TAC 2112

C-10-42

Heating controller with optimisation functions

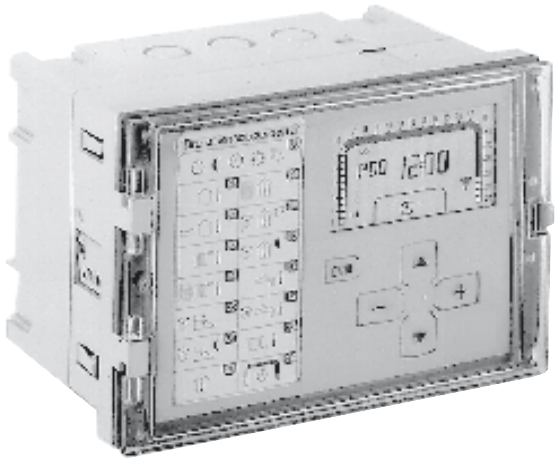
1999.12

The TAC 2112 offers heating for control of hot water heating systems. The radiator circuit is controlled according to an outdoor temperature-compensated reset curve and reference sensor.

This is what you get:

- Automatic adjustment of the reset curve
- Ramp limitation of supply setpoint
- Control of room temperature via reference sensor
- Weekly program for night setback
- Separate weekly program for external equipment
- Holiday program
- Variable night setback and morning heating
- Optimised changeover from daytime operation to night setback
- Pump control with exercise function
- External setpoint adjustment (SPC control)
- Extended daytime operation and forced night setback from an external unit
- Alarm

Simple symbols, a clear LCD display and a minimum of buttons make it easy to read and change the values.



There are three adjustable curve points where you can adjust the reset curve exactly to suit different heating systems.

A reference sensor is used to adjust the reset curve and the duration and the night setback automatically. Adjustments resulting from seasonal variations are automatic.

There is an additional weekly program that gives you the option to control any other item of equipment.

The timer automatically adjusts the clock in the controller to compensate for daylight saving time and leap years.

TECHNICAL DATA

Part number TAC 2112:
- Controller 200-2204-000
- Manual 0-004-7459

Power supply ..... 24 V AC ±20%, 50–60 Hz
Power consumption 3W
Thermistor inputs:
- Type of thermistor ..... 1800 ohm/ 25 °C
- Measurement range ..... –50 °C to +120 °C

Relay outputs:
- Max. voltage ..... 250 V AC
- Max. current ..... 2 A

Inputs:
- Sensor inputs B1-B4, U1, U4 thermistor input (see above)
- Setpoint adjustment (SPC), U2 ..... 0–10 V DC
- Pump alarm, U3 ..... closing contact to M
- Extended daytime operation, X1 ..... closing contact to M
- Forced night setback, X2 ..... closing contact to M

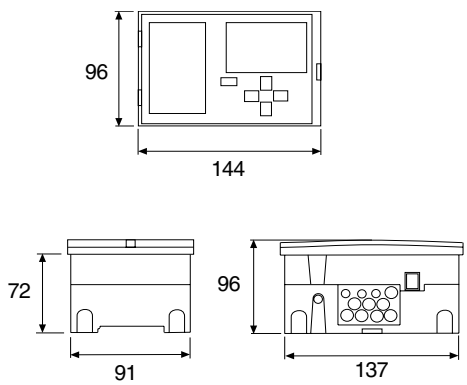
Outputs:
- Circulation pump, K1 ..... relay output (see above)
- Start time optimisation, K2 ..... relay output (see above)
- Buzzer alarm, K3 ..... relay output (see above)
- Weekly program 2, K4 ..... relay output (see above)
- Open heating valve, K5 ..... relay output (see above)
- Close heating valve, K6 ..... relay output (see above)
- Additional connection to outdoor temp., Y2 .... 0–10 V DC

Calendar clock:
- Accuracy ..... ±12 minutes/year at +25 °C
- Reserve running time ..... 48 hours

Enclosure rating ..... IP 40, front IP 54
Ambient temperature:
- Operating ..... 0°C to +50 °C
- Storage ..... –20°C to +50 °C

Ambient humidity ..... max. 90% RH
Electromagnetic compatibility:
- Emission ..... EN 50081-1
- Immunity ..... EN 50082-1

Material ..... ABS plastic
Colour ..... grey/red/transparent
Weight ..... 0,7 kg
Overall dimensions W×H×D (mm) ..... 144×96×96



