

Digital controller with system representation

161010

Heating controller

Manual for the
specialised craftsman

Installation

Operation

Troubleshooting



11211952

Thank you for buying this product.

Please read this manual carefully to get the best performance from this unit. Please keep this manual safe.

en

Manual

Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

Instructions

Attention must be paid to the valid local standards, regulations and directives!

Information about the product

Proper usage

The heating controller is designed for controlling single-circuit heating circuits and/or single-circuit cooling systems in compliance with the technical data specified in this manual.

Improper use excludes all liability claims.

CE-Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.



Note:

Strong electromagnetic fields can impair the function of the controller.

- Make sure the controller as well as the system are not exposed to strong electromagnetic fields.

Subject to technical change. Errors excepted.

Target group

These instructions are exclusively addressed to authorised skilled personnel.

Only qualified electricians should carry out electrical works.

Initial installation must be effected by the system owner or qualified personnel named by the system owner.

Description of symbols

WARNING!

Warnings are indicated with a warning triangle!



→ **They contain information on how to avoid the danger described.**

Signal words describe the danger that may occur, when it is not avoided.

- WARNING means that injury, possibly life-threatening injury, can occur.
- ATTENTION means that damage to the appliance can occur.



Note:

Notes are indicated with an information symbol.

- Arrows indicate instruction steps that should be carried out.

Disposal

- Dispose of the packaging in an environmentally sound manner.
- Dispose of old appliances in an environmentally sound manner. Upon request we will take back your old appliances bought from us and guarantee an environmentally sound disposal of the devices.

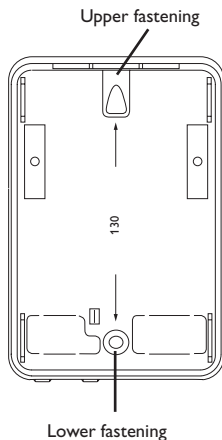
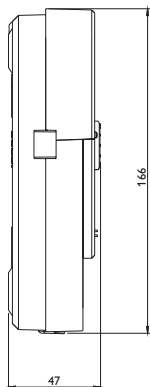
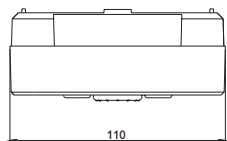
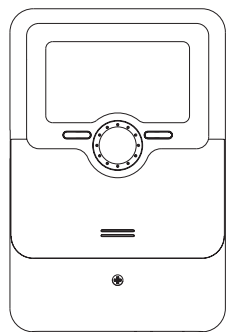
Heating controllers

The heating controller is designed for controlling single-circuit heating circuits and/or single-circuit cooling systems.

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1 Overview



Technical data

Inputs: 3 inputs for Pt1000 temperature sensors, 1 Grundfos Direct Sensor™ (analogue), 1 input for a room thermostat, 1 input for a dew point switch, 1 potential-free switch

Outputs: 3 semiconductor relays, 1 potential-free extra-low voltage relay, 1 PWM output

PWM frequency: 512 Hz

PWM voltage: 10.8 V

Switching capacity: 1 (1) A 240 V~ (semiconductor relay),
1 (1) A 30 V DC (potential-free relay)

Total switching capacity: 4 A 240 V~

Power supply: 100 ... 240 V~ (50 ... 60 Hz)

Supply connection: type Y attachment

Power consumption < 1 W

Mode of operation: type 1.B.C.Y action

Rated impulse voltage: 2.5 kV

Data interface: VBus®

VBus® current supply: 60 mA

Housing: plastic, PC-ABS and PMMA

Mounting: wall mounting, also suitable for mounting into patch panels

Indication / Display: full graphic display, control lamp (Lightwheel®) and back-ground illumination

Operation: 2 push buttons at the front and 1 adjustment dial (Lightwheel®)

Protection type: IP 20 / EN 60529

Protection class: I

Ambient temperature: 0 ... 40 °C

Degree of pollution: 2

Dimensions: 110 x 166 x 47 mm

2 Installation

2.1 Mounting

WARNING! Electric shock!



Upon opening the housing, live parts are exposed!

→ **Always disconnect the device from power supply before opening the housing!**



Note:

Strong electromagnetic fields can impair the function of the controller.

→ Make sure the controller as well as the system are not exposed to strong electromagnetic fields.

