SIEMENS

2216

Self-learning room temperature controller REA23

5 operating modes, heating / cooling functions and menu selection via rotary knob

- **Mains-independent room temperature controller**
- **Straightforward, self-explanatory menu selection via setting knob**
- **Self-learning 2-position controller providing PID mode (patented)**
- **Choice of operating modes:**
  automatic with maximum 3 heating or cooling periods, continuous comfort mode, continuous economy mode, frost or overheat protection with one 24-hour operating mode and one heating or cooling period
- **In automatic mode, one temperature setpoint can be adjusted for each heating or cooling period**
- **Control of cooling equipment**

Use

For the 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
- Circulating pumps in heating systems, zone valves
- Electric direct heating systems or fans of electric storage heaters
- Thermic actuators
- Cooling and refrigeration equipment

Functions

- PID mode 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
- One temperature setpoint for each heating or cooling period
- One 24-hour operating mode with one heating or cooling period
- Remote operation
- Override button
- Sensor calibration and reset function
- Frost protection function or overtemperature protection
- Limitation of the minimum setpoint
- Holiday mode
- Heating or cooling mode
- Periodic pump run
- Optimum start control for the first heating period

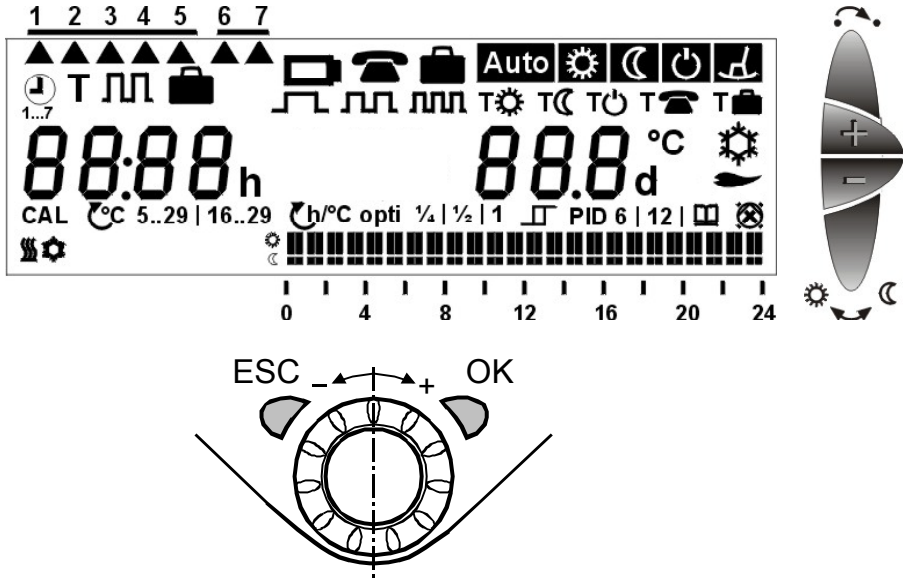
Ordering

Room temperature controller with 7-day time switch	**REA23**

When ordering, please give the type reference.
The controller is supplied complete with batteries.

Technical design

Display and operating elements



Operating elements

Selection of operating mode

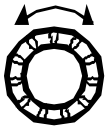
Temperature increase button

Temperature decrease button

Override button

ESC

Leaving the current menu level and returning to the menu level previously active (the settings currently displayed will be accepted)



The rotary knob is only operable within the menus.
Move from menu to menu, modify adjustable variables (temperature in increments of 0.2°C and time in hours and minutes) and select functions.

OK

Access the menus, enable a menu, save inputs, switch to the next menu option and acknowledge with the OK button

Display

Time of day

Room temperature

Change batteries (display appears about 3 months before batteries are exhausted)

Remote operation active

Holiday mode active

Selection of operating mode (only one operating mode is active)

Automatic mode

Comfort mode

Economy mode

Frost protection or overheating protection

Special day (24-hour mode with one heating or cooling phase. The switch-on and switch-off time and the setpoint for the phase are set manually.)

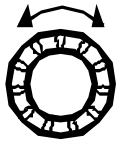
Temporary change of the current setpoint temperature (change only active until the next switching point is reached)

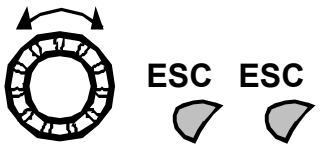
When pressing the + or – button once, the adjusted setpoint temperature will be displayed. It can be readjusted in increments of 0.2 °C (max. +/- 4 °C).