Dimensions in mm

EXAMPLE OF CONTROLS

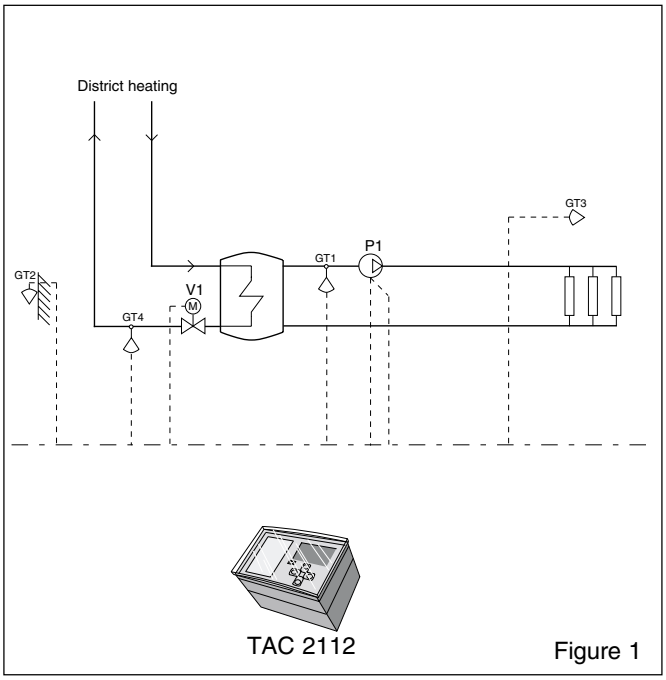


Figure 1

District heating system

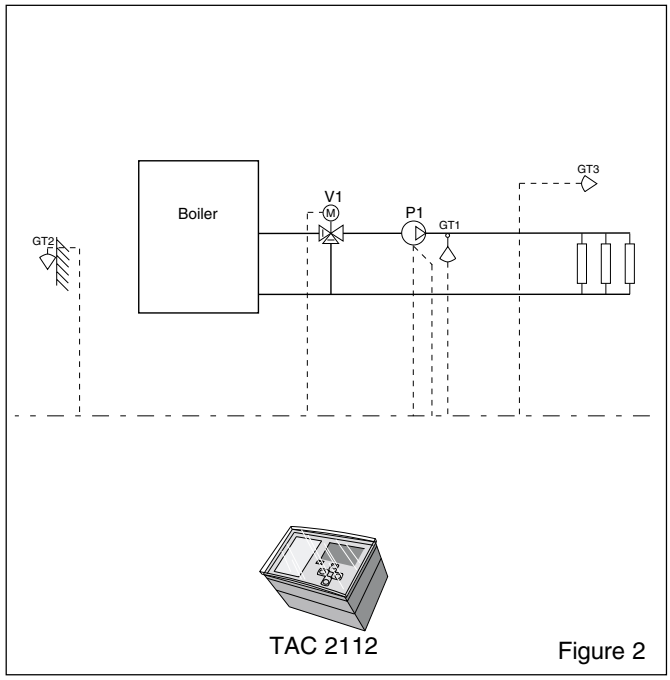


Figure 2

Shunt control with boiler

SUPPLY CONTROL

Reset curve

The reset curve for the supply temperature is based on three dimension points. The outer points are determined fixed to the outdoor temperature, whereas the breakpoint in the middle of the curve can be adjusted: see Figure 3.

The reset curve can be shifted in parallel in systems without a reference sensor. A further parallel shift can be made for night setback. In systems with reference sensors, the curve can be adjusted automatically depending on the room temperature.

The supply temperature can be limited to a minimum and maximum.

Automatic adjustment of the reset curve

The reset curve for the supply temperature can be adjusted automatically via the reference sensor. The reset curve is corrected continuously so that it is adapted exactly to suit the relevant building after a time.

In systems without reference sensors, or if automatic curve adjustment has been switched off, it is possible to design a specific reset curve by manually setting the curve points.

Damped outdoor temperature

The purpose of the supply temperature control is to maintain the correct room temperature irrespective of changes in the outdoor temperature.

The thermal inertia and mass of the building shell mean that a rapid change in outdoor temperature takes a while to affect the room temperature. To make effective use of the heat storage capacity of the building shell, regulation takes place according to a damped outdoor temperature: see Figure 4.

