

Self-learning Room Temperature Controller Receiver

REV23RF REV-R.02/16A

Consisting of controller (with integrated radio transmitter) and receiver (switching unit with relay outputs)

- Mains-independent room temperature controller
- Straightforward, self-explanatory menu selection via roller selector
- Self-learning 2-position controller providing PID mode (patented)
- Choice of operating modes:
 - Automatic with maximum 3 heating or cooling periods, continuously comfort, continuously economy, frost protection with one 24-hour operating mode including one heating or cooling period
- In automatic mode, one temperature setpoint can be entered for each heating or cooling period
- Optional control of cooling equipment
- Advantageous for retrofitting and upgrading projects (wireless room unit)
- Switching capacity of relay: AC24...250 V, 16 (2) A suited for the control of resistive loads (electrical heating elements)

Use

For control of the room temperature in:

- Apartments, single-family or holiday houses
- Offices, individual rooms, consulting rooms or commercially used spaces

For control of the following pieces of equipment:

- Solenoid valves of instantaneous water heaters
- Solenoid valves of atmospheric gas burners
- Forced draft gas or oil burners
- Smaller circulating pumps of heating systems, zone valves
- Electrical heating elements
- Thermal actuators
- Cooling and refrigeration equipment

Functions

- Radio signal transmission
- PID control with self-learning or selectable switching cycle
- 2-position control
- Automatic mode with 7-day switching program for 24-hour, working day, weekend or 7-day operation with up to 3 heating or cooling periods per day
- Each heating or cooling period has its own temperature setpoint
- One 24-hour operating mode with one heating or cooling period
- Override button
- Sensor calibration and reset function
- Frost protection or overtemperature protection
- Limitation of the minimum setpoint
- Holiday mode
- Heating or cooling mode
- Periodic pump run
- Optimum start control with the first heating period

Type summary

Radio signal equipment consisting of:

Room temperature controller (transmitter), receiver (switching unit) and support

Room temperature controller (transmitter) and support

Receiver (switching unit)

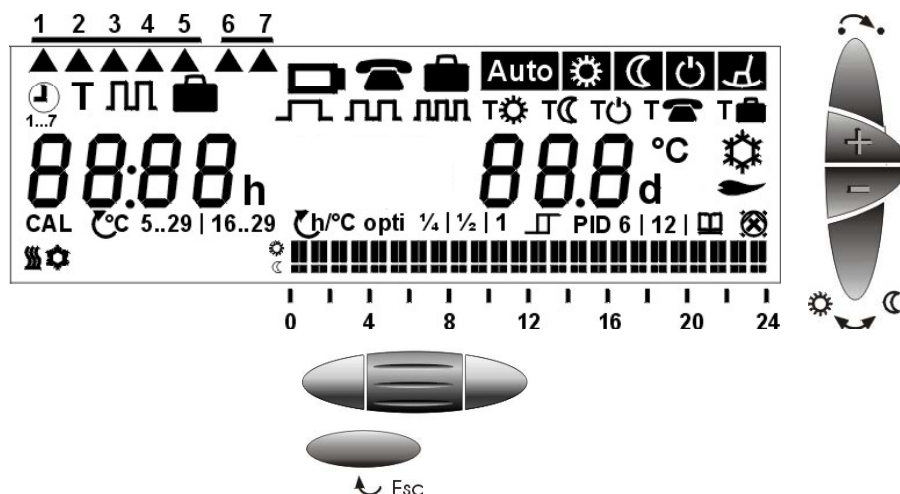
REV23RF16A/SET
REV23RF
REV-R.02/16A

Ordering

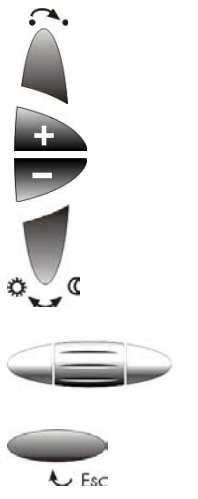
When ordering, please give the type references according to «Type summary». The controller / transmitter REV23RF is supplied complete with batteries.