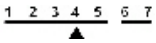
Override button

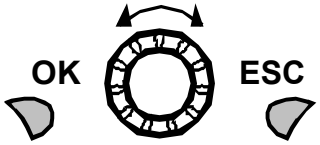
In operating modes Auto and , this button can be used to switch from comfort to economy temperature, or vice versa. The selection is maintained until the next switching point is reached or until the operating mode is changed.

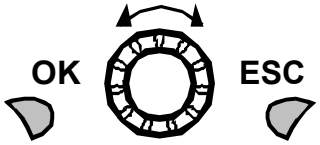
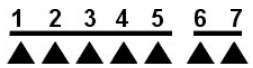
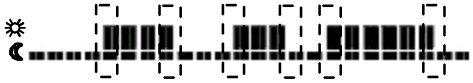
Menu-driven user settings: 4 main menus available

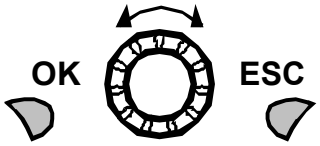
Time of day and day	Main menu	Submenu	Settings
OK 			**Current time of day**

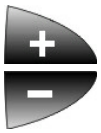
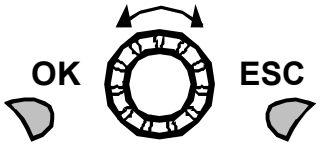


			**Current day of week**

Temperature	**Main menu**	**Submenu**	**Factory settings – heating / cooling**		
	**T**		**Setpoint comfort mode**	**19 °C**	**23 °C**
			**Setpoint economy mode**	**16 °C**	**29 °C**
			**Setpoint frost or overtemperature protection**	**5 °C**	**35 °C**
			**Setpoint economy mode remote operation**	**10 °C**	**30 °C**

Time switch	**Main menu**	**Submenu**	**Settings**
			**Selection of day of week, working day, weekend or week**
			**Selection of the number of heating or cooling periods, max. 3**
			**Selection of heating / cooling period start and end time**
			**Selection of heating / cooling period setpoint temperature**

Absence	**Main menu**	**Submenu**	
			**Entry of holidays or periods of absence. (number of days with economy mode setting / max. 99 days)** **Temperature setpoint during absence Factory setting 12 °C**

Menu-driven heating engineer settings	**Main menu**	**Settings**
	**CAL**	**Sensor calibration**
		Setpoint limitation
		**Optimum start control for first heating period (in unit of time per 1 °C)**
		**2-position control (factory setting)**
	PID 	**PID mode, self-learning**
	PID 6 | 12	**PID mode with a switching cycle of 6 or 12 minutes**

/	**Periodic pump run Off / On**
	Operating mode heating / cooling

Temperature setpoints

In the automatic operating modes, 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 the frost or overtemperature protection mode, the room temperature is constantly monitored. If it falls (rises) below (above) the adjusted setpoint, heating / cooling is switched on to maintain the adjusted frost or overtemperature protection setpoint temperature T.

Special day

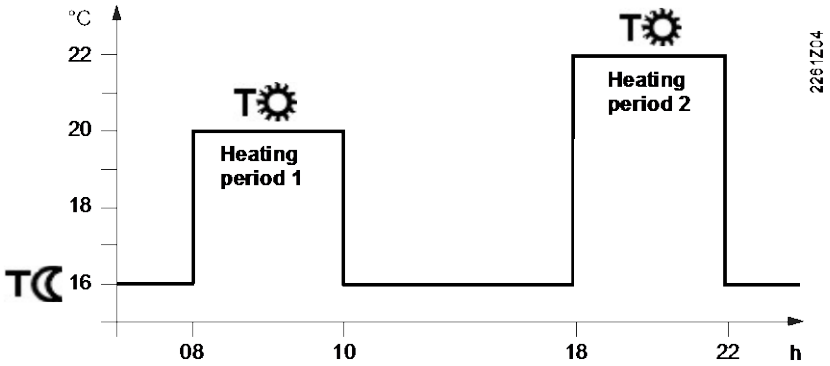
The "special" day is a 24-hour exception mode with one heating or cooling phase. The switch-on and switch-off time and the setpoint for the (heating or cooling) phase are set manually.
The settings for the "special" day (exception) are not linked to any particular day, and remain in memory until you modify these settings yourself. You can then select this preset special day operating mode quickly and easily with the operating-mode selector button . It will remain active until another operating mode is selected.