The amount of damping is adjustable to suit all types of buildings.

This function prevents a cold effect when the outdoor temperature rises quickly, and unnecessary additional heating during the usually cool evening hours before night setback.

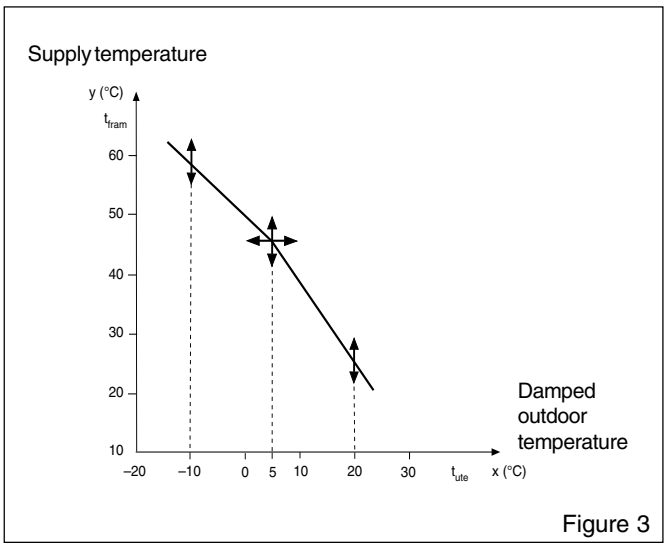


Figure 3

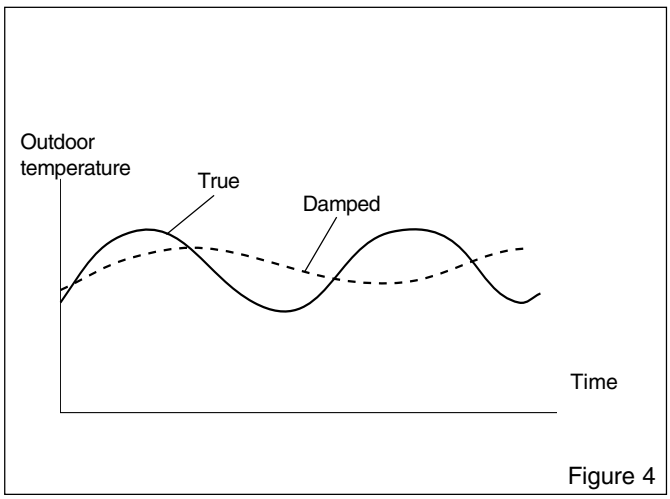


Figure 4

LIMITING THE RETURN WATER TEMPERATURE

Limitation comes into operation as soon as the return temperature exceeds the maximum permitted. The regulator then decreases the supply temperature.

The limitation is variable, i.e. it is a function of the outdoor temperature and follows a separate reset curve, with adjustable curve points: see Figure 5.

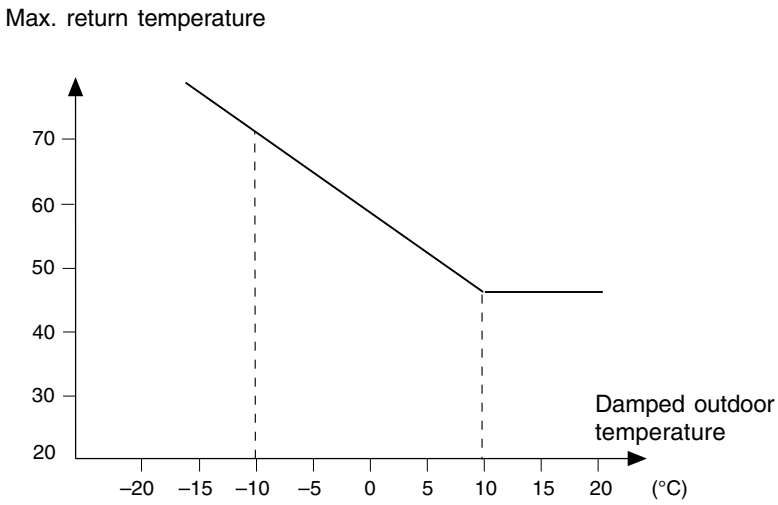


Figure 5

TIMED OPERATION

Time schedule

The controller has two weekly programs. One program controls night setbacks of heating. The other controls night setbacks of domestic hot water and any other equipment, e.g. the hot water circulation pump. In addition, up to any six holiday periods can be programmed up to a year in advance.