Technical design


Display and operating elements




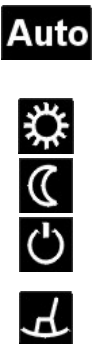
Operating elements

	<p>Selection of operating mode (see below)</p> <p>«Warmer» button</p> <p>«Colder» button</p> <p>Override button (see below)</p> <p>Roller selector for the menu, submenu and the settings</p> <p>Confirm by pressing</p> <p>Leaving the current menu level and returning to the menu level previously active (settings currently displayed will be accepted)</p>
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Displays

	<p>Time of day</p> <p>Room temperature</p> <p>Change batteries (display appears about 3 months before batteries are exhausted)</p> <p>Holiday mode active</p>
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Selection of operating mode (only one operating mode active)

		<p>Automatic mode</p> <p>Comfort mode</p> <p>Economy mode</p> <p>Frost protection or overtemperature protection</p> <p>24-hour mode with one heating or cooling period (heating or cooling period is automatically generated from the current 24-hour program)</p>
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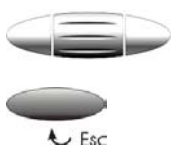


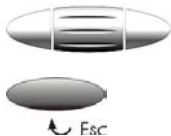










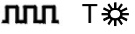

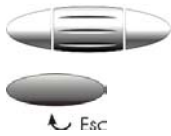


Temporary change of the current setpoint temperature (change only active until the next switching point is reached)

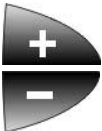




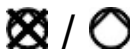

		<p>Press the + or – button once to display the adjusted temperature setpoint. It can be readjusted in increments of 0.2 °C (max. +/- 4 °C)</p>
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Override button

	<p>In operating modes Auto and , this button can be used to manually switch from comfort to economy temperature, or vice versa. The selection is automatically reset when the next switching point is reached or when the operating mode is changed</p>
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Menu-driven user settings: 4 main menus are available

Time of day and weekday	Main menu	Submenu	Settings												
	 1...7	12:00h 1 2 3 4 5 6 7 	Current time Current weekday												
Temperature	Main menu	Submenu	Default settings – heating / cooling												
	T	T  T  T  T 	<table border="1"> <tr> <td>Setpoint of comfort mode</td> <td>19 °C</td> <td>23 °C</td> </tr> <tr> <td>Setpoint of economy mode</td> <td>16 °C</td> <td>29 °C</td> </tr> <tr> <td>Setpoint frost or overtemperature protection</td> <td>5 °C</td> <td>35 °C</td> </tr> <tr> <td>Setpoint remote operation is not used with this unit</td> <td>(10 °C)</td> <td>(30 °C)</td> </tr> </table>	Setpoint of comfort mode	19 °C	23 °C	Setpoint of economy mode	16 °C	29 °C	Setpoint frost or overtemperature protection	5 °C	35 °C	Setpoint remote operation is not used with this unit	(10 °C)	(30 °C)
Setpoint of comfort mode	19 °C	23 °C													
Setpoint of economy mode	16 °C	29 °C													
Setpoint frost or overtemperature protection	5 °C	35 °C													
Setpoint remote operation is not used with this unit	(10 °C)	(30 °C)													
Time switch	Main menu	Submenu	Settings												
		1 2 3 4 5 6 7   06:00h   Selection of the heating / cooling period's start and end time  19.0 °C  Selection of the heating / cooling period's temperature setpoint	Selection of weekday, working day, weekend or week Selection of the number of heating or cooling periods (max. 3 periods per day)												
Absence	Main menu	Submenu	Settings												
		T 	Entry of holidays or periods of absence. Number of days with economy mode setting / max. 99 days Temperature setpoint during absence. Default setting is 12 °C for heating and 30 °C for cooling												


Menu-driven heating	Menu items	Settings
	CAL	Sensor calibration
	°C 5..29 16..29	Setpoint limitation
	h/°C opti ¼ ½ 1	Optimum start control for the first heating period (in unit of time per 1 °C)
		2-position control
	PID 	PID mode, self-learning
	PID 6 12	PID mode, switching cycle 6 or 12 minutes
		Periodic pump run off / on
		Heating / cooling mode

Temperature setpoints

In automatic operating modes, the temperature setpoints can be individually adjusted for every comfort period and for the continuous operating modes. The temperature setpoint of economy mode is the same in automatic and continuous operation.


Protective function



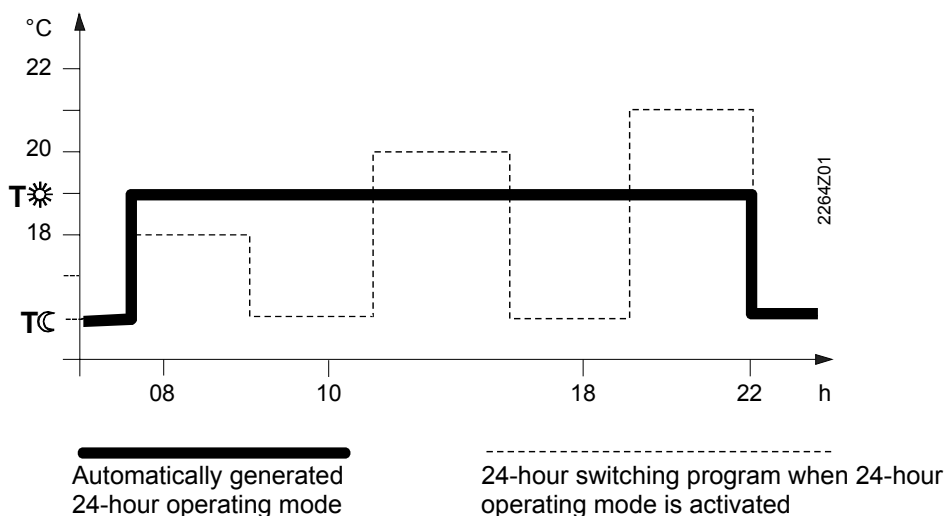
In frost or overtemperature protection mode, the room temperature is constantly monitored. If it falls (rises) below (above) the adjusted setpoint, control to the adjusted frost or overtemperature protection setpoint  will be ensured.

