User manual

DOMOTESTA
- RDO353A...   V4.40
- RDO383A...   V4.40

**Weather- or room temperature-compensated
heating controller**

Contents

1   General

DOMOTESTA RDO heating controllers are consequently designed to the requirements of customers and installers.

DOMOTESTA heating controllers exist in three different ranges:
RDO3xxA: With simple operation concept and LC display, able to communicate and network able
RDO2xxA: With simple operation concept and LC display, for standard applications
RDO1xxA: With analogic operation concept, for simple standard applications

The large LCD allows a comprehensive overview of all important information. A rotary knob each serves for operation-mode setting and temperature setpoint adjustment. All other functions are push-button operated. This controller is especially designed for use in heating applications that involve cascade operation, solar or district heating, gas heating or complex heating plants. Heating circuits are weather compensated, DHW control is temperature guided. An optional room temperature sensor with or without remote control unit allows automatic heating adaptation. Two configurable low-voltage outputs and freely assignable digital inputs increase the functionality of the controller. The range-wide compatible terminal assignment reduces wiring effort and eases application-specific controller selection.
It is available in following executions with different functions.

RDO353A000:   2-stage or modulating burner; boiler circulating pump,
                         1 mix-heating circuit (3-point valve and pump), DHW pump.
RDO383A000:   2-stage or modulating burner; boiler circulating pump,
                         2 mix-heating circuits (3-point valve and pump), DHW pump.

This manual contains in its front section all necessary information for the user concerning operation and settings. The installer finds in the middle section details concerning installation and electrical wiring. In the back section is the list of parameters and the programming protocol. This protocol is to be filled in by the service engineer.

?   <u>**Important:**</u>
This manual, together with the wiring diagram should be kept near the heating, easily accessible to the service engineer. The controller has been developed for use with a great variety of systems. It is possible that herein mentioned functions or accessories are not part of your heating system.

1.1   Main functions

Controller:
The controller consists in principle of three "independent" control circuits.

| Generation of heat energy | A heat generator, usually a boiler with burner or a heat pump or solar collector with buffer storage, supplies the energy required. |

| Room heating | The heating circuit (room heating) demands energy. Its amount depends mainly on the desired room temperature, the weather condition and the type of building. |

| Domestic hot water heating | The DHW heating demands energy. It's amount depends on the water temperature in the boiler and hot water demand. |

Additional control devices connected via the device bus (D-bus):
- Max. 6 heating circuit modules RZM510   (max. 7 heating circuits)
- Max. 3 DHW circuit modules RZM515   (max. 4 DHW pumps)
- Max. 3 boiler cascade modules RZM530   (max. 4 boilers)
- Remote control units RFB   (max. 1 per circuit)
- Active room temperature sensors   (max. 1 per circuit)
- Radio-controlled clock module   (max. 1)

All devices are connected at terminals 21/22 (D-Bus). The wires are interchangeable.
Limitation of the device bus:
- Total cable length   max. 200m
- Total number of devices   max. 15 (pole-reversible)

2   Safety regulations

2.1   Signs and notes

The danger signs and notes shown below and used in this document refer to the following instructions.

Warning: A "Warning" indicates actions or procedures which, if not performed correctly may lead to **personal injury** or a **safety hazard**. Strictly observe the instructions supplied.

Caution: A "Caution" indicates actions or procedures which, if not performed correctly may lead to faulty operations or **destruction of the controller** or system components. Strictly observe the instructions supplied.

Note: A "Note" indicates actions or procedures to **avoid unexpected results** or as **tips for easier work**. They include extra information for the user.

2.2   Correct usage

The product accompanying this manual complies with the technical regulations, valid at the time of production, and with CE standards.

It may only be used in impeccable condition.
Please inform your service engineer if you notice any defect. In case of malfunction please switch the controller off (mains fuse) and consult the checklist "Trouble shooting".

This heating controller may only be used in the following applications:
- Heat production by oil or gas boiler, district heating or heat pumps
- DHW heating with hot water boiler
- Heating operation for direct and/or mix-heating circuit

All safety provisions specified by national or international regulations must be observed under all circumstances:
- Regulations concerning electricity (mains current)
- Regulations concerning heating equipment
- Regulations concerning authorised personnel

2.3   Authorised personnel

Mounting, electrical installation, setting-up and maintenance of the device may only be carried out by trained personnel, authorised by the operator of the facility. Personnel must absolutely and without fail read and understand this manual before carrying out its instructions.

Any modification or alteration of the device is prohibited. Any work on the device (repairs, modifications) may only be carried out by the manufacturer or bodies authorised by him.

2.4   Product-specific dangers

Touching of the terminal bars and fastened or unfastened wires directly or with conductive materials constitutes the danger of electrical shock.
The controller terminal and/or wires may be supplied by external connections, even if the controller seems not to be life (consult wiring diagram).

Before any work is carried out on electrical parts of the heating system (i.e. controller and/or burner, pumps, switches, limiters, sensors, etc.), all mains fuses must be switched off.

3   Operation

Operation is performed on differently accessible user levels. Thus unwanted faulty parameter setting by non-experts is prevented. During regular, undisturbed operation, the basic indication on the LCD informs of operation mode, errors or superimposed modes. Pressing of any key will switch on the illumination. Further operation is described below. If there is no key pressed during a period of time, the display falls back to basic indication and illumination is switched off.
The following user levels are available:

Operation level I: Simple operation settings
With cover closed, only the operation modes: normal, reduced and frost protection as well as the temperature setpoint adjustment may be set.

Operation level II: Advanced operation settings
When the cover is opened, with basic indication on, additional modes, all time switch settings and setpoint adjustments are accessible. Additional information about values and settings can be retrieved.

Expert level I: Parameter setting
By means of special key sequences (from operation level II) the controllers basic parameters can be altered.

Expert level II: System test
By means of special key sequences (from expert level I) the relay functions of master and slave controllers and can be tested.

This chapter describes the operation for the enduser.
(see also the mini guide "Manual" in the front panel of the controller)

3.1 Operating elements
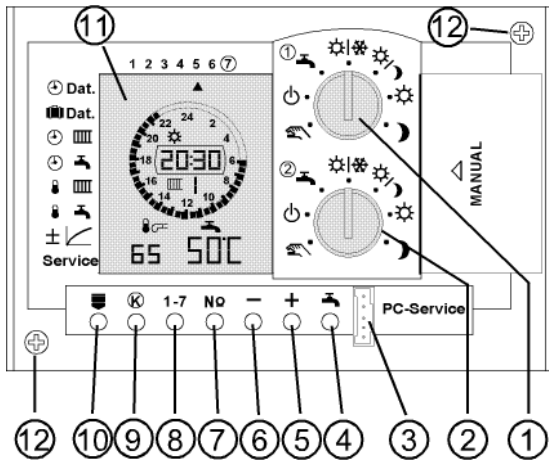
1   Mode switch=BA1
2   BA2 (temperature setpoint adjustment)
3   Service interface (PC)
4   Key "⌐" :   DHW charging
5   Key "+" :   Increase value
6   Key "—" :   Decrease value
7   Key "Nº" :   Parameter selection
8   Key "1-7" :   Weekday selection
9   Key "K" :   Circuit selection [▥/⌐/...]
10 Key "☰" :   Function selection
11 Display (LCD)
12 Fastening screws

3.2 Display
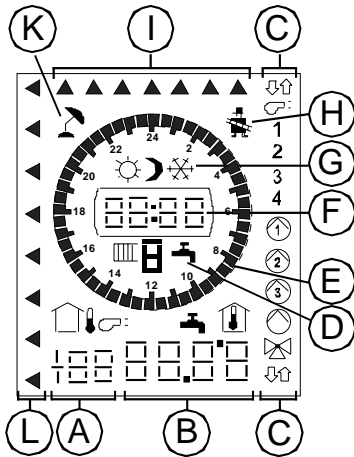
Temperature indication:

⌂▮	:	Outdoor temperature
▮⌐	:	Boiler temperature
⌐	:	Water temperature (DHW)
⌂	:	Room temperature

Temperature setpoint indication:

		Room:	Hot water:
❆	:	Anti-frost	Anti-frost
☽	:	Reduced	Reduced
☼	:	Normal	Normal
☼ flashing	:		Anti-legionella1

A : Display field 1
B : Display field 2
C : Status indicator (active outputs)
D : Reference symbol ▥: heating circuit/⌐: DHW circuit
E : Time switch program (only ON-segments are visible)
F : Actual time
G : Active temperature setpoint (☼ ☽ ❆)
H : Service mode activated (⚘)
I : Weekday indicator (▲)
K : Automatic heating limit activated (↗ summer operation)
L : Function selector (◄)

3.2.1 Display of special modes:

Special modes can be superimposed to the program by using push-buttons at the controller or the remote control unit or via external inputs. Thus different temperature setpoints may be activated.

Superimposed modes (flashing symbols):

▥	: Heating circuit
🝔	: DHW heating circuit
⌐:	: Boiler circuit (heat generator)

Special mode (displays 1 and 2):

EC 6h	Economy mode: "☽" or "❅" active for the indicated time period.

PA 3h	Party mode: "☼" active for the indicated time period.

HO 15.02 ▥ 1	Holiday mode: Setpoint ❅/☽ active. Heating will be resumed on the morning of the indicated date.

3.2.2 Indication of the system status:

These symbols represent the system status. They appear when the corresponding device is activated.

⇩⇧	Burner 1 modulation commands (⇩ INCREASE/⇧ DECREASE)
⌐:	Heat generator symbol (burner etc.)
1	Heat generator stage 1
2	Heat generator stage 2
3	Output PWM1 active
4	Output PWM2 active
①̲	Pump 1 (direct heating circuit)
②̲	Pump 2 (DHW charging)
③̲	Solar pump
◯	Pump MK (mix-circuit)
⋈	Symbol for mixing valve
⇩⇧	Mixing valve commands (⇩ CLOSE/⇧ OPEN)

3.2.3 Indication of errors:

When an error occurs, it will be recorded on the internal error list and indicated by the flashing display fields 1 and 2. It will only be shown this way, on the basic indication and only as long as the error is present. (serious errors must be acknowledged first by pressing a key). The error list records only the 10 most-recent errors. The older ones will be overwritten. An error that is already on the list, will not be recorded twice. (see operation level II: chapter 3.4.7 "Display service data" function "Service": parameters 90..99).

Error status display of sensors at "Service" function:

◯ K	: Switching to the next circuit (boiler, heating or DHW-circuit)
▥1 🝔	: Display number of boiler, heating or DHW-circuit
xx ⊏⊐⊐	: Sensor number xx is short-circuited
xx ⊏⊏⊐	: Sensor number xx is broken

Erase errors on base display, if possible:
Press "1-7".

Error numbers and description:

Sensor or function errors:

X	= 1..7	Heating circuit (1..7)
YY	= 11..14	Heat generator (burner 1..4)
YY	= 21..24	MCBA14..-errors (MCBA 1..4)
Y	= A..d	LMU64..-errors (LMU64 1..4)
ZZ	= 31..34	DHW circuit (1..4)
Er ZZ_1	: DHW temperature sensor 1 defective (boiler)	
Er ZZ_2	: DHW temperature sensor 2 defective (boiler)	
Er ZZ_3	: DHW temperature sensor 1 defective (mixer)	
Er ZZ_4	: DHW temperature sensor 2 defective (mixer)	
Er X10	: Outdoor temperature sensor defective (RZM)	
Er 11	: Outdoor temperature sensor 2 defective (Ba2)	
Er X12	: Room temperature sensor defective	
Er X14	: Flow temperature sensor defective	
Er YY20	: Return temperature sensor defective	
Er YY21	: Boiler temperature sensor defective	
Er YY23	: Flue gas temperature sensor defective	
Er 24	: Buffer storage temperature sensor 1 defective	
Er 25	: Buffer storage temperature sensor 2 defective	

Er 27	: Return temperature sensor (district heating for DHW) defective
Er 28	: Collector temperature sensor defective
Er YY30	: Flue gas temperature exceeded
Er YY31	: Burner malfunction, reported via aux. input

Er 5x	: **Controller malfunction**

Er ..6x	: **Device bus conflicts** during installation or operation

Er 7x	: **Field bus errors** during installation or operation

Er 8x	: **Interface errors**

Erase error memory:

○ ☰	Service	◄	: Select field "Service"
○ Nº	**90 YYXX**		: Select parameter 90
○ ⬤	**90 YYXX**		: Press "⬤" for 5 seconds
	S-Er		: Error memory erased
	90 0		: Error memory is not accessible if empty

3.3   Operation level I: Simple operation settings

3.3.1 Mode switch 1 for boiler cascades:
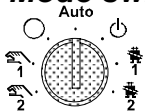
When the controller is used in configuration ***boiler cascade*** the symbol plate with symbols is fitted!

🖎 2   **Manual operation mode 2:** Burner on step 2 or modulation command full power. Boiler pump is on. The mixing valve output (return) is on pause DHW charge is released (emergency operation).

🖎 1   **Manual operation mode 1:** Burner on step 1 or modulation command minimum power. Boiler pump is on. The mixing valve output (return) is on pause. DHW charge is released (emergency operation).

○   **OFF:** Boiler OFF, no frost protection. Burner, boiler pump and DHW charge are off. Mixing valve command approximately 10 minutes "open", then pause.

AUTO   **Automatic mode:** Regular operation of all circuits and release of DHW charge according to the time switch program.

⏻   **Standby mode:** Boiler OFF, frost protection is active. Burner, boiler pump and DHW charge are off. Mixing valve command approximately. 10 minutes "open", then pause.

   🔧 1   **Service mode 1:** Burner on stage 1 or modulation command full power. Boiler pump is on. The mixing valve output (return) is in operation. DHW charge is permanently on.

   🔧 2   **Service mode 2:** Burner on stage 2 or modulation command to minimum. Boiler pump is on. The mixing valve output (return) is in operation. DHW charge is permanently on.

3.3.2   *Mode switch 1/2:*
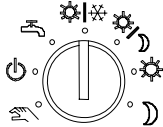
Depending on the controller configuration it might be fitted with 1 or 2 such switches. Operation Switch 1 is always for heating circuit 1 and/or heat generator. Switch 2 is commanding heating circuit 2.

  ✍   **Manual and service mode** (🔧): Burner and heating circuit pumps are on. The mixing valve output is on pause. DHW charging is permanently released (emergency operation).
Solar operation: Collector pump 3 min. on minimum speed, then automatic.

  ⏻   **Standby mode**: Heating and DHW charge OFF (frost protection is active). Solar operation: Controller remains on.

  🚰   **Summer operation mode**: Heating OFF (frost protection is active). The DHW charge is released according to the time switch program.

  ☼|❄   **Automatic mode ("☼ normal"/"❄ frost protection")** according to the time switch program. During the OFF-period the lower setpoint for frost protection is active. DHW charge is released according to the time switch program.

  ☼|☽   **Automatic mode ("☼ normal"/"☽ reduced")** according to the time switch program (back-up mode during lowering). DHW charge is released according to the time switch program.

  ☼   **Continuous** operation with ☼ **normal temperature** setpoint. The time switch program for heating circuits is not active. DHW charge is released according to the program.

  ☽   **Continuous** operation with ☽ **reduced temperature** setpoint. The time switch program for heating circuits is not active. DHW charge is released according to the program.

3.3.3   *Temperature setpoint adjustment*
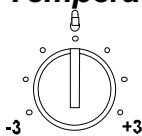
This rotary knob is to adjust the temperature setpoint for "☼ normal" and "☽ reduced" operation. The preset value can be adjusted by +3K. Adjustments set at an available remote control unit are superimposed to each other.

3.3.4   *Single DHW charging*

The DHW can be charged independently of the time switch settings. Is no demand for DHW charging i.e. boiler temperature is high enough, this function is terminated automatically.

  ○ **K** | **2 🚰** | : Select DHW circuit e.g. [**2 🚰**]
  ○ 🚰 | **2 🚰** | : Release DHW charging; "🚰" flashes
  ○ 🚰   : Switch selection OFF

3.3.5   *Number key: N⁰*

At the basic indications, the controller type and the SW version number are displayed when this key is pressed.

3.3.6   *Circuit key: K*

At the basic indications, this key switches the display to consecutive circuits of heating, boilers and DHW.

3.4   Operation level II: Advanced operation settings

Press key to select function

○Nº | 1 20.30 ☼ |

Additional symbols in the display
Parameter value (LCD: Display at lower right)

Parameter number (LCD: Display at lower left)
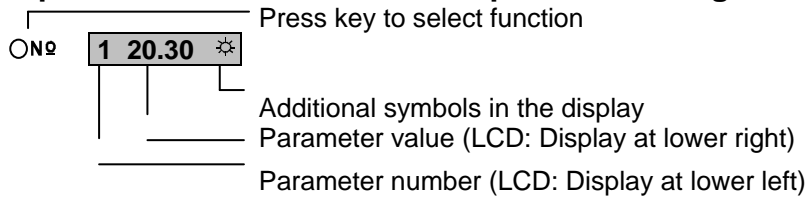
3.4.1   *Operation at operation level II*

Operation level II is activated by the function selector key. The cursor "◄" appears and moves downwards on every keystroke. As long as the cursor points to a function, operation level II is active.