Optimised changeover to night setback

When the reference sensor is used, normal daytime operation is reduced according to a curve calculated by the regulator from the outdoor temperature and the control deviation in the room: see Figure 6.

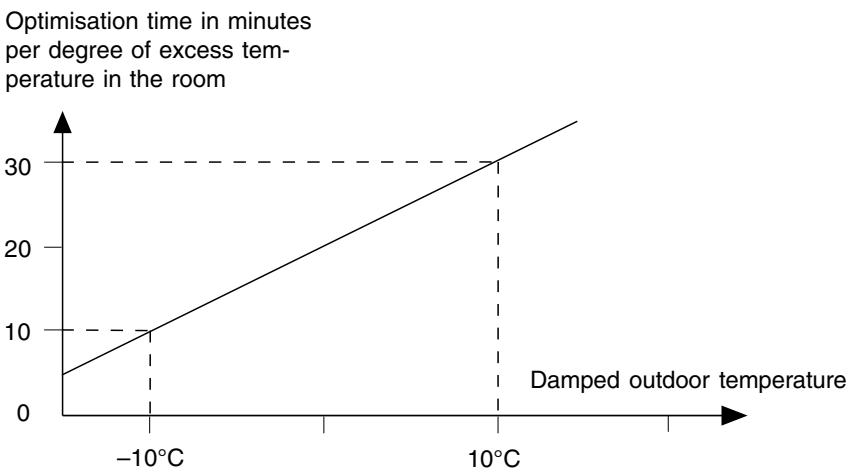


Figure 6

TIMED OPERATION

Variable night setback

The controller uses variable night setback to ensure that the heating system is able to restore the room temperature after night setback at low outdoor temperature.

The magnitude of the setback is a function of the damped outdoor temperature according to a curve that has two adjustable outdoor temperatures: see Figure 7.

At the point for the lowest outdoor temperature, there is no night setback at all. The latter then gradually increases as the outdoor temperature increases.

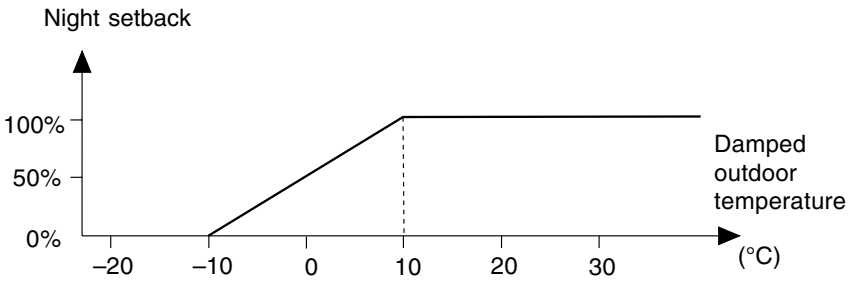


Figure 7

Morning heating

In systems with a reference sensor, the time of changeover to daytime operation is optimised automatically. This means that the controller starts the heating so that the correct temperature is obtained at the pre-set time.

The calculation is a function of a curve with self-adjusting curve points. Normal daytime operation is effected when the room temperature arrives at the level required, but not later than the pre-set time for day operation.

If there is no reference sensor, the morning heating time varies as a function of the damped outdoor temperature according to an adjustable curve: see Figure 8.

Output K2 is set during morning heating.

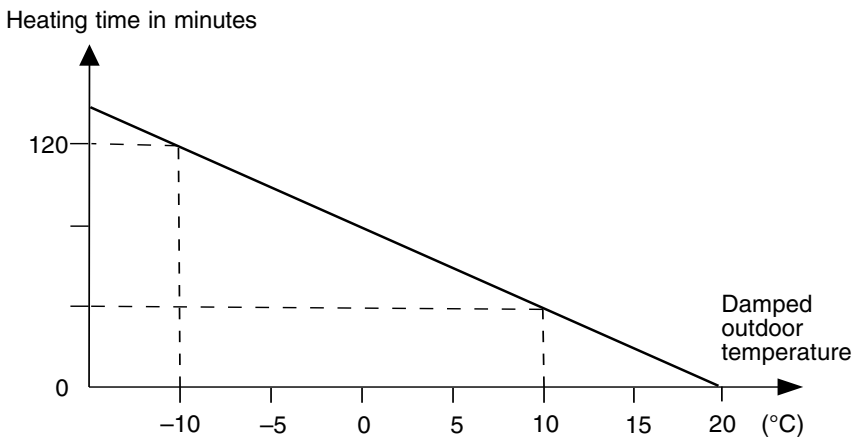


Figure 8

Morning boost

The supply temperature is boosted during morning heating. If there is no reference sensor, the boost is a function of the damped outdoor temperature: see Figure 9.