The unit must only be located in dry interior rooms.

The controller must additionally be supplied from a double pole switch with contact gap of at least 3 mm.

Please pay attention to separate routing of sensor cables and mains cables.

In order to mount the device to the wall, carry out the following steps:

- Unscrew the crosshead screw from the cover and remove it along with the cover from the housing.
- Mark the upper fastening point on the wall. Drill and fasten the enclosed wall plug and screw leaving the head protruding.
- Hang the housing from the upper fastening point and mark the lower fastening point (centres 130 mm).
- Insert lower wall plug.
- Fasten the housing to the wall with the lower fastening screw and tighten.
- Carry out the electrical wiring in accordance with the terminal allocation (see chapter 2.2).
- Put the cover on the housing.
- Attach with the fastening screw.

2.2 Electrical connection

WARNING! Electric shock!



Upon opening the housing, live parts are exposed!

→ **Always disconnect the device from power supply before opening the housing!**

ATTENTION! ESD damage!



Electrostatic discharge can lead to damage to electronic components!

→ **Take care to discharge properly before touching the inside of the device! To do so, touch a grounded surface such as a radiator or tap!**



Note:

Connecting the device to the power supply must always be the last step of the installation!

The controller is supplied with power via a mains cable. The power supply of the device must be 100 ... 240 V~ (50 ... 60 Hz).

The controller is equipped with 4 relays in total, to which loads such as pumps, valves, etc. can be connected:

- Relays 1 ... 3 are semiconductor relays:

Conductor R1 ... R3

Neutral conductor N

Protective conductor (⊕)

- Relay 4 is a potential-free extra-low voltage relay

Depending on the product version, mains cables and sensor cables are already connected to the device. If that is not the case, please proceed as follows:

Connect the **temperature sensors** (S1 to S3) to the following terminals with either polarity:

S1 = Sensor 1 (outdoor temperature sensor)

S2 = Sensor 2 (heating circuit flow)

S3 = Sensor 3 (e. g. return sensor)

Connect the **remote control** (if used in the system selected) to the S3/RTA12 input with either polarity.

Connect the **room thermostat** to the TA input with either polarity.

Connect the **dew point switch** (if used in the system selected) to the S5/TS10 input with either polarity.

Connect the **RPS Grundfos Direct Sensor™** (pressure sensor) to the input S6. S7 can be used as an input for a **potential-free switch for the cooling mode**. Pins 2 and 3 come with a pluggable cable link already connected. If the contact is closed (cable link connected), the heating mode will be active when demanded. If the contact is open (cable link not connected) and the cooling option is activated, the cooling mode will be active when demanded.

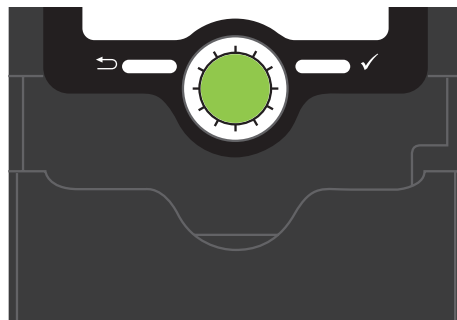
In order to connect a switch, cut the cable link and connect the switch to both wires.

The terminal marked **PWM A** is the control output for a high-efficiency pump.

If the **Central Outdoor Sensor** is to be used, connect it to the terminals marked **VBus** with either polarity.

3 Operation and function

3.1 Buttons and adjustment dial



The controller is operated via 2 buttons and 1 adjustment dial (Lightwheel®) below the display:

Left button (↶) - escape button for changing into the previous menu

Right button (✓) - confirming/selecting

Lightwheel® - scrolling upwards/scrolling downwards, increasing adjustment values/reducing adjustment values

3.2 Adjustment values and user code

Adjustment values will only be available if the correct user code has been entered.

In order to access the user code enquiry from the home screen, press the right button (✓) for approx. 3 s.

User code: 0322

If the user code has been entered, the adjustment values menu will be displayed.

In order to get back to the home screen, press the left button (↶).

If no button is pressed for 5 min, the controller will display the home screen.