24-hour operating mode






The controller generates the 24-hour operating mode from its current 24-hour program. It automatically selects the switch-on time of the first heating / cooling period and the switch-off time of the last heating / cooling period to generate and display a complete heating / cooling period. The comfort setpoint used by the controller is the currently stored standard setpoint of continuous operating mode . The self-generated 24-hour operating mode is maintained until another operating mode is selected.

Example



Switching program



The switching program can be used as a 7-day or 24-hour program, depending on programming. It is also possible to select one of the continuous operating modes    with which the switching program is not used.

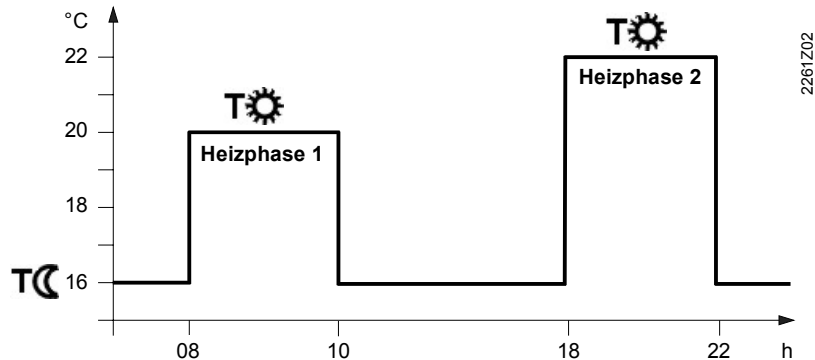
With the 7-day program, all individual days, working days (1-5), weekend (6-7), or the entire week (1-7) can be programmed.

For each heating / cooling period, 3 different switching patterns are available.

There is a choice of 1, 2 or 3 heating / cooling periods. For each heating / cooling period, the start time, end time and comfort setpoint are to be entered.

In between heating / cooling periods, it is always the same economy temperature setpoint that is used. This economy temperature setpoint can be adjusted on the temperature menu.

Example with 2 heating periods per day



Holiday function



The holiday function is to be selected on the user menu. Set the start of the holiday period (day of departure / $\frac{1}{2} \frac{3}{4} \frac{5}{6} \frac{7}{}$ / weekday), the duration of the holiday period and the temperature setpoint ($T_{\text{☐}}$). This will enable the controller to maintain the adjusted temperature for a period of up to 99 days. Every day at midnight, the counter subtracts one day.





When the holiday period is over, the counter reads 00, and the controller will automatically resume the operating mode selected last.

Remote operation



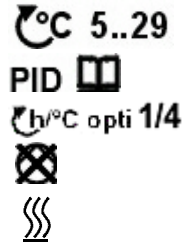
To be flexible, the REV23RF has no connection facility for remote operation.

Factory settings

Operating mode	Block / week-days	Switching times						Temperatures in °C											
		☀		☀		☀		T☀ 1st period		T☀ 2nd period		T☀ 3rd period		T☾		T☰		T☐	
		1st period	2nd period	3rd period	1st period	2nd period	3rd period	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀	☀
Auto	1-5 Mo-Fr 6-7 Sa-Su	06:00	08:00	11:00	13:00	17:00	22:00	19	23	20	23	21	23	16	29				
	1-7 Mo-Su	00:00	24:00					19	23										
	1-7 Mo-Su	00:00	24:00										16	29					
	1-7 Mo-Su	00:00	24:00												5	35			
	Absence																	12	30

Factory settings
Heating engineer level

Setpoint limitation
PID mode, self-learning
Optimum start control
Periodic pump run off
Heating active



Heating engineer level

Access

To access the heating engineer level, keep the «Warmer» and «Colder» buttons depressed and simultaneously roll the roller selector away from the display and then toward the display.

Sensor calibration

If the displayed temperature does not agree with the room temperature effectively measured, the temperature sensor can be recalibrated (recalibration to be made on the heating engineer level.)

CAL

The displayed temperature can be matched to the effective room temperature in increments of 0.2 °C (max. ± 2 °C).