If a reference sensor is fitted, the supply setpoint is increased by a fixed value.

At 10°C the morning boost reaches its maximum value and gradually decreases until it cuts out completely at -10°C or when the outdoor temperature reaches 20°C.

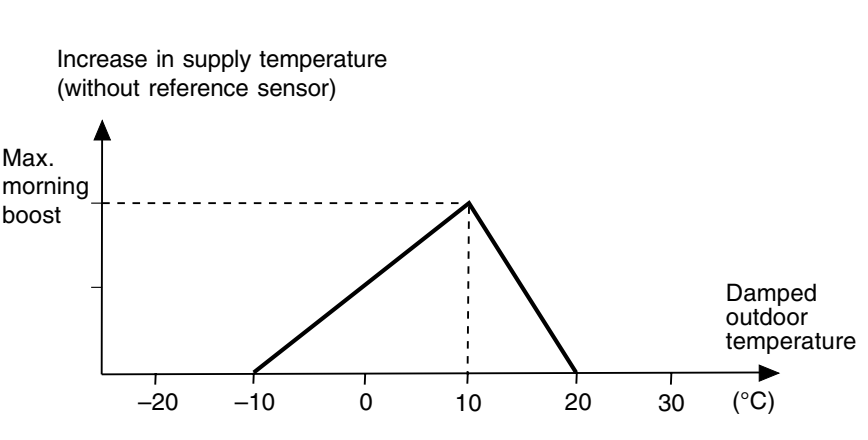


Figure 9

Monday effect

After a weekend when night operation has lasted more than 20 hours, the controller may start the heating earlier than is usually the case for morning heating. This is done by adding a percentage value to the time in the curve for morning heating.

PUMP CONTROL

The logic applied to pump control is designed to use the building's accumulated heat as effectively as possible. Consequently the pump operates only when there is an actual heat demand. The following criteria apply:

- The pump is stopped and the control valve closed when the calculated supply setpoint is less than an adjustable value.
- The pump is stopped and the control valve closed when the outdoor temperature exceeds an adjustable cut-off temperature.

The time for restarting the pump after a stoppage can be set to between 0 and 12 hours.

When the criterion for stopping the pump is met, the pump is stopped after a pre-set delay of 5 minutes.

Frost protection

The frost protection function for the pump ensures that the pump always starts and the valve begins to operate when the outdoor temperature is less than +3°C with a hysteresis of 2°C.

Pump exercise function

Every Monday at 12.00, the pump starts automatically to prevent seizure.

ALARM

The following alarm functions are available:

- Pump alarm
- Deviation alarm for the supply temperature
- Deviation alarm for the domestic hot water temperature
- Output for buzzer alarm

Alarms that have been activated can be read in the regulator's display window and are reset automatically when the cause of the alarm is no longer in force.

POWER FAILURE

The controller retains all settings for an unlimited time. However, the clock must be reset manually if there is a power failure that lasts for more than 48 hours.