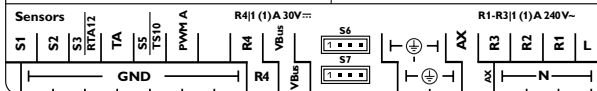


Note:

The user code has to be entered again each time you wish to access the adjustment values menu.

CALEFFI
Hydronic Solutions
161010

Manufactured
by RESOL - TYPE SLT 100...240V
Heiskampstr. 10
D-45527 Hattingen
CE IP 20



The **mains connection** is at the terminals:

Neutral conductor N

Conductor L

Protective conductor (⊕)

➔ Use a cable with a cross section of at least 0.75 mm² of the H05VV-F type for connecting the device to the mains.



Note:

The connection depends on the system layout selected (see page 7).

The auxiliary terminals can be used instead of R4 as the mixer switch for the heat generator, if a voltage higher than 30V is applied.

Antifreeze: Standard function – if the temperature at S2 falls below 7 °C, the controller activates the pump for 30 min, in order to reach 20 °C.

Outdoor sensor: If the outdoor temperature sensor is defective, 0 °C is used as the reference value.

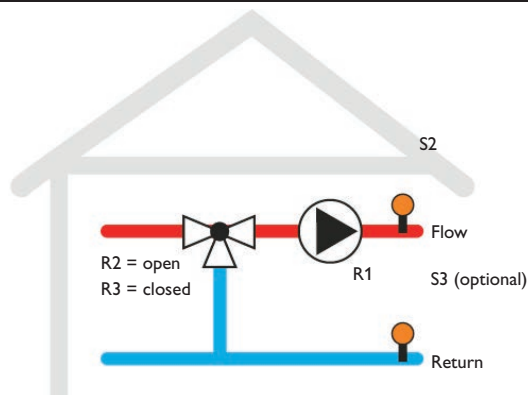
3.3 Control LED

The controller is equipped with a multicolour LED in the centre of the Lightwheel®, indicating the following states:

Colour	Permanently shown	Flashing
Green 	Everything OK	Manual mode: at least one relay in manual mode (Off , Max or Min)
Yellow 		PMin has fallen below the threshold, TMax exceeded by up to 5 K überschritten
Red 		Sensor fault, safety shutdown active, TMax exceeded by > 5 K

4 Systems

System 1 (flow temperature controlled heating with optional efficiency control of the heat exchange – flow controlled cooling)



The controller monitors the room thermostat (TA).

If the room thermostat demands heat, the pump (R1) starts and R4 is energised for the heating demand. The temperature at S2 is monitored. The mixer is controlled so that the adjusted temperature **Tset** is reached and maintained at S2.

If the **TFcalculated** option (return temperature monitoring S3, factory setting = active) is activated, the controller runs a heat demand-based calculation of the set flow temperature needed for keeping the system at the optimum temperature. For this purpose, the return temperature (S3) is monitored. The calculated set flow temperature is displayed as **TFset**.

The controller is equipped with a non-adjustable safety shutdown function. If the temperature at S2 reaches or exceeds 90 °C, the mixer closes. The warning symbol  appears on the screen and the Lightwheel® flashes yellow. If the temperature at S2 reaches or exceeds 95 °C, R1 and R4 switch off. The Lightwheel® flashes red.

If the **TMax** option is activated, the value for the safety shutdown function can be reduced. If the temperature at S2 exceeds TMax by less than 5 K, the warning symbol  appears on the screen and the Lightwheel® flashes yellow. If the temperature at S2 exceeds **TMax** by more than 5 K, R1 and R4 switch off. The Lightwheel® flashes red.

If the **Cooling** option is activated, the mixer is controlled so that the adjusted cooling temperature **TCool** is reached and maintained at S2. The S7 contact can be used for connecting a switch for remotely controlling the heating / cooling mode.

Contact open = cooling mode

Contact closed = heating mode

If the **Condensation** option is activated, the controller monitors a dew point switch. If the dew point switch triggers an alarm, cooling stops and the warning symbol is indicated. If the humidity falls again below the adjusted value, the cooling mode continues.

Terminal allocation

- S1 = outdoor temperature sensor
- S2 = heating circuit flow
- S3/RTA12 = return sensor (optional)
- TA = room thermostat
- S5/TS10 = dew point switch (optional)
- S6 = RPS Grundfos Direct Sensor™ pressure sensor (optional)
- S7 = contact for remotely controlling the heating / cooling mode (optional)
- R1 = pump
- R2 = mixer open
- R3 = mixer closed

R4 = demand contact of the heat generator (potential-free extra-low voltage relay). If the voltage at the contact used is higher than 30 V, use the auxiliary terminals at the 230 V side for the mixer.

