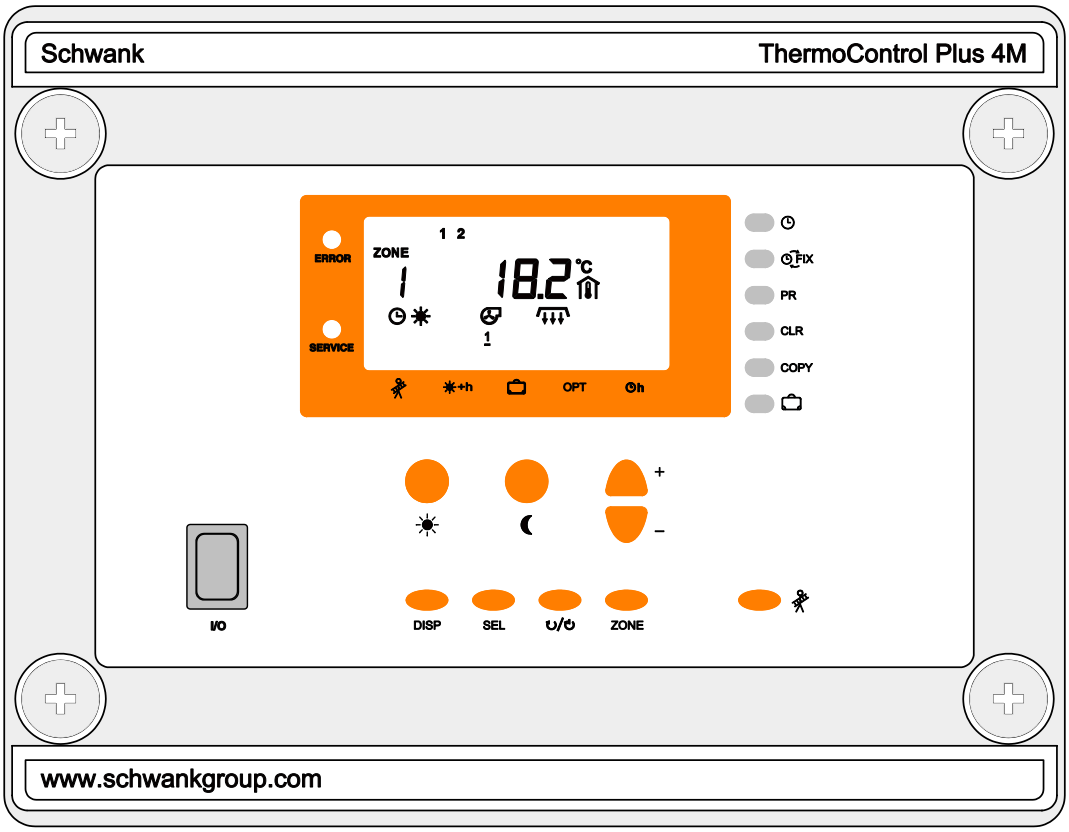
ThermoControl Plus 4M

Controller with four heating zones
Modulation or 2-stage control
(alternative: eight heating zones with 1-stage control)



Operating and Installation Manual

Schwank
Heating. Design. Comfort.

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Content:

1 Introduction

The Schwank ThermoControl Plus 4M is suitable for the control of single or two-stage / modulation gas-infrared heating systems.

Depending on the selected operation mode, the controller has 4 to 8 heating zones.

Please read this manual carefully before installing or using the control unit. Failure to follow the manual and warnings will affect your warranty. They are also a prerequisite for a professional installation and correct handling.

Please pay special attention to chapter 2 „Safety“.

The ThermoControl Plus 4M is designed to be used for industrial/commercial building heating systems.

Schwank will not be held responsible for any damages whatsoever resulting from incorrect use.

The controller measures the room temperature and switches the heater on/off by relays.
The controller features different operating programs.
P1…P5: Single-stage, Two-stage and Modulating heaters.

Daytime heating period extension ☼+h

Available as a special feature is the extension of the programmed heating period by a manually operated button. This button can be installed parallel to the sensor. By pushing the button (~1 sec.), the value of the programmed daytime ☼ temperature in the selected heating zone is maintained for an additional time period. (Default is 1h, adjustable in the parameter menu)

Programmed temperature values and operating programs

The temperatures and operating programs of every single heating zone are independently selectable.

- Daytime- ☼, night time- ☾ or frost protection temperature ✻ , selected by a weekly schedule
- Continuous daytime (☼ **FIX**) night time, (☾ **FIX**) or frost protection temperature (✻ **FIX**).
- Vacation program: the controller is able to save eight vacation periods, which are programmed according to the calendar.

Other Features:

– Four air-proving contact inputs
– Four 2-10V modulation outputs
– Illuminated display
– Selectable ºF / ºC temperature display
– Button for system check mode
– Real-time clock with calendar, including automatic summmer- / winter time correction
– Outdoor temperature sensor (OAS)
– Heat-up optimization: the heater starts/switches on earlier to ensure that the desired temperature is achieved exactly at the programmed time.
– Remote acess control
– Working-hour/time-counter at every relay output
– Error-relay: relay switches on in any case of error

2 Safety

Installation details

This is a 24VAC Class 2 extra low voltage temperature controller. Use only Class 2 rated power supply. Do not install on voltages higher than 30VAC.

Read all information in this manual before installing or programming the appliance. The electrical installation and wiring must conform to local and national building and electrical standards. Check the electrical equipment regularly. Defective wires etc. must be replaced immediately.

Be sure that power routed to the controller has been powered off before beginning installation or making any setting. Make sure that nobody can connect appliance to the power supply while you are working.

The Schwank ThermoControl Plus 4M has to be mounted on/at a place, where it's not affected by vibrations or shocks.

Please install the ThermoControl Plus 4M ensuring conformity to the wiring diagram.

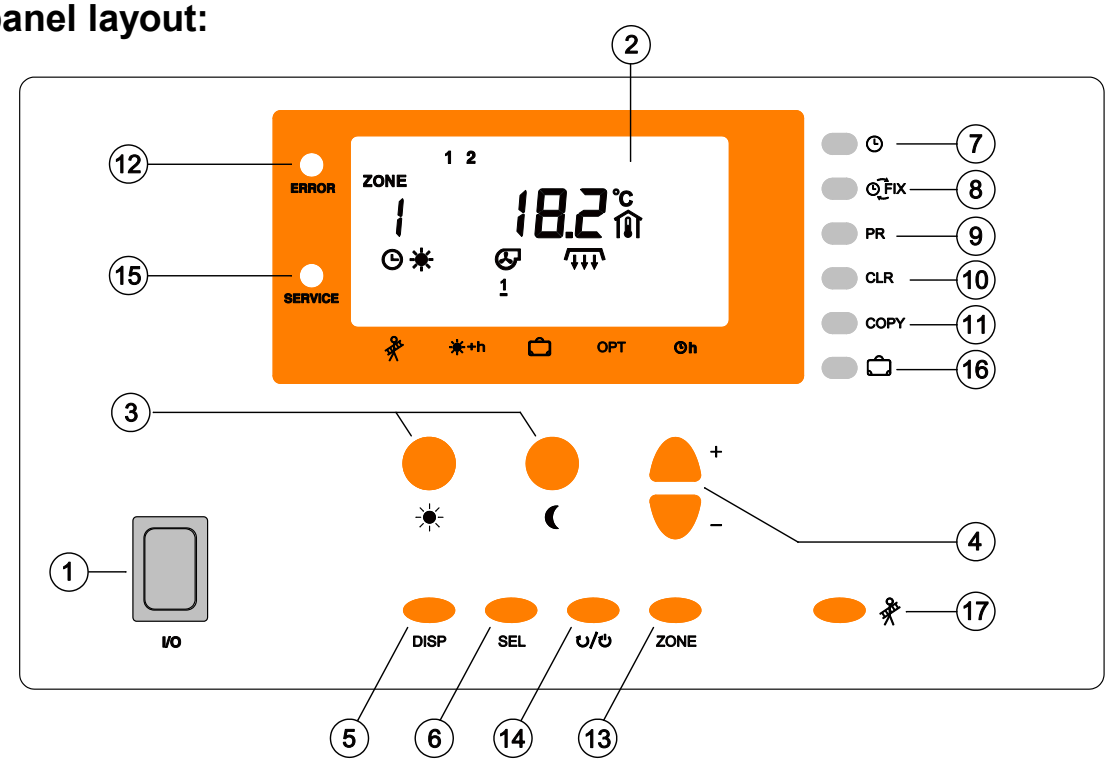
Ensure that the controller and the heater relays are connected by 16 AWG cable and controller and sensor connected by a 18 AWG cable.

Install the room-temperature-sensor between the radiation area of two heaters at a height of 2.5 m. Therefore the controller receives an optimal value of the nominal temperature.

+ If the controller is installed in a large building or in a building with extreme temperature differences (temperature gradiants), you can also measure average temperature, connecting additional room-temperature sensors for every single heating zone control circuit.

3 Structure and Function

Front panel layout:



1. **I/O** Main switch on / off
2. **LCD** Display: All functional- and operating-information is shown on the default screen (picture above).The control unit switches back to the default screen, if no button is pushed for more than one minute.
3. ☀ ☾ If you push the ☀ button or the ☾ button, the daytime or night time temperature setpoint will be displayed immediately. By using the **+/-** buttons the values can be modified.
4. **+ / -** With these buttons the currently displayed value can be increased or decreased.
5. **DISP** „Display-button“: To change the displayed screen. This button also offers the ability to switch back to the default screen immediately.
6. **SEL** „SELECT”: This button allows you to select a certain parameter out of every parameter shown on the display. The chosen/selected parameter can be modified by the **+/-** buttons.
7. Clock-button: It can be used to display and modify time and date.
8. FIX Push to switch between programmed and FIXed operation modes.
9. **PR** To check and modify the weekly schedule program in the displayed heating zone.
10. **CLR** „Clear-button“: To delete a switch-point or a complete schedule program.
11. **Copy** Push to copy time- and temperature programs.
12. **ERROR** The system-error light turns on for any kind of error. A blinking sign on the display will provide information about the cause.
13. **ZONE** Push to switch between different heating zones.
14. ↻/⏻ Push to turn on/off the selected heating zone.
15. **SERVICE** „Maintenance”: If this sign appears, the system requires maintenance: please call service.
16. Push to program vacation operation mode.
17. Button for system check operation mode: all heating zones will operate with full load.

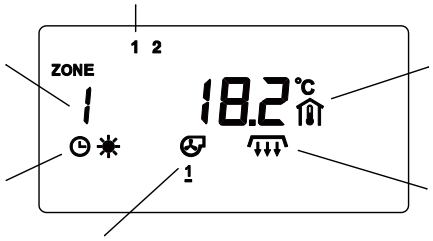
4 Operation

4.1 Basic operational parameters

By starting the ThermoControl with the I/O switch an automatic display-test is activated. The controller starts up with default settings. Afterwards the display jumps to the default screen, which shows all the important operational information.

ID number of relay outputs and sensor inputs assigned to the currently selected heating zone.

ID number of the selected heating zone



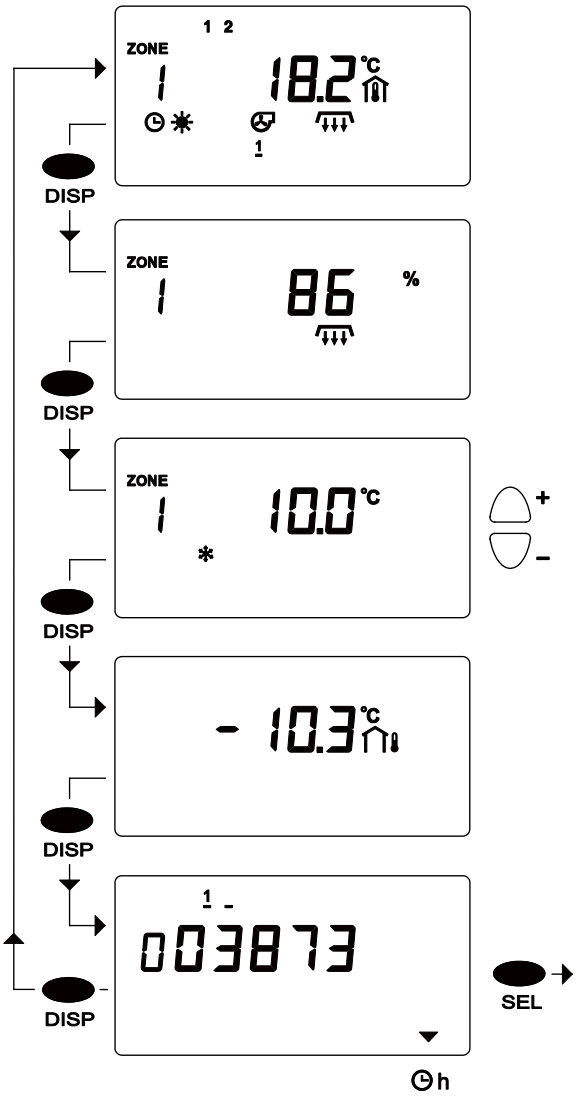
Measured temperature in the room/zone (18.2°C)

Actual control mode, in this case: day mode

The exhaust fan is working (optional)
1: Air-proving closed
1: Air-proving open

Present status of the heater:
full load
partial load (2-stage or Modulatingl)
heater is turned off

4.1.1 Further information



The default screen gives all important operating data, further information can be retrieved by pushing the **DISP** button.

Current level of heater output.
In one-stage operation it only shows 0% or 100%.

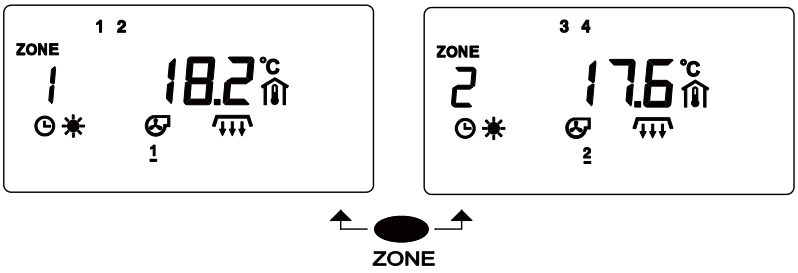
Value of the entered frost protection temperature ✻.
The displayed value can be changed by pushing the **+/-** buttons. Value range: +3 ... +20 °C / 37 ...68 ºF

Outdoor temperature – value measured by OAS outdoor temperature sensor only

Operation time counter: All stage relays have a counters in two-stage control mode

Push the **SEL** button to switch between the stage counters. The shown data cannot be modified, after 199999 hours the display resets to zero.