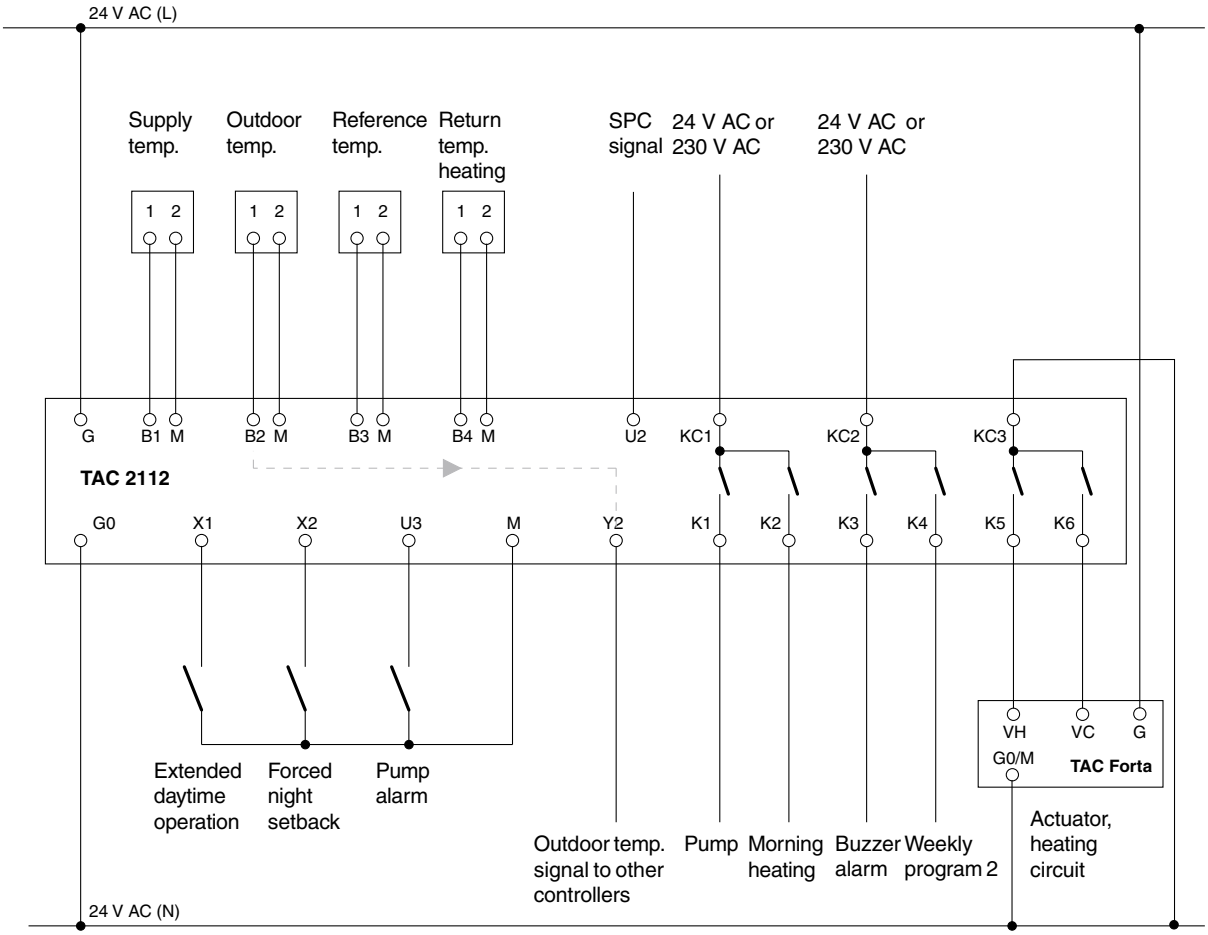
MAINTENANCE

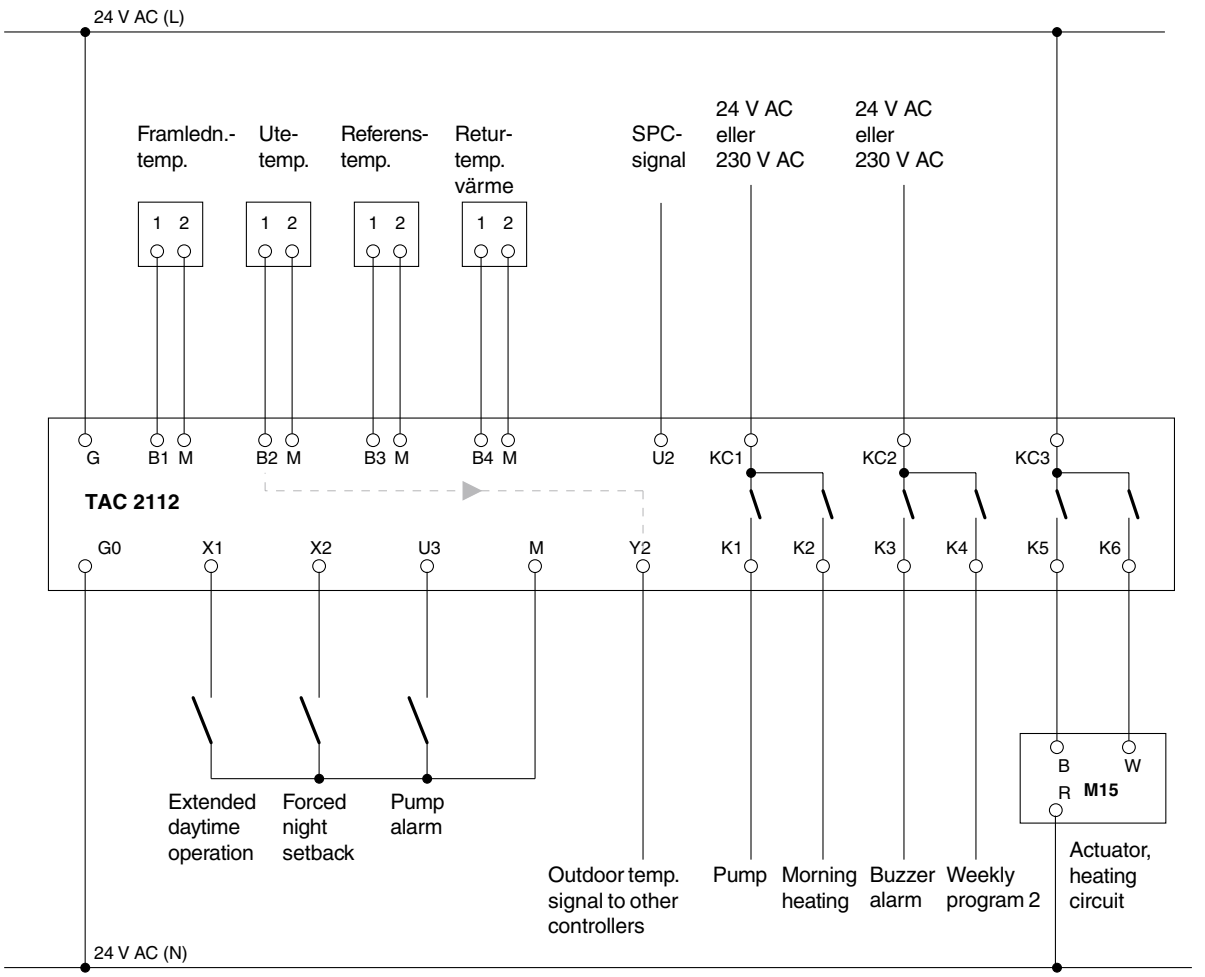
The controller requires no special maintenance but should be kept clean. However, the controller equipment should be inspected regularly so that any faults do not cause overheating or freezing of the pipes.

The display window can be wiped with a moist cloth as required.

ACCESSORIES

Accessories	Part No.
Transformer TR 32	341-3032-000
Assembly kit with enclosure rating IP55	200-2993-000





Wiring diagrams

INSTALLATION

Connections at terminal block L, left side

16	–	–
15	Y2	Output for outdoor temp.
14	–	–
13	KC3	Common to K5 and K6
12	K5	Heating valve: increase
11	K6	Heating valve: decrease
10	–	–
9	G	Supply, 24 V AC, phase
8	G0	Supply, 24 V AC, zero
7	–	Safety ground
6	KC1	Common to K1 and K2
5	K1	Circulation pump
4	K2	Morning heating
3	KC2	Common to K3 and K4
2	K3	Output for buzzer alarm
1	K4	Output for time channel 2

Connections at terminal block R, right side

16	M	Measurement neutral
15	M	Measurement neutral
14	–	–
13	U2	SPC signal
12	U3	Pump alarm
11	M	Measurement neutral
10	B1	Supply sensor
9	M	Measurement neutral
8	B2	Input for outdoor temperature
7	B3	Reference sensor
6	B4	Return sensor, heating
5	M	Measurement neutral
4	–	–
3	X1	Extended daytime operation
2	X2	Forced night setback
1	M	Measurement neutral

CABLE LENGTHS

When the 24 V transformer is placed by the TAC 2112, the following applies:

Cables to G, G0 and other terminal blocks on TAC 24 V: max 50 m, min. area 0,8 mm^2. If the cables exceed 50 m in length, the minimum cross-sectional area is 1,5 mm^2. The same applies to cables connected to KC3, K5 and K6.

Cables connected to the terminal blocks KC1, K1, K2, KC2, K3, and K4: max. 100 m, min. area 1,5 mm^2.

Cables to terminal blocks types B, U, and X: max. 200 m, min. area 0,5 mm^2.

WARNING! Power supply cables must be connected by a suitably qualified electrician.