PWM 1 = R1 speed signal, profile selectable

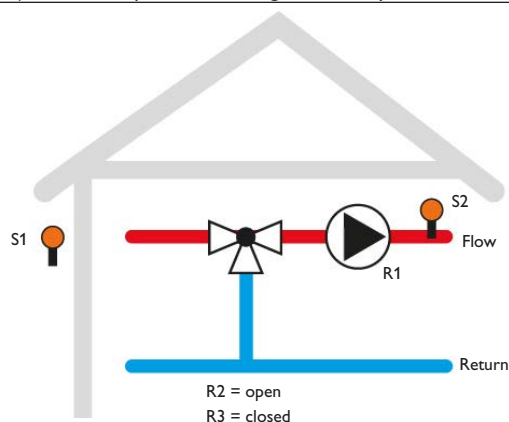
Adjustment and balance values menu system 1

	Factory setting	Range	Description
System	1	1, 2	System selection
Tset	40 °C	15 °C ... 90 °C	Set flow temperature
TFcalculated	Yes	Yes, No	Heat demand-based set flow temperature calculation option
TMin	No	Yes, No	Minimum temperature heating circuit option
TMin	25 °C	15 °C ... 40 °C	Minimum temperature heating circuit
TMax	Yes	Yes, No	Maximum temperature heating circuit option
TMax	50 °C	30 °C ... 90 °C	Maximum temperature heating circuit
tLimit	5 min	1 ... 30 min	Time for which the calculated set flow temperature is to be used
Cooling	No	Yes, No	Cooling option
TCool	16 °C	5 °C ... 25 °C	Cooling temperature
Condensat.	Yes	Yes, No	Dew point switch (DPS) option
Chiller on	No	Yes, No	Cooling demand on option
Pressure	No	Yes, No	Low pressure monitoring option
PMin	0.6 bar	0.2 ... 10.0 bar	Switch-on threshold low pressure monitoring
tMixer	75 s	30 ... 240 s	Mixer runtime
Corr:tMixer	90 s	5 ... 300 s	Surplus mixer runtime when the mixer is closing
tPLAY	4 s	1 ... 15 s	Mixer control time for change of flow direction
Block. prot.	Yes	Yes, No	Blocking protection option
PWM	Heating	Heating, Solar	PWM profile PWM A
Slab drying	-	-	Slab drying submenu
TStart	20 °C	10 °C ... 30 °C	Slab drying start temperature
TMax	45 °C	20 °C ... 60 °C	Slab drying holding temperature
Rise	5 K	1 ... 10 K	Slab drying rise value
Rise time	24 h	1 ... 24 h	Slab drying rise time
tBacking	7 d	1 ... 20 d	Slab drying holding time

	Factory setting	Range	Description
Start	-	Start, Cancelled	Activation / Deactivation slab drying
Language	Italiano	Deutsch, English, Français, Italiano	Language selection
Reset	No	Yes, No	back to factory settings
Operation	-	0 ... 9999	Operating days of the controller (balance value, cannot be set back to zero)
Pump	-	0 ... 9999	Balance values, can be set back to zero (see page 16)
Mixer open	-	0 ... 9999	
Mixer closed	-	0 ... 9999	
Backup heating	-	0 ... 9999	
Max. S1	-	max. 999.9 °C	
Max. S2	-	max. 999.9 °C	
Max. S3	-	max. 999.9 °C	
Min. press.	-	0.0 ... 10.0 bar	
Max. press.	-	0.0 ... 10.0 bar	
Version	-	-	Display of software version
All relays	Auto	Auto, Off	Operating modes of all relays
Man. 1	Auto	On, Auto, Off	Manual mode relay 1
Man. 2,3	Auto	Mixer closed, Auto, Mixer open, Off	Manual mode relay 2,3
Man. 4	Auto	On, Auto, Off	Manual mode relay 4

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System 2 (weather-compensated heating – flow temperature controlled cooling)



The controller monitors the room thermostat (TA).