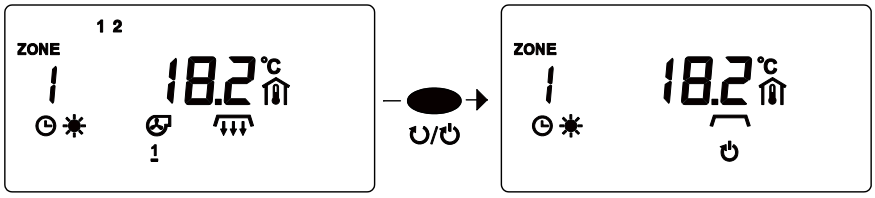
4.1.2 Selection of a heating zone



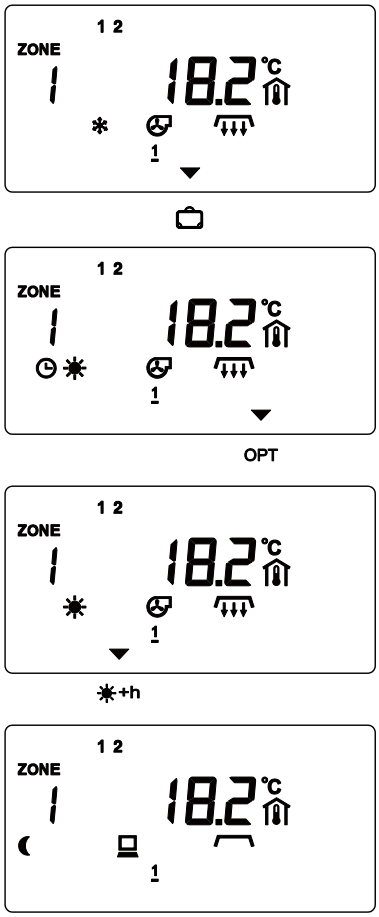
The screen content, and adjustable parameters belong to the selected heating zone. The zone can be selected by pushing the **ZONE** button. After pushing the button, all settings of the heating zone can be adjusted and set.

4.1.3 Turning the selected zone on/off

If you want to stop heating a certain zone, push the ↻/⏻ button. The ⏻ symbol will sign the off-state of the zone. Measurement and display of zone temperature still works in a zone that is turned off. You can turn the zone on again by pushing the ↻/⏻ button.



4.1.4 Special information on the default screen



While using the vacation-mode the sign 🧳 will be marked.
To stop or modify the vacation program, please push the 🧳 button (chapter 4.5).

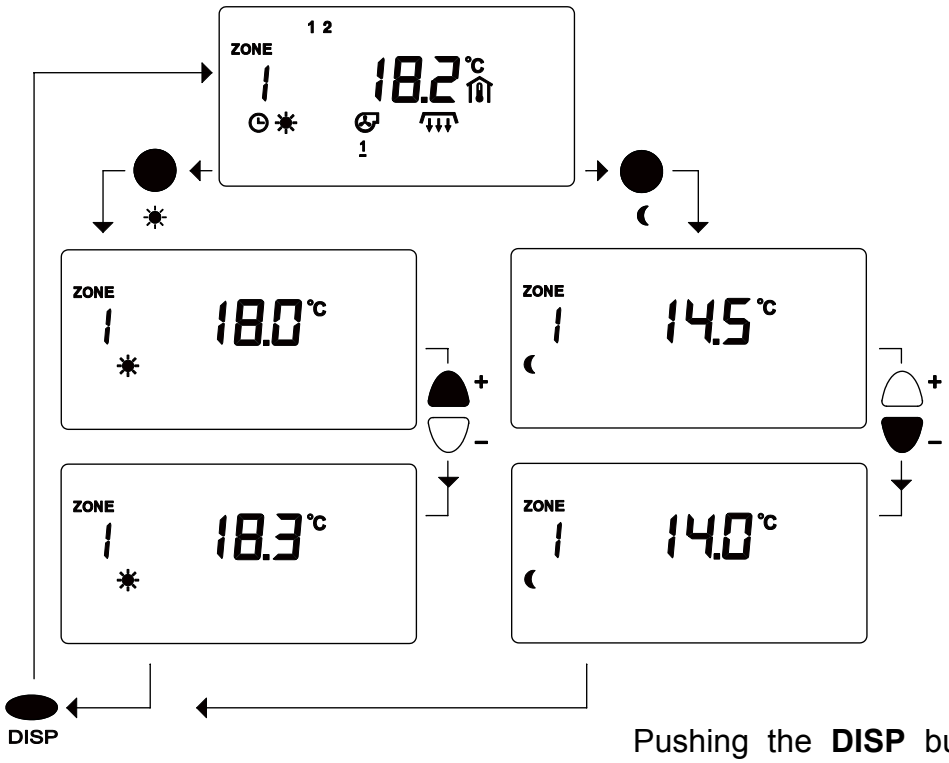
During the optimized heat-up period, you will notice the **OPT** symbol. The starting time of a specific zone is determined by an algorithm. This way the controller automaticaly adapts to environmental specifics like outdoor temperature, heat-up performance, and possible structural changes in the heating zone. The feature can only be deactivated in the setup-menu. An OAS outdoor temperature sensor is required for this feature.

Option: After pushing the override button the day time mode starts for a preset, adjustable time (0:00-24:00h; default is 1h). At the same time the ☀**+h** symbol will be marked. This operation can be stopped by using the FIX button.

Night time mode has been selected remotely (💻). All three operation modes (❄ ☾ ☀) are possible, just like in case of FIXed modes.

4.2 Display and change of day- and night time temperature

The desired temperature for every heating zone can be programmed separately.



The current day- or night time temperatures can be displayed, if you push the ☀ or ☾ button.

The displayed values can be modified by pushing the **+/-** buttons.

All modifications are saved immediately.

The temperature setpoint values can be adjusted in the following range:

+3…+35 °C / 37 ...95 ºF

Pushing the **DISP** button, (or automatically after one minute, without pushing a button) the display jumps back to the default screen.

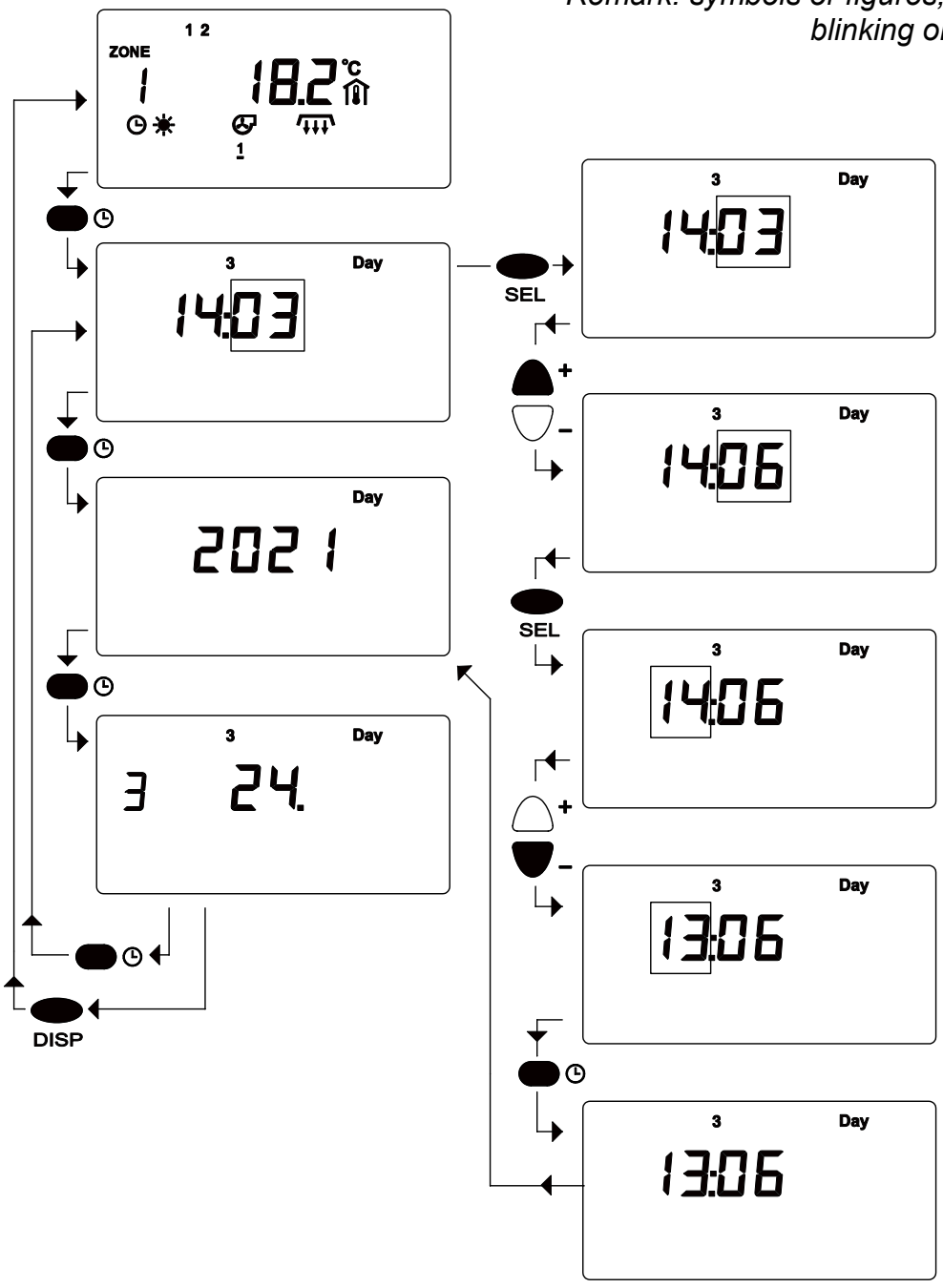
4.3. How to read and modify time and date

To read and modify time and date, the ⏲ button has to be pushed.
All heating zones have a separate program schedule. This function takes place in the digital clock. At first the time is shown (in the picture: 14:03). Afterwards you have to use the ⏲ button again, to be able to change the year (2021), after pushing the ⏲button for the third time month and day (in this case: 3 = March, 24) are displayed. „3 Day" stands for the third day of the ongoing week, in other words: Wednesday. (1= Monday, etc.)

After using the ⏲ button once more the display jumps back to the normal clock.
The display jumps to default screen, if you press the **DISP** button.

Setting the time

Remark: symbols or figures, which are framed are blinking ones!



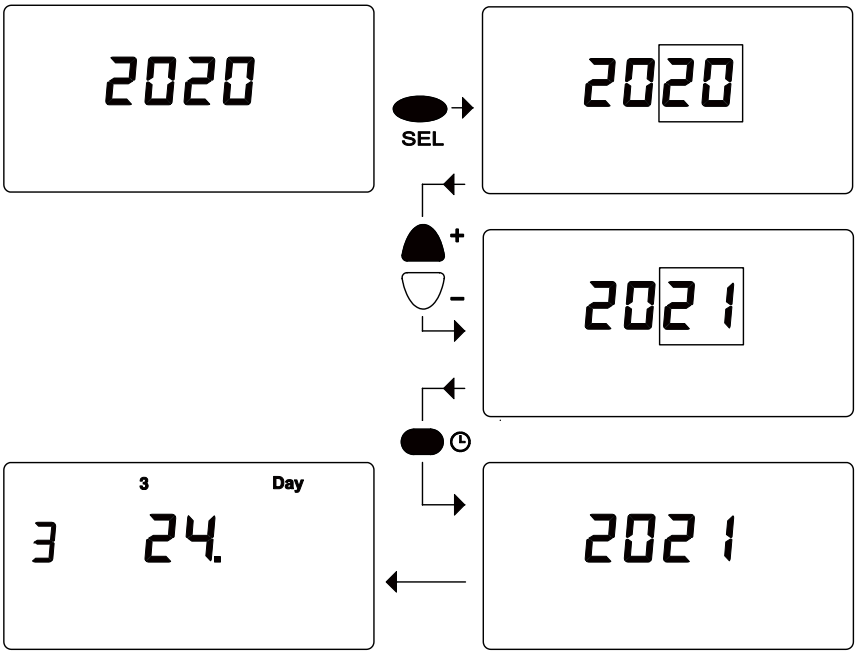
To change the time, the **SEL** button has to be pressed. At first the minutes start to blink (03), which can be modified by using the buttons **+/-**.

After pushing the **SEL** button again, the hours will start to blink. (14) The hours can also be changed with the **+/-** buttons.

The setting of the time can be finished by using the ⏲ button.
Afterwards the display goes back to the year.

Setting the year

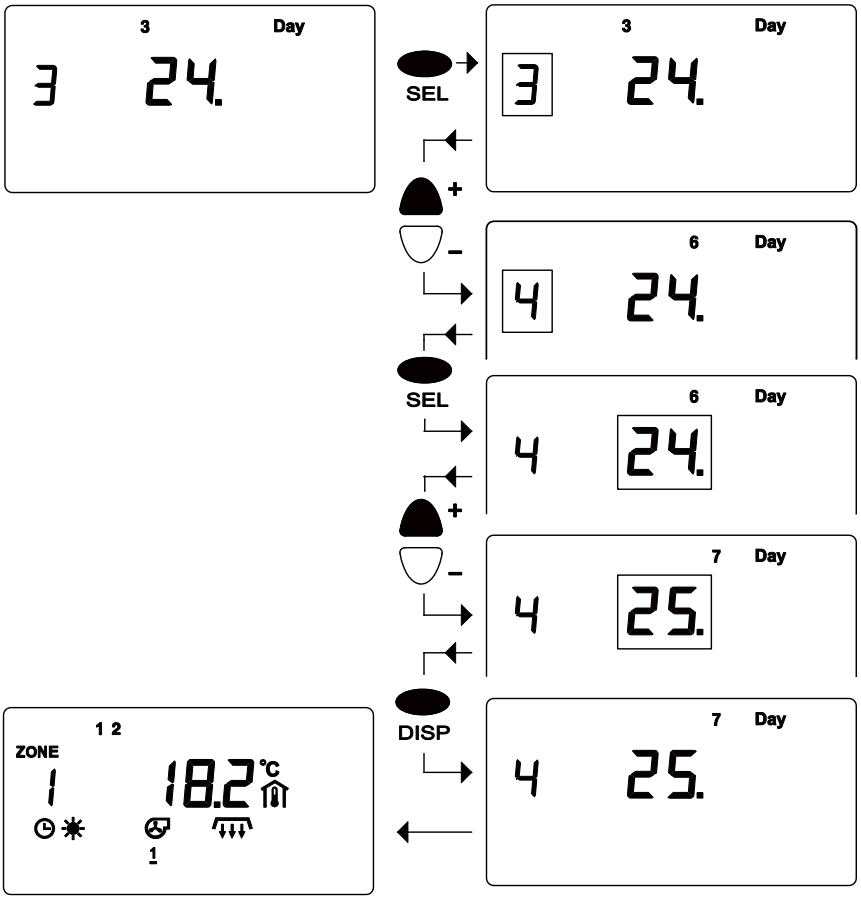
After the time has been modified, you have to set the right year, month and day as well. Otherwise the automatic summer- / wintertime correction won't work correctly.