Switching program

The switching program can be used as a 7-day or 24-hour switching 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 switching program, it is possible to program all days individually, the working days (1-5), the weekend (6-7), or the entire week (1-7).
When a heating / cooling period is programmed, 3 different switching patterns are available.
It is possible to select 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

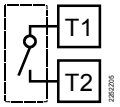
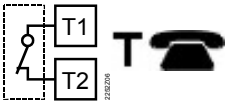


Holiday function

The holiday function is to be selected on the user menu. Set the start of the holiday period (day of departure/ 1 2 3 4 5 6 7 ▲▲▲▲▲ ▲▲ / day of week), the duration and the temperature setpoint (T) during your absence. This will enable the controller to maintain the required temperature for a period of up to 99 days. Every midnight, the counter subtracts one day.
When the holiday period is over and the counter reads 00, the controller will resume the operating mode selected last.

Remote operation

Using a suitable remote operating device, the controller can be switched to an independently adjustable economy temperature T☎. Changeover is accomplished by the making of a volt-free contact connected to terminals T1 and T2. In that case, symbol ☎ will appear on the display. When the contact opens, the operating mode selected last will be resumed.

Operation according to the setting made on the controller	Continuously remote operation economy temperature
	

Remote operating devices

Suitable remote operating devices:
telephone modem, manual switch, window switch, presence detector, central unit, etc.

Factory settings

Operating mode	Block / weekdays	Switching times 1st period		2nd period		3rd period		Temperatures in °C 1st period		2nd period		3rd period							
Auto	1-5 Mo-Fr	06.00	08.00	11.00	13.00	17.00	22.00	19	23	20	23	21	23	16	29				
	6-7 Sa-Su	07.00	23.00					19	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		
																		10	30
	Absence																	12	30

Factory settings heating engineer level

Setpoint limitation °C 5..29

PID mode, self-learning PID

Optimum start control h/°C opti 1/4

Periodic pump run Off

Heating active

Heating engineer level

Accessing

The heating engineer level will be enabled by pressing simultaneously the warmer and colder buttons and by turning the setting knob counter-clockwise and then clockwise.

Sensor calibration

CAL

If the displayed temperature does not correspond to the effective room temperature, the temperature sensor can be recalibrated (recalibration to be made on the heating engineer level).
The displayed temperature can be matched to the effective room temperature in increments of 0.2 °C (max. ±2 °C).

Limitation of setpoint

°C 5..29 | 16..29

Minimum setpoint limitation of 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.

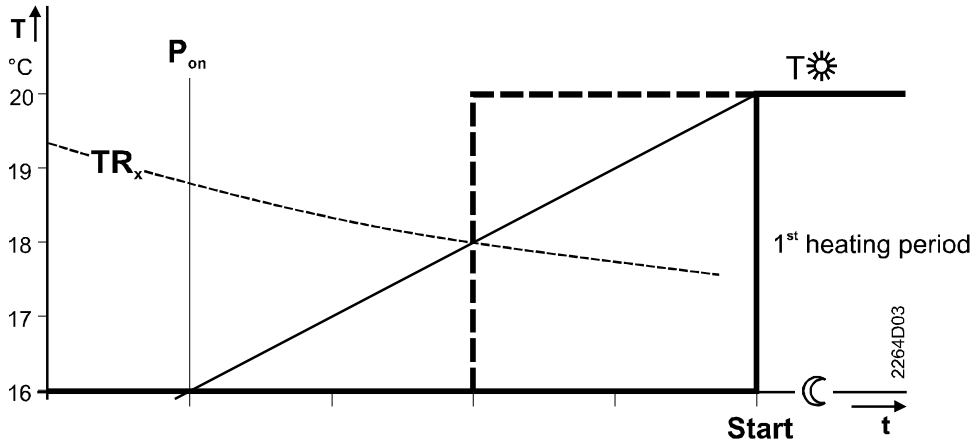
Optimum start control

h/°C opti ¼....

Optimization brings forward the switch-on point of the first heating period such that the adjusted setpoint will be reached at the desired 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 h/°C opti

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



1h/°C	- 4 h	- 3 h	- 2 h	- 1 h	(slow controlled system)
1/2h/°C	- 2 h	- 1½ h	- 1 h	- ½ h	(medium controlled system)
1/4h/°C	- 1 h	- ¾ h	- ½ h	- ¼ h	(fast controlled system)
Optimum start controll Off					(no impact)

T	Temperature (°C)	TR_x	Actual value of room temperature
t	Forward shift of switch-on point (h)	P_{on}	Starting point of optimum start control

Control

The REA23 is a 2-position controller providing PID mode. The room temperature is controlled through the cycling switching of an actuating device.