Functions which can be selected with the function selection key:

○ ≡	⏱ Dat.	◄	: Time, date, year
	🛏 Dat.	◄	: Holiday (absence) program
	⏱ ▥	◄	: Time switch program: Heating circuits
	⏱ 🚰	◄	: Time switch program: DHW (& independent. time switch)
	🌡 ▥	◄	: Temperature setpoints heating circuits
	🌡 🚰	◄	: Temperature setpoints DHW circuits
	± ∠	◄	: Heating characteristic adjustment
	Service	◄	: Display temperatures and service data

Circuit key

○	**K**		: Circuit selection and display
	▥ 2	: Heating circuit with number
	2 🚰	: DHW-circuit with number
	3	: Boiler- or heat generator circuit with number

Number key

○ Nº | 1 20.30 | : Parameter selection; (field 1 e.g."**1**")

Minus/Plus key

○−/+ | 1 20.30 | : Changes value: field 2 e.g. "**20.30**"
Only values that are flashing may be altered.

3.4.2   *Set time and date*

For satisfactory operation, the correct time, date and year must be set!

○ ≡	⏱ Dat.	◄	: Select function " ⏱ Dat. "
○ Nº			: Select the next parameter
○ −/+			: Change value

Parameter number and value:

1 20.30	: Time (hours.minutes)
2 20.01	: Date (day.month)
3 1998	: Year

3.4.3 Holiday program

6 Holiday blocks can be programmed. Odd parameters (1, 3, 5, ...) represent **absence start**, (temperature setpoint "❄=frost protection" or "☽=reduced") and even parameters (2, 4, 6, ...) represent the **resume date** (temperature setpoint "☀=normal"). DHW charging is disabled, when all heating circuits are in frost protection mode (i.e. no heating needed).

Note: With the program "☀☽ normal/reduced" the setpoint reduced is valid during vacations.

○ ☰	Dat.	◄	: Select function " Dat."
○ **K**		▥ **2**	: Select heating circuit [▥ **2**]

Activating the holiday program:

	1 - -.- -	: Select unused block (odd)
○ −/+	**1 29.01 ❄**	: Enter first day of absence
○ Nº	**2 30.01 ☀**	: Select block end (even)
○ −/+	**2 15.02 ☀**	: Enter resume date
○ Nº	**3 - -.- -**	: Select next block as required

Deactivate single block:

○ Nº	**2 15.02 ☀**	: Select date of return (even)
○ −	**1 - -.- -**	: Press key "-" until block erased

Clearing all blocks:

○ ⬕	**1 29.01 ❄**	: Press "⬕" for 5 seconds
	1 - -.- -	: Holiday programs erased

3.4.4 Set time switch program

1 2 3 4 5 6 ⑦ Weekday indicated by cursor "▲"

▲

Operation mode at the time indicated
(e.g. normal)

Time segment "☀|☽" for reduced operation

6:00

Time segment "☀" for normal operation

▥ 2

Circuit selected (time switch program)
(e.g. ▥ 2=heating circuit No. 2)

| 06.00 |

Switching time

Switching point Nº   (Nº =number)
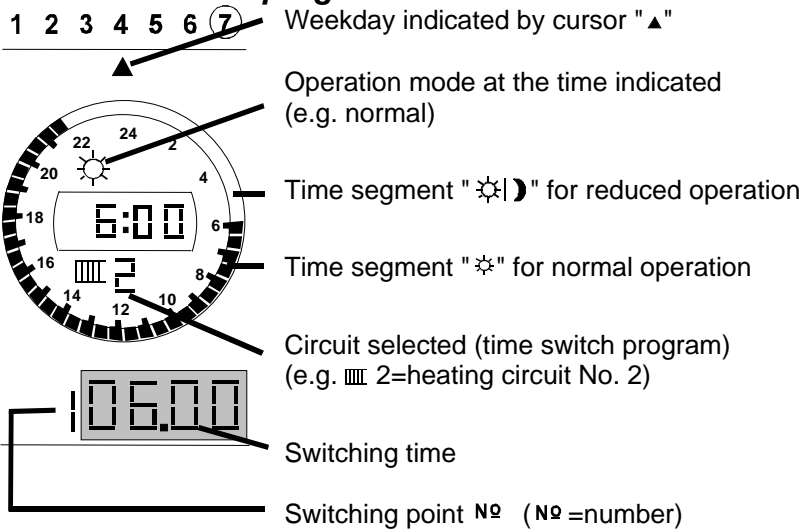
Display set switching points:

○ ☰	⏱ ▥	◄	: Function: "⏱ ▥" heating circuit or "⏱ ⬕" hot water
		1 07:00 ☀	(independent time switch at "⏱ ⬕", display: **9**)
○ **K**		▥ **2**	: Select heating circuit [▥ **2**]
		2 ⬕	: Select DHW circuit [**2 ⬕**]
○ **1-7**	1234567		: Select weekday; 1=Monday..7=Sunday (cursor)
		▲	(cursor move)
○ Nº	**1 06.00 ☀**		: Select switching point; (**odd** "☀=normal")
	2 22.00 ☽		: Next switching point; (**even** "☽=reduced")
	3 - -.- -		: Next available (6 switching points available)

Modify switching points:

○ Nº	**2 22.00 ☽**	: Select appropriate switching point "☽=reduced"
○ −/+	**2 13.30 ☽**	: Modify time

Add switching points:

○ N♀	3 - -.- -	: Select next unused switching point "- -.- -"
○ − / +	3 16.00 ☼	: Set desired time; e.g. 16:00 "☼=normal"
○ N♀	4 16.15)	: Select next switching point
○ − / +	4 22.00)	: Set desired time; e.g. 22:00 ")=reduced"

Erase switching point:

| ○ N♀ | 4 22.00) | : Select even switching point |
| ○ − | 3 - -.- - | : Press key "-" until cycle erased |

Copy switch cycles of weekday:

○ 1-7		: Select weekday (source) with cursor
○ ♙	COPY	: Copy/read program; "COPY" is displayed
	▲	: Source weekday is displayed
○ 1-7	▲	: Select weekday (target): cursor flashes
○ +		: Copy/paste program to weekday
○ 1-7	▲	: Select next day (target), etc.
○ ♙		: Terminate copy function

Recall standard program: (factory settings)

○ ≣	⏀ ▥	: Select function: "⏀ ▥" or "⏀ ♙"
○ K	▥ 2	: Select heating circuit [▥ 2]
	2 ♙	: Select DHW circuit [2 ♙]
○ ♙	COPY	: Press key "♙" for 5 seconds; "COPY" is displayed
		After 5 seconds one of the following appear:
	S-UH ▥ 2	: Function "⏀ ▥": Standard program ▥ 2 loaded
	S-Ub 2 ♙	: Function "⏀ ♙": Standard program 2 ♙ loaded
	S-UF 9	: Function "⏀ ♙": Standard program independent time switch loaded

Standard program: (factory settings)

Field:	Display:	1-5 (MO-FR)	6-7 (SA-SU)	
⏀ ▥	▥ 2	7:00 ☼-23:00	8:00 ☼-23:00	(HK-time switch)
⏀ ♙	2 ♙	6:30 ☼-20:00	7:30 ☼-21:00	(DHW-time switch)
⏀ ♙	9	6:30 ☼-20:00	7:30 ☼-21:00	(independent time switch)

3.4.5 Adjust temperature setpoints

○ ≣	♙ ▥	: Select function "♙ ▥" heating circuit or "♙ ♙" DHW
○ K	▥ 2	: Select heating circuit [▥ 2]
	2 ♙	: Select DHW circuit [2 ♙]
○ N♀		: Select parameter
○ − / +		: Modify the setpoint

Standard room temperatures: 🏠

1	10.0°C	❄ ▥	"Frost protection" (minimum temperature 5°C)
2	15.0°C	) ▥	"reduced"
3	20.0°C	☼ ▥	"normal"

Standard DHW temperatures: ♙

1	5°C	❄ ♙	"Frost protection" (minimum temperature 5°C)
2	5°C	) ♙	"reduced"
3	55°C	☼ ♙	"normal"
4	65°C	☼ ♙	"anti-legionella", if released (☼ flashes if running)

3.4.6 Correct room temperature deviation

If the actual room temperature deviates from the setpoint after several hours of operation, the internal reference can be adapted as follows:

○ ☰	± ∠ ◀		: Select function "± ∠"
○ K		▥ 2	: Select heating circuit [▥ 2]
	1 20.3°C ⬠		: Temperature is displayed
○ − / +	1 19.8°C ⬠		: Enter the measured temperature

Recall the standard heating curve:

○ ⬱	1 19.8°C ⬠	: Press key "⬱" for ca. 5 seconds
	S----H	: Standard heating curve is loaded

Attention:

- This adaptation should be made once each at low and at high outdoor temperatures. Thus the heating characteristic is adapted correctly.
- It will only be available once a day

3.4.7 Display service data

Values are displayed only if the sensors are connected:

○ ☰	Service	◀	: Select function "Service"
○ Nº			: Select parameter
○ K		▥	: Select heating circuit [▥ 2]
		⬱	: Select DHW circuit [2 ⬱]
		⟲:	: Select heat generator (⟲:)
○ 1-7		*	: **Key pressed -> displays setpoint ***

Error status display of sensors:

xx ⁼⁼⁼ °C	: Sensor number xx is short-circuited
xx ⁼⁼⁼ °C	: Sensor number xx is broken

Temperatures: *○1-7 : **Displays setpoint ***

*	⬱	1	55°C ⬱	: DHW temperature 1 *
*	⬱	2	53°C ⬱	: DHW temperature 2 *
*	⬱	3	58°C ⬱	: DHW mixing valve 1 *
*	⬱	4	65°C ⬱	: DHW mixing valve 2 *
*	▥	10	-5°C ⌂↓	: Outdoor temperature
		11	-5°C ⌂↓	: Outdoor temperature 2
*	▥	12	20.1°C ⬠	: Room temperature *
*	▥	14	52°C	: Flow temperature * (respective boiler temperature)
	⟲:	20	45°C	: Return temperature *
*	⟲:	21	60°C ⬱:	: Boiler temperature *
*	⟲:	23	95°C	: Flue gas temperature (*max. flue gas temperature)
*		24	75°C	: Buffer storage temperature 1 *
*		25	75°C	: Buffer storage temperature 2 *
*		27	45°C	: Return temperature sensor (district heating w. 2 HE) *
*		28	163°C	: Collector temperature (* differential value)

Heat generator operating hours, etc.:

⟲:	30	1675	: Heat generator stage 1, total running time [hours]
⟲:	31	347	: Heat generator stage 2, total running time [hours]
	34	2535	: Collector pump, total running time [hours]
	35	12.20	: Collector power [kW]
	36	1590	: Collector energy total [kWh]

Heat generator start cycles: *○1-7 : **Displays setpoint ***

⟲:	40	630	: Heat generator stage 1 (value x 10)
⟲:	41	150	: Heat generator stage 2 (value x 10)
* ⟲:	45	50	: Actual boiler power of boiler [%]
*	46	30	: Actual cascade boiler power [%]

Additional data:

81	63.00	: Totalized 1: counter 1 x factor 1 (split indication: low value)
	1130	High value: (at clock segment) [total: 113063.00]
82	93.00	: Totalized 2: counter 2 x factor 2 (split indication: low value)
	0245	High value: [total=24593.00]
85	50	: PWM1 (speed collector pump, output 0..10V, etc.) [%]

Error list:

For error codes see chapter: 3.2.3 "indication of errors".

The error list records only the 10 most-recent errors. The older ones will be overwritten. An error that is already on the list, will not be recorded twice.

90	YYXX	**: Most recent error and code**
:		**YY = 1..7 Heating circuits (1..7)**
:		**YY = 11..14 Generator circuit (boiler 1..4)**
:		**YY = 21..24 Gas boiler controller (MBCA 1..4)**
:		**Y = A..d Gas boiler controller (LMU64 1..4)**
:		**YY = 31..34 DHW circuits (1..4)**
:		**XX = Number of the error code (XXX for LMU64 error codes)**
99	YYXX	**: Earliest error entry**

Clearing error list:

90	YYXX	: Press key "🚿" for ca. 5 seconds
	S-Er	: Error list being cleared
90	0	: Error list empty

3.4.8   *Floor dry up program*

A2	0 °C	: Select parameter A2
A2	50 °C	: Set the maximal heat-up temperature
A2	x	: Press key "🚿" for ca. 5 seconds

Sequence

- 6 Days: Flow setpoint continuous from Par.160 to Par.A2
- 3 Days: Par.A2
- 6 Days: Flow setpoint continuous from Par.A2 to Par.160,
                followed by end of program and normal regulation

Note: Symbol 〓 flashes during operation
           Flow setpoint and program duration are displayed.
           The program is active for all circuits, their mode switch stand on " ❱ reduced". DHW charge is released. An upload of the saved sequence data is possible with the PC program „RDO History Import".
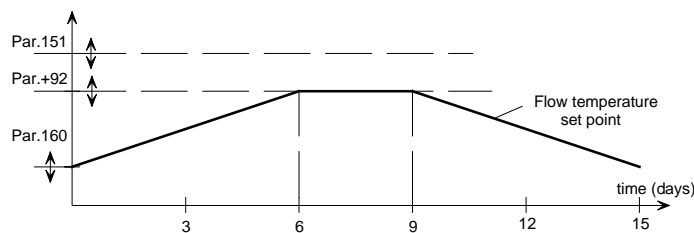
4 Installation

4.1 Controller

4.1.1 Dimensions
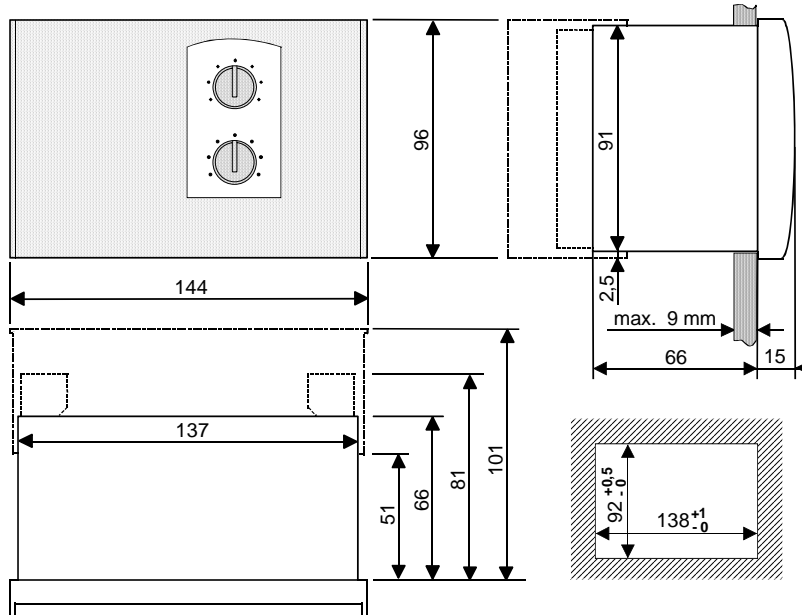
4.1.2 Mounting

Flush mounting:
Slide device into panel cut-out and secure it with fastening bolts. Wire with connectors for AMP male connectors RZB500A and RZB501A, screw able connectors RZB510A and RZB511A (or base plate RZB520A with RZB511A).

Wall mounting:
Mount base plate RZB520A and wire it. Plug device on and fix it. (RDO383A requires RZB511A)

DIN-rail mounting:
Screw rail clamps RZB106A for DIN rail 35mm onto base plate RZB520A.
Snap base plate onto DIN rail and wire it. Plug device on and fix it.

Base plate and extension of terminal compartment:
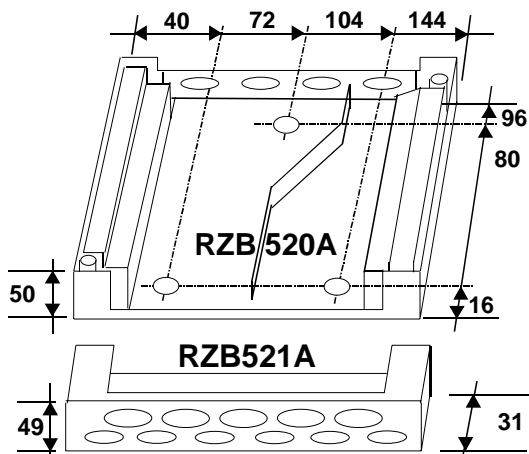
RZB520A: Base plate with 2 side walls (for glands 4xPG9) with screw able connectors RZB510A in position.