Setpoint limitation



Minimum setpoint limitation to 16 °C prevents undesired heat transfer to neighboring apartments in buildings with several heating zones. The setting is to be made on the heating engineer menu.

Optimum start control

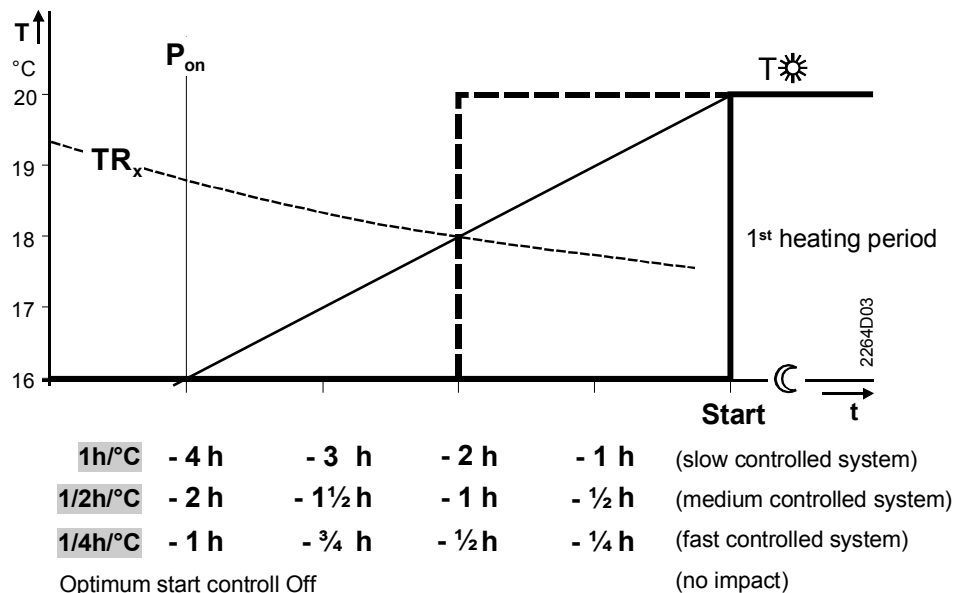


Optimization brings forward the switch-on point of the first heating period such that the adjusted setpoint will be reached at the required time.

The setting depends on the type of controlled system, that is, on heat transmission (type of piping system, radiators), building dynamics (building mass, insulation), and heat output (boiler capacity, flow temperature).

Optimum start control is switched off at

Example using an actual room temperature of 18 °C and a setpoint of 20 °C



T Temperature (°C)

t Forward shift of switch-on point (h)


TR_x Actual value of room temperature

P_{on} Starting point of optimum start control

Control


REV23RF is a 2-position controller providing PID mode. The room temperature is controlled by the cyclic switching of an actuating device.

The controller generates the positioning signals depending on the deviation of the setpoint from the actual value acquired by the built-in temperature sensor.

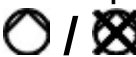
Self-learning mode
PID 

The rate of response to the deviation depends on the selected control algorithm:
 The controller is supplied with an active self-learning mode, enabling it to automatically adapt to the type of controlled system (building construction, type of radiators, size of the rooms, etc.). After a certain learning period, the controller optimizes its parameters and then operates with the parameters it has learned.



Exceptions
 In exceptional cases, where the self-learning mode may not be ideal, it is possible to select PID 12, PID 6 or 2-Pt mode:

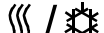
PID 12
PID 6


PID 12 mode Switching cycle of 12 minutes for normal or slow controlled systems (massive building structures, large spaces, cast-iron radiators, oil burners).
 PID 6 mode Switching cycle of 6 minutes for fast controlled systems (light building structures, small spaces, plate radiators or convectors, gas burners).
 2-Pt mode Pure 2-position control with a switching differential of 0.5 °C (±0.25 °C) for very difficult controlled systems with considerable outdoor temperature variations.

Periodic pump run


Protects the pump against seizing during longer off periods. Periodic pump run is activated for one minute every 24 hours at midnight. This function can be selected on the heating engineer menu.
 (Caused by the smaller inductive switching load of the relay, we recommend to control smaller inductive loads only, like smaller pumps.)

Periodic pump run active:  / periodic pump run inactive: 

Operating mode
Heating / cooling



The controller is suited for cooling applications.
 The function can be selected on the heating engineer menu.
 The controller comes set for heating operation (refer to section «Factory settings»).

User-defined data:
 Press the button behind the pin opening for at least one second: This resets the user-specific settings to their default values (heating engineer settings will not be changed). The clock starts at 12:00. During the reset time, all sections of the display are lit, enabling them to be checked.