If the room thermostat demands heat, the pump (R1) starts and R4 is energised for the heating demand. The temperature at S2 is monitored.

The controller calculates the set flow temperature by means of the outdoor temperature (S1) and the selected heating curve. The mixer is controlled so that the calculated set flow temperature is reached and maintained at S2.

The controller is equipped with a non-adjustable safety shutdown function. If the temperature at S2 reaches or exceeds 90 °C, the mixer closes. The warning symbol  appears on the screen and the Lightwheel® flashes yellow. If the temperature at S2 reaches or exceeds 95 °C, R1 and R4 switch off. The Lightwheel® flashes red.

If the **TMax** option is activated, the value for the safety shutdown function can be reduced. If the temperature at S2 exceeds TMax by less than 5K, the warning symbol  appears on the screen and the Lightwheel® flashes yellow. If the temperature at S2 exceeds TMax by more than 5 K, R1 and R4 switch off. The Lightwheel® flashes red. If the **Cooling** option is activated, the mixer is controlled so that the adjusted cooling temperature **TCool** is reached and maintained at S2. The S7 contact can be used for connecting a switch for remotely controlling the heating / cooling mode.

Contact open = cooling mode

Contact closed = heating mode

If the **Condensation** option is activated, the controller monitors a dew point switch. If the dew point switch triggers an alarm, cooling stops and the warning symbol is indicated.

Terminal allocation

S1	= outdoor temperature sensor
S2	= heating circuit flow
S3/RTA12	= return sensor or remote control (optional)
TA	= room thermostat
S5/TS10	= dew point switch (optional)
S6	= RPS Grundfos Direct Sensor™ pressure sensor (optional)
S7	= contact for remotely controlling the heating / cooling mode (optional)
R1	= pump
R2	= mixer open
R3	= mixer closed
R4	= demand contact of the heat generator (potential-free extra-low voltage relay). If the voltage at the contact used is higher than 30V, use the auxiliary terminals at the 230 V side for the mixer.
PWM 1	= R1 speed signal, profile selectable

Adjustment and balance values menu system 2

	Factory setting	Range	Description
System	1	1, 2	System selection
Curve	0.8	0.3 ... 3.0	Heating curve
TMin	Yes	Yes, No	Minimum temperature heating circuit option
TMin	25 °C	15 °C ... 40 °C	Minimum temperature heating circuit
TMax	Yes	Yes, No	Maximum temperature heating circuit option
TMax	50 °C	30 °C ... 90 °C	Maximum temperature heating circuit
Remote control	No	Yes, No	Remote control option
Cooling	No	Yes, No	Cooling option
TCool	16 °C	5 °C ... 25 °C	Cooling temperature
Condensat.	Yes	Yes, No	Dew point switch (DPS) option
Chiller on	No	Yes, No	Cooling demand on option
Pressure	No	Yes, No	Low pressure monitoring option
PMin	0.6 bar	0.2 ... 10.0 bar	Switch-on threshold low pressure monitoring
tMixer	75 s	30 ... 240 s	Mixer runtime

	Factory setting	Range	Description
Corr.tMixer	90 s	5 ... 300 s	Surplus mixer runtime when the mixer is closing
tPLAY	4 s	1 ... 15 s	Mixer control time for change of flow direction
Block. prot.	Yes	Yes, No	Blocking protection option
PWM	Heating	Heating, Solar	PWM profile PWMA
Slab drying	-	-	Slab drying submenu
TStart	20 °C	10 °C ... 30 °C	Slab drying start temperature
TMax	45 °C	20 °C ... 60 °C	Slab drying holding temperature
Rise	5 K	1 ... 10 K	Slab drying rise value
Rise time	24 h	1 ... 24 h	Slab drying rise time
tBacking	7 d	1 ... 20 d	Slab drying holding time
Start	-	Start, Cancelled	Activation / Deactivation slab drying
Language	Italiano	Deutsch, English, Français, Italiano	Language selection
Reset	No	Yes, No	back to factory settings
Operation	0	0 ... 9999	Operating days of the controller (balance value, cannot be set back to zero)
Pump	-	0 ... 9999	Balance values, can be set back to zero (see page 16)
Mixer open	-	0 ... 9999	
Mixer closed	-	0 ... 9999	
Backup heating	-	0 ... 9999	
Max. S1	-	max. 999.9 °C	
Max. S2	-	max. 999.9 °C	
Max. S3	-	max. 999.9 °C	
Min. press.	-	0.0 ... 10.0 bar	
Max. press.	-	0.0 ... 10.0 bar	
Version	-	-	Display of software version
All relays	Auto	Auto, Off	Operating modes of all relays
Man. 1	Auto	On, Auto, Off	Manual mode relay 1
Man. 2,3	Auto	Mixer closed, Auto, Mixer open, Off	Manual mode relay 2,3
Man. 4	Auto	On, Auto, Off	Manual mode relay 4