RZB521A: Extension kit for terminal compartment. Fits to top or bottom of base plate RZB520A, for glands 6xPG9 and 5xPG11, with slide covers.

4.2 Sensors

4.2.1 *Remote control unit, room temperature sensors*

For residential area only. Not to be exposed to sun or other heat sources (chimney, radiators, draughts, TV-set, lamps); not behind furniture or curtains; ca. 1.2-1.5m height; seal installation conduit. Use breakthroughs in housing base for drilling the fixing points. The address of the remote control unit must be set identical to the address of the corresponding mix-heating circuit (factory setting: Address=1). Total length of the devices bus max. 200m. Cable 2x1mm^2 (flex type for max. length), unshielded, separated from mains lines. Minimize use of conduit- or connector-boxes.

Device bus:
With address selector

ADR
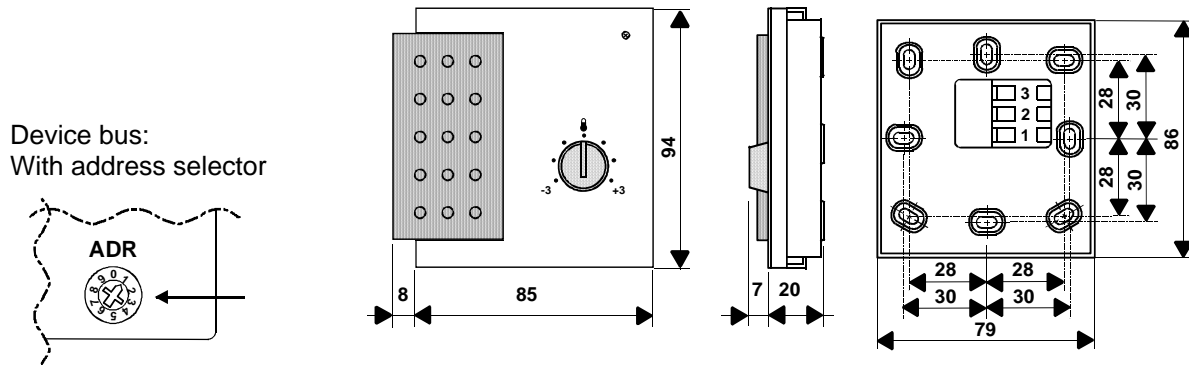
Remote control unit RFB510A: **(active, connected to device bus)**
Remote control unit with temperature sensor: Program selection by sliding switch, temperature setpoint adjustment, status display (LED)

Remote control unit RFB520A: **(active, connected to device bus)**
Remote control unit with temperature sensor: Program selection by single key, temperature setpoint adjustment, status display (LED)

Comfort remote control RFB540A: **(active, connected to device bus)**
Remote control unit with temperature sensor: Program selection, LCD-indication

Room temperature sensor RFT510A: **(active, connected to device bus)**
Active room temperature sensor without control elements

Room temperature sensor RFT410A: **(NTC 10kΩ; at 25°C)**
Passive room temperature sensor without control elements

4.2.2 *Wireless devices, remote control unit*

Receiver unit RZM610A010: **(active, connected to device bus)**
For the devices as follows:

Wireless remote control unit RFB610A010
Heating applications with room sensor, program selection, temperature setpoint adjustment, LCD-display

Wireless output sensor RFT620A010
Actualisation of sensor values every 30 minutes

4.2.3 Passive temperature sensors

Use flex cable 2x1mm², unshielded, separated from mains lines. Max. length for passive sensors 100m.
Minimize use of conduit- or connector boxes.

Total length:	up to	25m	Cable cross section:	0.25	mm²
Total length:	up to	50m	Cable cross section:	0.5	mm²
Total length:	up to	100m	Cable cross section:	1.0	mm²

FT1A   **FT2A**   **RFT**   **FT12A**

FT12A   **FT1A**

68   86   5   22   46   40   62   80   PG9   30   29
28   PG9   58

FT2A   G1/2"   ∅9   **RFT113B** **RFT203B** **RFT303A**
13   100   142   PG9   58   68   86   ∅6   ∅4,5   50   L

RFT113B20:   L=2m
RFT203B40:   L=4m
RFT303A50:   L=5m
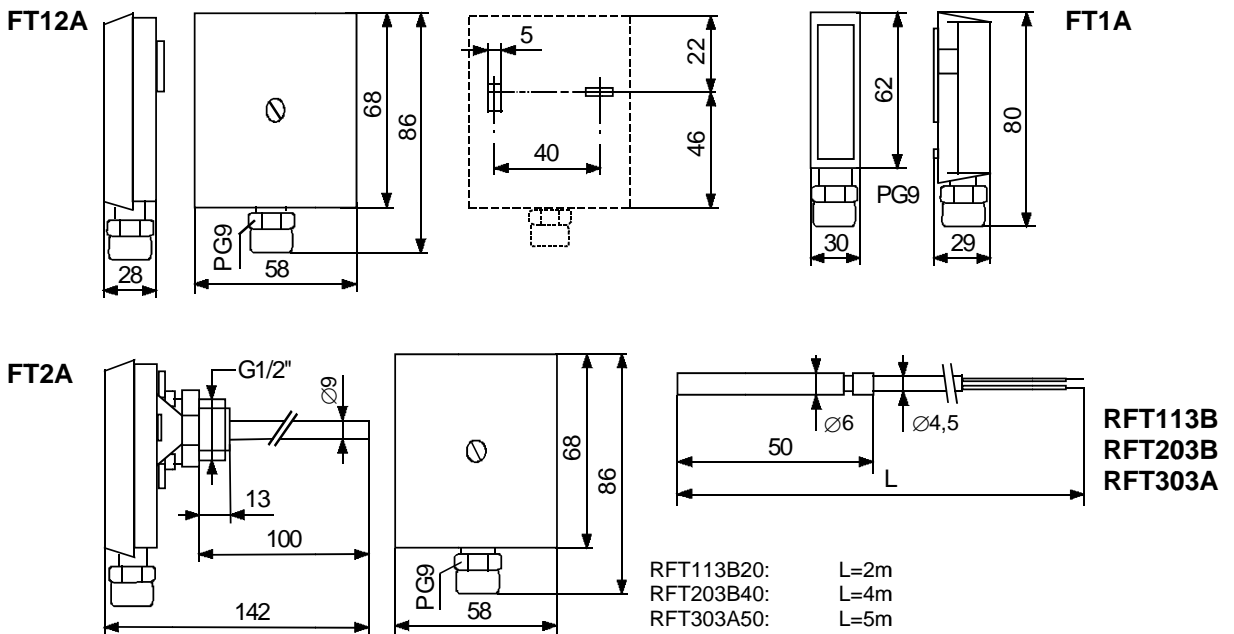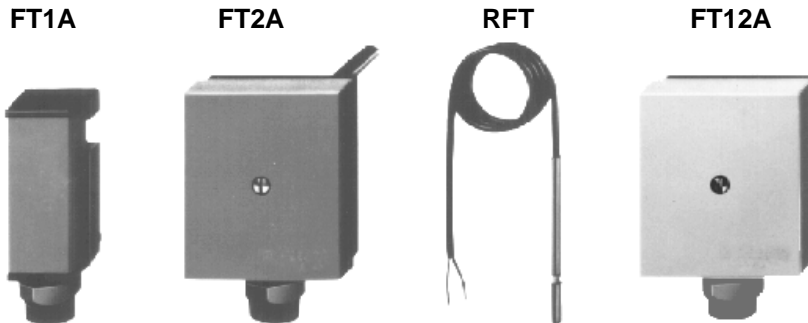
Outdoor sensor FT12A: (NTC 10kΩ; by 25°C)
Mount at 2/3 of building height, not above window or underneath roof protrusions, preferably on north or north-west side.
Connection   : 2-way screw terminal (cable glands: PG9)
Protection class   : IP40   Measuring range   : -30..40°C

Clamp-on sensor FT1A: (PTC 1kΩ; by 25°C)
Mount in the flow immediately behind the pump or, if pump in return, approximately 1.5m behind the mixing valve. Mount with clamping band ZB126A on blank pipe, no thermal conductive paste necessary.
Connection   : 2-way screw terminal (cable glands: PG9)
Protection class   : IP40   Measuring range   : -30..120°C

Immersion sensor FT2A: (PTC 1kΩ; by 25°C)
Mount in the flow immediately behind the pump or, if pump in return, approximately 1.5m behind the mixing valve. Mount in a pipe bend pointed towards the flow.
Connection   : 2-way screw terminal (cable glands: PG9)
Protective tube   : 100mm for PN10
Protection class   : IP40   Measuring range   : -30..120°C

Cable sensor RFT113B: **(NTC 10kΩ; by 25°C)**
Cable sensor RFT203B: **(PTC 1kΩ; by 25°C)**
RFT113B for primary temperature (Br)
Mounting: With insertion pod (mounting depth min. 51mm).
- RFT113B20   : L=2m   Measuring range: -30..105°C (Br)
- RFT203B40   : L=4m   Measuring range: -30..105°C
Protection class   : IP54

Cable sensor RFT303A: **(PT 1000Ω; by 0°C)**
For solar temperature in collector.
Mounting: With insertion pod (mounting depth min. 51mm).
Connection   : L=2m or 5m
Protection class   : IP54   Measuring range: -30..240°C

4.3   Accessories

Heating circuit module   RZM510A004:
For additional heating circuit, connected via device bus

DHW module   RZM515A004:
For additional DHW circuit, connected via device bus

Boiler cascade module   RZM530A004:
For boiler cascade, connected via device bus

Radio clock module   RZM550A000:
For additional radio clock, connected via device bus

Interface converter cable   RZB008A:
Interface converter cable, connecting controller to a PC (RS232).

Interface converter cable   RZB010A:
Interface converter cable, connecting controller to a PC (USB 2.0).

I/O-module (disturbance module)   RZB540A:
Connection of up to four digital input signals (230VAC) to one analog input for PTC or NTC at the RDO.
Offers one additional relay output controlled by a PWM output of RDO.
(Wire cross section to RDO: up to 15m 0.5mm^2, up to 30m 1.0mm^2, up to 50m 1.5mm^2)

Bus interface   RZB565A000 (RDO3x3A only):
Plugs into back of controller (RDO3x3A only):
RS232C   : Connection to PC (master) via serial link cable (zero modem), max. 15m. (Software
                RDOcom for setup and monitoring of connected controllers.)
RSC   : Connection of max. 10 controllers (slaves) via cable, 2 wires, shielded, max. length
                1000m, up to 500m: 0.5mm^2, up to 1000m: 1.0mm^2. (Terminal switch at both ends set to
                position C. No data transfer between the controllers.)

Max. 10 RSC-Interfaces can be connected.
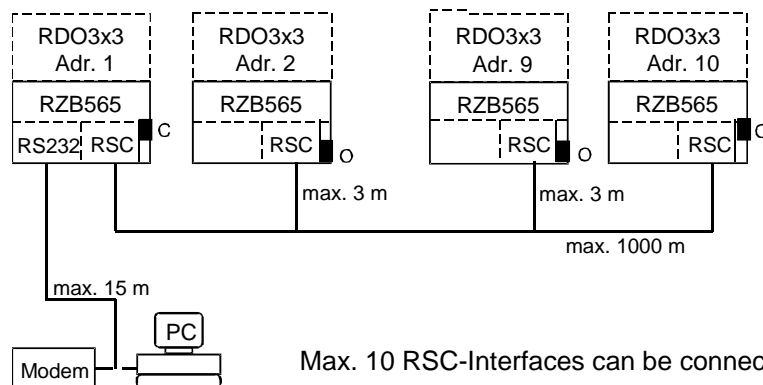
Bus interface   RZB568A000 (RDO3x3A only):
Plugs into back of controller (RDO3x3A only):
RS485   : Connection of max. 63 controllers (slaves) to REN Bus or Modbus via cable, 2 wires, shielded, max. length 1200m, up to 500m: 0.5mm^2, up to 1000m: 1.0mm^2. (Terminal switch TER at both ends set to position ON. No data transfer between the controllers. Setup and monitoring of connected controllers via communication software.)
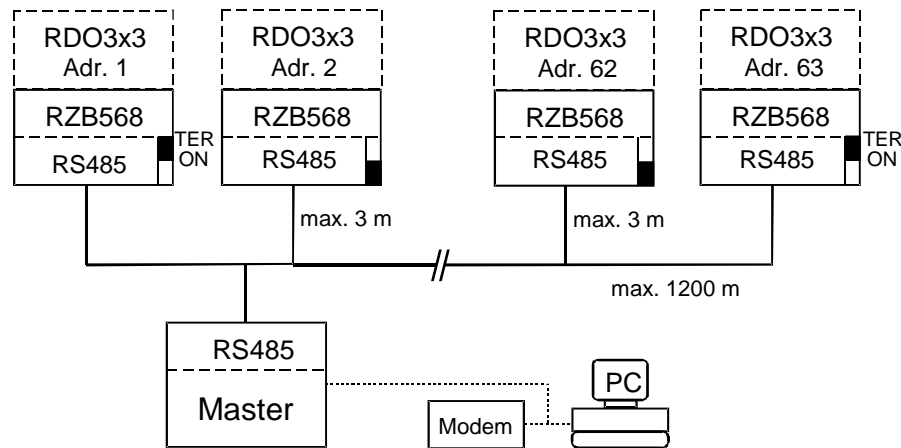
Protocols: REN Bus or Modbus

Relay module (RM)
Relay RY211012 for potential-free connection (use socket RY78626)

Opto-coupler module (OM)		RZB001A:		
230VAC connectors:		low voltage connections:		
1	red	(L)	3	grey	(5V)
2	black	(N)	4	black	(GND)

5   Terminal assignment

Wire according to application diagram or wiring diagram. Observe local regulations regarding authorised personal.

(A) **Terminals 1 to 15** are for **mains voltage 230 V**. The prints and relay contacts are not short-circuit-proof. Operation tests of external loads must be carried out with unplugged controller.
In case of high inductive loads, consumers (contactors, solenoid valves, etc.) need parallel RC modules (e.g. RIFA RC module 250VAC, 0.1uF (X2), 47ohm).

(A) **Terminals 21 to 35** are for **low voltage circuits**. For external inputs on terminals 26..35 use gold-plated, potential-free contacts only.

Functions external inputs:
Ext.1-Ext.5, Ext.9:   The functions of digital inputs are configurable!

(?) **Notes D-Bus:**
- Only 1 master (RDO3x3A) and max. 15 slaves may be connected to the D-Bus.
- The connections to the D-Bus are pole-reversible.