To change the year, you have to press the **SEL** button. The last two figures will start to blink (20), they can be modified with the **+/-** buttons.

Afterwards the ⏲ button has to be pushed, and month and day respectively will be shown on the display. When the year has been modified, the day of the week might be changing, according to the calendar (in this case 3).

Setting the month and day



To change the setting you have to press **SEL**. At first the month (3) will start to blink, the setting can be modified with **+/-**.

To change the day please push the **SEL** button again. Now, the day starts to blink (24). The day can also be modified with the buttons **+/-**.
Once more the day of the week changes according to the calendar (first from 3 to 6, then from to 7).

If the setting is completed push **DISP**. After pushing the button, the display switches back to the default screen.

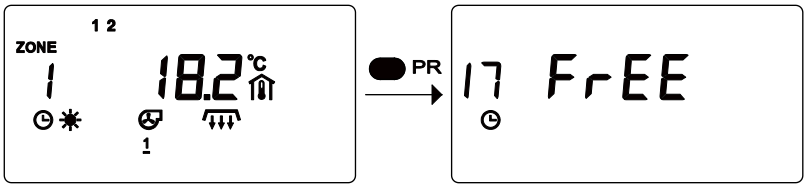
4.4 Timing

Every heating zone has an independent schedule program, which can be modified.
The time program is a series of different switching times or switching points. The controller changes automatically from daytime , to night time or frost protection mode .
An on/off command can be described as:

- time (hour and minute)
- operation mode , or , which will start at this time
- day of the week, or couple of days, when the on/off command should be active (1 = Monday, 2 = Tuesday ……7=Sunday)
- number of on/off command (max. 19 times in one program)

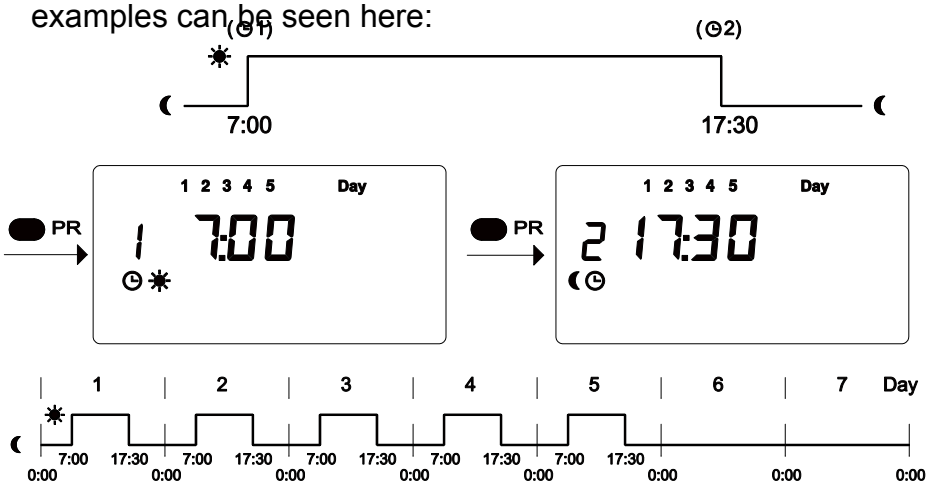
4.4.1 How to read a time program

To see the time program in the selected zone push the **PR** button.

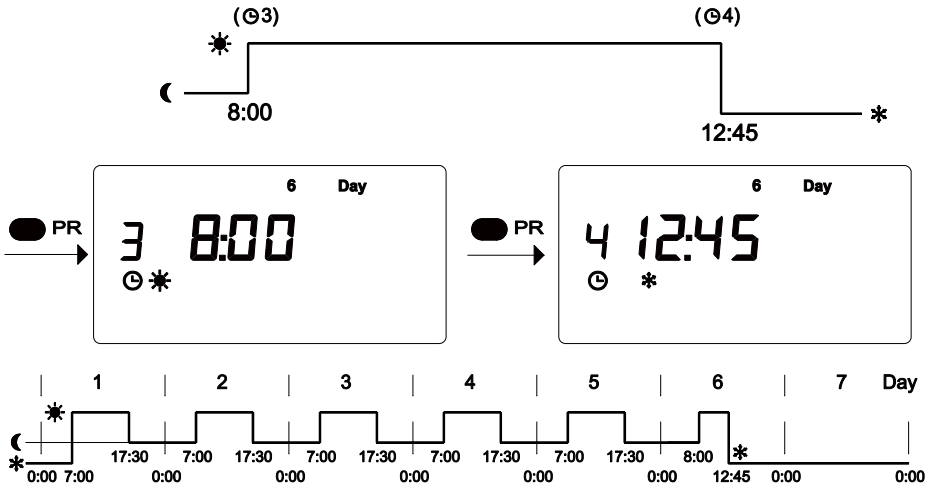


When you first press the **PR** button: for a short time the display will show the number of free on/off command locations (here:17 free points).

Then display will jump to the first programmed on/off command. When press the **PR** button repeatedly the stored on/off command will appear one by one. Over the symbol the number of the on/off command can be seen, on the upper part of the display the " **1 2 3 4 5 Day**" informs that on what days of the week (1= Monday…) will this on/off function be active. With a few presses on the **PR** button you can see the full weekly heating program. Two examples can be seen here:

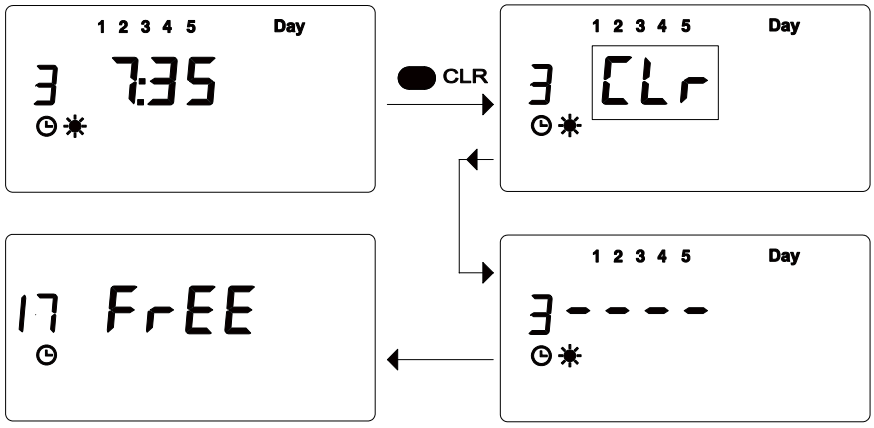


At the on/off (**7:00**) daytime mode heating is started. Then at time point **2** (**17:30**) the night time mode heating begins. As these two points are valid on the first five days of the week (**1 2 3 4 5 Day**) and there are no other programmed points for the last two days (**6 7**) the whole weekly program is described with these two command points.



In the next example this program is extended with two additional on/ff commands : on Saturday (**6 Day**) at the time **3** (**8:00**) day mode heating is started, then at time point **4** (**12:45**) the frost protection mode begins. This mode will be active until the next on/off command(**1**) that is on Monday.

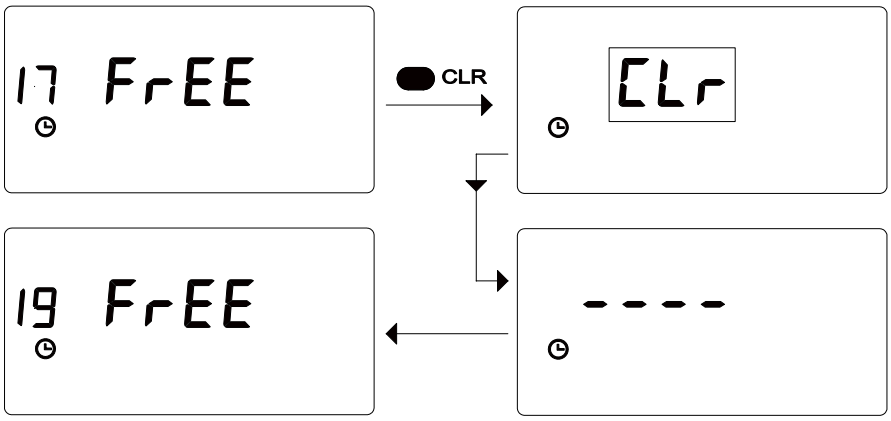
4.4.2 How to clear a switching point



If you want to clear an on/off command, you have to push and hold the **CLR** button. The symbol CLR will blink on the display, so that you are warned you are going to clear a on/ off command,. If the **CLR** button is released immediately the cancellation will be stopped. If the cancellation is completed, horizontal lines are visible. Afterwards the new number of free on/off commands are displayed.

The ID number of an on/off command, is not fixed. If an on/off command, is deleted the numbers of the remaining command will be assigned again, thus there is no chance of holes in the time program.

4.4.3 How to clear a whole program schedule

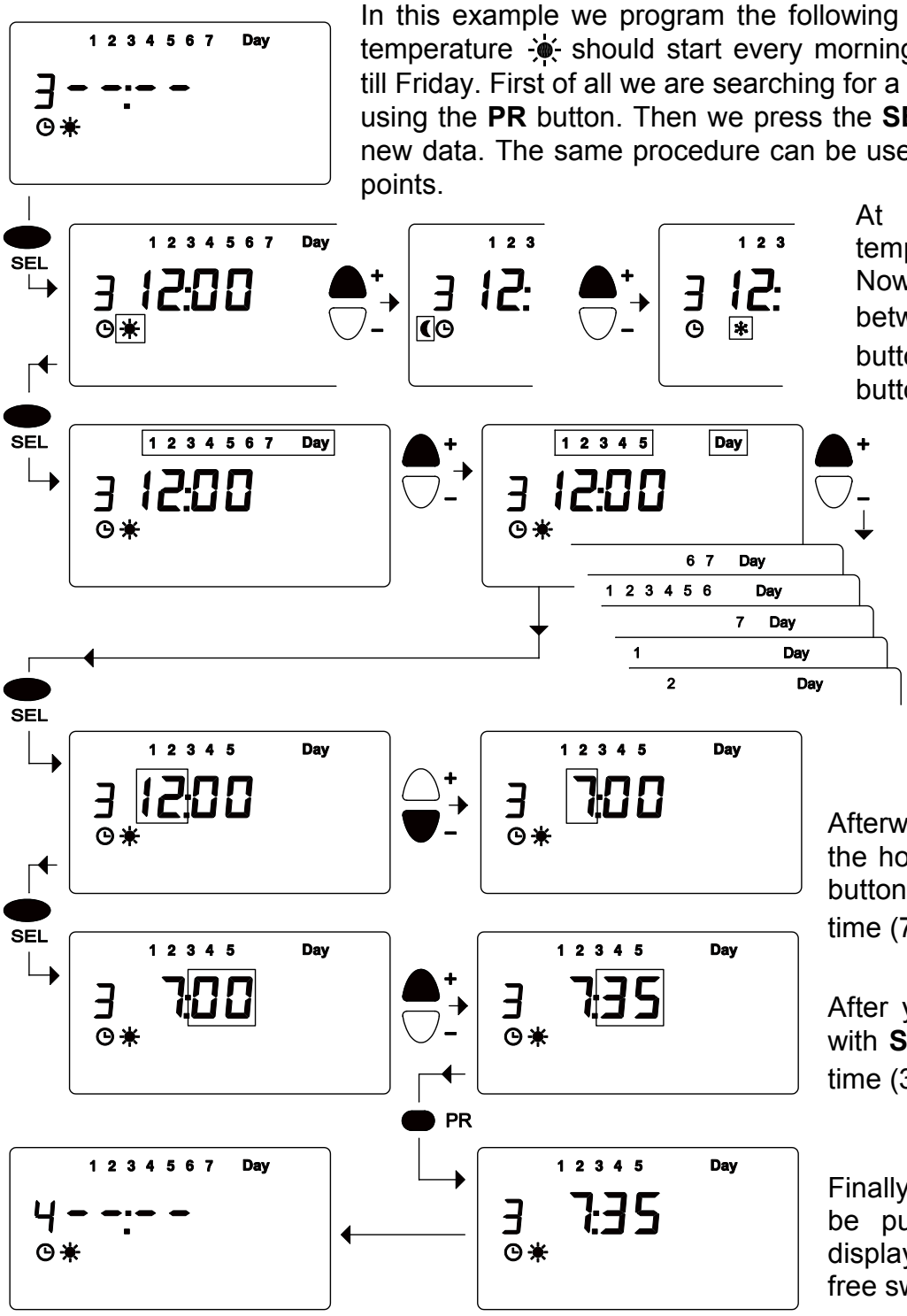


To clear a whole on/off schedule, you have to push and hold the **CLR** button while the number of free spaces are shown in the display **(FrEE)**.
The symbol CLR will start to blink, to warn you. If the button is released immediately the cancellation of the program will be stopped.
The cancellation is completed, if horizontal lines become visible. That is followed by the new number of free spaces (19).

4.4.4 How to protect the program schedule

The function of the program schedule is based on the clock and calendar data.
The clock is supplied by a battery (1,5 V AA). A warning signal shows, when the battery has to be changed. The exact time and date won't get lost while the battery is getting changed (for 2 minutes).
In case the control unit has not been used for a long time, including a complete discharge of the batteries, you will have to check if time and date are still correct after the change of the battery, to avoid problems.
The saved on/off command are independent of the battery charge, because the program is saved on a secured EEPROM-
memory . Thus time programs cannot get lost as a consequence
of a battery change or in the case of any other mistake.

4.4.5 How to program the switching points



In this example we program the following circumstance: The day temperature ☼ should start every morning at 7 :35 from Monday till Friday. First of all we are searching for a free on/off point by using the **PR** button. Then we press the **SEL** button to modify the new data. The same procedure can be used for existing son/off points.