All user-defined data plus the heating engineer settings:
 Press the button behind the pin opening together with the warmer and colder buttons for at least one second.
 After the reset, all **factory settings** will be reloaded (also refer to section «Factory settings»).

Mechanical design

Controller
 The REV23RF has a plastic housing with a large display and easily accessible operating elements. The controller is removed from its base by sliding it upward. It is thus possible to replace the two type **AA** 1.5 V alkaline batteries contained in the compartment at the rear of the controller.

Battery change
 About 3 months before the batteries are exhausted, battery symbol  appears on the display, but all functions are fully maintained. When replacing the batteries, the current data will be retained for a maximum of one minute.

Receiver
REV-R.02/16A
 Plastic housing with easily accessible operating elements and removable cover. The unit can be fitted to all commercially available recessed conduit boxes or directly on the wall. A relay with a potential free changeover contact, the connection terminals and the receiving antenna are integrated in the housing.

Base The base can be fitted to most types of commercially available recessed conduit boxes or directly on the wall.

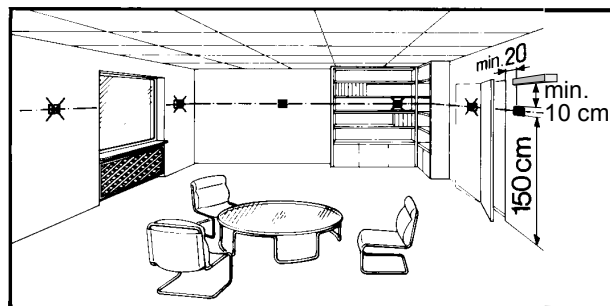
Support The support supplied with the controller enables the unit to be put on a shelf. It can be easily fitted to the controller with no need for tools.

Notes

Planning Controller / transmitter REV23RF

- The room unit should be located in the main living room (on the wall or free-standing using the support provided) while giving consideration to the following points:
- The distance to the receiver should not exceed 20 m or 2 floors
- The unit should be located such that the sensor is able to capture the room temperature as accurately as possible, without getting affected by direct solar radiation or other heat or refrigeration sources (in the case of wall mounting, about 1.5 m above the floor)
- The unit should be located such that it can transmit signals with as little interference as possible. For this reason, the following points should be observed:
 - Do not mount the unit on metal surfaces
 - Not in the vicinity of electrical cables and equipment such as PCs, TV sets, microwave appliances, etc.
 - Not in the vicinity of large metal structures or construction elements with fine metal meshes like special glass or special concrete
- In the case of wall mounting, ensure that there is sufficient clearance for removing the controller from its base, and for replacing it

Wall mounting



Planning Receiver REV-R.02/16A

- The receiver and switching unit should preferably be mounted near the controlled device
- The unit should be located such that it can receive signals with as little interference as possible. For this reason, the following points should be observed (same as with the transmitter):
 - Not in control panels
 - Not on metal surfaces
 - Not in the vicinity of electrical cables and equipment such as PCs, TV sets, microwave appliances, etc.
 - Not in the vicinity of large metal structures or construction elements with fine metal meshes like special glass or special concrete
- The location where the unit is mounted should be dry and free from splash water
- The unit can be fitted to most commercially available recessed conduit boxes or directly on the wall

Wall mounting of controller / transmitter REV23RF

- First, fit the base. Then, engage the controller from the top. The base can be fitted to most commercially available recessed conduit boxes or directly on the wall

Support

Refer to the Installation Instructions printed on the package.

Mounting and installation of receiver REV-R.02/16A



The receiver must be wired with the power supply switched off. Mains voltage may be switched on again only after the unit is completely mounted.

- When mounting the unit, the base must first be fitted and wired (L/N = AC 230 V mains supply, LX/L1 = consumers). Then, engage the unit at the top, swing it downward and secure it with a screw
- For more detailed information, refer to the Installation Instructions supplied with the unit

For the electrical installation, the local safety regulations must be complied with.

Commissioning Receiver REV-R.02/16A

It is recommended to first commission and switch on the receiver, then the transmitter.









- Switch on mains supply
 - a) Press the «Reset» button (= delete) for about 3 seconds, LED flashes for about 5 seconds (deleting the stored address)
 - b) Press «Set» button (= setting / learning) for about 1 second until the LED lights up
 - c) The duration of the receiver's learning readiness is a maximum of 25 minutes. If no signal is received from the transmitter during that period of time, repeat steps b) and c)
 - d) Mount transmitter and put it into operation
 - e) When the receiver receives a signal from the transmitter, the LED flashes briefly
 - f) When the LED is steady on, the relay is energized = controlled device ON
 - g) When the LED is dark, the relay is deenergized = controlled device OFF
 - h) In the event of a power failure at the receiver, the relay will automatically be deenergized.