5.1 Terminal designation

| Terminal number	Symbols designation	Description	
A:		**230VAC: Inputs and outputs**	
1	N	Neutral	
2, 5, 12, 13	L	Phase (230VAC)	
3	⊂⁼ Bh1	Counter of operating hours burner stage 1 (230VAC)	
		District heating with 1 HE:	Qmin limitation
4	⊂⁼ Bh2	Counter of operating hours burner stage 2 (230VAC)	
		District heating with 2 HE:	Qmin limitation 2, DHW
6	⊂⁼ 2 on/1 ⇧	Burner stage 2 ON / stage 1 modulation INCREASE	
		District heating:	Return temp. increasing
		Solar:	Collector pump ON
7	⊂⁼ 2 off/1 ⇩	Burner stage 2 OFF / stage 1 modulation DECREASE	
		District heating with 1 HE:	Return temp. decreasing
8	⊘ HK	Boiler circuit pump	
9	⊘ MK1	Mix-circuit pump 1	
10	⇧◣ MK1	Mixing valve 1 OPEN:	Command "warmer"
		Boiler return temperature control:	Increase temperature
		Boiler cascade:	Shut off valve "CLOSE"
11	◣⇩ MK1	Mixing valve 1 CLOSE:	Command "colder"
		Boiler return temperature control:	Decrease temperature
		Boiler cascade:	Shut off valve "OPEN"
14	⊂⁼ 1 on	Burner stage 1 ON	
15	⊘ WW	DHW charging pump	
C:		**230VAC: Control heating circuit 2 (RDO383A)**	
43, 45	L	Phase (230VAC)	
44	Q3 / ⊘ MK2	Mix-circuit pump 2	
42	Q2 / ⇧◣ MK2	Mixing valve 2 OPEN:	Command "warmer"
		District heating with HE for DHW:	Increase temperature
41	Q1 / ◣⇩ MK2	Mixing valve 2 CLOSE:	Command "colder"
		District heating with HE for DHW:	Decrease temperature
B:		**Low voltage: Inputs and outputs**	
21	D-Bus	Device bus (remote control units, auxiliary modules and additional devices)	
22	D-Bus	Pole-reversible connection	
23	PWM2	Relay module or PWM output (PWM=pulse width modulation)	
24	PWM1	Relay module or PWM output	
		Solar: Speed control for collector pump possible via el. relay	
25	GND	Common ground	
26	Ba1	Outdoor temperature sensor	FT12A
27	Br (Ba2)	Room temp. sensor or Ba2	RFT410A (or FT12A)
28	Bk	Boiler temperature sensor	RFT203B (FT1A, ...)
		District heating with 1 HE:	Sec. flow temp. sensor
29	Bv1	Flow temperature sensor 1	FT1A (FT2A)
		Boiler cascade: Common flow temperature sensor	
30	Brü	Return temperature sensor	FT2A (FT1A)
		Solar: Collector temperature sensor	RFT303A
31	Bres (Bv2)	Reserve temperature sensor (Bv2)	FT1A (FT2A)
		District heating with 2 HE:	DHW return temp. sensor
	S5 (Ext.5)	Aux. input 5 (digital, potential-free)	
32	Bww	DHW temperature sensor	RFT203B
33	Bag	Flue gas temperature sensor	RFT303A
		Buffer storage temperature sensor 1	RFT203B (FT2A)
	S3 (Ext.3)	Aux. input 3 (digital, potential-free)	
34	S2 (Ext.2)	Aux. input 2 (digital, potential-free)	
		Buffer storage temperature sensor 2	RFT203B (FT2A)
35	S1 (Ext.1)	Aux. input 1 (digital, potential-free)	

Terminal number	Description
RFB	Remote control unit for room temperature adaptation with sensor (on D-bus)
RM	Relay module: External relay: 12VDC; Ri > 600Ω (print relay recommended)
RZM5xx	Auxiliary module (on D-bus)
OM	Opto-coupler module for DHW thermostat (for galvanic separation)
WW-Th	DHW thermostat
WW el.	Electrical DHW charger (insertion device)
WWZ	DHW circulation pump

5.2   Controller RDO353A
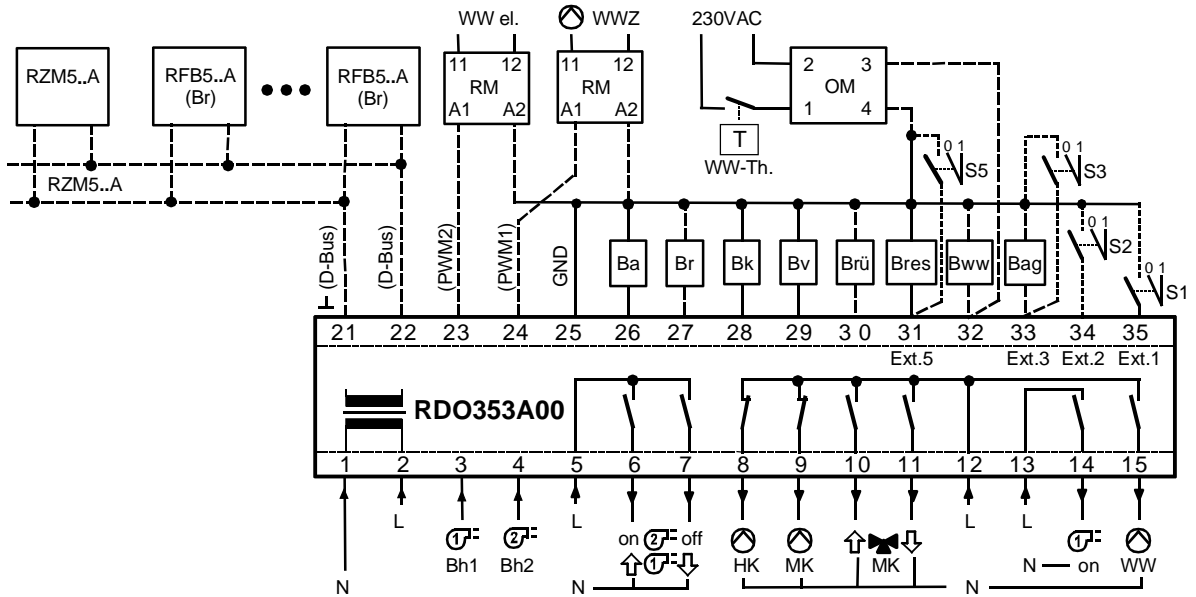
5.3   Controller RDO383A
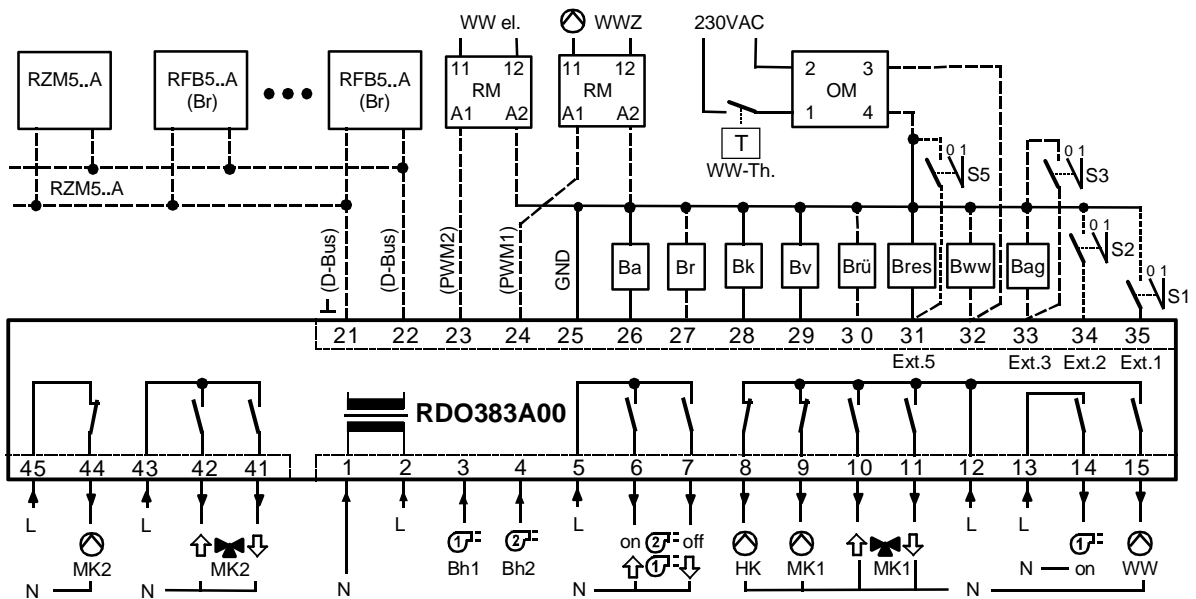
5.4 Heating circuit module RZM510A004
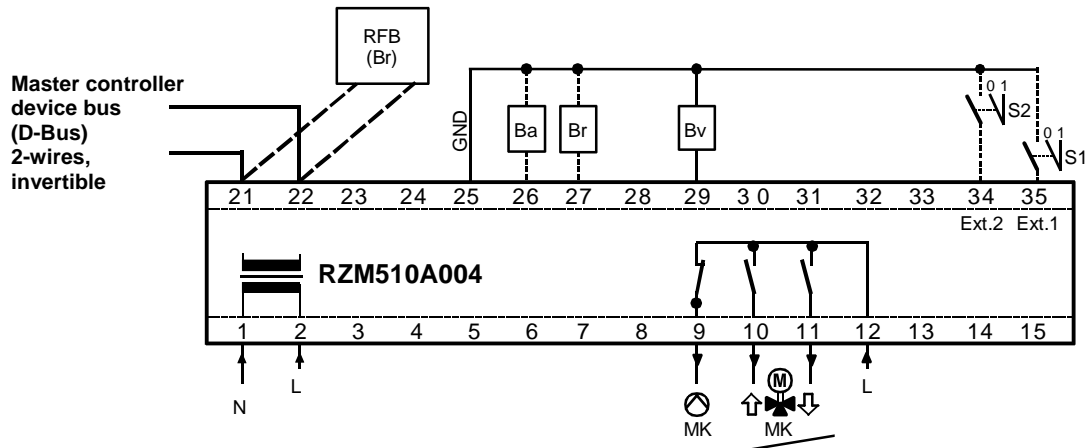
S1: Aux. input: Heating on standby
1 = Heating off, frost protection active

S2: Aux. input: Flow temperature setpoint
1 = Min. temperature setpoint active
(automatic heating limiter operates on unrestricted flow setpoint)

5.5 Boiler cascade module RZM530A004

S1: Aux. input: Boiler on standby
1 = Boiler OFF, frost protection active

S2: Aux. input: Boiler temperature setpoint
1 = Min. temperature setpoint active

5.6 DHW module RZM515A004

Master controller
device bus
(D-Bus)
2-wires,
invertible
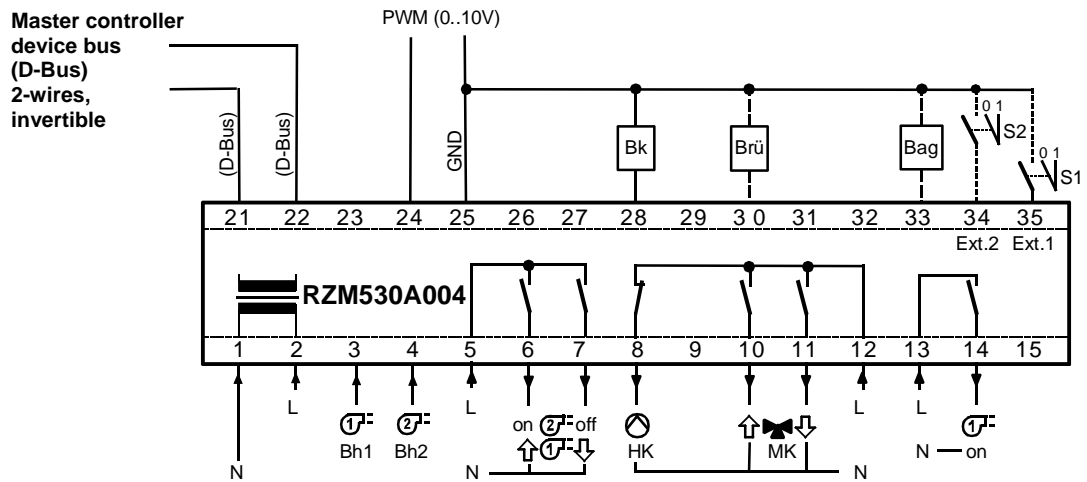
S1: Aux. input: DHW heating on standby
1 = DHW heating OFF, frost protection active, DHW pump as set

S2: Aux. Input: DHW temperature setpoint
1 = „normal" temperature setpoint active, single DHW charging possible
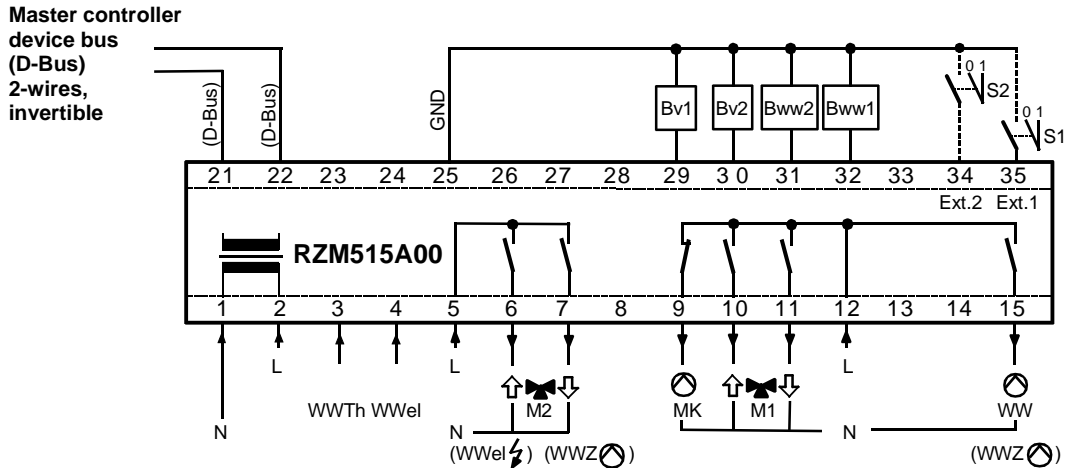
5.7 Address an parameter setting

Boiler cascade (Par.101>0) or *fixed-value* (Par.110=5, 6, 7, 8):
- Outputs for mixing valve 1 (10/11) and boiler pump (8) are used for direct heating circuit (return control)
- Heating curve for heating circuit 1 is applied on direct heating circuit.
- The **first heating circuit** (internal or external) starts with **address 2**.
- The mode switch 1 acts on boiler 1 using heating curve 1.
Boiler cascade only:
- Output for mixing valve 1 (10/11) is used for the shut-off valve (11=OPEN).
- Mix-circuit pump 1 (9) is used as the common boiler pump.

Single boiler or weather compensated heating

Nr. ▥	▥ 1	▥ 2	▥ 3	....	▥ 7
Par.110=0	KK ⌀	⧓ ⌀	⧓ ⌀	....	⧓ ⌀
Par.110=1	⧓ 1 ⌀	⧓ ⌀	⧓ ⌀	....	⧓ ⌀
Par.110=2	KK ⌀ ⧓ 1 ⌀	⧓ ⌀	⧓ ⌀	....	⧓ ⌀
Par.110=3	KK ⌀	⧓ 1 ⌀	⧓ ⌀	....	⧓ ⌀
Par.110=4	⧓ 1 ⌀	⧓ 2 ⌀	⧓ ⌀	....	⧓ ⌀
Address RZM510A		(2)	3	....	7

▬▬▬ Internally controlled heating circuits

Boiler cascade or fixed-value controlled heating

The virtual heating circuit 1 is employed as internal control for cascade or fixed-value heating. Therefore address 1 is reserved and cannot be used for other heating circuits.

Nr. ▥		▥ 2	▥ 3	....	▥ 7
Par.110=0	KK ⌀ ⧓ 1 ⌀	⧓ ⌀	⧓ ⌀	....	⧓ ⌀
Par.110=1	KK ⌀ ⧓ 1 ⌀	⧓ 2 ⌀	⧓ ⌀	....	⧓ ⌀
Address RZM510A		(2)	3	....	7

▬▬▬ Internally controlled heating circuits

Boiler cascade modules and gas boiler controller:

Parameter	Module	🔥1	🔥2	🔥3	🔥4
Par.102=1..3	Address RZM530A	▓	2	3	4
Par.102=10	Address gas module	1	2	3	4
Par.102=11	Address RZM530A	✕	2	3	4
	Address gas module	1	2	3	4

▓   Internally controlled boiler

Address for DHW modules:

Addresses (2..4) may be assigned to the DHW modules RZM515A according their circuit number. DHW circuit 1 is controlled by the RDO3x3A.
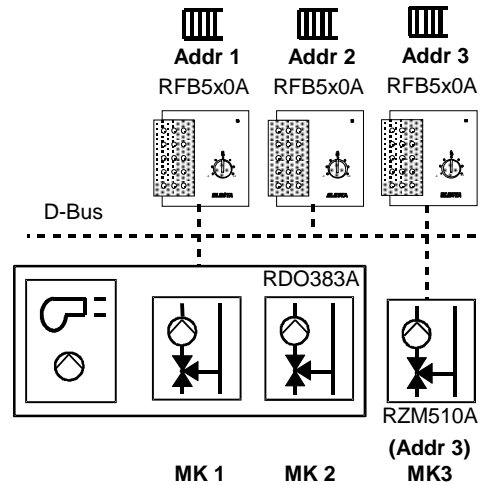Same address numbers of heating circuits (1..7) or cascade circuits (1..4) do not interfere with DHW address numbers.
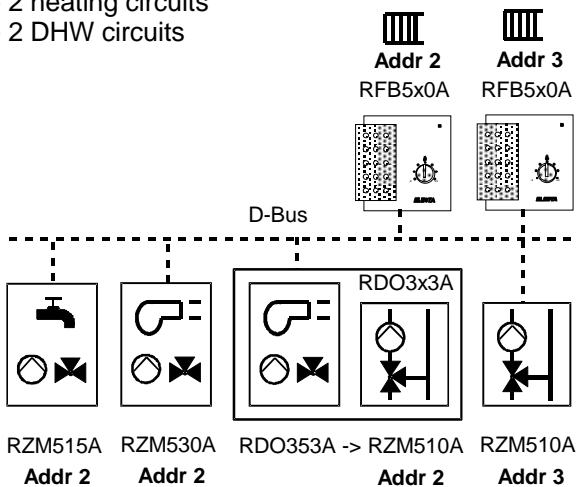
Address setting (examples):

- Boiler cascade (2 boilers)
- 2 heating circuits
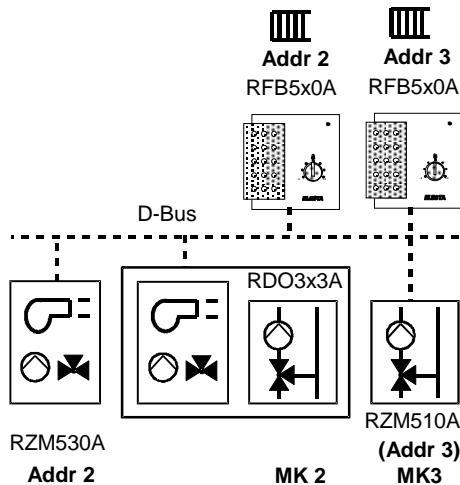
- 1 boiler:
- 3 heating circuits

- Boiler cascade (2 boilers)
- 2 heating circuits
- 2 DHW circuits

⚠️   **Warning: Address setting in RZM510A, RZM515A, RZM530A:**
- Disconnect the heating system completely from mains
- Carefully open the cover using a screw driver (left side of mode switch)
- Set required address using an insulated screw driver.
- Put cover back into place

❓   **Note: District heating with one heat exchanger (HE)**
- Stage 2: (6/7) for primary valve: (6) ON (increase return temperature)
- Stage 1: (14) not used
- Boiler temp. sensor: (28) on the secondary side of heat exchanger!