At first the type of temperature starts to blink. Now you are able to chose between ☼ ☾ and ✻ button by using the **+/-** buttons.

Now you can select the day program with the **SEL** button. Then the whole week appears: 1234567

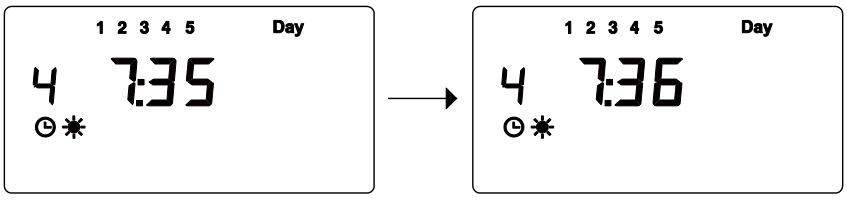
Pressing **+/-** you are able to select different day groups or only single days (1=Monday).

Afterwards you can modify the hour by pushing the **SEL** button (12). The requested time (7) can be set with **+/-**.

After you select the minutes with **SEL** (00), the requested time (35) can be set with **+/-**.

Finally the **PR** button has to be pushed. Afterwards the display switches to the next free switching point.

It is not possible to program two different on/off points with the same time parameter. In case of a saving mistake of two on/off points for the same time, the time of the last programmed command will be corrected by one minute.



In this case a new on/off point was programmed with a time parameter of 7:35. Unfortunately this time parameter was used already in on/off command 3. Thus the time changes automatically to 7:36.

4.5 Vacation program

The controller gives you the opportunity to program 8 vacation periods. Beginning and ending of the vacation is displayed with exact data (year, month, day). The programs can be changed or stopped anytime.

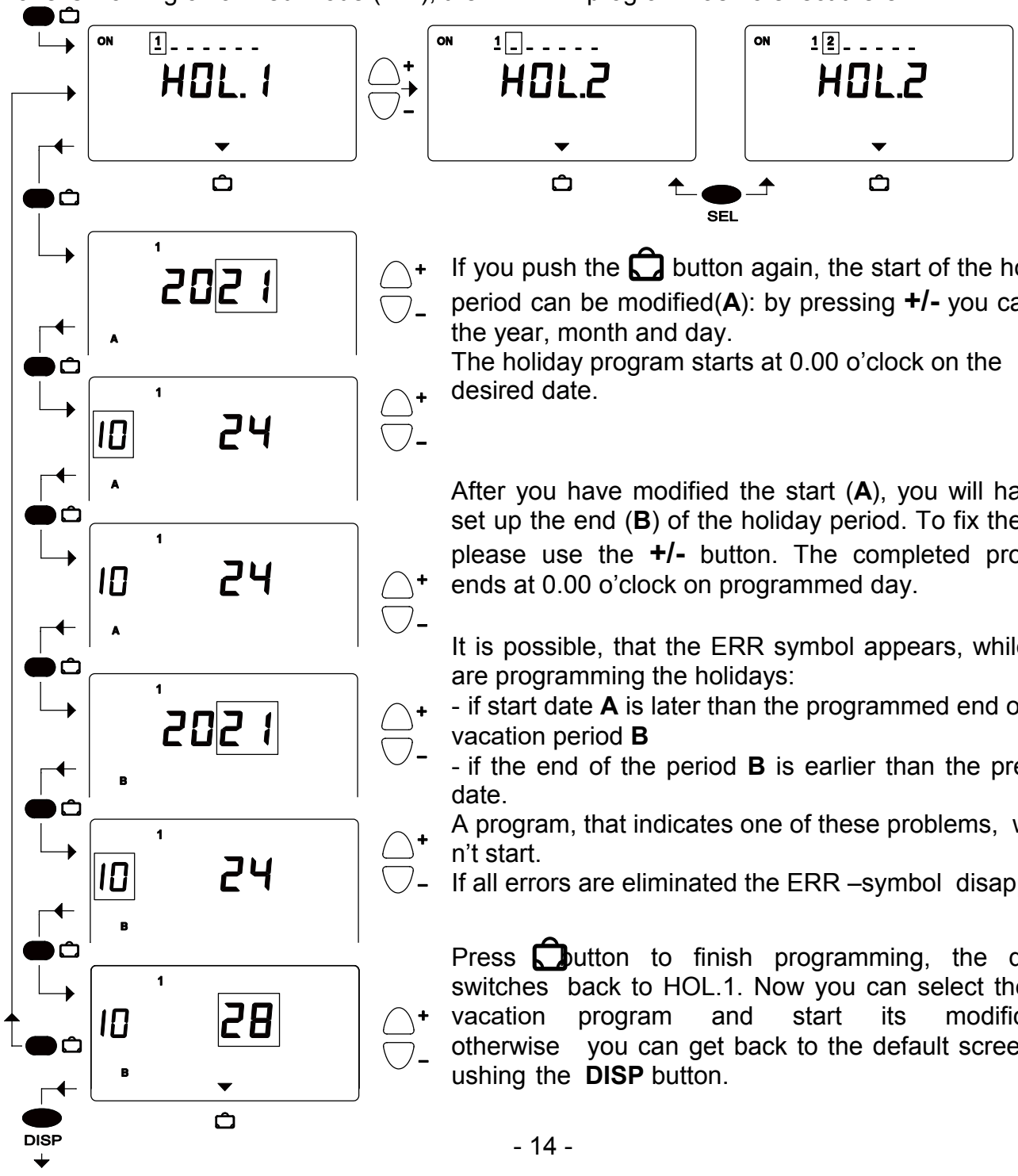
During the vacation program the frost protection temperature ✻ will be maintained.

To program the holiday periods, push the 🛍 button.

At first the number of the vacation program HOL 1 (vacation 1) appears. The number above t he vacation number shows which program is activated. A programmed vacation period starts

automatically at the programmed date. With the **SEL** button you are able to start or stop the programmed vacation period. If the program is switched off (program number does not appear) it won't start, a running program would be shut down respectively. By using **+/-** you are able to choose one of the 8 holiday programs.

The vacation program starts in all heating zones, which are working in automatic mode 🕒. If a zone is working on a fixed mode (FIX), the vacation program has no effect there.



If you push the 🛍 button again, the start of the holiday period can be modified(**A**): by pressing **+/-** you can set the year, month and day.
The holiday program starts at 0.00 o'clock on the desired date.

After you have modified the start (**A**), you will have to set up the end (**B**) of the holiday period. To fix the date please use the **+/-** button. The completed program ends at 0.00 o'clock on programmed day.

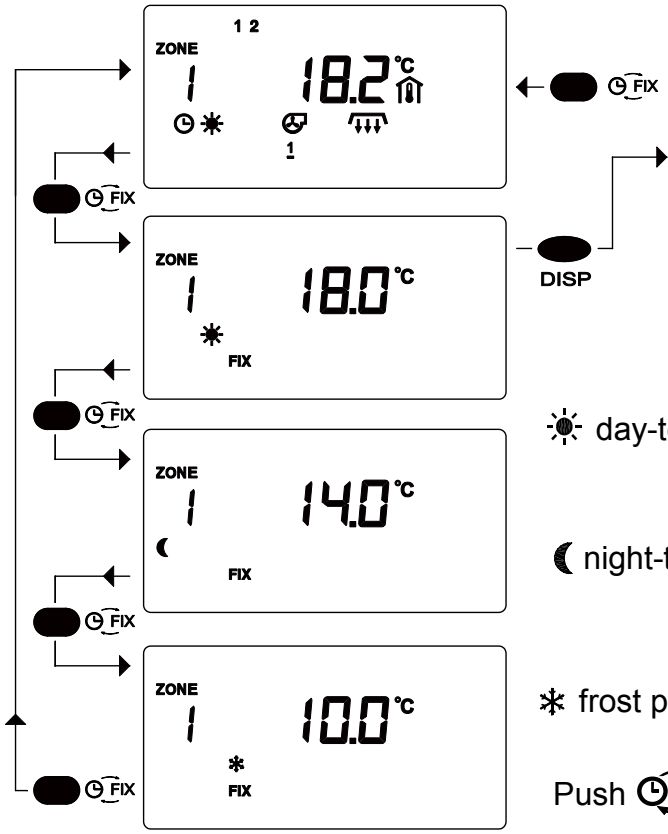
It is possible, that the ERR symbol appears, while you are programming the holidays:
- if start date **A** is later than the programmed end of the vacation period **B**
- if the end of the period **B** is earlier than the present date.

A program, that indicates one of these problems, would n't start.
If all errors are eliminated the ERR –symbol disappears.

Press 🛍 button to finish programming, the display switches back to HOL.1. Now you can select the next vacation program and start its modification, otherwise you can get back to the default screen by p ushing the **DISP** button.

4.6 Manual operation FIX

If you use the FIX button, you are able to select different operating modes.



To change the **FIX** mode you have to push the FIX button.

Press **DISP**, if the desired operation mode appears (for example: continuous ☼ **FIX** mode). The control unit switches back to the default screen and the selected mode is activated.

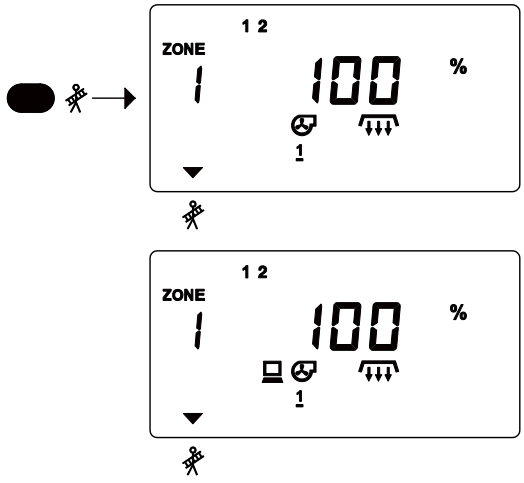
☼ day-temperature mode

☾ night-temperature mode

✻ frost protection temperature

Push FIX to get back to the default screen.

4.7 Button for chimney-sweep mode



By pushing the **button** the heater runs with full power independent of the current room temperature. You can switch back to the base display mode by pushing this button again.

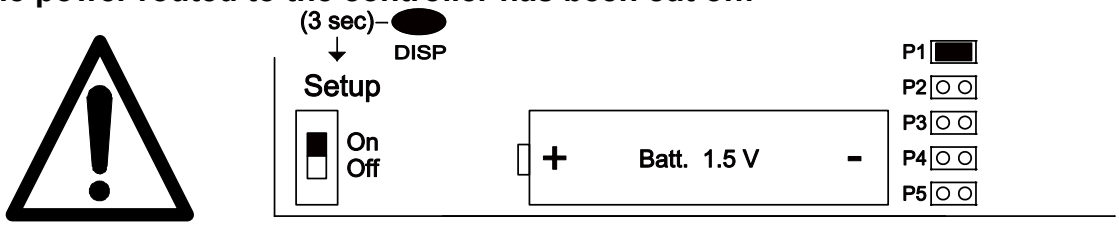
System check mode activated remotely (💻).

To turn off System check mode, push the button.

5 Set up the operating parameters

The setup parameters can be modified from the front panel. To modify the parameters you have to have technical knowledge, otherwise proper operation can not be guaranteed. Inside the controller there is a sliding switch to avoid unwanted functional changes, thus
parameters can be locked. The switch is located in the upper inside of the control unit. Permit the setup: „ON", avoid the setup: „OFF".

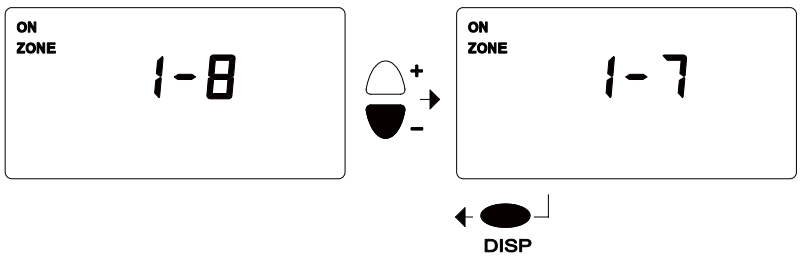
Before you open the control unit, please read the important notes in chapter 2! The „setup"-switch as well as the selection of the program P1 and P2 may only be carried out after the power routed to the controller has been cut off.



The main operation program can be selected inside the controller unit(P1, P2, P3, P4, P5). A small "jumper" has to be placed in the correct position. Only one program can be chosen at any given time. Please be careful by choosing the right electrical connection for the desired program!
In case of changing the application program(P1, P2, P3, P4, P5) all parameters switch back to the default settings (chapter 5.1 and 5.2) !
P1 - Eight heating zones, single-stage
P2…P5 – Four to seven zones, single-, two-stage or modulation control

5.1 Enter the number of heating zones

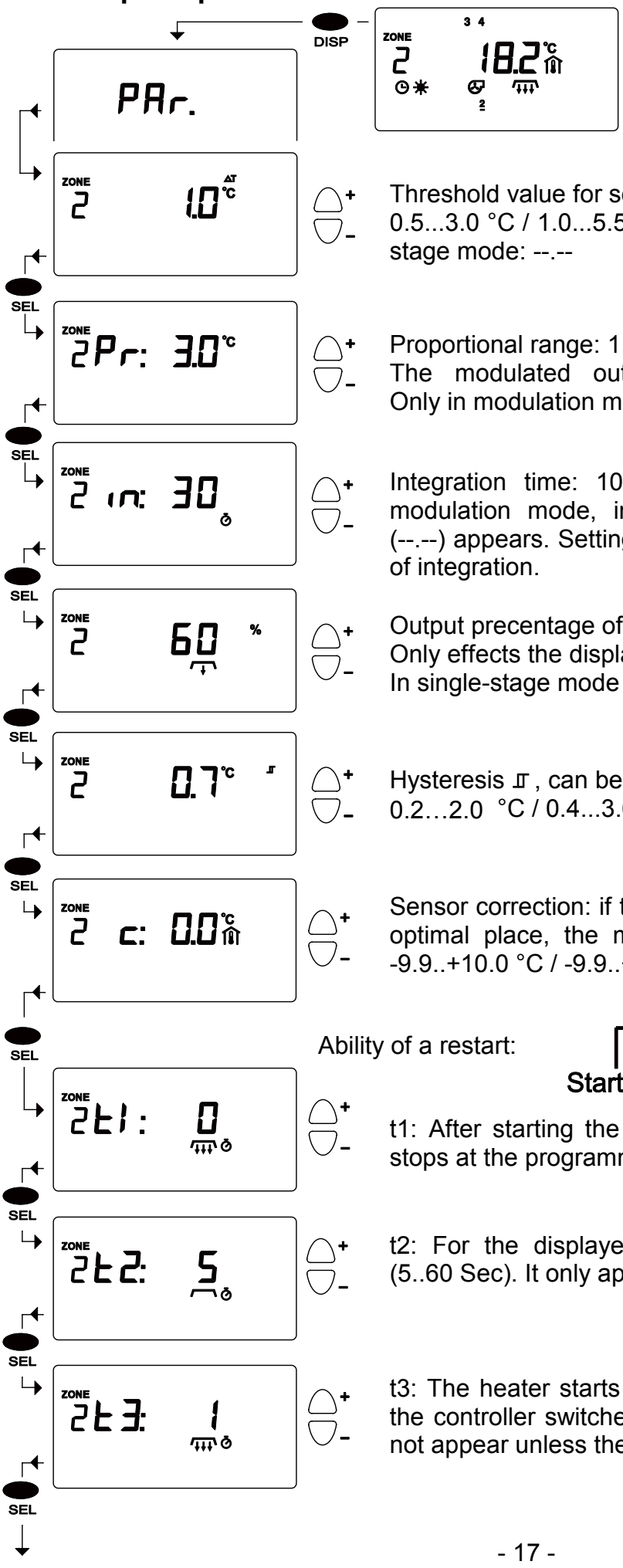
The controller is able to manage four to eight control zones, depending on the chosen operation program. In the following example we are fixing the actual number of control zones.