The transmitter repeats the ON or OFF signal at 20-minute intervals, depending on the operating state. This means that the relay will be energized / deenergized again after 20 minutes at the latest. This interval was selected to extend battery life.

If the REV-R.02/16A receives no signal from the controller / transmitter for 60 minutes, the relay will drop out so that the controlled device will automatically be switched off.

Commissioning Controller / transmitter REV23RF

It is recommended to first commission the receiver and then the transmitter.

- If the reference room is equipped with thermostatic radiator valves, they must be fully opened
 - a) Remove the battery transit tab, which prevents inadvertent operation of the unit during transport and storage. The unit switches on
 - b) When – immediately after switching on – symbol  or  appears on the display (controlled device ON), the first signal has already been sent to the receiver and communication has been opened
 - c) Make the settings according to the Operating Instructions
 - d) If symbol  or  does **not** appear on the display (controlled device OFF), it must first be activated for signal transmission
 - e) Select operating mode  (comfort mode)
 - f) On menu **T**, select the setpoint for comfort mode **T** 
 - g) Use the roller selector to adjust the setpoint to 29 °C and confirm by pressing
 - h) Heating ON symbol  or  appears on the display after a maximum of one minute
 - i) The first signal transmission to the receiver has taken place
 - j) After 10 seconds, the transmitter sends another signal

- k) The ON / OFF signal will then be repeated every 20 minutes (the 20-minute interval has been chosen to extend battery life)
- l) Reset the setpoint according to f) and g)
- m) Press  to reset the operating mode to the required position

Important:

The receiver's readiness to learn is a maximum of 25 minutes. If no signal is received from the transmitter during that period of time, repeat steps d) through m) above. The control mode can be changed via the menu-driven heating engineer settings. If the room temperature displayed does not agree with the room temperature effectively measured, the temperature sensor should be recalibrated (refer to «Calibration of sensors»).

Technical data controller / transmitter REV23RF

General data controller / transmitter	Operating voltage	DC 3 V
	Batteries (alkaline AA)	2 x 1.5 V
	Battery life	approx. 2 years
	Backup for battery change	max. 1 min
General data controller	Sensing element NTC	NTC 10 kΩ at 25 °C ±1 %
	Measuring range	0...50 °C
	Time constant	max. 10 min
	Setpoint setting ranges	
	Normal temperature	5 ... 29 °C
	Economy temperature	5 ... 29 °C
	Frost protection setpoint	
	Setting range	5...29 °C
	Factory setting	5 °C
	Resolutions of settings and display	
General data transmitter	Setpoints	0.2 °C
	Switching times	10 min
	Measurement of actual value	0.1 °C
	Display of actual value	0.2 °C
	Display of time	1 min
	SRD band	868.7 to 869.2 MHz
	Transmit frequency REV23RF	868.95 MHz
	Max. transmitter power	< 10 mW / typically 4 mW
	Max. data throughput	19200 symbol/s = 38400 Bit/s
	Modulation	binary frequency changeover BFSK
Frequency stability	< ±20 ppm (±17 kHz)	
Address range	16 Bit (0...65535)	
	(preset in the factory)	
Environmental conditions	Operation	to IEC 60 721-3
	Climatic conditions	class 3K3
	Temperature	5...+40 °C
	Humidity	<85 % r. h.
	Transport	to IEC 60 721-3
	Climatic conditions	class 2K3
	Temperature	-25...+70 °C
	Humidity	<93 % r. h.
	Mechanical conditions	class 2M2

Norms and standards

CE conformity	
EMC directive	89/336/EEC
R&TTE directive	EN 301 489-3
Product safety	
Radio equipment	EN 301 489-3
Automatic electrical controls for household and similar use	EN 60 730-1
Electromagnetic compatibility	
Immunity	EN 50 082-1
Emissions	EN 50 081-1
Radio equipment	EN 300 220-3
Approvals	CE 0359 ⓘ
In the following countries	all ECC countries, Norway, Iceland and Switzerland
Devices of safety class	II to EN 60 730-1
Degree of pollution	normal
Weight (incl. package)	
	REV23RF 0.37 kg
	REV23RF/SET 0.68 kg
Color	
Housing	signal-white RAL 9003
Base	grey RAL 7038
Dimensions	140x103x30 mm

Technical data receiver REV-R.02/16A**General unit data**

Operating voltage	AC 230 V +10/-15 %
Power	< 10 VA
Frequency	45...65 Hz
Switching capacity of relays	
Voltage	AC 24...250 V
Current	16 (2) A
cos (Phi)	0.9