Note: District heating with two HE

Additionally to the above for DHW:
- Mixing valve 2: (41/42) primary valve: (42) ON (increase return temp.)
- Reserved sensor: (31) return of primary side of heat exchanger.

Note: Gas boiler controller

- Stage 1: (14) not used
- Stage 2: (6/7) may be used for special applications
- Connect boiler-, return- and flue gas sensor to gas module for burner

Note: Modulating burner

- Stage 1: (14) release
- Stage 2_ON: (6) increase power
- Stage 2_OFF: (7) decrease power

Note: Solar collector

- Stage 2_ON: (6) collector pump ON
- PWM1: (24) collector pump, speed control

6   Checklists

6.1   Initial start up

- Set the parameters as required (see 7: Expert level I, parameter list).
- Switch the mains OFF (remove mains fuses).
- **Before connecting the controller** to the base plate or AMP connectors, check that the necessary devices (pumps, sensors, burner, mixing valve, etc.) are connected according wiring diagram.
- Make sure, that all necessary safety devices (safety thermostats, temperature limiters, etc.) are installed and checked (electrical installation diagram).
- Plug in connector 21..35 (low voltage) and then connector 1..15 and 41..45 (mains) or plug the controller onto the base plate.
- Set the operating mode switch to "⏻=Standby" or "O=OFF".
- Switch mains ON.
- Check the LC display, all segments should appear for a few seconds.
- Recheck controller type and SW version by pressing N° -key (at basic indication, if no errors are indicated).
- Set the correct time, date and year (see 3.4.2: Set time and date).
- Check if all sensors are operative (see 3.4.7: Display service data).
- Check correct function of connected system components using relay test function (see 8: Expert level II).
- Check the system's functioning at the different operation modes.
- Set preferred operating mode (Auto or Auto „normal/reduced" or Auto „normal/frost protection").
- Set time switch programs and the room temperature setpoints as desired (see 3.4.4 and 3.4.5: Operation level II).
- For boiler cascade and fixed temperature control, set required boiler temperature setpoint (at basic indication, by pressing keys "+,-").

6.2   Trouble shooting

Please check the following items before calling your service specialist:
- If an error is being displayed by flashing "**Er xxxx**" see 3.2.3: "Indication of errors". Press the key N° for reset. If the error is still present, notify your service specialist.
- Is the mode switch in the correct position (Auto/☼❨/☼❈)?
- Are time and date set correctly?
- Is the controller working in the correct heating mode? The actual setpoint is indicated by the symbols ☼ ❩ ❈. If any of the symbols ▥/⚒/ ⏚ flash, a different setpoint is superimposed (see 3.2.1 Display of special functions). The automatic heating limitation may have interrupted heating due to warm weather (" ⤳"=visible).
- Is the remote control unit RFB set correctly?
- Is the burner working correctly? (press the burner reset button)
- Are all necessary switches on?
- Are all fuses OK?

If you do not succeed in trouble-shooting, **notify your service specialist**!

Emergency operation general:

If heat generator and pump are still working, set the mode switch to manual operation "✍\". Adapt boiler thermostat setting to the required flow temperature. Open the mixing valve by hand as necessary. Set mixing valve to "automatic". For DHW charging set boiler temperature at least 10°C higher than DHW temperature setpoint.

Emergency operation for boiler cascades:

If heat generator and pump are still working, set the mode switch to manual operation: (✍\1 for low to medium, resp. ✍\2" for high energy demand). Adapt boiler thermostat setting to the required flow temperature. Open the mixing valve by hand as necessary. For DHW charging set boiler temperature at least 10°C higher than DHW temperature setpoint.

Emergency operation for district heating:

General emergency procedure as stated above. The valve on the primary side before the heat exchanger is inoperative. **Notify your service specialist immediately!**

7 Expert level I: Parameter setting

Ⓐ The expert level shall be accessed by authorised personnel only, that is trained for this device.
Inappropriate modification of parameters may lead to faulty system behaviour and result in damage to system and devices.

Access to expert level I:

Activate function "Service" using the function selector key. (operation level II)
Press and keep key "№", then press "+" for ca. 5 seconds.
The parameter numbers 100 and above appear and can be modified.
Key-operation and display is similar to 3.4.1: "Operation on operation level II"

Key functions:

○ №   Select parameter
○ K   Select heating circuit [▥ 2], boiler [2] or DHW circuit [2 ⌁]
○ +   Increase value (only if value flashes)
○ —   Decrease value (only if value flashes)
○ № & +   Advance to next decade block: Press and keep key "№" then press "+"
○ № & —   Back step to previous decade block: Press and keep key "№" then press "—"

Return to operation level II:

Press and keep key "№" then press "—" for ca. 5 seconds.

Return to basic indication:

Press key "☰".

Presentation and meaning of parameters:

Parameter number   *Please note your individual settings <u>here</u>,*
      /   Circuit   (<u>or here</u>, for more than one circuit)

Par 000 ⌁	Parameter designation			
○ K	⌁ 1:	⌁ 2:		

    0..99   0   Description 1
                9   Description 2
   /
Value range

From the parameters described herein only the ones relevant for your particular setting may be shown on your device. Whether a parameter is accessible or not depends often on the setting of other, more fundamental parameters.

Configuration of energy production/hydraulics

Par 100	Energy	
	0	Without boiler (burner)
	1	Oil/gas boiler only
	2	Heat generator release after energy demand (without boiler sensor)
	6	District heating with heat exchanger
	7	District heating with heat exchanger but without return flow temp. control (without return flow sensor)
	40	Oil/gas burner at buffer storage
	41	Oil/gas burner with separate buffer storage

Par 101	Boiler cascade	
	Note:	Address of the devices see chapter 5.7
	RDO383A: Par.110 set to 1 first	
	RDO353A: Par.110 set to 0 first	
0..3	Number of cascade modules	

Par 102 ⊡	Heat generator			
○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:
	0 No heat generator (not for cascade!)			
	1 Heat generator single stage			

	2	Heat generator dual stage			
	3	Modulating heat generator (burner)			
	10	Gas module for burner			
	11	Gas module for burner and RZM530A (special)			
	21	Heat pump single stage			
	22	Heat pump dual stage			

Par 103	⏻	**Flue gas temperature sensor**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
0	Without flue gas temperature sensor				
1	With flue gas temperature sensor				

Par 104		**Cascade type**			
	Note:	For weather comp. control with fixed value base, the heating curve of virtual heating circuit 1 is used with Par.104=0 as boiler heating curve			
0	Weather compensated (without common return control)				
1	Fixed-value control (without common return control)				
2	As 1 with common return control				
10	As 0, boiler activation thru Tv1				
11	As 1, boiler activation thru Tv1				
	Note:	Par.113 defines transition time of boiler circuit mixing valve.			

Par 105	⏻	**Transition time of valve at boiler cascade circuit**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
0	Shut-off valve used				
	Note:	The **mixing** valve output **CLOSE** at the boiler cascade module RZM530A must be wired to **OPEN** the **shut-off** valve			
1..5	Transition time of mixing valve in minutes				

Par 106		**Cascade strategy**	
0	Release next boiler at 100% power		
1	Release next boiler at defined partial load (Par.109)		
2	As 1 for mixed boilers (highest setpoint for all released boilers, without Par.10h)		

Par 107		**Cascade release sequence**	
0	Regular sequence		
1	Reverse sequence by auxiliary input (terminal 35..31)		
2	Operating hours balance (difference of over 100h)		

Par 108		**2nd source switching point**	
	Note:	Affected by Par.10d	
0	Not used (independent release of next step)		
1	Release both heat sources simultaneously		
11	Change release sequence on every start		
21	Swap active heat source (exclusive operation)		
22	Swap active heat source, heat pump lock		

Par 109	⏻	**Partial load switching point for next boiler [%]**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
0..100	Partial load switching point of individual max. load				

Par 10A	⏻	**Wait time to next stage [min]**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
1..60	Wait time before commencing next stage				

Par 10b	⏻	**Boiler standby time [min]**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
1..120	Boiler on standby, KK pump on. Wait time (Par.10A not active)				

Par 10c	⏻	**2nd source switching point for cascade release [°C]**			
○ **K**	⏻ **1:**	⏻ **2:**	⏻ **3:**	⏻ **4:**	
20	2nd source switching point inactive. The next step is on standby.				
-20..20	Outdoor temperature for the release of the next step				

Par 10d		**2nd source switching point 2 [°C]**	
-40..60	5	Outdoor temperature for the release of 2nd step	

Par 10E		**Output boiler bypass pump**	
0	No output		
1	External relay PWM1	(terminal 24; ext. relay)	
2	External relay PWM2	(terminal 23; ext. relay)	

3	DHW pump	(terminal 15)
4	Boiler circuit pump	(terminal 8)
5	Mix circuit pump 1	(terminal 9)
6	Mixing valve 1 ON	(terminal 10)
7	Mixing valve 1 OFF	(terminal 11)
8	Mix circuit pump 2	(terminal 44)
9	Mixing valve 2 ON	(terminal 42)
10	Mixing valve 2 OFF	(terminal 41)
11	Burner 1	(terminal 14)
12	Burner 2 ON	(terminal 6)
13	Burner 2 OFF	(terminal 7)

Par 10F	**Buffer storage type**	
	Note: Inputs are defined by Par.12x	
0	No buffer storage	
1	1 sensor at buffer storage	
11	2 sensors at buffer storage, charging on auxiliary input signal	
12	As 11, charging continuously released	
13	As 11, charging continuously released except on DHW charging	

Par 10h	**Virtual cascade setpoint shift [K]**			
○ K	1:	2:	3:	4:
	Note: Values affect boilers in the order of start sequence. Each step will raise setpoint of preceding ones by set values (1=first boiler; ...; 4=last boiler)			
0..10	Shift setpoint to keep proper sequencing (ON: 1 -> .. -> 4; OFF: 4 -> 3 -> 2 -> 1).			
	Example: 3 boilers, sequence 1-2-3, setpoint 50°C, values: 1=0, 2=3, 3=7			
	Start of step 1 sets 1 to 50 + 0=50°C			
	Start of step 2 sets 1 to 50 + 3=53 and 2 to 50 + 0=50°C			
	Start of step 3 sets 1 to 50 + 7=57, 2 to 50 + 3=53°C and 3 to 50 + 0=50°C			

Par 10J	**Solar collector hydraulic**	
0	No solar operation	(Par.1Ax faded out)
1	Pump to buffer storage (requires 2 sensors at buffer storage)	
2	Pump to DHW boiler (requires 2 sensors at buffer storage)	
4	Pump to DHW boiler, then to buffer storage (requires 2 sensors at buffer storage)	
11	Autonomous ΔT control (no buffer storage necessary)	

Par 10L	**Output solar diverting valve**	
	Parameter list as Par.10E	
0	Without solar diverting valve	

Par 10n	**Energy release at flow temperature difference setpoint/actual value**	
0	Inactive	
1	1st and 2nd stage	
2	Only 2nd stage	
11	Boiler cascade, all stages	
12	Boiler cascade, without 1st stage	

Configuration of energy distribution/hydraulics

Par 110	**Hydraulic system**	
	Note: Use of the heating circuits, see chapter 5.7	
0	Direct heating circuit only	
1	Mix-heating circuit only	
2	Direct and mix-heating circuit for same zone (1 time switch channel)	
3	Direct and mix-heating circuit for different zones (2 channels)	
4	2 mix-heating circuits used in 2 zones	
5	Boiler: Fixed-value control **without** return control (Ba sensor possible)	
6	As 5 with internal mix-heating circuit (terminal HK2)	
7	Boiler: Fixed-value control **with** return control (Ba sensor possible)	
8	As 7 with internal mix-heating circuit (terminal HK2)	
9	Direct and mix-heating circuit in zone 1 and mix-heating circuit in zone 2	

Par 111	**Heating circuit modules (RZM510) at device bus**	
	Note: A total of 7 heating circuits can be controlled by one RDO. For address setting see chapter 5.7	
0	Without extra mix-heating circuit modules (RZM510A)	
1..6	Number of extra mix-heating circuits	

Par 112	▥	**Mixing valve drive (characteristic)**							
	○ K	1:	2:	3:	4:	5:	6:	7:	
	2	2-point mixing valve drive is used (relay mixing valve_OPEN)							
	3	3-point mixing valve drive is used							

Par 113	▥	**Transition time of the mixing valve [min]**							
	○ K	1:	2:	3:	4:	5:	6:	7:	
1..30		Transition time of the mixing valve drive (effective for 3-point action)							

Par 114		**Heating circuit pump 1**	
	0	Standard ON/OFF	
	1	Speed control on 2 stages (external relay connected to terminal 24)	

Par 115		**Heating circuit pump 2**	
	0	Standard ON/OFF	
	1	Speed control on 2 stages (external relay connected to terminal 23)	

Par 116	🚰	**DHW hydraulics**			
	○ K	🚰 1:	🚰 2:	🚰 3:	🚰 4:
* #		**Note:** * available for RDO; # available for RZM515A			
*	0	No DHW circuit			
*	1	1 charging pump (at heat generator/storage)			
*	2	Diverting valve (after boiler circuit pump)			
*	3	With charging pump from distributor (KK-pump before distributor)			
*	4	DHW charging by district heating (2nd HE)			
*	5	Charging pump before buffer storage			
*	6	Diverting valve before buffer storage			
*	7	DHW electrical only			
*	8	DHW combi storage			
#	11	1 charging pump (at heat generator/storage)			
#	12	2 pumps, external HE			
* #	13	Mix-heating circuit to DHW boiler			
* #	14	Mix-heating circuit primary side, DHW charging pump secondary side			
#	15	DHW charging pump primary side, mix-heating circuit secondary side			
#	16	2 mix-heating circuits, MK-pumps on the same output			
* #	17	Mix-heating circuit to HE, secondary side to circulation pump			
#	21	As 11, but before buffer storage (circuits 2..4 only)			
#	22	As 12, but before buffer storage (circuits 2..4 only)			
* #	23	As 13, but before buffer storage			
* #	24	As 14, but before buffer storage			
#	25	As 15, but before buffer storage (circuits 2..4 only)			
#	26	As 16, but before buffer storage (circuits 2..4 only)			
* #	27	As 17, but before buffer storage			

Par 117	🚰	**Equipment of the DHW storage**			
	○ K	🚰 1:	🚰 2:	🚰 3:	🚰 4:
	0	Thermostat connected to input Bww			
	1	Sensor connected to input Bww			
	2	2 sensors connected, layer storage charge (Bww, auxiliary input, max. limit by par.194)			
	3	As 2, but end of DHW charging by the lower temperature sensor (max. limit by par.194)			

Par 118		**Output electrical DHW heater**	
	0	No output	
	1	External relay PWM1	(terminal 24; ext. relay)
	2	External relay PWM2	(terminal 23; ext. relay)
	3	DHW pump	(terminal 15)
	4	Boiler circuit pump	(terminal 8)
	5	Mix circuit pump 1	(terminal 9)
	6	Mixing valve 1 ON	(terminal 10)
	7	Mixing valve 1 OFF	(terminal 11)
	8	Mix circuit pump 2	(terminal 44)
	9	Mixing valve 2 ON	(terminal 42)
	10	Mixing valve 2 OFF	(terminal 41)
	11	Burner 1	(terminal 13)
	12	Burner 2 ON	(terminal 6)
	13	Burner 2 OFF	(terminal 7)

Par 119	DHW modules (RZM515A) at device-bus	
	Note: A total of 3 DHW circuits can be controlled by one RDO	
	For address setting see chapter 5.7	
0..3	Number of external DHW modules (RZM515)	

Par 11A	Boiler circuit pump output (terminal 8) KK	
0	Controlled by demand	
1	Operate as buffer storage pump	
2	Operate as buffer storage pump, deactivated for DHW charging	
3	Free for other functions	
4	Boiler circuit pump only if external minimal boiler setpoint activated (Par.12x=5 and Par.158=xx)	

Par 11b	⊐: PWM1 output (terminal 24)		
○ K	⊐: 1:	⊐: 2:	⊐: 3:	⊐: 4:

0	ON/OFF	
1	PWM speed control for solar collector pump (needs Par.1bx)	
3	Power control 0-10V for modulating heat generator (Par.1b1 and 1b2)	
4	Boiler setpoint control 0-10V for modulating heat generator (based on par.1b4 and 1b5)	
5	As 4, but with release by relay Br1	
11	0..10V speed control for solar collector pump (needs Par.1bx)	
101	Condensator pump (ON/OFF)	

Par 11d	Autonomic return temperature regulation	
0	Inactive	
1	Relay mixing valve 1 OPEN/CLOSE (terminal 10/11)	
2	Relay mixing valve 2 OPEN/CLOSE (terminal 42/41)	
3	Relay burner 2 OPEN/CLOSE (terminal 6/7)	

Par 11E	▥ Heating circuit special function						
○ K	1:	2:	3:	4:	5:	6:	7:

0	Not used	
1..7	Energy demand to pre-control (mix-circuit 1..7)	
10..50	Maximum setpoint for swimming pool control	

Par 11F	⌁ DHW circuit energy demand			
○ K	⌁ 1:	⌁ 2:	⌁ 3:	⌁ 4:

0	Energy demand to heat generator	
1..7	Energy demand to pre-control (mix-circuit 1..7)	
11	No energy demand to heat generator	

Configuration of electrical inputs and outputs

Warning: Low voltage inputs!