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5 Indications, functions and options



Note:

The display and adjustment channels as well as the adjustment ranges depend on the system selected, the functions and options as well as on the system components connected to the controller.

5.1 Home screen

The home screen is a graphic representation of the current system state.

The following indications are possible:

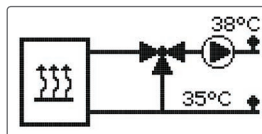
Standby mode

The room thermostat does not demand heating / cooling.



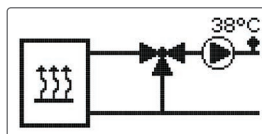
Heating mode in system 1 with return temperature monitoring

The room thermostat demands heat, TFcalculated = Yes.



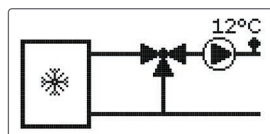
Heating mode in system 1 without return temperature monitoring

The room thermostat demands heat, TFcalculated = No.



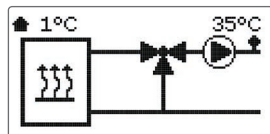
Cooling mode in system 1

The room thermostat demands cold.



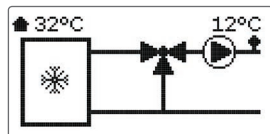
Heating mode in system 2

The room thermostat demands heat, the outdoor temperature is indicated.



Cooling mode in system 2

The room thermostat demands cold, the outdoor temperature is indicated.



5.2 Display values

In order to access the display values from the home screen, briefly press the right button (✓).

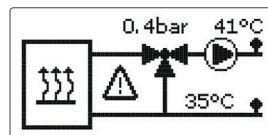
Displayed values	
► Pump	0%
Mixer open	0%
Mixer closed	0%
TFlow	96.3 °C
TFset	16 °C
Treturn	96.3 °C
Alarm Pmin	0
Alarm dew point	0

5.3 Warning messages

TMax is exceeded.



Pressure has fallen below **PMin**.



Sensor fault warning message

Sensor cable broken or short-circuit.



Dew point switch warning message

The dew point switch has detected condensation, the cooling mode is interrupted.



5.4 Configuration

In order to access the adjustment values from the home screen, press the right button (✓) for approx. 3 s and enter the user code (see page 6).

Tset

Set flow temperature

Tset	
40 °C	
15	90
▲ = 40	

TFcalculated

Heat demand-based set flow temperature calculation option

TFcalculated	
☒ Yes	
☐ No	

TFset

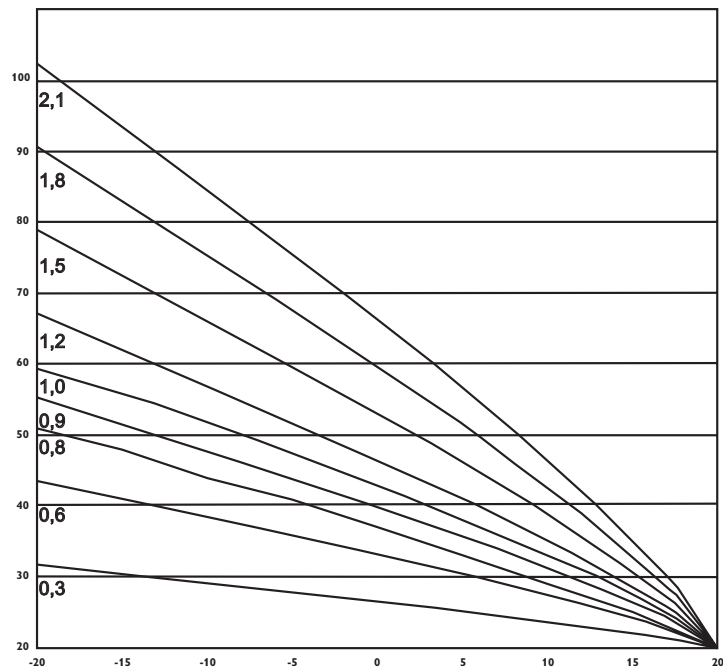
Display value: calculated set flow temperature