Hold the **ZONE** button for about 3 seconds. The number of available heating zones appears on the screen (for example.: 1-8: eight heating zones). The desired number of heating zones can be selected if you push **+/-** (1-7).

Get back to the default screen by pushing the **DISP** button.

5.2 Set up the parameters



To set up the parameters please hold the **DISP** button for about 3 seconds. The „Par" symbol appears for a short time. The parameters can be selected with the **SEL** button.

Threshold value for second-stage:
0.5...3.0 °C / 1.0...5.5 ºF. Only in two-stage mode; in single-stage mode: --.--

Proportional range: 1.5...10.0 °C / 2.7...18.0 ºF.
The modulated output is spread across this range. Only in modulation mode; in single-stage mode: --.--.

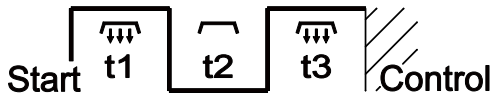
Integration time: 10…99 minutes Only in two-stage or modulation mode, in single-stage mode, or in off-state (--.--) appears. Setting it lower than 10 will result in off-state of integration.

Output precentage of the heater in first-stage.
Only effects the displayed value.
In single-stage mode (--.--) appears.

Hysteresis ⎍, can be activated by
0.2…2.0 °C / 0.4...3.6 ºF

Sensor correction: if the sensor could not be mounted at an optimal place, the measured temperature can be offset: -9.9..+10.0 °C / -9.9..+10.0 ºF

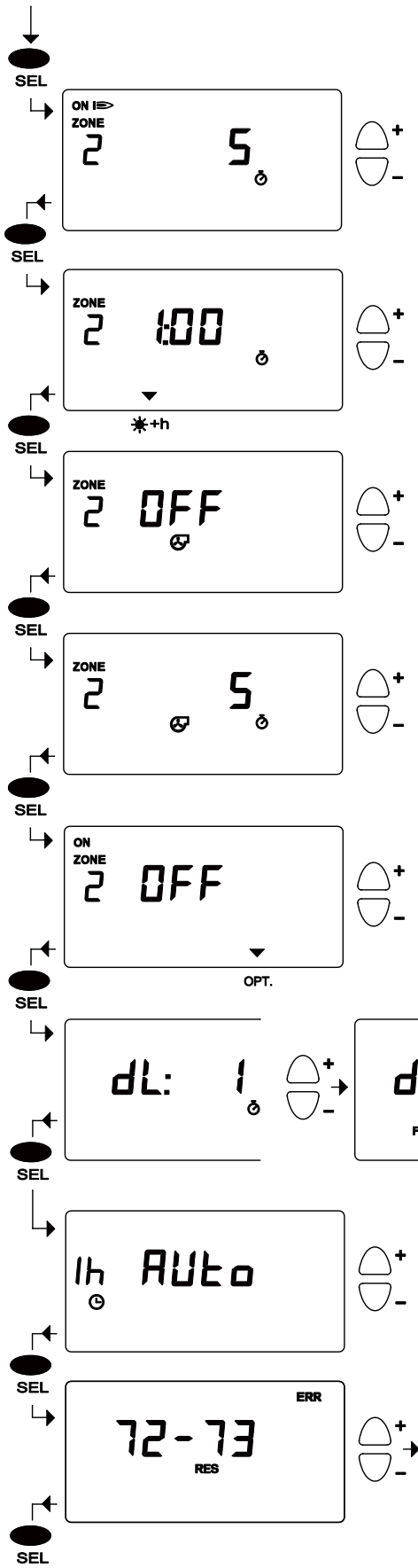
Ability of a restart:



t1: After starting the heater, it runs with full power until it stops at the programmed time, in this case: 0…5 minute.

t2: For the displayed time, the heater stops completely (5..60 Sec). It only appears, if the t1 is not equal to zero.

t3: The heater starts with full load for 1 minute, afterwards the controller switches to the regular mode (0: off). It does not appear unless the two-stage control is selected.



Minimal operation time of the heater. (0...15 min)

Programmable time for the override button ☼**+h**
(0:00-24:00)

'OFF': the exhaust fan is switched off (also the symbol doesn't appear).

'AUto': exhaust fan and air-proving contact in use.

Exhaust fan follow-up-time :
After the heating zones have been switched off, the exhaust fan continues to run for a preset time. From 0 up to 60 minutes can be programmed (it appears only in the "AUto" ventilation mode).

The Heat-up optimization can be switched on (AUto) or off (OFF). The effective warm up time is shown.

The illumination of the display can be programmed: 1…9 minutes, switched on (ON) or switched off (OFF).

Automatic switch from summer time to wintertime (+/- 1h).
This function can be activated (AUto) and deactivated (OFF).

Feature selection of the contact input no. 72-73:
☼ : remote contact
RES-ERR: signal input - Error

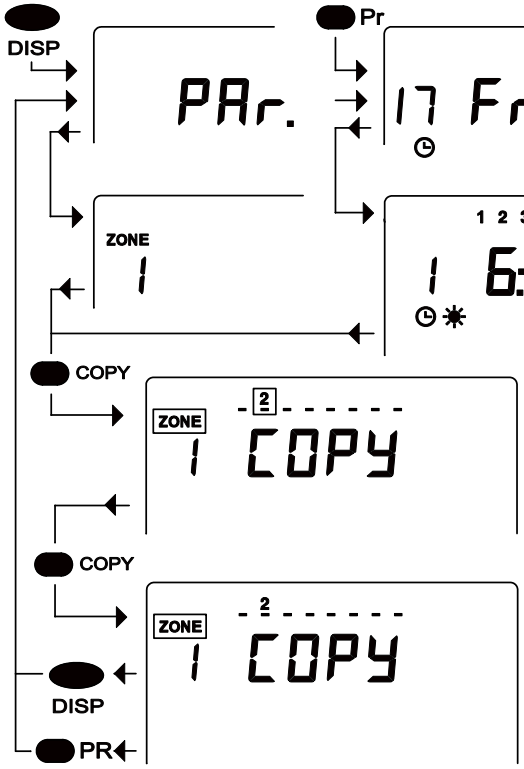
If a communication module is integrated into the controller, other parameters will follow.

5.3 The Heat-up optimization

The Heat-up optimization is only operational if an OAS sensor is connected to the controller. The program works automatically and doesn't need to be adjusted. The Heat-up optimization follows an easy principal: the controller switches on the heater ☼ earlier than it is programmed, so the desired temperature is achieved at the favoured time. Temperature differences and the current outside temperature are integrated in the calculation for the heat-up time. The control-unit incorporates the heating characteristics of the building and adjusts the starting point of the heat-up time to be precise. Every heating zone has a separate, optimized heat-up time.

5.4 COPY

The **COPY** button offers you the opportunity to copy all parameters of a certain zone or the complete time program and insert it into the program of one or many other zones.



To copy parameters hold **DISP** (approx. 3 sec., chapter 5.2).
To copy time programs use the **PR** button (chapter. 4.4.1).
To exemplify the procedure, we copy the data of Zone 1.

ZONE signal and number of Zone 2 start to blink. „COPY" appears on the screen to indicate the copy mode. Push **COPY** to paste the data of Zone 2.

The data of Zone 1 are now copied into Zone 2, The numeric 2 is indicating the completion of the copy process. Now you can continue to copy to other Zones by selecting Zone 3 to Zone 8 using the **SEL** button.

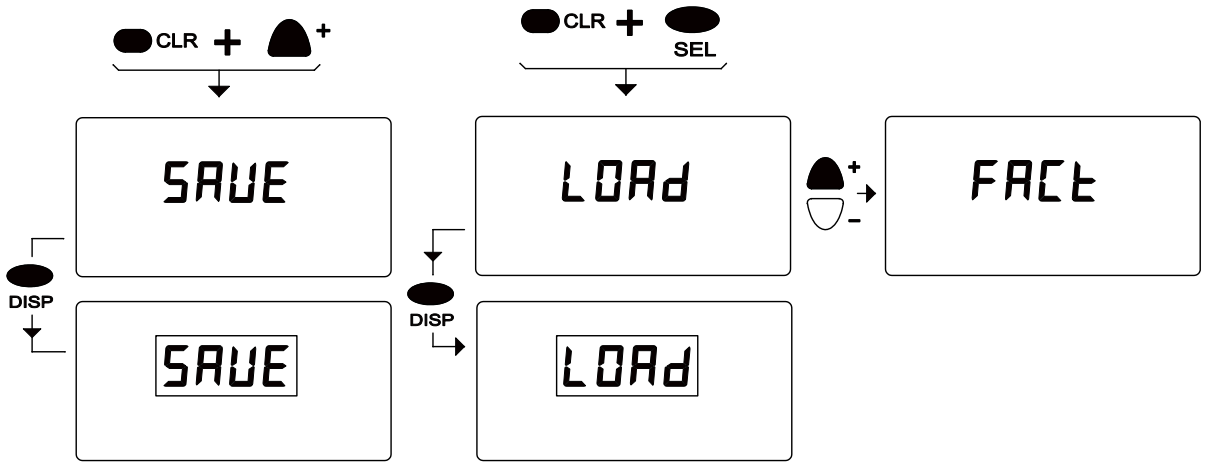
To finish the copying of the parameters you have to press **DISP**, while you have to use the **PR**-button to finish the copying of time programs.

5.5 How to do a security save and how to reload all parameters:

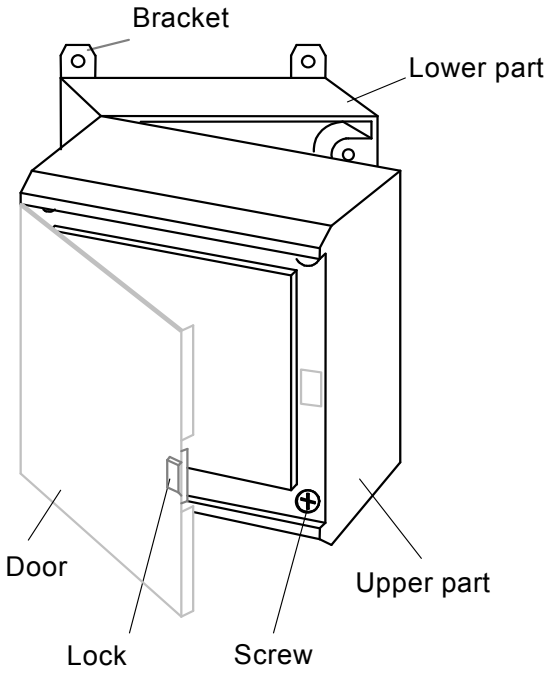
The Schwank-service technician can save all operational parameters as a package on a storage memory. In case of unintentional parameter changes, and functionality problems, the stored parameters can be restored. It is also possible to reload the default settings.

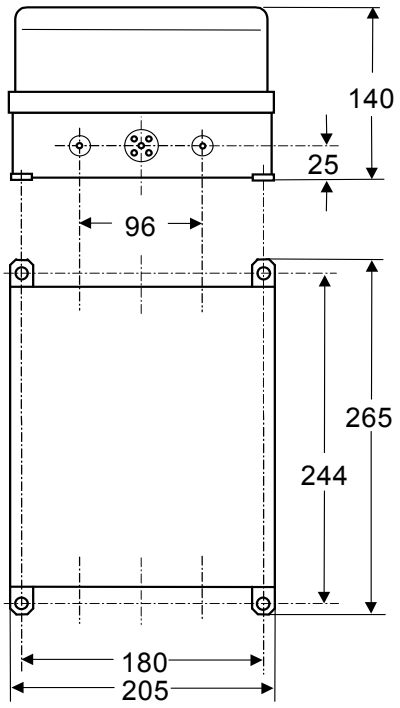
Press **CLR** and **+** simultaneously. The „SAVE" symbol will appear on the display. Now push **DISP**, the display will start to blink, the parameters are saved, afterwards the display switches back to the default screen.

If you press **CLR** and **SEL** simultaneously, the „LOAd" symbol appears on the display. Then press the **DISP** button and the parameters, that were saved by the Schwank-service technician, will start to reload. Switch from „LOAd" to „FACt", by using the **+/-** button. If „FACt" appears on the display, push the **DISP** button and the default parameters are restored.



6 Installation



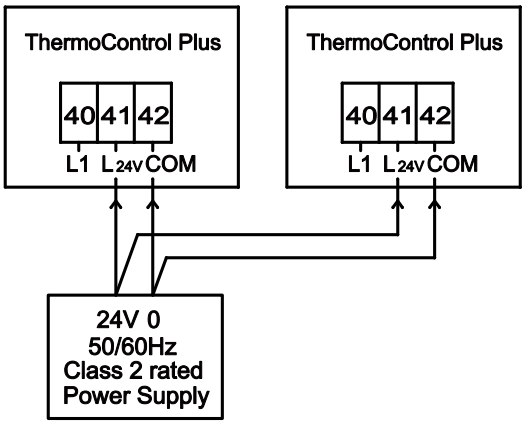


6.1 Important general instructions

The appliance must be isolated from the power supply while installation or connection works are carried out! The "Off" position (O) of the main control switch I/O doesn't indicate a complete zero potential of the controller!