Par 120	Auxiliary input 1 (terminal 35)	
0	No function	
1	Set system to standby	
2	Set summer operation to all heating circuits	
3	Release electrical DHW-charge	
4	Operate on parameters for solid fuel	
5	Activate minimum boiler temperature setpoint	
6	Activate minimum flow temperature setpoint	
7	Activate normal room temperature setpoint on heating circuit 1	
8	Activate reduced room temperature setpoint on heating circuit 1	
9	Signal: burner deactivated (no error signal)	
10	Reverse boiler cascade sequence	
11	Signal: Burner malfunction	
12	Activate minimum buffer storage temperature setpoint	
13	Activate 2nd source switching point 2 (Par.10d)	
14	Force single DHW-charge (signal > 5 seconds)	
15	Set heating circuit 1 to standby	
16	Set heating circuit 1 to summer operation	
17	Pulse input for counter 1 (terminal 35 only)	
19	Operate on parameters for solid fuel without boiler circuit pump KK	
20	Input for flue gas temperature sensor	
21	Input for flow temperature sensor 2	
22	Input for DHW temperature sensor 2 (bottom)	
23	Input for flow temperature sensor 1	
24	Input for return temperature sensor 1	

	25	Input for buffer storage temperature sensor 1
	26	Input for buffer storage temperature sensor 2 (bottom)
	27	Input for return temperature sensor (primary side of HE for DHW charge)
	28	Input for solar collector temperature sensor 1
	30	Input for DHW temperature sensor 1
	40	Set heating circuit 2 to standby
	41	Set heating circuit 2 to summer operation
	42	Activate minimum flow temperature setpoint to heating circuit 2
	43	Activate normal room temperature setpoint to heating circuit 2
	44	Activate reduced room temperature setpoint to heating circuit 2
	52	Set DHW circuit to standby
	53	Activate DHW temperature setpoint "reduced"
	54	Activate DHW temperature setpoint "normal"
	55	Activate DHW temperature setpoint "legionella"
	69	Signal: Burner malfunction without operation stop
	70	Block energy function after flow control deviation (Par.10n)
	71	External boiler setpoint 0..10V with RZB541A000 interface
	72	External swimming pool setpoint 0..10V with RZB541A000 interface
	75	Activate independent time switch channel 9
	151	Ext. disturbance 36, inverted (NC)
	152	Ext. disturbance 37, inverted (NC)
	153	Ext. disturbance 38, inverted (NC)
	154	Ext. disturbance 39, inverted (NC)
	161	Ext. disturbance 32, inverted (NC)
	162	Ext. disturbance 33, inverted (NC)
	163	Ext. disturbance 34, inverted (NC)
	164	Ext. disturbance 35, inverted (NC)
	181	Ext. disturbance 36
	182	Ext. disturbance 37
	183	Ext. disturbance 38
	184	Ext. disturbance 39
	191	Ext. disturbance 32
	192	Ext. disturbance 33
	193	Ext. disturbance 34
	194	Ext. disturbance 35
Par 121		**Auxiliary input 2 (terminal 34)**
		Parameter list as Par.120 + following
	18	Pulse input for counter 2 (terminal 34 only)
	120	Ext. disturbance 36..39, inverted (NC), I/O-module 2.x (E1=distr. 36, ..., E4=distr. 39)
	121	Ext. disturbance 32..35, inverted (NC), I/O-module 2.x (E1=distr. 32, ..., E4=distr. 35)
	186	Ext. disturbance 36..39, I/O-module 2.x (E1=distr. 36, ..., E4=distr. 39)
	196	Ext. disturbance 32..35, I/O-module 2.x (E1=distr. 32, ..., E4=distr. 35)
Par 122		**Auxiliary input 3/flue temperature sensor (terminal 33)**
		Parameter list as Par.120
Par 123		**Auxiliary input 5/reserve temperature sensor (terminal 31)**
		Parameter list as Par.120
Par 124		**Analogue input outdoor temperature sensor (terminal 26)**
	0	No function
	1	Input for output temperature sensor 1 (Ba1)
	2	Input for output temperature sensor 2 (Ba2)
	3	Input for room temperature sensor 1 (Br1)
	4	Input for room temperature sensor 2 (Br2)
Par 125		**Analogue input room temperature sensor (terminal 27)**
	0	No function
	1	Input for output temperature sensor 1 (Ba1)
	2	Input for output temperature sensor 2 (Ba2)
	3	Input for room temperature sensor 1 (Br1)
	4	Input for room temperature sensor 2 (Br2)
	71	External boiler setpoint 0..10V with RZB541A000 interface
	72	External swimming pool setpoint 0..10V with RZB541A000 interface
	101	Input for multi switch (I/O module)
		Function defined with: Par.12c, 12d, 12E, 12F

Par 126	⌐:	Input Bh2: Operating hours 2 (terminal 4)				
○ K	⌐: 1:	⌐: 2:	⌐: 3:	⌐: 4:		

	230VAC input
0	Counter for operating hours burner 2
1	Signal: Burner malfunction
2	DHW thermostat
3	Release DHW electrical charge
4	Qmin-limiter for DHW district heating
69	Signal: Burner malfunction without operation stop
70	Block energy function after flow control deviation (Par.10n)
151..194	As in list of parameter 120 (RDO only)

Par 127	Input flow temperature sensor (terminal 29)	
0	No function
20	Input for flue gas temperature sensor
21	Input for flow temperature sensor 2
22	Input for DHW temperature sensor 2 (bottom)
23	Input for flow temperature sensor 1
24	Input for return temperature sensor 1
25	Input for buffer storage temperature sensor 1
26	Input for buffer storage temperature sensor 2 (bottom)
27	Input for return temperature sensor (primary side of HE for DHW charge)
28	Input for solar collector temperature sensor 1
30	Input for DHW temperature sensor 1

Par 128	Input return temperature sensor (terminal 30)
	Parameter list as Par.127

Par 129	Output independent time switch channel 9	
0	No output	
1	External relay PWM1	(terminal 24; ext. relay)
2	External relay PWM2	(terminal 23; ext. relay)
3	DHW pump	(terminal 15)
4	Boiler circuit pump	(terminal 8)
5	Mix circuit pump 1	(terminal 9)
6	Mixing valve 1 ON	(terminal 10)
7	Mixing valve 1 OFF	(terminal 11)
8	Mix circuit pump 2	(terminal 44)
9	Mixing valve 2 ON	(terminal 42)
10	Mixing valve 2 OFF	(terminal 41)
11	Burner 1	(terminal 13)
12	Burner 2 ON	(terminal 6)
13	Burner 2 OFF	(terminal 7)

Par 12A	Output 2nd source switching point
	Parameter list as Par.129

Par 12b	Output error warning
	Parameter list as Par.129

Par 12c	Input multi switch 9.1: (R=10kOhm on terminal 27)
Note:	Parameter list as Par.120, only digital functions!
Note:	Set Par.125 to 101.

Par 12d	Input multi switch 9.2: (R=22kOhm on terminal 27)
Note:	Parameter list as Par.120, only digital functions!
Note:	Set Par.125 to 101.

Par 12E	Input multi switch 9.3: (R=47kOhm on terminal 27)
Note:	Parameter list as Par.120, only digital functions!
Note:	Set Par.125 to 101.

Par 12F	Input multi switch 9.4: (R=100kOhm on terminal 27)
Note:	Parameter list as Par.120, only digital functions!
Note:	Set Par.125 to 101.

Par 12L	Output independent time switch heating circuit 7
	Parameter list as Par.129

Par 12n	Output independent time switch DHW circuit 4
	Parameter list as Par.129

Configuration of controller functions

Par 130		Basic indication field 1 (format: -99..199)	
	0	No indication	
	1	DHW temperature	(sensor Bww)
	2	DHW temperature 2	(sensor bottom)
	3	DHW temperature mixing valve 1	
	4	DHW temperature mixing valve 2	
	10	Outdoor temperature	(sensor Ba)
	12	Room temperature	
	14	Flow temperature	(sensor Bv)
	20	Return temperature	(sensor Brü)
	21	Heat generator temperature	(sensor Bk)
	24	Buffer storage temperature 1 (top)	
	25	Buffer storage temperature 2 (bottom)	(sensor bottom)
	27	Return temperature of HE (sensor primary side for DHW charge)	
	28	Solar collector temperature sensor	
	30	Operating hours heat generator 1	
	31	Operating hours heat generator 2	
	34	Operating hours solar collector pump	
	35	Solar collector power [0.01kW]	
	36	Total solar collector energy output [kWh]	
	40	Start cycles heat generator stage 1	(display * 10=start cycles)
	41	Start cycles heat generator stage 2	(display * 10=start cycles)
	45	Actual boiler power [%]	
	46	Actual cascade boiler power [%]	
	51	DHW temperature	setpoint
	52	DHW temperature 2	setpoint
	53	DHW temperature mixing valve 1	setpoint
	54	DHW temperature mixing valve 2	setpoint
	60	Building specific outdoor temperature	Tageb
	62	Room temperature	setpoint
	64	Flow temperature	setpoint
	70	Return temperature	setpoint
	71	Heat generator temperature	setpoint (boiler)
	74	Buffer storage temperature 1 (top)	setpoint
	75	Buffer storage temperature 2 (bottom)	setpoint
	77	Return temperature HE (primary side for DHW charge)	setpoint
	78	Temperature difference solar collector	TKOLDIFF
	81	Year (2 digits: 98 --> 1998)	
	85	Speed collector pump [%]	setpoint
	95	Actual boiler power [%]	setpoint
Par 131		**Basic indication field 2 (format: -999..9999)**	
		Parameter list as Par.130 + following	
	23	Flue gas temperature	(sensor Bag)
	73	Flue gas temperature limit	Tagmax
	82	Date (format: day.month)	
Par 132		**Status display at basic indication**	
	0	Status display OFF	
	1	On at position "Service" only	
	2	Always ON	
Par 133		**Time source**	
	0	Internal Clock	
	1	Radio controlled clock on device bus	
	2	Other clock on BCB	
Par 135		**Automatic summer time change-over (time -1h)**	
	0	No automatic change-over to summer time	
	1.01	First weekend of the year	
	5.03	Last Sunday in March	
	5.12	Last weekend of the year	
Par 136		**Automatic winter time change-over (time +1h)**	
	0	No automatic change-over to summer time	
	1.01	First weekend of the year	
	5.10	Last Sunday in October	
	5.12	Last weekend of the year	

Par 137		**Baudrate for PC connection**					
600..9200		Baudrate (values: 600/1200/2400/4800/9600/9200=19200)					

Par 138		**Controller address**
1..200		Address of the controller for the RS232 interface

Par 139		**Remote setting of operation mode**
	Note:	Performed via RS232
	Note:	Local setting "manual", "OFF", or "standby" supersedes remote setting
0	Remote setting prohibited	
1	Remote setting enabled	
2	Remote setting enabled. Local parameter setting prohibited	

Par 13A	▥	**Remote operation mode setting for heating circuit**					
○ K	1:	2:	3:	4:	5:	6:	7:
1-7	**Note:** Function as corresponding mode switch						
	1=manual; 2=standby; 3=only DHW charge; 4=auto "normal/frost"; 5=auto "normal/reduced"; 6=continuous "normal"; 7=continuous "reduced"						

Par 13b	�651:	**Remote operation mode setting for boiler cascade**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
1-7	**Note:** Function as corresponding mode switch			
	1=manual2; 2=manual1; 3=OFF; 4=auto; 5=standby; 6=Service1; 7=Service2			

Par 13c	⌐	**Remote operation mode setting for DHW**		
○ K	⌐ 1:	⌐ 2:	⌐ 3:	⌐ 4:
1-7	**Note:** Function as corresponding mode switch			
	1=OFF; 2=standby; 3=DHW continuously released; 4=auto; 5=50° setpoint; 6=55° setpoint; 7=60° setpoint			

Par 13E		**Meter factor 1 [0.01]**
0..99.99		Factor used on counter 1

Par 13F		**Meter factor 2 [0.01]**
0..99.99		Factor used on counter 2

Configuration of heat generator and district heating

Par 140	�651	**Switching difference (SD1) [K]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
2..20	Switching difference for burner stage 1			

Par 141	�651	**Switching difference (SD2) [K]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
2..20	Switching difference for burner stage 2			

Par 142	�651	**Wait time to stage 2, load-dependent [min]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
	Burner with 2 stages: Minimal wait time			
	Modulating burner: Wait time for modulation "CLOSE" active during this time			
0	Without delay			
1..30	Wait time			

Par 143	�651	**Minimum burner running time [min]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
0..30	Minimum burner running time (min. running time before shut-off)			

Par 144	�651	**Modulation P-band [K]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
6..80	P-band			

Par 145	�651	**Modulation offset P-band [K]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
0..40	Offset P-band			

Par 146	�651	**Modulation Integral phase [‰*K/s]**		
○ K	�651 1:	�651 2:	�651 3:	�651 4:
0..99	I-value per mil			
	TN[s]=xd * 1000 / Par.146		xd: Deviation boiler setpoint – actual value	

Par 147	⌐	**Modulation differential phase [s/K]**			
	○ **K**	⌐ **1:**	⌐ **2:**	⌐ **3:**	⌐ **4:**
0..99		D-value TV[s]=Par.147 / xp xp: Par.144			

Par 148	⌐	**Modulating burner transition time [s]**			
	○ **K**	⌐ **1:**	⌐ **2:**	⌐ **3:**	⌐ **4:**
10..120		Transition time of the drive			

Par 149	**District heating bend point 1 (Ta) [°C]**
0..30	Outdoor temperature at bend point 1

Par 14A	**District heating return temperature 1 [°C]**
20..90	Return temperature at bend point 1

Par 14b	**District heating bend point 2 (Ta) [°C]**
-30..0	Outdoor temperature at bend point 2

Par 14c	**District heating return temperature 2 [°C]**
20..90	Return temperature at bend point 2

Par 14d	**District heating, P-band of valve drive [K]**
10..40	**Note**: Threshold at which continuous CLOSE command is given P-Band (terminals for stage 2 OPEN/CLOSE)

Par 14E	**District heating, transition time of valve drive [0.5min]**
0.5..5	Transition time of valve drive

Par 14F	**Allowed number of heat generator starts per hour**
0	OFF
1..20	Allowed number of heat generator starts per hour (delay between subsequent starts is 60 min. / 1..20)

District heating:
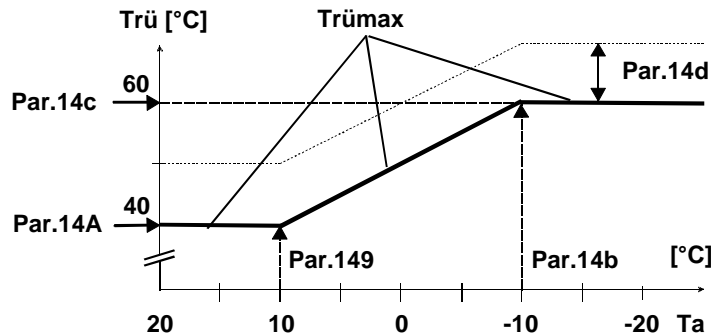
Par 14h	▥	**Offset ON flow temperature difference setpoint/actual value [K]**					
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
0		No heat generator release					
2..20		Offset flow temperature difference setpoint/actual value					