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

The rate of response to the deviation depends on the selected control algorithm:

Self-learning mode

PID

If the self-learning operating mode is active, the controller automatically adapts to the controlled system (type of building construction, heating capacity, type of heaters, room size etc.). After a learning period, the controller self-optimizes the parameters and then operates in accordance with the newly learned parameters..

Exceptions

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

PID12	PID 12 mode	Switching cycle of 12 minutes for normal or slow controlled systems (solid building structures, large spaces, cast-iron radiators, oil burners).
PID 6	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	The default (factory-set) mode is 2-Pt mode. Simple on/off controller with a switching differential of 0.5+°C (±0.25 °C) for very difficult controlled systems with large fluctuations in the outside air temperature.

Periodic pump run

Prevents the pump from 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.

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 factory settings).

Reset functions

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 (the heating engineer settings will not be changed). The clock starts at 12:00. During the reset time, all sections of the display light up, 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 this reset, all **factory settings** will be reloaded (also refer to section “Factory settings“).

Mechanical design

Battery change

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

Controller

The REA23 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 1.5 V alkaline batteries type **AA** in the compartment at the rear of the controller.

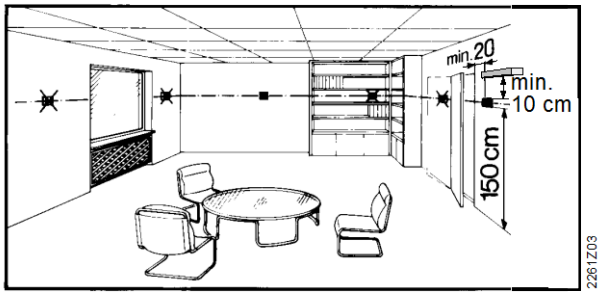
Base

The base can be fitted to most types of commercially available recessed conduit boxes or directly on the wall for wiring. The base only houses the terminals for the electrical connection between the controller and connected devices. The entire electronics (including the relay with a volt-free changeover contact) are accommodated in the controller.

Notes

Engineering

- The room temperature controller should be fitted in the main living area
- The place of installation should be chosen such that the sensor can capture the room temperature as accurately as possible, without being affected by direct solar radiation or other heating or cooling sources
- Mounting height is approximately 1.5 m above the floor
- The controller can be fitted to most commercially available recessed conduit boxes or directly on the wall
- Above the unit, there must be sufficient clearance for removing the controller from its base and for replacing it



Mounting and installation

- When installing the controller, the base must first be fitted and wired. Then, the unit can be slid onto the base from above
- For more detailed information, please refer to the installation instructions supplied with the controller
- For the electrical installation, the local safety regulations must be complied with
- The remote operation contact T1 / T2 must be wired separately using a separate screened cable

Warning!
No internal line protection for supply lines to external consumers.
Risk of fire and injury due to short-circuits!

- Adapt the line diameters as per local regulations to the rated value of the installed overcurrent protection device.
- The power supply lines must have an external circuit breaker with a rated current of no more than 10 A.

Commissioning

- The battery transit tab, which prevents inadvertent operation of the controller during transport and storage, must be removed
- The control mode can be changed on the heating engineer level
- If the reference room is equipped with thermostatic radiator valves, they must be set to their fully open position
- If the displayed room temperature does not correspond to the effective room temperature, the temperature sensor should be recalibrated
  (refer to “Sensor calibration”)

Disposal

The devices are considered electronics devices for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic waste.

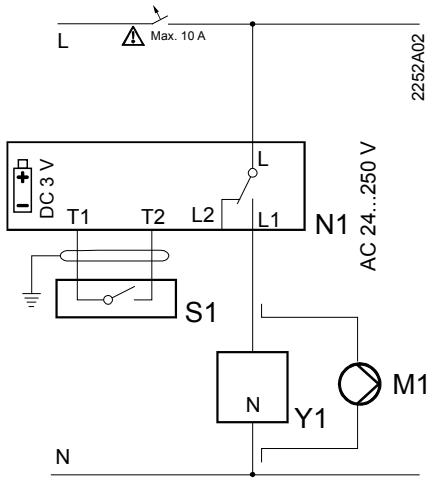
- Dispose of the device via the channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.
- Dispose of empty batteries at designated collection points.