We recommend that the installation is to be carried out in accordance with the national local and any local Bye-laws and the UL wiring regulation.
The power supply connection terminals identified as "L 24V" and "COM". The "COM" connection point is the common ground in the circuit: it is directly connected to the marked "C" points of the relay outputs and it is also the common point of the signal input terminals and the communication terminal. The "L 24V" power supply is connected through a Fuse (6.3A) to the connection terminal "L1".,**It is very important to make connections correctly in accordance with the wiring schemes of the selected application program!**

Pay special attention for the common ground while connecting external devices, to avoid making a short-circuit. When several ThermoContorol units are connected to one 24VAC power supply, be careful to connect the same terminals of the power supply to the "L 24V" and "COM" terminals of the units.



6.2 Sensor connections

The sensor has to be connected with two wires. There is no need to provide the sensor with shielded cables, because the controller includes an effective protector. The length of the wires (up to 200 m) has no influence on the accuracy of the measurement. Please avoid running the sensor wires next to high voltage wires. The sensor connection has to match the selected operating program. Unused inputs have to be kept free of usage!

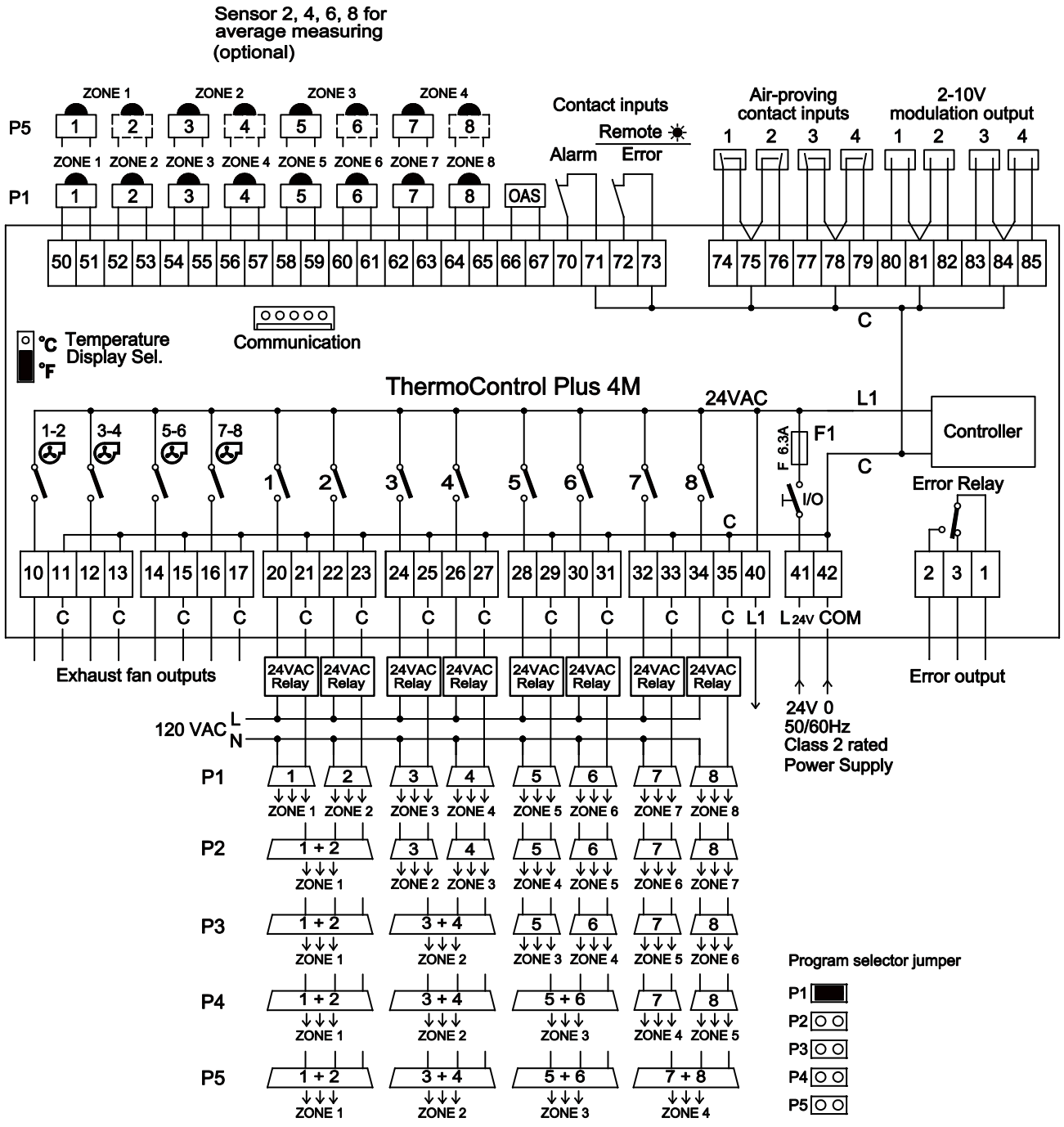
6.3 Connection of the heaters

Only 24VAC Class 2 equipments can be connected to the controller ! The relays inside the controller are switching 24VAVC powered contacts
on the connection terminals. Use 24VAC Class 2 rated power
relays to connect heaters that operate with higher than extra low voltage. Connect the heaters only at the provided terminals. Please note that the total load of the controller is limited to the value of 6.3 A.

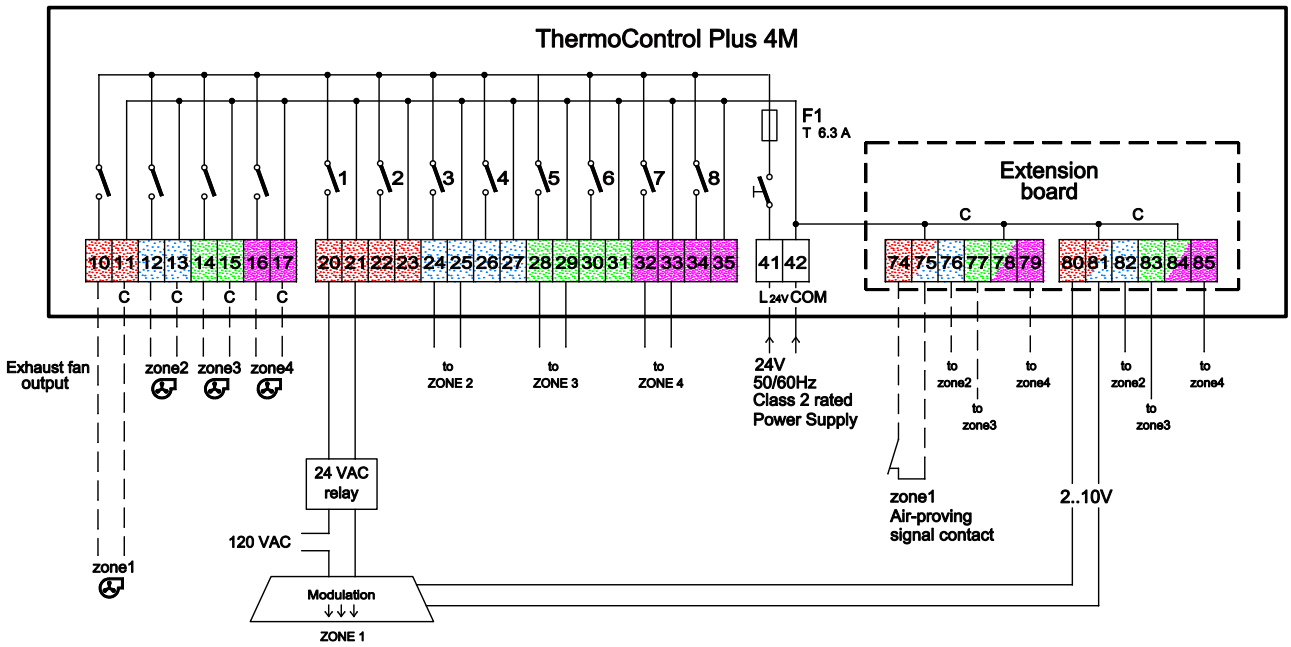
6.3.1 Modulation outputs (2-10V)

There are four modulation (2-10V) outputs (terminals 80-85). These will work simultaneously with the two-stage zones. Wiring should be carried out in accordance with the actual heater types (two-stage or modulation).
Example given: With program P5 selected, the first stages should be connected to terminals 20, 24 28, 32 (chapter. 6.4).
In case of two-stage heaters, second stage should be connected to 22, 26, 30, 34. In case of modulating heaters, the 2-10V inputs should be connected to terminals 80, 82, 83, 85. It is not important to have the same type of heaters in every zone.
If a zone is set to be one-staged, its modulation output will give 0V. (e.g. P4 – zone 4, zone 5) Outputs are protected from short-circuits, each can be loaded with 8mA (load ≥ 1,2kOhm).

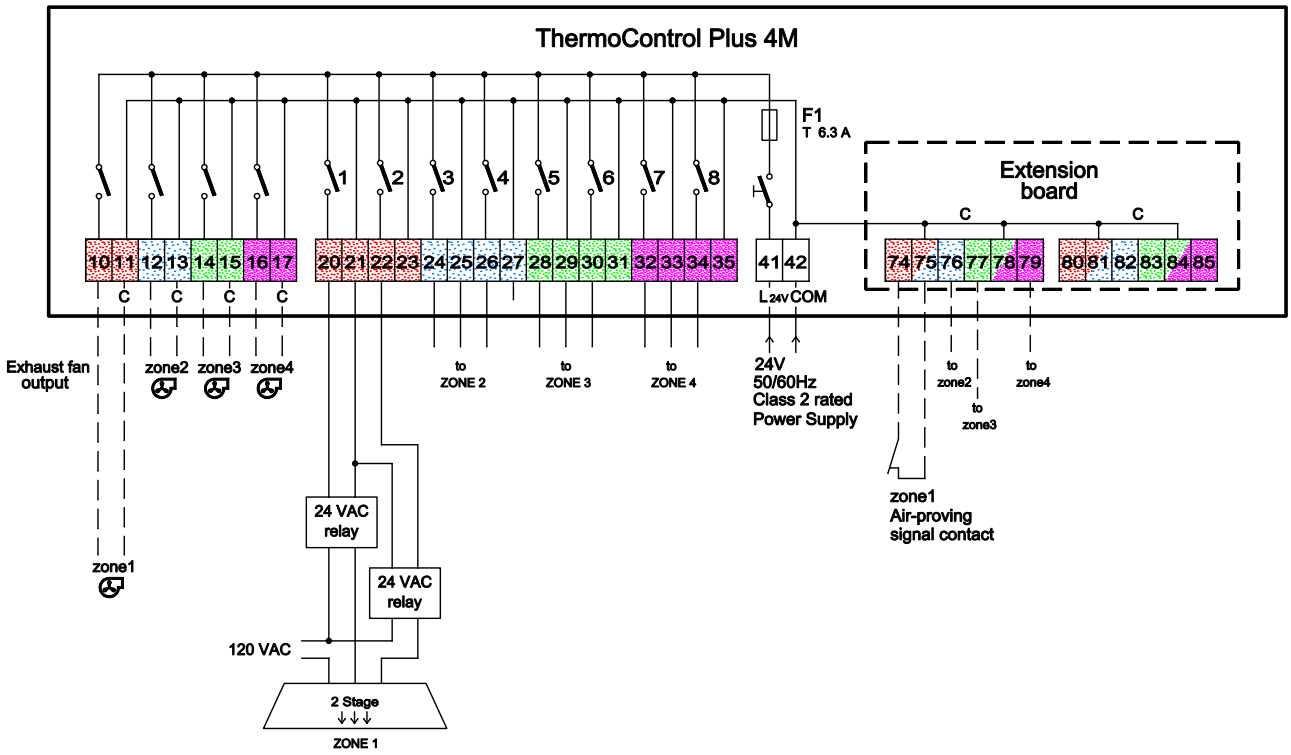
6.4 Wiring connections



Wiring of modulation heaters



Wiring of 2-stage heaters



6.5 Exhaust fan connection

Only 24VAC Class 2 equipments can be connected to the controller ! Use 24VAC Class 2 rated power relays to connect exhaust fan that is operating with higher than extra low voltage.
The ThermoControl Plus is provided with a exhaust fan control. The outputs of two heating zones belong to one common exhaust fan control. For example: terminal 10-11 is the common exhaust fan control for heating zones 1 and 2.
In case one (or both) heating zone outputs are activated, the exhaust fan control will be activated as well. If both heating zone outputs switch off, the exhaust fan also switches off immediately or with delay, after a preset period of time (chapter 5.2).
In case single-stage heaters are divided into two heating zones and one zone is switched off, the exhaust fan goes on due to the still active second heating zone (chapter 4.1.2). If no exhaust fan is installed or connected the exhaust fan control can be locked (chapter 5.2).

6.5.1 Air-proving contact inputs

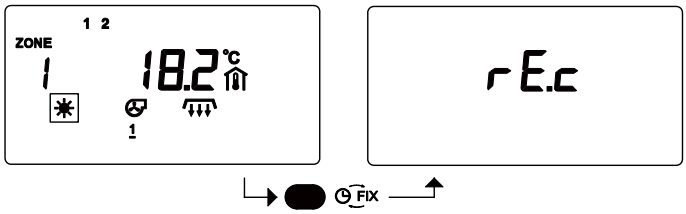
In case of active exhaust fan control (see: 5.2 set up), air-proving is also active:
The contact inputs (terminals 74-79) will block the operation of the respective heaters if the contact is open. The contacts have 30 seconds after the start of the fans to get in closed state, or else an error indication is generated (see chapter 6.11) and maintained until the contact is closed. If the contact gets open during operation, the heaters will be turned off immediately, and an error indication is generated. In case there is a exhaust fan, but no air-proving contact, the contact input of the controller must be short-circuited.

6.6 Alarm contact input

Connect potential-free contact to this input. **The contact must be provided by extra low voltage Class 2 rated equipment.** If the dry contact is interrupted, the controller turns off all heaters and exhaust fans independently. At the same time „ERROR" starts to blink on the front panel and the „ALr" symbol appears on the display. In case the contact is not used, you have to short-circuit the terminals.