Par 14J	▥	**Offset OFF flow temperature difference setpoint/actual value [K]**					
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
1..20		Offset flow temperature difference setpoint/actual value					

Configuration of limitations and boiler protection

Par 150	⊡	**Boiler temperature minimum limitation (Tkmin) [°C]**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
0..99		Minimum boiler temperature					

Par 151	⊡	**Boiler temperature maximum limitation (Tkmax) [°C]**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
0..125		Maximum boiler temperature at DHW charging (boiler temperature sensor)					

Par 152		**Boiler temperature maximal limitation (heating) [°C]**	
0..125		Maximum boiler temperature limit regular heating (boiler temperature sensor)	

Par 153	▥	**Flow temperature minimum (Tvmin) [°C]**					
	○ K	1:	2:	3:	4:	5:	6:	7:
0..99		Minimum flow temperature of the mix-heating circuit					

Par 154	▥	**Flow temperature maximum (Tvmax) [°C]**					
	○ K	1:	2:	3:	4:	5:	6:	7:
0..125		Maximum flow temperature of the mix-heating circuit					

Par 155	⊡	**Return temperature minimum (Trümin) [°C]**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
0		Minimum return temperature limitation OFF					
1..99		Minimum return temperature (return sensor required)					

Par 156	⊡	**Flue gas temperature maximum (Tagmax) [°C]**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
40..240		Temperature at witch burner is cut-off for 30 minutes					

Par 157	⊡	**Boiler start-up relief, DHW discharge protection**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
0		Both OFF					
1		Boiler start-up relief and DHW discharge protection ON					
2		Boiler start-up relief only					
3		DHW discharge protection only					
11		As 1 with rise Tkmin					
12		As 2 with rise Tkmin					

Par 158		**Alternate boiler minimum temperature setpoint (Tkmin_ext) [°C]**	
0		OFF	
1..125		Alternate boiler minimum temperature setpoint (activated via auxiliary input)	

Par 159	▥	**Alternate minimum flow temperature setpoint (Tvmin_ext) [°C]**					
	○ K	1:	2:	3:	4:	5:	6:	7:
0		OFF					
1..125		Alternate minimum flow temperature setpoint (activated via auxiliary input)					

Par 15A		**Alternate buffer storage minimum temperature setpoint [°C]**	
0		OFF	
1..99		Alternate buffer storage minimum temperature setpoint (activated via auxiliary input)	

Par 15b		**Setpoint raise vs. buffer storage setpoint [K]**	
0..20		Raise of heat generator temperature setpoint vs. buffer storage setpoint.	

Par 15c		**External flow temperature minimum limit**	
0		On heating modes	
1		On heating and DHW charging modes	

Par 15E	▥	**Heating circuit return temperature minimum limit offset**					
	○ K	1:	2:	3:	4:	5:	6:	7:
-99..99		Heating circuit return temperature minimum limit offset					

| Par 15F	⊡	**Heating circuit return temperature minimum limit offset of stage 2**					
	○ K	⊡ 1:	⊡ 2:	⊡ 3:	⊡ 4:		
-30..30		Heating circuit return temperature minimum limit offset stage 2					

Configuration of heating curve
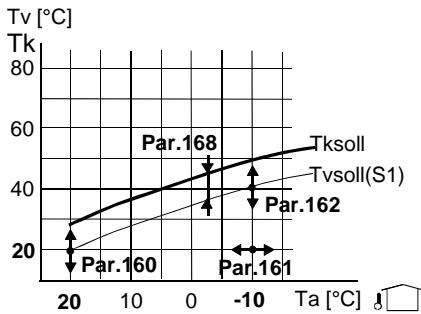
**For boiler cascade or
for fixed-value control:**

Note:
The boiler setpoint temperature can be
modified using the keys „+,-„ at basic
indication. When using the outdoor
temperature sensor, it will be increased
automatically as to the heating curve
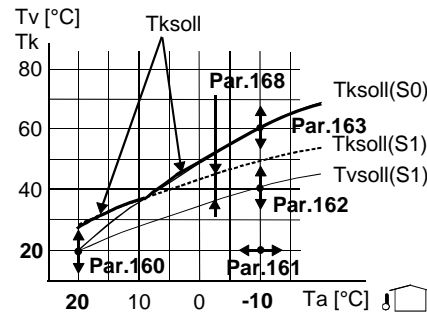
Tksoll: Compensated setpoint temperature
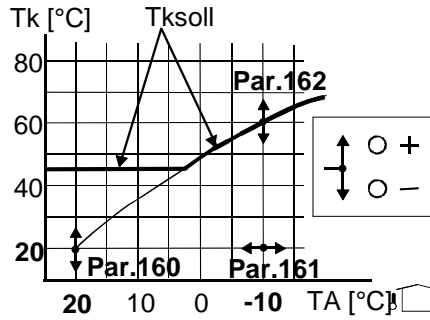
**Heating curve:
Mix-heating circuit
(direct heating circuit w/o Par.168)**

**Direct- and mix-heating circuit
in same heating zone**
Tksoll: Compensated setpoint temperature

Par 160	▥	**Fixed point of heating curve (Tvfix) [°C]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
10..40		Flow temperature at Ta=20°C outdoor temperature						
Par 161	▥	**Outdoor temperature at design point (Taausl) [°C]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
-30..0		Outdoor temperature at the design point						
Par 162	▥	**Flow temperature at design point (Tvausl) [°C]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
20..99		Flow temperature at the design point						
Par 163		**Auxiliary boiler temperature at fixed point (Tkausl) [°C]**						
20..99		**Note**: Set **Par.110=2** Boiler temperature at the design point (at Taausl)						
Par 164	▥	**Adapted flow temperature at fixed point (read only) [°C]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
10..40		Adapted flow temperature at the fixed point (Ta=20°C)						
Par 165	▥	**Adapted flow temperature at design point (read only) [°C]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
0..99		Adapted flow temperature at the design point (Taausl)						
Par 166		**Adapted boiler temperature at design point (read only) [°C]**						
0..99		Adapted boiler temperature at the design point (Taausl)						
Par 167	▥	**Adaptation of heating curve**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
	0	No adaptation						
	1	Adaptation manual, automatic with room temperature sensor						
	2	Adaptation manual, correction with value						
Par 168	▥	**Setpoint raise vs. flow temperature setpoint [K]**						
	○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
0..30		Setpoint raise of heat generator (boiler) vs. flow temperature setpoint of the mix-heating circuit.						

Par 169	▥	**Source of outdoor temperature**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

0 No outdoor temperature sensor used (room temperature control)
1 Outdoor temperature sensor 1 (Ba1) used
2 Outdoor temperature sensor 2 (Ba2) used
3 Mean value of outdoor temperature sensors 1 and 2 (Ba1, Ba2) used
4 Outdoor temperature sensor at heating circuit module RZM510 used
5 Outdoor temperature at BCB
6 Outdoor temperature at D-Bus
9 Without heating circuit setpoint

Par 16A		**Source of boiler temperature**

0 Internal boiler temperature sensor used
1 Boiler temperature sensor at BCB

Par 16b		**Source of return temperature**

0 Internal return temperature sensor used
1 Return temperature sensor at BCB

Optimization

Par 170	▥	**Thermal lag of building**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

0 No lag   (for testing purposes only)
1 Light design   (no or light insulation)
2 Normal design   (medium or good insulation)
3 Heavy design   (very good insulation)

Par 171	▥	**Boost heating cut-off**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

0 Economy : Floor heating and radiators (Trsoll -0.75°K)
1 Normal   : Radiator heating only (Trsoll -0.25°K)

Par 172	▥	**Optimization of heating circuit switching times**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

Note: Switching times see Par.173, Par.174
0 OFF: Begin and end of heating period according heating circuit time switch program
1 ON: Begin and end of heating period advanced to heating circuit time switch program
2 Ramp function for begin of heating (defined by parameter 173)

Par 173	▥	**Maximum time shift for heating start [min]**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
0..180		Heating start earlier than time programmed						

Par 174	▥	**Maximum time shift for heating end [min]**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**
0..120		Heating end earlier than time programmed						

Par 175	⚲	**Optimization of DHW charge switching times**			
○ **K**		**⚲ 1:**	**⚲ 2:**	**⚲ 3:**	**⚲ 4:**

0 Release of DHW charge according to the DHW time switch program
1 Release of DHW charge 1 hour prior to the heating start
2 DHW charge continuously released (no programming possible)

Configuration of special operation modes

Par 180	▥	**Automatic short herm heating limit**						
○ **K**		**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

Note:
- Mode switch must be set to any heating operation.
- Limit is based on calculated flow temperature setpoint
0 OFF
1 ON: Automatic heating limit activated
2 As 1, ambient frost protection activated by parameter 187

Par 181	▥	**Automatic summer/winter heating limit [K]**						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**	

Note:
- Mode switch must be set to automatic mode.
- When limit is active, the "sunshade" symbol appears on the display

0.0	OFF
0.5..10.0	Value for the automatic summer/winter heating limit

Heating limit:
The automatic short term heating limit is a short term economy function that switches off heating operation if the flow temperature setpoint is only ca. 3K higher than the room temperature setpoint.
The automatic summer/winter heating limit is a medium term economy function that switches heating operation to „summer", as soon as the difference between the room temperature setpoint „normal" and the attenuated outdoor temperature (time constant ~21h) reaches or gets smaller than the value set. ("normal" minus Par.181)

Par 182	▥	**Room sensor at remote control unit**						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**	

0	Not used
1	In operation

Par 183	▥	**Influence of room temperature (Ez) [%]**						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**	

0	No influence
1..150	Control feedback to counteract for deviation

Par 185		**Pump protection during summer operation**

0	OFF
1	ON: Activates pumps and valves daily at 4 pm at summer operation
2	ON: Summer protection active without mixer timeout

Par 186	▥	**Follow-up time of heating circuit pumps [min]**						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**	

0..30	Follow-up time of the heating circuit pump

Par 187		**Frost protection temperature [°C]**

-15..3	Controls pump frost protection (room temperature sensor required)

Par 188	⌷	**Follow-up time of boiler circuit pump [min]**			
○ **K**	⌷ **1:**	⌷ **2:**	⌷ **3:**	⌷ **4:**	

0..180	Follow-up time of the boiler circuit pump

Par 18c		**Internal function of independent time switch channel 9**

	Parameter list as Par.12c

Functions of frost protection:
Pump frost protection: Heating circuit pump ON; if the building specific mean outdoor temperature is below the frost protection temperature (hysteresis ± 0.25°C). This function is active, if the heating operation is ON.
Building frost protection: Protection by automatic short term heat limit.
DHW frost protection: Possible when a DHW sensor is used and if the DHW setpoint "frost protection" is reached (hysteresis ± 0.5 * Par.191).
Boiler frost protection: If the boiler temperature is below 5°C the boiler temperature is controlled on 5°C. (hysteresis ± 0.5 * Par.140)

Pump automatic:
The "pump automatic" guarantees an operation of the pump regarding the demand. The automatic is influenced by: Automatic heating limit, follow-up time of the pump, function for frost protection, boiler start-up protection, DHW-discharge protection, and limitations.

Configuration of DHW charging

Par 190	⌁	**Maximum temperature for DHW setpoint [°C]**			
○ **K**	⌁ **1:**	⌁ **2:**	⌁ **3:**	⌁ **4:**	

5..99	Maximum temperature for DHW setpoint (with DHW temperature sensor only)

Par 191	⌁	**Switching difference DHW (SDWW) [K]**			
○ **K**	⌁ **1:**	⌁ **2:**	⌁ **3:**	⌁ **4:**	

1..10	Switching difference for DHW setpoint (with DHW temperature sensor only)

Par 192	🚰 Anti legionella function			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

0	Anti legionella function disabled
1..7	Weekly heating to setpoint "legionella" (1=Monday..7=Sunday)
8	Daily heating to setpoint "legionella"

Par 193	🚰 Setpoint raise on DHW charge [K]			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

2..60	Setpoint raise on DHW charge (with DHW temperature sensor only)

Par 194	🚰 Alternate boiler temperature setpoint on DHW charge [°C]			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

0..99	Boiler setpoint for DHW charge (with DHW thermostat only)

Par 195	Power setting for DHW charge

0	Demand-dependent power setting
1	Heat generator stage 1 only (if already on, stage 2 is kept)
2	Heat generator stage 2

Par 196	▥ Priority for DHW charging						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

0	No priority, heating works independently
1	Medium-priority, heating circuits remain open
2	Full priority, heating circuits are closed

Par 197	🚰 Follow-up time of DHW charge pump [min]			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

0..10	Follow-up time of the DHW charge pump

Par 198	🚰 Release of electrical DHW charging			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

	DHW charge by electrical device, connected as Par.118
	Note: Output is only active, if heating of DHW boiler is required.
	Ext. WWel requires signal on auxiliary input as Par.12x
0	Ext. WWel active
1	Ext. WWel active (DHW-pump ON, if WWel ON)
2	Ext. WWel active and controller on summer operation mode
3	Ext. WWel active or controller on summer operation mode
10	Buffer storage temperature too low
11	Buffer storage temperature too low and summer operation mode on
12	Buffer storage temperature too low related to DHW-temperature
14	Buffer storage temperature too low related to DHW reduced setpoint

Par 199	🚰 DHW forced charging			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

0	No forced charging
1	Forced charging with first release daily
2	Synchronized forced charging
3	Synchronized forced charging, in summer operation mode only

Par 19A	Temperature difference to release electrical DHW charging [K]

-20..20	Electrical DHW charging is released, as soon as the difference between the DHW temperature setpoint and the buffer storage temperature exceeds the value set here

Par 19b	▥ Allocation of DHW module to heating circuits						
○ **K**	**1:**	**2:**	**3:**	**4:**	**5:**	**6:**	**7:**

	DHW module is off, if all dependent heating circuits are on standby
0	No allocation
1	Internal DHW circuit
2..4	Ext. DHW module (address 2..4)

Par 19c	🚰 Setpoint raise DHW mix-circuit 1 [K]			
○ **K**	🚰 **1:**	🚰 **2:**	🚰 **3:**	🚰 **4:**

	Note: Set Par.116=13, 14, 15, 16
0..99	Setpoint raise DHW mix-circuit/DHW setpoint

Par 19d	🚰	Setpoint raise DHW mix-circuit 2 [K]			
○ K		🚰 1:	🚰 2:	🚰 3:	🚰 4:
	Note:	Set Par.116=16			
0..99		Setpoint raise DHW mix-circuit 2/DHW mix circuit 1			

Par 19E	🚰	Transition time DHW mixer 1 [min]			
○ K		🚰 1:	🚰 2:	🚰 3:	🚰 4:
1..30		Transition time DHW mixer 1			

Par 19F	🚰	Transition time DHW mixer 2 [min]			
○ K		🚰 1:	🚰 2:	🚰 3:	🚰 4:
1..30		Transition time DHW mixer 2			

Par 19h	🚰	DHW pump operation			
○ K			🚰 2:	🚰 3:	🚰 4:

Note: 1..3 effectively with RZM515A only

0 Continuously OFF
1 Continuously ON
2 Independent time switch program used (channel 9)
3 When DHW circuit is released (setpoint "normal" or "anti legionella")
5 Intermittently 5 minutes per 30 minutes, when DHW charging is released
10 Intermittently 10 minutes per 30 minutes, when DHW charging is released
15 Intermittently 15 minutes per 30 minutes, when DHW charging is released

Configuration of solar operation

Par 1A1	Starting point for collector pump [K]	
	Note: Including speed variable pumps	
4..20	Temperature difference at solar collector that starts pump	

Par 1A2	Shut-off point for collector pump [K]	
	Note: Including speed variable pumps	
	Minimum switching difference to Par.1A1: 3K	
0..16	Temperature difference at solar collector that shuts pump off: TKOLDIFF < Par.1A2	

Par 1A3	Reaction on exceeding maximum collector temperature	
0	None	
1	Collector pump to max. speed, charge buffer storage	
2	Terminate charge (steam in collector)	

Par 1A4	Maximum collector temperature [°C]	
0..240	Maximum collector temperature (switching difference 20%)	

Par 1A5	Reaction on exceeding maximum buffer storage temperature	
0	None	
1	Back cooling to collector at night	
2	Solar collector pump OFF	
3	Back cooling to collector at night and solar collector pump OFF	

Par 1A6	Maximum buffer storage temperature [°C]	
	Note: Par.1A5 can block function	
0..99	Maximum buffer storage temperature	