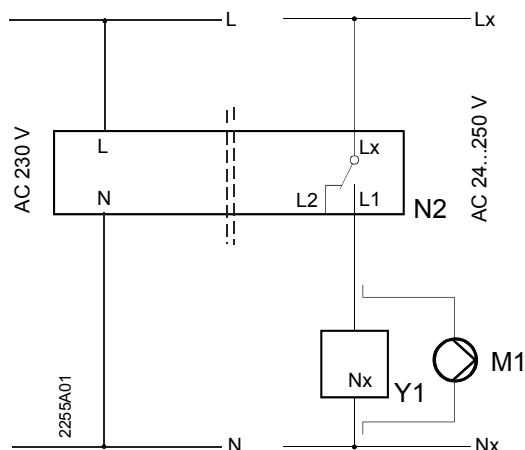
Environmental conditions

Operation	to IEC 60 721-3
Climatic conditions	class 3K3
Temperature	0...+45 °C
Humidity	<85 % r. h.
Mounting	
Operating temperature of mounting surface	max. 85 °C
Storage and transport	to IEC 60 721-3
Climatic conditions	class 2K3
Temperature	-25...+70 °C
Humidity	<93 % r. h.
Mechanical conditions	class 2M2

Norms and standards

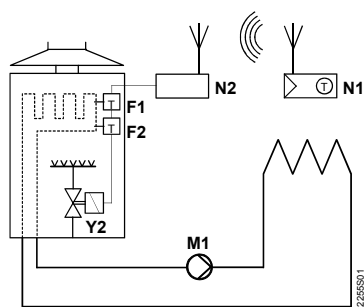
CE conformity		
EMC directives		89/336/EEC
Low-voltage directives		73/23/EEC
R&TTE directives		EN 301 489-3
Product safety		
Radio equipment		EN 301 489-3
Automatic electrical controls for household and similar use		EN 60 730-1
Special requirements placed on energy controllers		EN 60 730-2-11
Electromagnetic compatibility		
Immunity		EN 50 082-1
Emissions		EN 50 081-1
Radio equipment		EN 300 220-3
Approval		CE 0359 ⓘ
In the following countries		all ECC countries, Norway, Iceland and Switzerland
Devices of safety class		II to EN 60 730-1
Degree of pollution		normal
Weight (incl. package)		
	REV-R.02/16A	0.24 kg
	REV23RF/SET	0.68 kg
Color		
Unit front		Signal-white RAL 9003
Base		grey RAL 7038
Dimensions		83x104x32 mm

Connection diagram receiver REV-R.02/16A

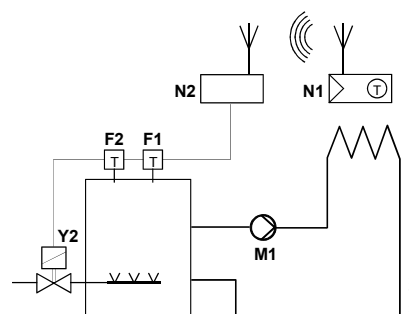


- L Live conductor, AC 230 V
- N Neutral conductor, AC 230 V
- Lx Live, AC 24...250 V
- L1 N.O. contact, AC 24...250 V / 16 (2) A
- L2 N.C. contact, AC 24...250 V / 16 (2) A
- M1 Smaller circulating pump
- N2 Receiver REV-R.02/16A
- Y1 Actuating device