Technical data

General unit data	Operating voltage	DC 3 V
	Batteries (alkaline AA)	2 x 1.5 V
	Battery life	approx. 2 years
	Backup for batter change	Max. 1 min
	Switching capacity of relay	
	Voltage	AC 24…250 V
	Current	6 (2.5) A
	**No internal fuse.** External preliminary protection with max. C 10 A circuit breaker in the supply lines required under all circumstances.	
	Safety class	II to EN 60 730-1
	Sensing element	NTC 10 kΩ ±1 % at 25 °C
	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 temperature	5...29 °C (factory setting 5 °C)
	Resolution of settings and display	
	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
Norms and standards	EU Conformity (CE)	8000078259_xx*)
	C-Tick	N474
Environmental conditions	Operation	
	Climatic conditions	Class 3K3 to IEC 60721-3
	Perm. ambient temperature	5...40 °C
	Humidity	< 85 % r.h.
	Storage and transport	
	Climatic conditions	class 2K3 to IEC 60721-3
	Ambient temperature	-25…+70 °C
	Humidity	< 93 % r.h.
	Mechanism	Class 2M2 to IEC 60721-3
Weight	Incl. package	0.33 kg
Color	Housing	Signal white RAL9003
	Base	Gray RAL7038
Size	Housing	140 x 104.5 x 30 mm

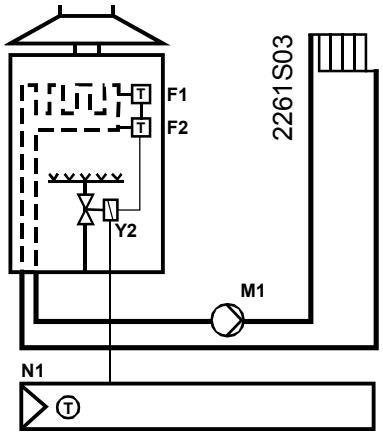
*) The documents can be downloaded from http://siemens.com/bt/download.

Connection diagram

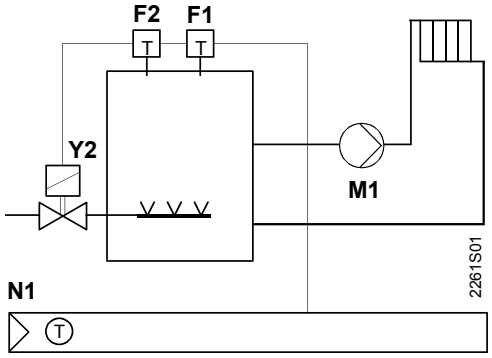


L	Live AC 24…250 V	N1	Room temperature controller REA23
L1	N.O. contact, AC 24…250 V / 6 (2.5) A	S1	Remote operating device (volt-free)
L2	N.C. contact, AC 24…250 V / 6 (2.5) A	T1	Signal “remote operation”
M1	Circulating pump	T2	Signal “remote operation”
N	Neutral conductor	Y1	Actuating device

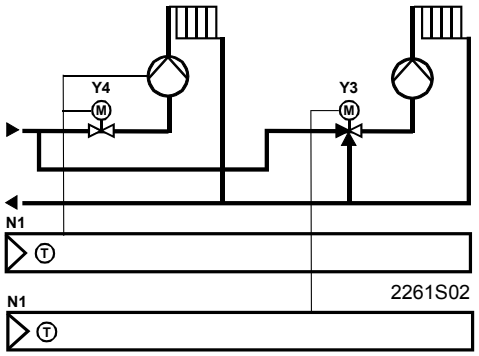
Application examples



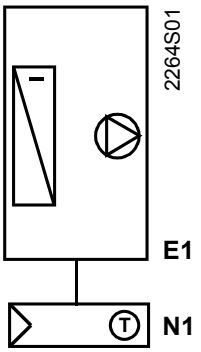
Instantaneous water heater



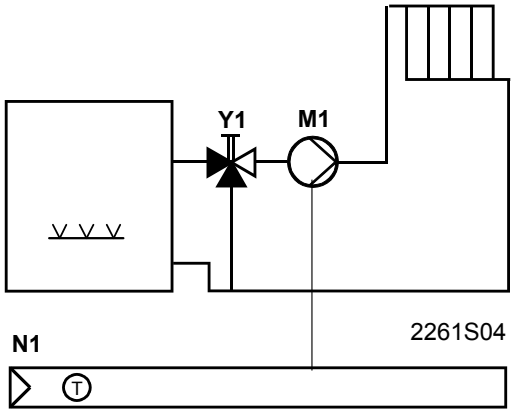
Atmospheric gas burner



Zone valve



Cooling equipment



E1	Cooling equipment
F1	Limit thermostat
F2	Safety limit thermostat
M1	Circulating pump
N1	Room temperature controller REA23
Y1	3-port valve with manual adjustment
Y2	Solenoid valve
Y3	Motorized 3-port valve
Y4	Motorized 2-port valve

Circulating pump with precontrol via manual mixing valve

Dimensions