiver channel will switch OFF

This function will be terminated after 10 minutes after last key press.

2.5 Test the radio distance (option 12, table 1)

To access this function, the USER-SETTINGS need to be activated, see 9. on page before, then:

press button **>** until option 12 is displayed
press button **+** ON will be displayed, now radio telegrams will be transmitted

Now follow the instructions in the receiver.

Cancel the function by pressing **<**

This function terminates after 5 minutes

Note: In the receiver there is also a description for "test the radio link" we recommend to use the one described here (this one will not affect the radio link)

3. Installer options

Attention: The settings should only be carried out by the installer, as settings may affect the functions and security of the heating system. List of Installer options see Table 2.

To activate the menu, in AUTO mode, press the **<** and **+** buttons simultaneously for 5 seconds
InSt00 will be displayed.
Select an option by pressing the **<** or **>** button
Change an option by pressing the **+ / –** button

Press **>** to accept each change.
Press < to cancel a setting without saving

To exit the menu, press the **<** and **+** buttons simultaneously for 5 seconds.

If no button is pressed within 2 minutes, the thermostat will return to the auto mode.

3.1 Kind of program (option 1, table 2)

The operating mode of the thermostat is set via this function.

7 days (7d):
Different time/temperature settings can be chosen for each day individually.

5/2 days (5:2):
Different time/temperature settings can be chosen for the weekdays (Monday to Friday) and the weekend (Saturday and Sunday) in this mode.

24 hours (24h):
The same time/temperature settings are used for all days of the week in this mode.

3.2 Frost protection (option 2, table 2)

The frost protection of the thermostat can be activated via this option.

Frost protection will switch on the heating if the room temperature falls to 5 °C and will then control the temperature at 7 °C see 10.

Frost protection is active in OFF-mode only.

3.3 Control algorithm PWM or ON/OFF (option 3, table 2)

press button **+ / –** to change
PId = PWM
On:OF = ON/OFF

PWM for floor heating or radiator heating

ON/OFF for boiler control or special applications

3.4 Low and high limit set points (option 4, 5, table 2)

These limits can be used to prevent temperatures from being set too high or too low.

The set point default values are 32 °C (high limit) and 5 °C (low limit).

3.5 Optimum start (option 6, table 2)

If this function is activated, the thermostat will automatically calculate the warm up time for the heating system in order to achieve the desired temperature for each event.

This function is a major energy saving factor.

Note: This function is only possible in the AUTO mode.

After commissioning, it takes a couple of days for the thermostat to gather enough information to correctly calculate this function.

3.6 Heating/cooling (option 7, table 2)

Use this function to select whether the thermostat is used exclusively for either heating or cooling applications.

HEATING: The receiver will switch on when the temperature falls below the set point.

COOLING: The receiver will switch on when the temperature rises above the set point.
Note: The same time/temperature events will be used as in heating

3.7 Valve protection (option 9, table 2)

If valve protection is selected, the receiver's relay will be switched on once a day at 10:00 h.

This function is designed to prevent the valves and pumps from seizing during the summer months.

For electric heating systems or in cases where seizing' is not expected, this feature should be switched off.

The valve protection time can be set here between OFF and 1...5 minutes

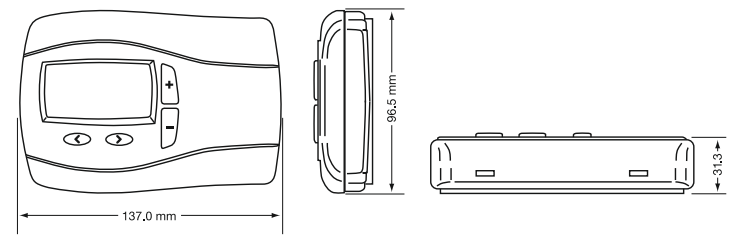
3.8 Master Reset (option 10, table 2)

Restores all settings to original factory settings, see table 2

4. Technical data

Order Type	*INSTAT+ 868-r*
Supply voltage	2 x AA 1,5V alkaline batteries
Battery life	2 years (typically)
Temperature setting range	5 °C to 32 °C
Temperature resolution	0.1 °C
Carrier frequency	868,95 MHz
Transmission interval	<10 minutes (radio data transmision 3 times)
Antenna	internal
Typical transmition range	100 m free air or 1 ceiling or 2 walls respectively
Output signal	Pulse Width Modulation (PWM) or ON/OFF adjustable
Timing resolution	1 Minute
Accuracy of clock	< 4 minutes / year
Ambient temperature	Operating 0 °C to 40 °C Storage –20 °C to 85 °C
Ambient humidity	Operating 45% to 93% (without condensation) Storage 45% to 93% (without condensation)
Degree of pollution	2
Degree of protection	IP 30 / insulated (moisture condensation not permitted)
Brinell test temperature	75° C
Software class	A
Weight (with batteries)	~ 200 g

Dimensions



5. Troubleshooting

1. It is getting warm too late

a. Are clock and program events set correctly?
b. Is the Optimum Start switched on? (see 3.5)
c. Did the thermostat have enough time (some days) to determine the room data?
d. Was the radio link established properly and is it still active? see 2.1
If the receiver lamp is blinking, the transmission is interrupted. See receiver manual to correct

2. The thermostat does not accept any changes

Is the access protection lock switched on? (see 9.8)

3. Setting temperature values is limited

Are set-points low limit or high limit activated ? (option 4+5, Table 2)

4. E1 is displayed

This indicates a sensor fault

6. Battery handling

Batteries, rechargeable or not, should not to be disposed of into ordinary household waste. Instead, they must be recycled properly to protect the environment and cut down the waste of precious resources.

Your local waste management authority can supply details concerning the proper disposal of batteries.

In compliance with the EU Directive 2006/66/EC, the button cell battery located on the printed circuit board inside this product, can be removed at the end of the product life, by professional personnel only.

Table 2 Installer Options

Installer-Option	Title	Min.	Max.	Factory setting
1	Product programme type	24hr	5/2days / 7days	7 days
2	Frost protection	Off	On	On
3	Temperature control algorithm	PWM (PId)	ON/OFF	PWM
4	Set point low limit	5 °C	High limit	5 °C
5	Set point high limit	Low limit	32 °C	32 °C
6	Optimum start	Off	On	On
7	Heating/Cooling	Heat	Cool	Heat
8	not used			
9	Valve protection	Off	1...5 minutes	3 minutes
10	Restore all Factory settings	On	Off	Off