Displayed values	
TFlow	43.6 °C
TFset	40 °C
Treturn	26.2 °C

Curve

Heating curve

Curve	
0.8	
0.3	3.0
▲ = 0.8	



TMin

Minimum temperature heating circuit option

TMin	
☒ Yes	
☐ No	

TMin

Minimum temperature heating circuit

TMin
25 °C
15 ▲ = 25 40

TMax

Maximum temperature heating circuit option

TMax
☒ Yes
☐ No

TMax

Maximum temperature heating circuit

TMax
50 °C
30 ▲ = 50 90

tLimit

Time for which the calculated set flow temperature is to be used

tLimit
5 min
1 ▲ = 5 30

Remote control

Remote control option

Remote control
☐ Yes
☒ No

Cooling

Cooling option

Cooling
☐ Yes
☒ No

TCool

Cooling temperature

TCool
16 °C
5 ▲ = 16 25

Condensat.

Dew point switch (DPS) option

Condensat.
☒ Yes
☐ No

Chiller on

Cooling demand on, if the dew point switch detects condensation (only if Condensation = Yes)

Chiller on
☐ Yes ☒ No

Pressure

Low pressure monitoring option

Pressure
☐ Yes ☒ No

PMin

Switch-on threshold low pressure monitoring

PMin
0.6 bar ☒ 0.2 ▲ = 0.6 10.0

tMixer

Mixer runtime

tMixer
75 ☒ 5 ▲ = 75 240

Corr.tMixer

Surplus mixer runtime when the mixer is closing

Corr.tMixer
15 ☒ 5 ▲ = 15 300

tPLAY

Mixer control time for change of flow direction

tPlay
4 s ☒ 0 ▲ = 4 15

Block. prot.

Blocking protection option

Block. prot.
☒ Yes ☐ No

PWM

PWM profile selection

PWM
☒ Heating ☐ Solar

Slab drying

Slab drying submenu

Slab drying	
▶ TStart	20 °C
TMax	45 °C
Rise	5 K

TStart

Start temperature

TStart	
20 °C	
10	30
▲ = 20	

TMax

Holding temperature

TMax	
30 °C	
20	60
▲ = 30	

Rise

Rise value

Rise	
5 K	
1	10
▲ = 5	

Rise time

Rise duration

Rise time	
24 h	
1	24
▲ = 24	

tBacking

TMax holding time

tBacking	
7 d	
1	20
▲ = 7	

Start

Activation / Deactivation of the slab drying

Slab drying	
tBacking	7 d
▶ Start	Start
back	

Language

Selection of the menu language

Language	
● Deutsch	
▶ ○ English	
○ Français	

Reset

Reset to factory settings

Reset	
Reset?	No

5.5 Balance values

Operation

Operating hours counter

Parameters	
▶ Operation	0 d
Pump	0 h
Mixer open	0 h

Pump, Mixer open, Mixer closed, Backup heat.

Operating hours counter of the relays

Parameters	
▶ Pump	12 h
Mixer open	12 h
Mixer closed	7 h

Max. S1 (2, 3)

Maximum temperature at the corresponding sensor

Parameters	
▶ Max. S1	146 °C
Max. S2	96 °C
Max. S3	69 °C

Min. press., Max. press.

Minimum and maximum pressure

Parameters	
▶ Min. press.	0.4 bar
Max. press.	1.2 bar
Version	1.00

The balance values can be set back to zero. In order to reset a value, proceed as follows:

➔ Select the desired value and press the right button (✓).

Does the security enquiry **Delete?** appear?

➔ Turn the Lightwheel® clockwise.

Yes instead of **No** will be displayed.

➔ Confirm your selection with the right button (✓).

The value will be set back to zero.

In order to interrupt this process, press the left button (↩).