6.7 Remote-Control

Connect dry contacts to this input.
The contact must be provided by extra low voltage Class 2 rated equipment.
The feature Remote-Control access can be selected in the SETUP-Menu (5-2). The controller switches to daytime mode in all zones, if the remote contact is activated. The display shows the symbol. In case of not using the remote contact, you have to short-circuit the terminals.



If the remote contact is activated it is not possible to change the operating mode by using the FIX button. A warning signal "rE.c" (remote contact) appears on the display.

6.8 Signal input fault

Connect dry contacts to this input. **The fault signal must be provided by extra low voltage Class 2 rated equipment.**
The feature contact input fault can be selected in the SETUP-menu (5-2). The external error message can be connected to input terminals 72-73. In case of an error message (option) the signal ERR and RES as well as ERROR light begins to blink. At the same time the Error relay switches on. The operation mode of the controller is not changed due to the error signal.

6.9. Temperature display ºF / ºC selection

Select the **ºF** / **ºC** temperature display mode by a jumper (see figure 6.4 Wiring Connection). **Switch off power supply before making any operation with this jumper !** After selecting the readout all displays and settings will automatically appear with the selected mode. Default setting is **ºF**. Set values for **ºF** / **ºC** are stored separately so after modifying selection you must set actual values (no automatic conversion here).

6.10 Communication connection

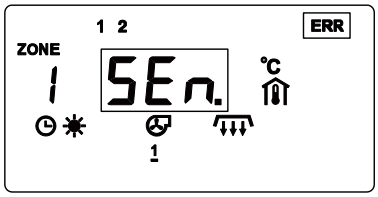
Two types of optional communication module can be used and connected to the "Communication" terminal (only one type can be used at a time):

- **CM-NET (Ethernet):** The controller connects to the local network, and become available remotely via PCs or smart devices. Availability is not limited to the local network, it also works via the Internet, from anywhere in the world. The CM-Net module can also serve as a Modbus gatway, using Modbus TCP protocoll.

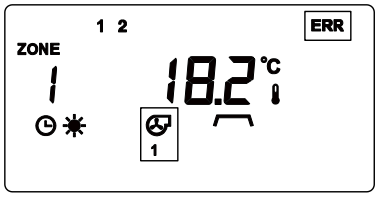
- **CM485** card: Modbus (RS485) output, standard interface to building and industrial supervisory systems. The output of this card is optically isolated from the controller.

6.11 Common ERROR signal

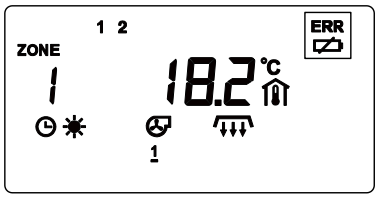
In case of any operational error the red “ERROR” symbol starts to blink, simultaneously the error relay switches on (terminals 1, 2, 3). The display shows the affected heating zone. Type and cause of the problem is shown as well by other symbols. To select another zone, press “ZONE”, but if you do so, the red “ERROR” signal won’t disappear, because the problem is not yet solved. The blinking “ERROR“ signal and the activated error relay can be deactivated, if you turn the zone off by using the ↻/⏻ button.



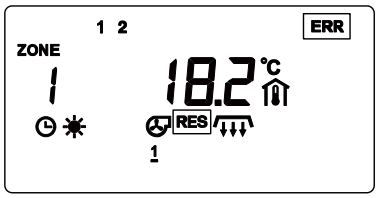
Sensor error: The temperature sensor is not connected in an accurate way. It is damaged or short-circuited. Verify connections and wires. In case of sensor error, the heaters will operate with maximal output.



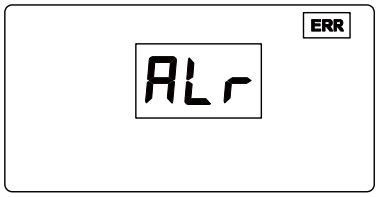
Exhaust fan error: The air-proving contact is open, while it should be closed. Heaters can only turn on after the error is gone. Closed state is indicated by underlined fan number: **1**.



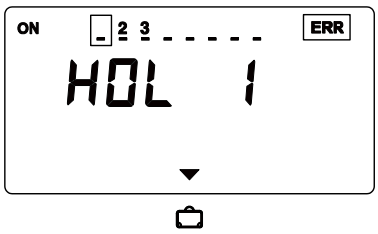
Battery error: Battery low or discharged. The battery has to be changed immediately. The battery is located at the inside of the control unit. Type: 1.5V (AA). Use long-term batteries. Before changing the batteries please read the general security instructions!



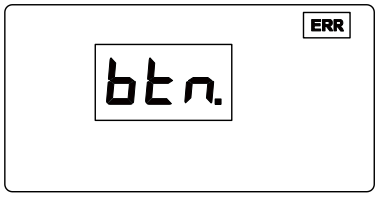
This is an error message (see chapter 5.2) of a heater (terminals 72-73). The operation mode of the controller is not changed due to the error signal.



Alarm signal: Does not point out the kind of operational error. It only shows that an error message has arrived at the “alarm contact”. The controller switches off all heaters and exhaust fans. In case of not using the “alarm contact“, the terminals should be short-circuited.



If you modify the holiday program, the “ERROR“ signal would appear, if starting(A) or ending(B) dates or calendar data are conflicting. (for example: the switch-off point is earlier than the starting point of a vacation period) In case of wrong data the program won’t even switch on.



This screen indicates a very rare error: a forced position of a button at the front panel. Please check!

7 Technical Parameters

Relay outputs: 8 control relays (up to 8 heating zones), 4 exhaust fan relays.
Relays switch 24VAC to connection terminals.
1 error relay: connected as potential-free contact to connection terminals
Relay load: max. 6.3A 24V 50/60Hz (inductive)

2-10V output: Up to 4 zones. Max:8mA (Load ≥ 1.2kOhm), short-circuit protection.

Inputs: Temperature sensors: 2-wire connection
SR type black-bulb temperature sensor (NTC)
OAS type outside temperature sensor (NTC)
Contact inputs: dry contacts, closed if not used
Connected appliances must meet extra low voltage Class 2 requirements
Alarm contacts
Remote ☼: Forced daytime mode operation or Signal input fault contacts (selectable)
4 Air-proving contacts

Set values: The values of every zone can be modified separately:

Type:		
	Daytime mode:	☼ +3...+35 °C / 37...95 ºF
	Night time mode:	☾ +3...+35 °C / 37...95 ºF
	Frost protection mode:	✻ +3...+20 °C / 37...68 ºF

Holiday program: 8 programmable holiday periods (given by calendar dates)

Application: Luminous- and tube-radiant-gas heaters; warm-air-heaters; programmable
Hysteresis ⎍ : 0.2 … 2.0 °C / 0.4 ... 3.6 ºF
Threshold value: (two-stage operation only): 0.5 …3.0 °C / 1.0...5.5 ºF
Proportional range: (modulation operation only): 1.5...10.0 °C / 2.7...18.0 ºF.
Integration time: (two-stage-heater operation only): 10 ... 99 minutes
Sensor correction: -9.9…+10.0 °C / -9.9...+10.0 ºF
Exhaust fan delay time: 0 …. 60 minutes

Clock, calendar: Real-time clock with calendar
Clock power: 1,5 V AA battery, durability: ~ 3 years
automatic summer / winter time correction (+/- 1 hour):
can be deactivated
correction to summer time: second Sunday in March
correction to winter time: first Sunday in November

Time programs: Independent weekly program in different zones:
19 switching points
Saved on internal EEPROM-memory

Power supply: 24V+-20% 50/60Hz (terminals L $_{24V}$, Com) P_{max} (controller): 10 VA
Must use Class 2 rated power supply

Fuse: F1 5x20mm 6,3 A (F) standard

Connections: Screw terminals, wire section max.: 11 AWG

Safety standards: UL 60950

RoHS directive: 2011/65/EU

Operating temperature: 0...50 °C / 32...122 ºF

Storage temperature: -10...60 °C / 14...140 ºF

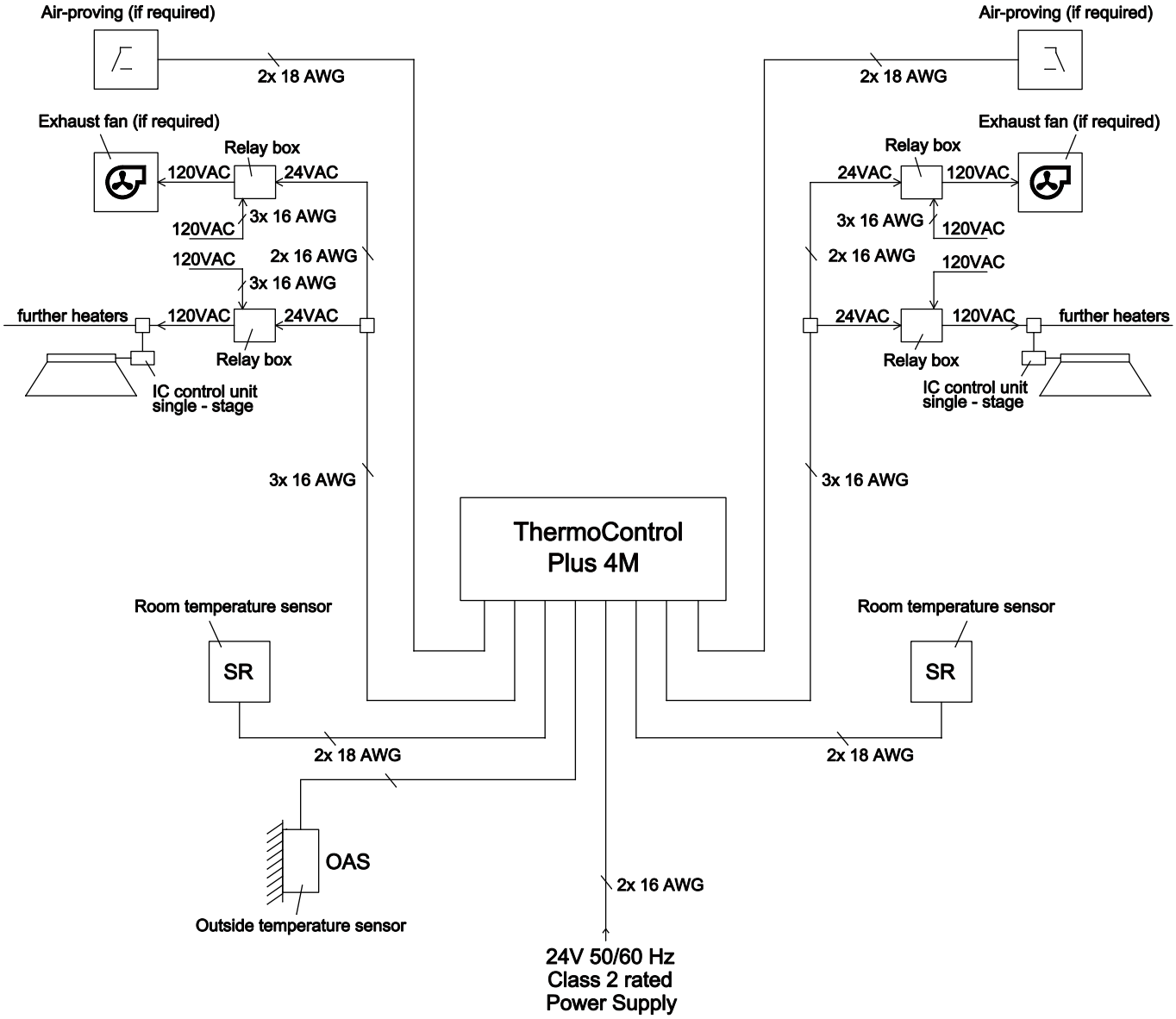
Protection: NEMA13 / IP65

Housing: Plastic housing with transparent door (with key lock); waterproofed; UV-resistant