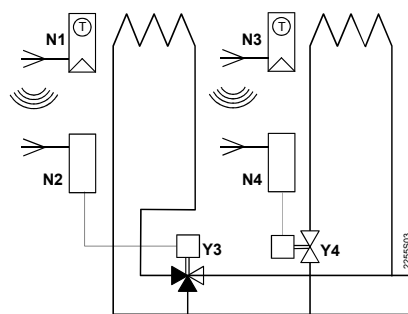
Application examples



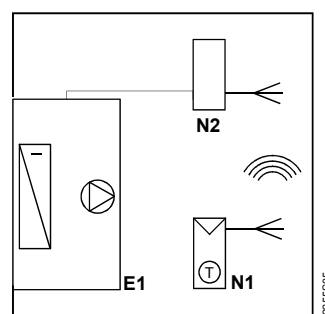
Instantaneous hot water heater



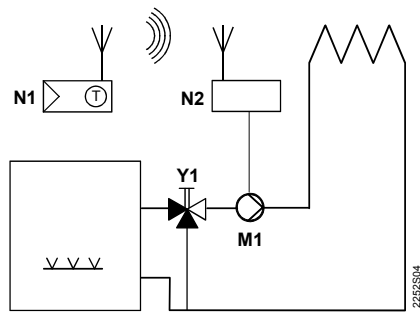
Atmospheric gas burner



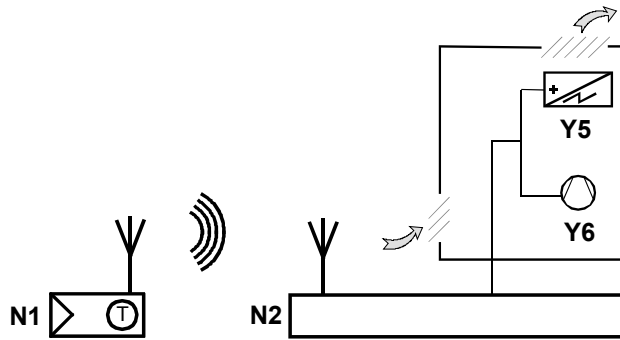
Zone valve



Cooling equipment



Smaller circulating pump with precontrol by manual mixing valve

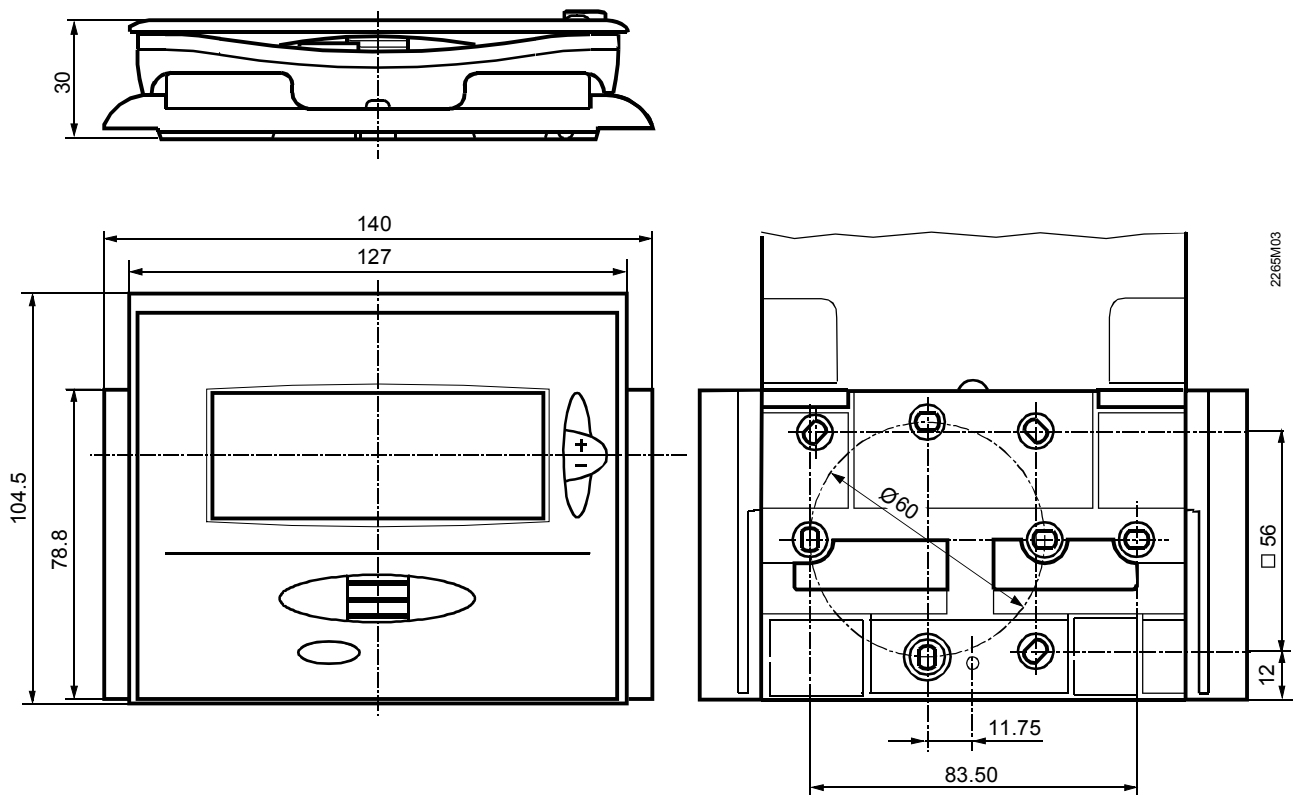


Electrical heating element

- E1 Cooling unit
- F1 Thermal reset limit thermostat
- F2 Safety limit thermostat
- M1 Smaller circulating pump
- N1 Room temperature controller (transmitter) REV23RF
- N2 Receiver REV-R.02/16A
- N3 Room temperature controller (transmitter) REV23RF
- N4 Receiver REV-R.02/16A
- Y1 3-port valve with manual adjustment
- Y2 Solenoid valve
- Y3 Motorized 3-port valve
- Y4 Motorized 2-port valve
- Y5 Electrical heating element
- Y6 Fan

Dimensions

Controller / transmitter REV23RF



Receiver REV-R.02/16A