5.6 Manual mode

All relays

Operating modes of all relays

All relays	
▶ ☒ Auto	
☐ Off	

Man. 1 (4)

Manual mode of the relays 1 and 4

Man. 1	
☐	On
☒	Auto
☐	Off

For control and service work, the operating mode of the relays can be manually adjusted.

- On Relay on
- Auto Relay in automatic operation
- Off Relay off

Man. 2,3

Manual mode of the mixer

Man. 2,3	
☐	Closed
☒	Auto
☐	Open

For control and service work, the operating mode of the mixer can be manually adjusted.

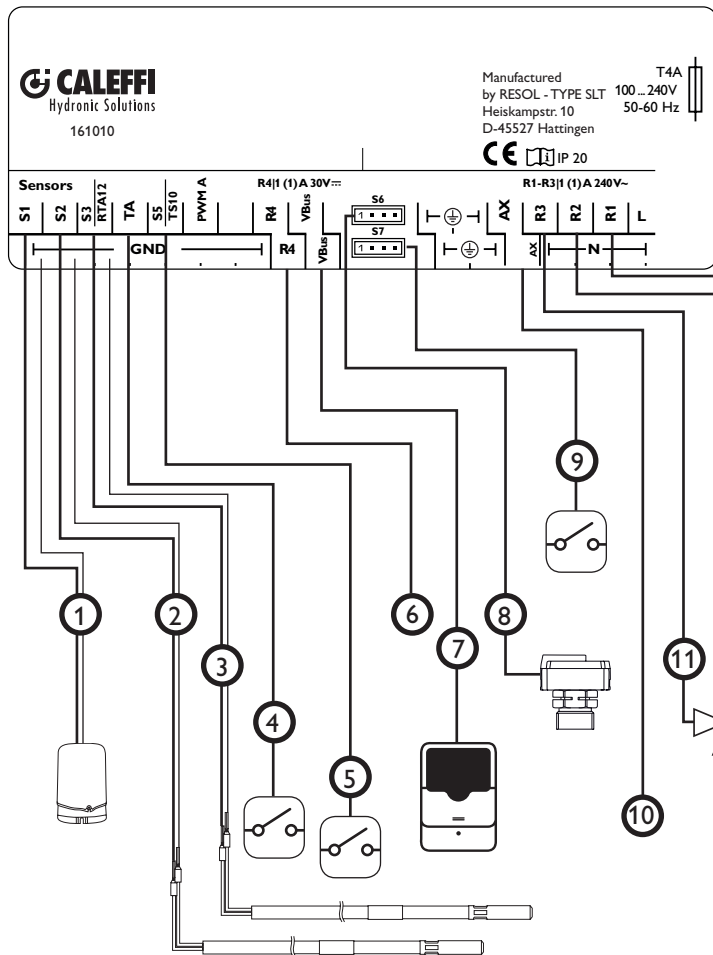
- Mixer open Relay 2 on, Relay 3 off
- Auto Relays 2 and 3 in automatic operation
- Mixer closed Relay 2 off, Relay 3 on
- Off Relays 2 and 3 off



Note:

Always adjust the operating mode back to **Auto** when the control and service work is completed. Normal operation is not possible in manual mode.

6 Application example



- ① Outdoor temperature sensor
- ② Heating circuit flow
- ③ Return sensor (optional)
- ④ Room thermostat
- ⑤ Dew point switch (optional)
- ⑥ Boiler demand when voltage < 30 V
- ⑦ Central Outdoor Sensor
- ⑧ RPS Grundfos Direct Sensor™ pressure sensor (optional)
- ⑨ Contact for remotely controlling the heating / cooling mode (optional)
- ⑩ Boiler demand when voltage > 30 V
- ⑪ Mixer closed
- ⑫ Mixer open
- ⑬ Pump

Short circuit or line break.

Disconnected temperature sensors can be checked with an ohmmeter. Please check if the resistance values correspond with the table.

°C	Ω Pt1000	°C	Ω Pt1000
-10	961	55	1213
-5	980	60	1232
0	1000	65	1252
5	1019	70	1271
10	1039	75	1290
15	1058	80	1309
20	1078	85	1328
25	1097	90	1347
30	1117	95	1366
35	1136	100	1385
40	1155	105	1404
45	1175	110	1423
50	1194	115	1442

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