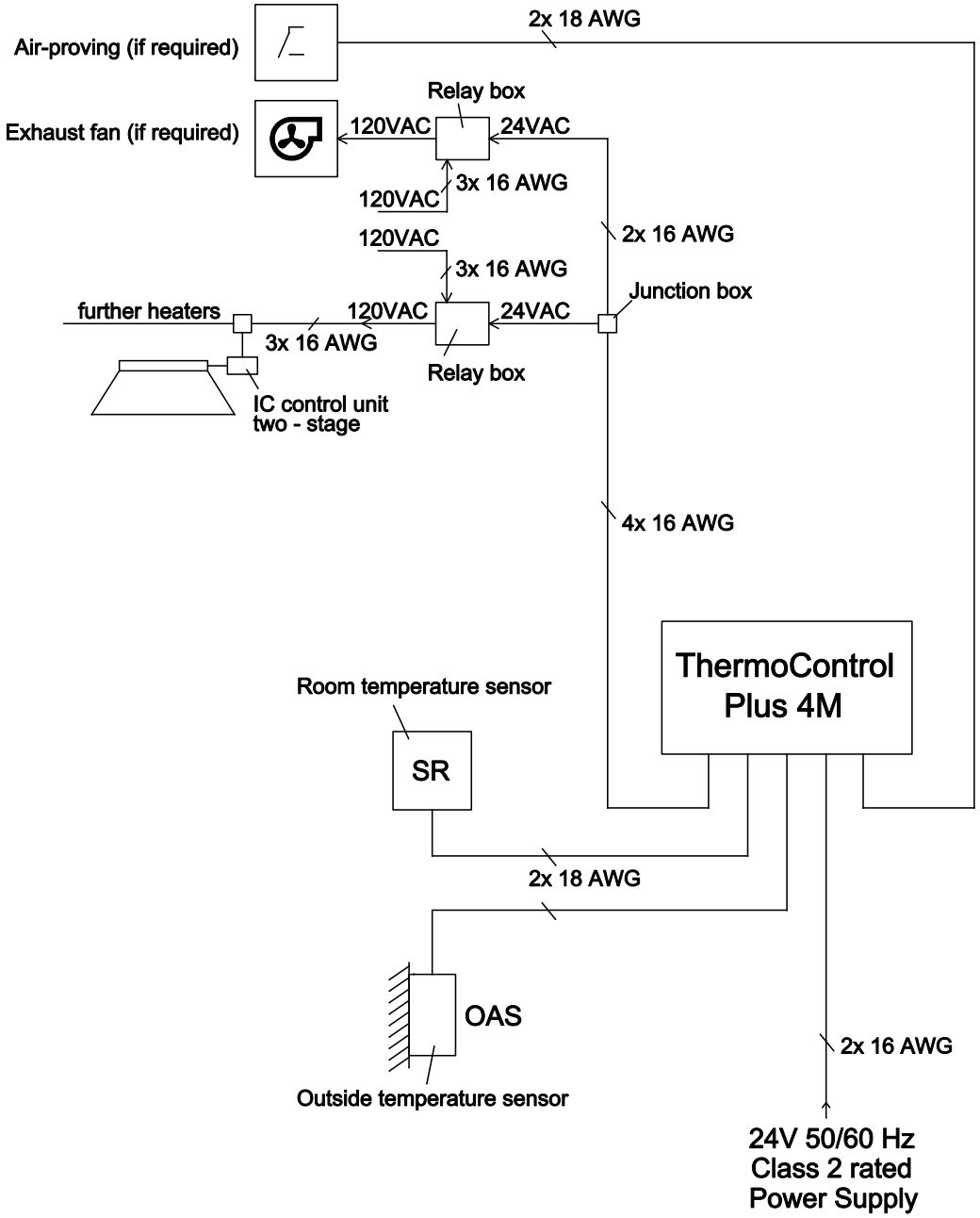
Dimensions: 275 x 265 x 140 mm

8 Appendix

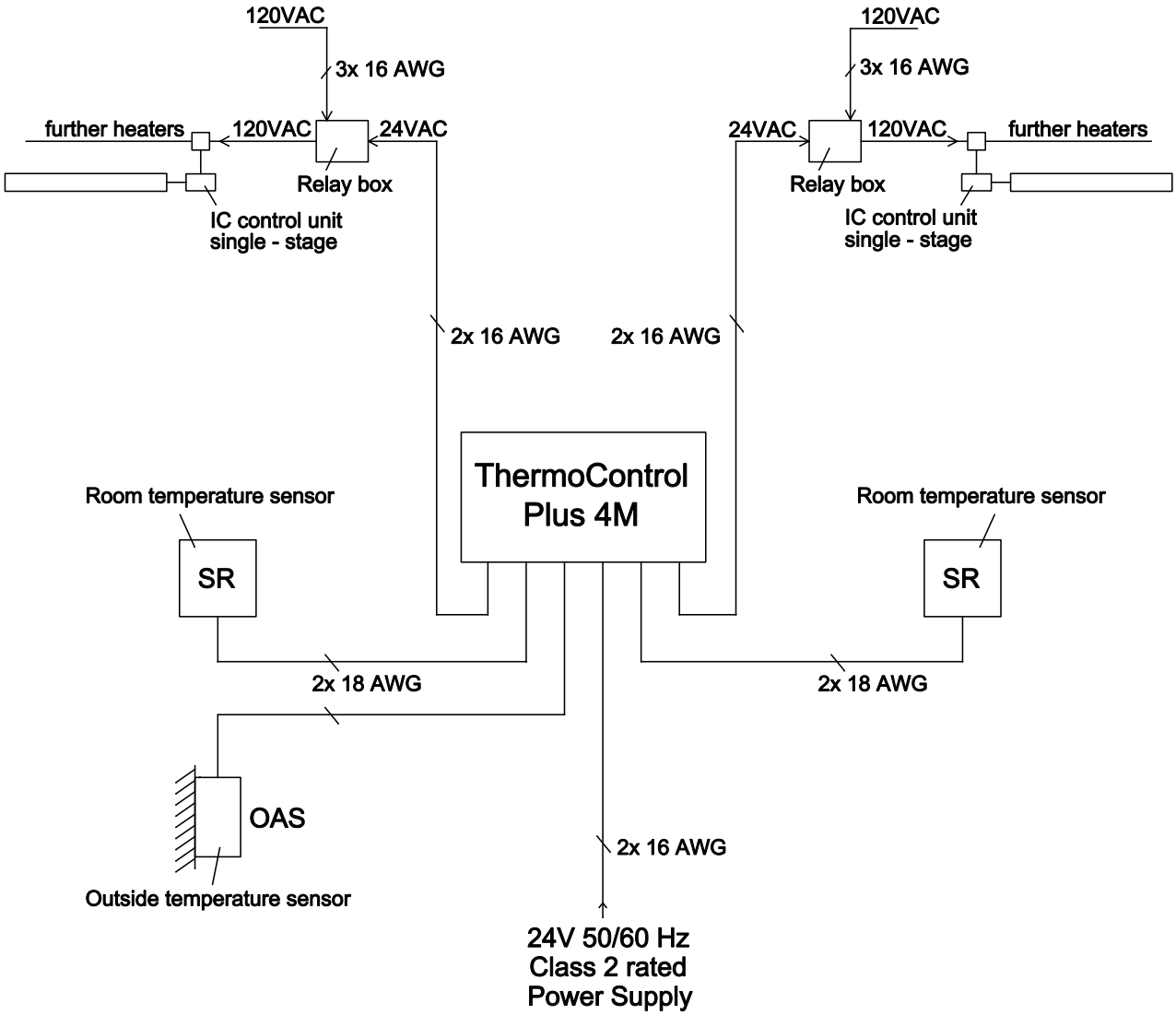
Wiring diagram ThermoControl Plus 4M
1-8 Zones, single-stage, luminous heater



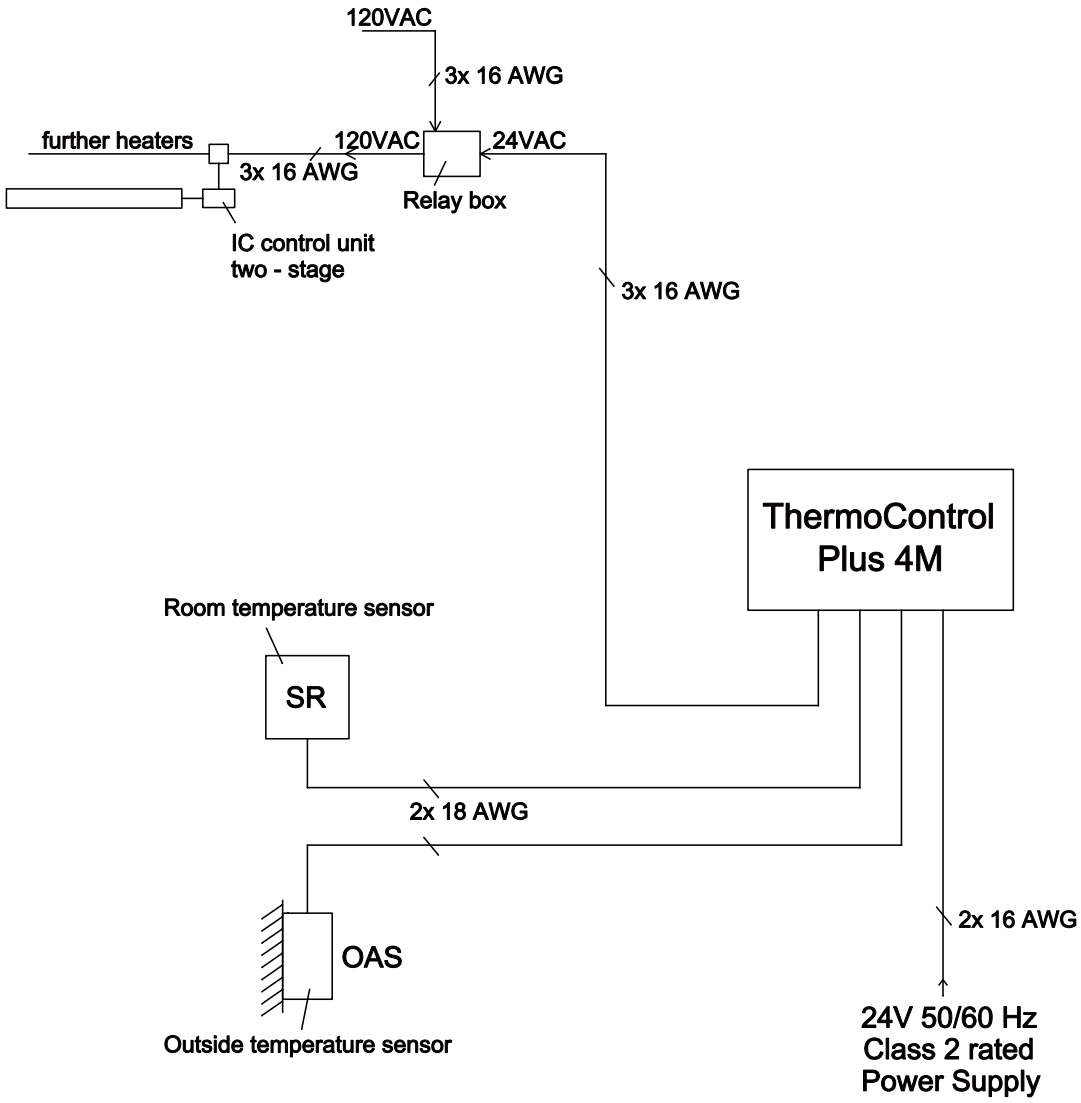
Wiring diagram ThermoControl Plus 4M
1-4 Zones, two-stage, luminous heater



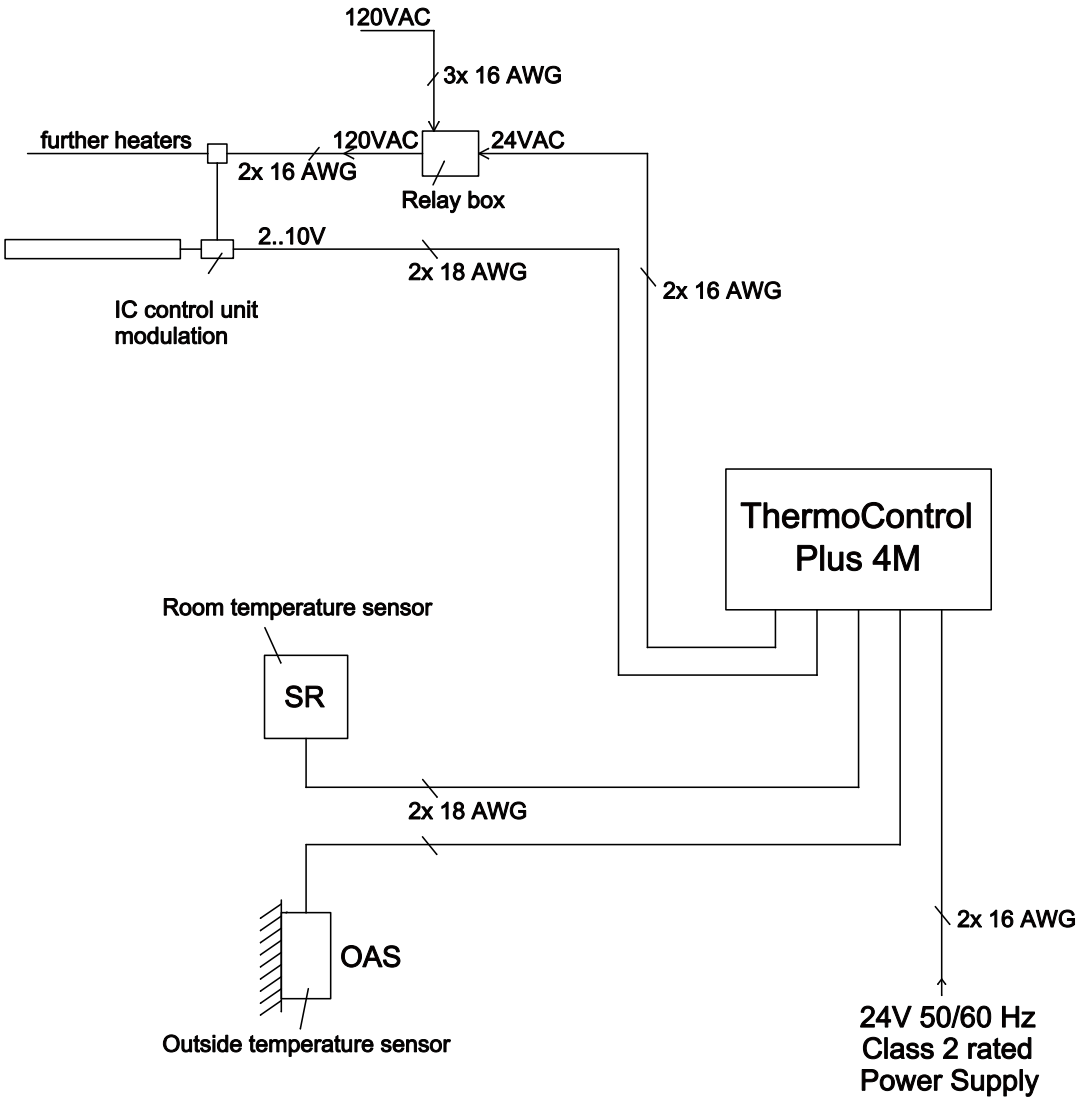
Wiring diagram ThermoControl Plus 4M
1-8 Zones, single-stage, radiant tube heater



Wiring diagram ThermoControl Plus 4M
1-4 Zones, two-stage, radiant tube heater

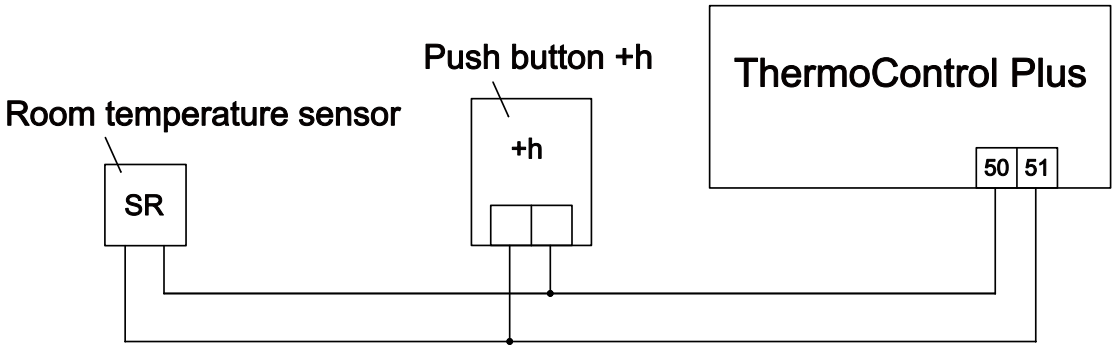


Wiring diagram ThermoControl Plus 4M
1-4 Zones, modulation, radiant tube heater



Wiring diagram, accessories

Option 1: Over ride button



Option 2: Average temperature measurement, 4 SR sensor