Par 1A7	Switching difference on maximum buffer storage temperature [K]	
1..50	Temperature decrease to terminate reaction set at Par.1A5	

Par 1A8	Frost protection of collector [°C]	
-40..3	**Note:** Switching difference 5K	
	Collector pump to max. speed, if the collector temperature falls below	

Par 1A9	Output collector pump	
	Note: Use relay output for conventional pump. Only ON-OFF signal for variable-speed pump.	
	Parameter list as Par.10E	

Par 1AA	Output solar energy beyond capacity	
	Note: Signal if max. collector temperature or max. buffer temperature are exceeded.	
	Parameter list as Par.10E	

Par 1Ab	Volume flow rate of solar pump [l/h]	
0..2000	Volume flow rate of solar pump at 100% speed	
Par 1Ac	**Specific heat capacity [kJ/l*K]**	
3.50..4.50	Specific heat capacity of fluid	
Par 1Ad	**Collector efficiency [%]**	
0..100	100=ideal energy transmission	
Par 1AF	**Collector absorber area [m^2]**	
0..99.99	**Note:** Max. collector performance=Par.1AF * 0.8kW	

Configuration of PWM1 control

Par 1b0	Cycle time of PWM 1 signal [0.1s]	
0.1..60	Cycle time of PWM signal for variable-speed pump	
Par 1b1	**Minimum PWM1 signal strength [%]**	
0..100	Minimum PWM signal strength, on PWM output	
Par 1b2	**Maximum PWM1 signal strength [%]**	
0..100	Maximum PWM signal strength, on PWM output	
Par 1b4	**Temperature at minimum PWM signal strength [°C]**	
-125..125	Temperature up to which minimum PWM signal strength is given	
Par 1b5	**Temperature at maximum PWM signal strength [°C]**	
-125..125	Temperature up to which maximum PWM signal strength is given	

District heating with 2nd HE for DHW charging

Par 1d9	District heating HE2 bend point 1 (Ta) [°C]	
0..30	Outdoor temperature at bend point 1	
Par 1dA	**District heating HE2 return temperature 1 [°C]**	
20..90	Return temperature at bend point 1	
Par 1db	**District heating HE2 bend point 2 (Ta) [°C]**	
-30..0	Outdoor temperature at bend point 2	
Par 1dc	**District heating HE2 return temperature 2 [°C]**	
20..90	Return temperature at bend point 2	
Par 1dd	**District heating HE2 P-band of valve drive [K]**	
10..40	**Note:** Threshold at which continuous CLOSE-command is given P-band for stage 2 OPEN/CLOSE	
Par 1dE	**District heating HE2 transition time of valve drive [min]**	
0.5..5	Transition time of valve drive	

Additional parameters

Par 1EA	Configuration of output for buffer storage charging pump	
	Parameter list as Par.118	

8   Expert level II: System test

Functions of level:
- Configuration of special functions
- Function test of relay and PWM outputs
- Function test of inputs

Set and reset of operating hours:

⌐²	**+30**	**1675**	: Heat generator stage 1, total running time [hours] (Par.30)
⌐²	**+31**	**347**	: Heat generator stage 2, total running time [hours] (Par.31)
	+34	**2535**	: Collector pump, total running time [hours] (Par.34)
	+36	**1590**	: Collector power [kWh] (Par.35)
⌐²	**+40**	**630**	: Heat generator stage 1 start cycles (value x 10) (Par.40)
⌐²	**+41**	**150**	: Heat generator stage 2 start cycles (value x 10) (Par.41)
	+48	**xx**	: Counter 1 (Par.81; only reset to 0)
	+49	**xx**	: Counter 2 (Par.82; only reset to 0)

Note: Counters can be set to zero by pressing the "🔧" key

Function of the relays:

Ⓐ   Several relays may be activated at the same time independently of their function. To avoid damage to the system or its components consult the installation diagram and wiring diagram before activating the relays.

During the system test all control functions are terminated.
Some of the functions or components can not be activated at the same time if the same relay is involved and the contactors are blocked against each other. Such functions are marked with (¦¦ bars).

○ **K**	:	Select circuit
⌐²	:	Parameter is available for every heat generator
▥	:	Parameter is available for every heating circuit
🔧	:	Parameter is available for every DHW circuit

Outputs that are not allocated to circuits ⌐², ▥ or 🔧:

District heating with 2 HE:

Par.	○K Terminal:			
+50	14	Relay burner 1	autonom	
+51	6	Relay burner 2 ON	autonom	
+52	7	Relay burner 2 OFF	autonom	
+53	8	Relay boiler circuit pump	autonom	
+54	15	Relay DHW charging pump	autonom	
+55	9	Relay mix-heating circuit pump 1	autonom	
+56	10	Relay mixing valve 1 OPEN	autonom	
+57	11	Relay mixing valve 1 CLOSE	autonom	
+58	24	PWM1 output		
+59	23	PWM2 output		
+5A	44	Relay mix-heating circuit pump 2	autonom	
+5b	42	Relay mixing valve 2 OPEN	autonom	¦DHW OPEN ¦
+5c	41	Relay mixing valve 2 CLOSE	autonom	¦DHW CLOSE¦

Outputs that are allocated to heating circuits:

Par.	○K Terminal:		Key:	*2-point* - / +	*3-point* - / +
+65	9 ▥	MK pump		off / on	off / on
+66	10 ▥	Mixing valve OPEN		off / on ¦	off / on ¦
+67	11 ▥	Mixing valve CLOSE		blocked ¦	on / off ¦

Outputs that are allocated to heat generator:

Par.	○ K Terminal:		Key:	Burner 2-step - / +	Burner modulating - / +	BrA with RZM530A - / +	District heating - / +
+70	14	Burner 1		off / on	off / on		
+71	6	Burner 2 on/OPEN		¦ off / on ¦	¦ off / on ¦		¦ off / on ¦
	7	Burner 2 off/CLOSE		¦ on / off ¦			
+72	7	Burner 2 off/CLOSE			¦ on / off ¦		¦ off / on ¦
+73	8	Boiler circuit pump KK		off / on	off / on	off / on	
+75	9	Mix-circuit pump MK1		off / on	off / on		
+76	10	Mixing valve 1 OPEN		¦ off / on ¦	¦ off / on ¦		
+77	11	Mixing valve 1 CLOSE		¦ on / off ¦	¦ on / off ¦		
+78	24	PWM1					

BrA=Gas module for burner

Outputs that are allocated to DHW:
WWel: Electrical charging released   WWZ: Circulation pump released

Par.	○ K Terminal:		Key:	Par.116= 1,2,3,11,12 - / +	13,14,15,17 - / +	16 - / +
+80	(10)	DHW mixer 1 OPEN			¦ off / on ¦	¦ off / on ¦
+81	(11)	DHW mixer 1 CLOSE			¦ off / on ¦	¦ off / on ¦
+82	6	DHW mixer 2 OPEN		Wwel	WWel	¦ off / on ¦
+83	7	DHW mixer 2 CLOSE		WWZ	WWZ	¦ off / on ¦
+84	15	DHW pump		off / on	(off / on)	WWZ
+85	10	DHW mixer pump		(off / on)	off / on	off / on

Auxiliary inputs
They're indicated by the weekday cursors as long as they're active (connected to GND).

Weekday:	1	2	3	4	5	6	7
▲=active	▲	▲	▲	▲	▲	▲	▲
Terminal:	35	34	33	32	31	3	4
Designation:	Ext.1	Ext.2	Bag	Bww	Bres	Bh1	Bh2
Function "digital":	Ext.1	Ext.2	Ext.3	WW-Th	Ext.5	Bh1	Bh2
+52 digital inputs:	Ext.2.1	Ext.2.2	Ext.2.3	Ext.2.4			
+59 digital inputs:	Ext.9.1	Ext.9.2	Ext.9.3	Ext.9.4			
RZM515A:	Ext.1	Ext.2				WW-Th	WWel

Choose application:

○ Nº	**+90**	**x**	: Select application register	
	+90	**x**	: Select number of desired application	

A list of all applications and the detailed information are available.
Application "0" to reset all counters!

○ 🔧   **+90**   **x** : Press key 🔧 for 5 seconds

All controllers are delivered with Par.+90=1!

Resetting controller to application main parameters:
○ Nº   **+90**   **x** : Select application register, check number of desired application
○ 🔧   **+90**   **x** : Press key 🔧 for 5 seconds, setup controller with application parameters

Controller type:
○ Nº   **+98**   **383** : Display controller type (353A or 383A)

9   Abbreviations

Ba	; Ta	: Outdoor temperature sensor	; Outdoor temperature (weather)
Bag	; Tag	: Flue gas temperature sensor	; Flue gas temperature
Bh1		: Input running hours burner step 1	
Bh2		: Input running hours burner step 2	
Bk	; Tk	: Boiler temperature sensor	; Boiler temperature
Br	; Tr	: Room temperature sensor	; Room temperature
BrA		: Gas module for burner	
Bres	; Tres	: Reserve temperature sensor	; Reserve temperature
Brü	; Trü	: Return temperature sensor	; Return temperature
Bv	; Tv	: Flow temperature sensor	; Flow temperature
Bww	; Tww	: DHW temperature sensor	; DHW temperature
dTr		: Deviation of the room temperature from setpoint	
D-Bus		: Device bus	
Ext.		: External	
Ez		: Influence of the room temperature to the controlling system	
GebArt		: Construction of the building heavy, medium, light	
GND		: Ground, reference potential for low voltage connections	
HK	; HKP	: Heating circuit	; Heating circuit pump
KK	; KKP	: Direct heating circuit	; Direct heating circuit pump
L		: Phase (230VAC)	
MK	; MKP	: Mixer circuit	; Mixer circuit pump
M-HK		: Mix-heating circuit	
N		: Neutral wire (230VAC)	
OM		: Opto-coupling module	
PWM		: Output (pulse width modulation)	
RFB		: Remote control unit (with or without room temperature sensor)	
RM		: Relay module (external relay connected to output PWM)	
RZM510A		: Heating circuit module connected to D-bus	
RZM530A		: Boiler cascade module connected to D-bus	
S		: Slope standardized (fixed point of heating characteristics)	
S_akt		: Actual slope	
SD		: Switching difference	
SD1	; SD2	: Switching difference stage 1	; Stage 2
SDWW		: Switching difference DHW	
standby		: Main function off, safety functions on	
SW		: Software	
Taausl		: Outdoor temperature at design point	
Taged		: Outdoor temperature attenuated	
Tageb		: Building specific mean outdoor temperature	
Tanl_f		: Frost point temperature of installation	
Tkmax	; Tkmin	: Maximum boiler temperature	; Minimum boiler temperature
Tksoll		: Boiler temperature, setpoint	
Tksoll_unbegr		: Unlimited boiler temperature setpoint	
Tk_Th		: Boiler temperature setpoint for DHW charge with thermostat control	
TN		: Integral phase (PID controller)	
TV		: Differential phase (PID controller)	
Tvausl		: Flow temperature in the design point	
Trümin		: Minimum return temperature	
Trsoll		: Room temperature, setpoint	
Tvmax	; Tvmin	: Maximum flow temperature	; Minimum flow temperature
Tvsoll		: Flow temperature setpoint	
Twwsoll		: DHW temperature setpoint	
Twwüb		: Raising of the DHW temperature	
t_verz		: Wait time	
WW		: DHW	
WWel		: DHW charge by electrical device	
WWP		: DHW pump (DHW charging pump)	
WW-Th		: DHW thermostat	

10   Protocol: Setpoints, time switch program, …

Control unit	**Type: RDO**		**SW-Version:**	
Program switch				
Plant hydraulics			▥	⌁
	⌑:			
	▧			
	⌁			
	▧			
	▥			
	▧			
Function aux. input	1:	2:	3:	4:
	5:	6:	7:	8:
Function input Bh	1:		2:	
Date/Name				

Heat generator 1		
Plant hydraulics	⌑:	
	▧	
Date/Name		

Boiler cascade module 2	**Type: RZM530A**	**SW-Version:**
Plant hydraulics	⌑:	
	▧	
Function aux. input	1:	2:
Function input Bh	1:	2:
Date/Name		

Boiler cascade module 3	**Type: RZM530A**	**SW-Version:**
Plant hydraulics	⌑:	
	▧	
Function aux. input	1:	2:
Function input Bh	1:	2:
Date/Name		

Boiler cascade module 4	**Type: RZM530A**	**SW-Version:**
Plant hydraulics	⌑:	
	▧	
Function aux. input	1:	2:
Function input Bh	1:	2:
Date/Name		

DHW 1 in RDO   ⏰ 🚰 **symbol 1** 🚰 **lit**

		☼:	):	☼:	leg:
DHW-setpoint		☼:	):	☼:	leg:
Plant hydraulics		🚰:			
		✖:			
Aux. input		1:	2:	WW-Th:	WWel:
Weekday	on ☼	off) ☼	on ☼	off) ☼	on ☼	off) ☼
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

DHW circuit 2   **Type: RZM515A**   ⏰ 🚰 **symbol 2** 🚰 **lit**

		☼:	):	☼:	leg:
DHW-setpoint		☼:	):	☼:	leg:
Plant hydraulics		🚰:			
		✖:			
Aux. input		1:	2:	WW-Th:	WWel:
Weekday	on ☼	off) ☼	on ☼	off) ☼	on ☼	off) ☼
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

DHW circuit 3   **Type: RZM515A**   ⏰ 🚰 **symbol 3** 🚰 **lit**

		☼:	):	☼:	leg:
DHW-setpoint		☼:	):	☼:	leg:
Plant hydraulics		🚰:			
		✖:			
Aux. input		1:	2:	WW-Th:	WWel:
Weekday	on ☼	off) ☼	on ☼	off) ☼	on ☼	off) ☼
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

DHW circuit 4   **Type: RZM515A**   ⏰ 🚰 **symbol 4** 🚰 **lit**

		☼:	):	☼:	leg:
DHW-setpoint		☼:	):	☼:	leg:
Plant hydraulics		🚰:			
		✖:			
Aux. input		1:	2:	WW-Th:	WWel:
Weekday	on ☼	off) ☼	on ☼	off) ☼	on ☼	off) ☼
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Free clock channel   ⊕ 🚰 **symbol 9 lit**

Weekday	on ☼	off ☽ ❄	on ☼	off ☽ ❄	on ☼	off ☽ ❄
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Heating circuit 1   ⊕ ▥ **symbol ▥ 1 lit**

Room setpoint	❄:		☽:		☼:	
Remote control unit						
Plant hydraulics	▥					
Aux. input	1:				2:	
Weekday	on ☼	off ☽ ❄	on ☼	off ☽ ❄	on ☼	off ☽ ❄
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Heating circuit 2   ⊕ ▥ **symbol ▥ 2 lit**

Room setpoint	❄:		☽:		☼:	
Remote control unit						
Plant hydraulics	▥					
Aux. input	1:				2:	
Weekday	on ☼	off ☽ ❄	on ☼	off ☽ ❄	on ☼	off ☽ ❄
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Heating circuit 3   ⊕ ▥ **symbol ▥ 3 lit**

Room setpoint	❄:		☽:		☼:	
Remote control unit						
Plant hydraulics	▥					
Aux. input	1:				2:	
Weekday	on ☼	off ☽ ❄	on ☼	off ☽ ❄	on ☼	off ☽ ❄
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Heating circuit 4   🕐 ▥ **symbol** ▥ **4 lit**

		☼:		☽:		☼:	
Room setpoint		☼:		☽:		☼:	
Remote control unit							
Plant hydraulics		▥					
Aux. input		1:			2:		
Weekday	on ☼	off ☽ ☼	on ☼	off ☽ ☼	on ☼	off ☽ ☼
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							

Heating circuit 5   🕐 ▥ **symbol** ▥ **5 lit**

		☼:		☽:		☼:	
Room setpoint		☼:		☽:		☼:	
Remote control unit							
Plant hydraulics		▥					
Aux. input		1:			2:		
Weekday	on ☼	off ☽ ☼	on ☼	off ☽ ☼	on ☼	off ☽ ☼
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							

Heating circuit 6   🕐 ▥ **symbol** ▥ **6 lit**

		☼:		☽:		☼:	
Room setpoint		☼:		☽:		☼:	
Remote control unit							
Plant hydraulics		▥					
Aux. input		1:			2:		
Weekday	on ☼	off ☽ ☼	on ☼	off ☽ ☼	on ☼	off ☽ ☼
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							

Heating circuit 7   🕐 ▥ **symbol** ▥ **7 lit**

		☼:		☽:		☼:	
Room setpoint		☼:		☽:		☼:	
Remote control unit							
Plant hydraulics		▥					
Aux. input		1:			2:		
Weekday	on ☼	off ☽ ☼	on ☼	off ☽ ☼	on ☼	off ☽ ☼
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							

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Your representation:
Your installer: