Instruction manual of the control equipment

SIEMENS

C L I M A T I X 2

Program version: 2014-01-17
Benekov 04.00

CONTENTS

1. INTRODUCTION

This instruction manual is intended for users and service technicians of the BENEKOV boilers that are equipped with the CLIMATIX 2 control unit from SIEMENS. The manual describes all factors affecting the essential functions of the boilers, which are installed either separately or in a cascade. It is necessary to become thoroughly familiar with these instructions before putting the boilers into operation. Since this manual is a supplementation of the boiler documentation, it is necessary – in addition to the instructions included in this manual – to follow the operating instructions and the installation manual of the boiler, as well.
Incorrect parameter settings may result in incorrect operation of the boiler and dangerous situations. When the boiler is put into operation, the service technician is obliged to make sure that the boiler with the control unit works properly with the default values.
The manufacturer assumes no responsibility for the damage resulting from failure to observe this manual!

1.1. TERMINOLOGY AND ABBREVIATIONS

In this instruction manual of the CLIMATIX 2 control unit the following terminology and abbreviations are used:

Source A separate boiler or a cascade of 4 boilers at the maximum
Buffer storage tank (hereafter “BST”)

Appliance Heating circuit 1 (hereafter “HC1”)
Heating circuit 2 (hereafter “HC2”)
Hot water heating (hereafter “DHW heating”)
External input

1.2. NUMBER OF HEATING CIRCUITS IN A CASCADE

The following table defines possible applications of the individual appliances according to the number of boilers in a cascade:

					In all
Cascade of 2 boilers	Boiler 1 (Master)	HC1	HC2		**4 x HC 1 x DHW**
	Boiler 2	HC1	HC2	DHW	
Cascade of 3 boilers	Boiler 1 (Master)	HC1	HC2		**6 x HC 2 x DHW**
	Boiler 2	HC1	HC2	DHW	
	Boiler 3	HC1	HC2	DHW	
Cascade of 4 boilers	Boiler 1 (Master)	HC1	HC2		**8 x HC 3 x DHW**
	Boiler 2	HC1	HC2	DHW	
	Boiler 3	HC1	HC2	DHW	
	Boiler 4	HC1	HC2	DHW	

- DHW heater cannot be connected to Boiler 1 (Master).
- If a buffer storage tank is used in the system instead of a hydraulic equalizer of dynamic pressures (HEDP – torus), only the pump HC2 can be used as HC2.
- Boilers 2 to 4 can have two mixing HCs and HDW heating.
- Hydraulic diagram of boilers connection to a cascade – see chap. 11.4.

2. DESCRIPTION OF BUTTONS ON THE CONTROL PANEL

Button	Description
A	This button is used to quickly return to the basic display or to the functions **Quick access** - see chap. 6.15.
B	The button ALARM is used to display alarms, and the history of errors.
C	This button is used to return to the superordinate menu (ESC).
D	This button is used to move the cursor to the line above or to select higher values when the boiler parameters are set. If the button is held for a longer time, the change of setting values speeds up.
E	This button is used to move the cursor to the line below or to select lower values when the boiler parameters are set. If the button is held for a longer time, the change of setting values speeds up.
F	This button is used to confirm the modifications of the line, or to confirm the changed values (ENTER).

3. STRUCTURE OF MENUS

This chapter contains texts of the basic display, the user menu and the service menu depicted in the tree structure.

IMPORTANT NOTICE: Some lines are displayed after entering the service password or the factory password. The extent of the display is also dependent on the selected equipment of the boiler and the heating system (see chap. 7.1. Configuration), which is defined by the service technician before putting the boiler into operation.

The symbol ► on the right edge of the line enables the immediate access to the submenu by pressing button F (ENTER).

3.1. BASIC DISPLAY

Basic display of the CLIMATIX 2 control equipment is arranged in rows as follows:

- BENEKOVterm s.r.o.
- Date, Identification of the boiler (only if it is a cascade), Real time
- Boiler mode (OFF / ON)
- State of boiler (Put out of operation / Operation / Reduce from temperature / External reduce / External OFF / Feeding / Ignition / Emptying / Calibration)
- Actual power (after clicking on button F it is possible to set the fan power):
  - Fan settings
    - 30% Wood pellets
    - 100% Wood pellets
    - 30% Brown coal
    - 100% Brown coal
    - 30% Other fuel
    - 100% Other fuel
- Fuel feeding (after clicking on button F it is possible to set the feeding time):
  - Feeder rate
  - Feeding time
  - Delay time
    - 100% Wood pellets
    - 30% Wood pellets
    - 100% Brown coal
    - 30% Brown coal
    - 100% Other fuel
    - 30% Other fuel
- B9 Outside temperature
  After entering the **service password** (see chap. 5.24.) it is possible to set:
  - Time constant building
  - Time constant summer/winter
  - Simulation outside temperature
  - Actual state of building
    - Modified outside temperature
    - Attenuated outside temperature
- B10 Cascade sensor
- B2 Boiler temperature (after clicking on button F it is possible to display or set):
  - Actual required temperature
  - Minimum boiler temperature
  - Maximum boiler temperature
  - Hysteresis ON boiler
  - Hysteresis OFF boiler
  - Excess heat draw
  - External input
- B7 Return temperature (after clicking on button F it is possible to set):
  - Required return temperature

- B7 Return temperature
- Return valve

After entering **the service password** (see chap. 5.24.) at a certain configuration it is possible to set:

- Return compensation

➢ B8 Flue gas temperature

➢ O2 concentration

- Required O2 minimum power
- Required O2 maximum power
- O2 influence
- State of O2 sensor

After entering **the service password** (see chap. 5.24.) it is possible to set:

- O2 calibration
- State of calibration
- O2 sensor heating
- Heating-up of O2 sensor

After entering **the factory password** (see chap. 5.24.) it is possible to set:

- Delete message
- Sensor power supply (0,0V)
- Power supply save
- PCB temperature
- O2 operating hours

➢ B4 Top buffer (after clicking on button F it is possible to set):

- Minimum buffer temperature
- Hysteresis ON B4
- Hysteresis OFF B41
- Boost buffer
- Minimum charging temperature B41
- Buffer full charge
- Actual limits of buffer
  - Top buffer B4 ON boiler
  - Bottom buffer B41 OFF boiler

➢ B41 Bottom buffer

➢ B1 Flow HC1

➢ A6 Room HC1 (after clicking on button F it is possible to set):

- Frost protection HC1
- Reduce HC1
- Comfort HC1
- Room influence
- Room differential
- Hysteresis
- Quick setback
- Boost heating
- HC1 RU

➢ B12 Flow HC2

➢ A7 Room HC2 (after clicking on button F it is possible to set):

- Frost protection HC2
- Reduce HC2
- Comfort HC2
- Room influence

- Room differential
- Hysteresis
- Quick setback
- Boost heating
- HC2 RU

➢ B3 DHW (after clicking on button F it is possible to set):
- DHW regulation
- TSP DHW
  - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- Comfort DHW
- Reduce DHW

After entering **the service password** (see chap. 5.24.) it is possible to set:
- Overheating limit
- Switch differential
- Source boost
- DHW priority (No / Absolute)

➢ Fuel
- Wood pellets
- Brown coal
- Other fuel

➢ User menu - see chap. 3.2.
➢ Service menu - see chap. 3.3.
➢ Password enter
➢ Application name

3.2. STRUCTURE OF THE USER MENU

The user menu of the CLIMATIX 2 control equipment is arranged as follows:

➢ Manual control (after clicking on button F it is possible to set):
- Feeding manually
- Feeding time manually
- Fan manually
- Fan On time
- Fan power manually
- Blowing-through

➢ Reduce (after clicking on button F it is possible to set):
- Feeding time
- Delay time
- Fan power
- Fan overrun time

After entering **the service password** (see chap. 5.24.) it is possible to set:
- Minimum flue gas temperature
- Differential B2 B8 reduce
- Error delay number cycles
- Delay time of ignition after reduce
- Differential B8 B2 operation
- Hysteresis differential B8 B2 operation

- Delay of loss of flame
- Low boiler temperature
- Delay from low boiler temperature

➢ Deasher (after clicking on button F it is possible to set):
- Number of feeding
- Actual number of feeding (only informative message, cannot be set)
- Time of deashing

➢ Heating circuit 1 (after clicking on button F it is possible to set):
- Heating circuit 1 (Auto/Frost protection/Reduce/Comfort)
- TSP HC1
  - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- ECO HC 1
  - Summer/winter limit
  - HC1 limit comfort
  - HC1 limit reduce
  - Summer/winter switch
- Room parameters HC1
  - Frost protection HC1
  - Reduce HC1
  - Comfort HC1
  - Room influence
  - Room differential
  - Hysteresis
  - Quick setback
  - Boost heating
  - HC1 RU
- Heating curve HC1
  - Outside temperature B9 - point 1
  - Initial flow temperature B1 - point 1
  - Outside temperature B9 - point 2
  - Initial flow temperature B1 - point 2
  - Curve exponent

  After entering **the service password** (see chap. 5.24.) it is possible to set:
  - Minimum required temperature B1
  - Maximum required temperature B1
  - Boost source

After entering **the service password** (see chap. 5.24.) it is possible to set:
- Pump HC1
  - Frost protection
  - HC1 overrun time
- H1 HC1 room thermostat
  - Polarity of contact

➢ Heating circuit 2 (after clicking on button F it is possible to set):
- heating circuit 2 (Auto/Frost protection/Reduce/Comfort)
- TSP HC2
  - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- ECO HC2
  - Summer/winter limit
  - HC2 limit comfort
  - HC2 limit reduce
  - Summer/winter switch

- Room parameters HC2
  - Frost protection HC2
  - Reduce HC2
  - Comfort HC2
  - Room influence
  - Room differential
  - Hysteresis
  - Quick setback
  - Boost heating
  - HC2 RU
- Heating curve HC2
  - Outside temperature B9 - point 1
  - Initial flow temperature B12 - point 1
  - Outside temperature B9 - point 2
  - Initial flow temperature B12 - point 2
  - Curve exponent

  After entering **the service password** (see chap. 5.24.) it is possible to set:
  - Minimum required temperature B12
  - Maximum required temperature B12
  - Boost source

After entering **the service password** (see chap. 5.24.) it is possible to set:

- Pump HC2
  - Frost protection
  - HC2 overrun time
- H3 HC2 room thermostat
  - Polarity of contact

➢ State of binary inputs (clicking on button F displays only information about the state of inputs):
- External input
- Safety thermostat
- Backfire sensor
- Boiler hopper lid
- H1 HC1 room thermostat
- H3 HC2 room thermostat

➢ State of binary outputs (clicking on button F displays only information about the state of outputs):
- Feeder 1
- Feeder 2
- Deasher
- Ignition
- Flue gas outlet
- Flue damper
- Boiler pump
- HC1 pump
- HC2 pump
- DHW pump

➢ State of analog inputs (clicking on button F displays only information about the state of inputs):
- B9 Outside temperature
- B2 Boiler temperature
- B7 Return temperature

- B8 Flue gas temperature
- O2 concentration
- B4 Top buffer
- B41 Bottom buffer
- B1 Flow HC1
- B12 Flow HC2
- A6 Room HC1
- A7 Room HC2
- B3 DHW
- B10 Cascade sensor

➢ State of analog outputs (clicking on button F displays only information about the state of outputs):
- Fan
- Return valve
- Valve HC1
- Valve HC2

➢ Diagnostics of cascade (if it is used - clicking on button F displays only information about the state):
- B10 Cascade sensor
- ON cascade
- OFF cascade
- Cascade power
- Absolute cascade power
- K1 diagnostics
- Demand (demand active/no demand)
- K2 diagnostics
- Demand (demand active/no demand)
- K3 diagnostics
- Demand (demand active/no demand)
- K4 diagnostics
- Demand (demand active/no demand)
- Sequencing priority
- Actual sequencing
- Actual time
- Sequencing period
- Time to change cascade priority

➢ Diagnostics of source (clicking on button F displays only information about the state):
- Diagnostics of boiler
  - State of boiler
  - Actual required temperature
  - Temperature boiler ON
  - Temperature boiler OFF
- Diagnostics of buffer
  - Buffer
  - Top buffer B4 boiler ON
  - Bottom buffer B41 boiler OFF
- Demands from users
  - HC1 demand
  - HC2 demand
  - DHW demand

- External input

➢ Diagnostics of appliance (clicking on button F displays only information about the state):
- Heating circuit 1
  - Operating mode
  - Mode
  - Cause
  - State of room
  - B1 Flow HC1 (required temperature – measured temperature)
  - A6 Room HC1 (required temperature – measured temperature)
  - HC1 correction room
  - Room thermostat H1 HC1
  - Pump HC1
  - Valve HC1
- Heating circuit 2
  - Operating mode
  - Mode
  - Cause
  - State of room
  - B12 Flow HC2 (required temperature – measured temperature)
  - A7 Room HC2 (required temperature – measured temperature)
  - HC2 correction room
  - Room thermostat H3 HC2
  - Pump HC2
  - Valve HC2
- DHW
  - Operating mode
  - Mode
  - Cause
  - DHW demand (required temperature – measured temperature)
  - DHW pump
- External input
- HZ 1 demand
- HZ 2 demand
- B9 Outside temperature
- Modified outside temperature
- Attenuated outside temperature

➢ Diagnostics of controller (clicking on button F displays only information about the state):
- Version
  - Program version
  - Info about application
- Save/load
  - Set application default

  After entering **the service password** (see chap. 5.24.) it is even possible to set:
  - Save custom setting
  - Restore custom setting
- Restart counter
- Internal temperature

After entering **the service password** (see chap. 5.24.) it is possible to discover:
- Operating hours
- MSR started up

➢ Date and time

3.3. STRUCTURE OF THE SERVICE MENU

It is possible to enter the service menu after entering **the service password** (see chap. 5.24.).

The service menu of the CLIMATIX 2 control equipment is arranged as follows:

- Configuration (after clicking on button F it is necessary to define the entire hydraulic system):
  - Cascade
  - SMS server
  - Oxygen sensor
  - Ignition
  - Emptying
  - Flue damper
  - Influence of appliance on return temperature
  - Buffer
  - DHW
  - Heating circuit HC1
  - A6 Room HC1
  - Heating circuit HC2
  - A7 Room HC2
  - External input
  - Substitute operation
  - B9 Outside sensor
  - Save configuration
  - Autosave in:
- Cascade (after clicking on button F it is possible to define parameters of the cascade):
  - Differential ON B10
  - Differential OFF B10
  - Maximum cascade temperature
  - Minimum cascade temperature
  - Release integral
  - Run up time
  - Reverse integral
  - Restart after blackout
  - Boost lead boiler
  - Boost lag boiler
  - Boiler sequence
  - Boiler sequencing period
  - Minimum ON time of a boiler
  - Minimum OFF time of a boiler
  - Delay of boiler hopper lid
  - Boiler operating hours
    - Operating hours boiler 1
    - Operating hours boiler 2
    - Operating hours boiler 3
    - Operating hours boiler 4

- State of communication between boilers
  - Communication boiler 2
  - Communication boiler 3
  - Communication boiler 4

After entering **the factory password** (see chap. 5.24.) it is possible to discover:

- Lock signal
- PID cascade
  - Cascade P factor -10
  - Cascade P factor 0
  - Cascade P factor +10
  - Cascade I factor

➢ Input output test (after clicking on button F it is possible to check the operation manually):

- Fans
  - Fan
  - Flue gas outlet
- Engines
  - Feeder 1
  - Feeder 2
  - Deasher
- Pumps
  - Boiler pump
  - HC1 pump
  - HC2 pump
  - DHW pump
- Valves
  - Return valve
  - Valve HC1
  - Valve HC1
- Ignition
  - Ignition

➢ Boiler pump (after clicking on button F it is possible to set):

- Switch ON temperature
- Differential OFF
- Pump overrun time
- Frost protection

➢ Ignition (after clicking on button F it is possible to set):

- First feeding
- Second feeding
- Ignition time
- Differential flue gas - water
- Flue gas differential
- Boost flue gas temperature
- Fan during ignition
- Fan delay time
- Ignition repetition

➢ Flue gas outlet (after clicking on button F it is possible to set):

- Flue gas limitation
- Operating mode
  - Ignition
  - Ignition + Operation
- Overrun time of flue gas outlet

- Parameters for backfire (after clicking on button F it is possible to set):
  - Feeding time
  - Delay time
  - Protection time
  - Intervention period
- Substitute operation (after clicking on button F it is possible to set):
  - Including boiler OFF
  - Switch ON delay
  - Substitute operation
- Sensor calibration (after clicking on button F it is possible to set):
  - B9 Outside temperature
  - A6 Room HC1
  - A7 Room HC2
- Language (after clicking on button F it is possible to set languages):
  - Czech / English / Spanish / German / Russian
- Operating hours
- IP configuration (after clicking on button F it is possible to use this data for Internet connection)
  - DHCP
  - Actual IP
  - Actual mask
  - Actual gateway
  - Given IP
  - Given mask
  - Given gateway
  - 100MB
  - Name
  - MAC
  - Link
  - User name ADMIN
  - Password SBTAdmin!
  - FTP user name ADMIN
  - FTP password SBTAdmin!
  - After modification of values restart is required

After entering **the factory password** (see chap. 5.24.) it is possible to enter other instances of the service menu:

- PID boiler
  - Boiler P factor
  - Boiler I factor
- PID valves
  - Return valve P factor
  - Return valve I factor
  - HC1 P factor
  - HC1 I factor
  - HC2 P factor
  - HC2 I factor
- Password handling
  - 1. level (service password)
  - 3. level (factory password)

4. PARAMETERS SETTINGS

Under normal circumstances the text on the display is light-colored on a dark background. The place, at which the cursor points, is displayed reversely.

In the dialog box, where the selection of certain functions is made (ON/OFF, Yes/No, etc.), the symbol of a hook on the left side of the line indicates which function is active at the moment.

When a parameter or a function is set, it is necessary:

- to connect the boiler to the electrical power network (230V/50Hz)
- to use button “D” (up-arrow) or “E” (down-arrow) to search the selected parameter.
- to confirm that we want to set this parameter with button "F" (Enter)
- to use button “D” (up-arrow) or “E” (down-arrow) to set the required parameter value or to select the required function in the dialog box (ON/OFF, Yes/No, etc.)
- to confirm it with button ENTER

If a power failure occurs (230V/50Hz), all values of the control equipment remain preserved. That means that after power recovery the boiler can continue in automatic operation.

5. DESCRIPTION OF THE BASIC DISPLAY

5.1. DATE

The date is displayed in “DD. MM. YY.” format. The correct date setting is primarily used for the back specification of the failure reported by the control equipment.
The instructions for setting the date can be found on the last line of the user menu – see chap. 6.14.

5.2. BOILER IDENTIFICATION

The boiler identification appears only if the boilers are connected in a cascade. It defines whether it is **Boiler 1**, **Boiler 2**, **Boiler 3** or **Boiler 4**.

5.3. REAL TIME

The real time is displayed in “h:min:s” format. The correct real time setting is primarily used for the back specification of the failures reported by the control equipment.
The instructions for setting the real time can be found on the last line of the user menu – see chap.

6.14.

5.4. BOILER MODE

The state of boiler indicates whether the boiler is in operation or not (**ON/OFF**). The instructions for the boiler mode setting can be found in chapter 4.

5.5. STATE OF BOILER

State of boiler indicates the operating state of the boiler at the moment. State of boiler is also reflected in the color or blinking light of the indicator on button “A”. The possibilities are:

State of boiler	***Color of the indicator on button "A"***
Out of operation	---
Operation	Green ON
Reduce from temperature	Green blinking
External reduce	Green blinking
External OFF	---
Feeding	Yellow ON
Ignition	Yellow - green blinking
Emptying	Yellow blinking
Calibration	Red blinking

A red light of the indicator on button “A” indicates a failure.

5.6. ACTUAL POWER

Based on the difference between the actual required and the real value of the DHW temperature in the boiler, the control equipment enables the modulation (continuous change) of the heat output of the boiler. The actual power is shown as a percentage and reflects the heat output of the boiler at the moment.

After clicking on the line **Actual power** it is possible to set fan parameters.

The **Fan settings** parameter defines the fan speed during automatic operation; it states the values for different fuels when the boiler power is 30 % and 100 %. The value of 30% represents the lower

limit of a possible modulation of the boiler. If the value is below this lower limit the boiler gets into reduce. The value of 100% represents maximum (rated) power, which the boiler cannot exceed.

It is recommended to define the **Fan settings** parameter as follows:

Fuel	Boiler power	~ 15 kW	~ 25 kW	~ 49 kW	~ 99 kW
WOOD PELLETS	30 %	30 %	20 %	22 %	21 %
	100 %	60 %	38 %	85 %	47 %
BROWN COAL	30 %	25 %	30 %	33 %	35 %
	100 %	55 %	70 %	95 %	57 %

If a fuel with different properties is used (calorific value, moisture, apparent density, etc.), it is necessary to correct the fan speed in due proportion.
The values of the **Fan settings** are ranging from 20 to 100 %; the default values for wood pellets and brown coal are c. 25 kW.
The instructions for changing these parameters can be found in chapter 4.

5.7. FUEL FEEDING

It displays actual values of the feeding time and the delay time of the feeder. The first value (feeding time) is constant when the boiler is in operation. The other value (instantaneous delay time) is automatically recalculated by the controller according to the instantaneous value of the actual power of the boiler and - if an oxygen sensor is connected - according to the amount of oxygen in flue gas.

After clicking on the line **Fuel feeding** it is possible to set feeding parameters:

- The **Feeder rate** parameter determines how long the drive of feeder 2 works (a turnstile or a feeder from a fuel storage tank) compared to the drive of feeder 1 (a feeder into the boiler).
The parameter setting is ranging from 20 – 100 %; the default value is 100 %. In this case the feeding time of feeder 2 is the same as the feeding time of feeder 1.
The instructions for changing this parameter can be found in chapter 4.

- The **Feeding time** parameter determines how long feeder 1 works within one cycle of feeding.
The parameter setting is ranging from 2 – 15 s; the default value is 5 sec. This value can be changed only after entering the service password (see chap. 5.24.). Even if the boiler power is modulated, the setting of the **Feeding time** parameter does not change.

- The **Delay time** parameter determines how long feeder 1 is OFF within one cycle of feeding. The values of **Delay time** for different fuels (when power is either 30 % or 100 %) are presented in the **Delay settings** table.

For **Feeding time = 5 sec** it is recommended to set the values of **Delay time** as follows:

Fuel	Boiler power	~ 15 kW	~ 25 kW	~ 49 kW	~ 99 kW

WOOD PELLETS	30 %	112 sec	75 sec	41 sec	70 sec
	100 %	37 sec	18 sec	9 sec	17 sec
BROWN COAL	30 %	145 sec	90 sec	54 sec	120 sec
	100 %	50 sec	30 sec	13 sec	30 sec

If a fuel with different properties is used (calorific value, moisture, apparent density, etc.), it is necessary to correct the delay time in due proportion.
The general rule is – the longer delay time (feeder OFF), the lower boiler power.

The setting of **Delay time** is ranging from 5 – 200 s; the default values for wood pellets and brown coal are c. 25 kW.
The instructions for changing these parameters can be found in chapter 4.

5.8. B9 OUTSIDE TEMPERATURE

Outside temperature shows the instantaneous value of the outside temperature.

After entering the service password (see chap. 5.24.) and clicking on the line **B9 Outside temperature** it is possible to enter the menu concerning the building model.

According to the ability of the building to collect and storage heat (technical equipment of the building) the room temperature changes in a number of ways, if the outside temperature fluctuates.

The **Time constant building** parameter influences the reaction speed of the required run up temperature (B1 for HC1, B12 for HC2) according to the fluctuating outside temperature (B9).

Time constant building	Reaction speed
> 20 h	The room temperature reacts slowly to the varying outside temperature.
10 – 20 h	This setting can be used for most of the buildings.
< 10 h	The room temperature reacts fast to the varying outside temperature.

This parameter setting is ranging from 0 – 50 h; the default value is 10 h.
The instructions for changing this parameter can be found in chapter 4.
The **Time constant summer/winter** parameter influences the speed of the summer-winter heating switchover.
This parameter setting is ranging from 0 – 120 h; the default value is 72 h.
The instructions for changing this parameter can be found in chapter 4.

The line **Simulation outside temperature** checks whether the weather-compensated function works properly. After setting certain outside temperature the simulation shows how all the sources and appliances would work at that particular temperature.

This deviation from the automatic mode of the control equipment is indicated with a blinking red light on button “B” - see chap. 2.
The simulation setting is ranging from -50 to +50 °C; the default value is **Auto** (*****).
The instructions for changing this parameter can be found in chapter 4.

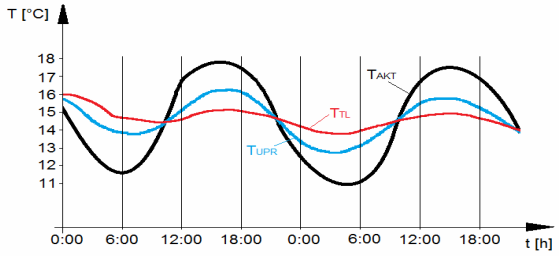
WARNING!!! After checking the functionality it is necessary to switch the simulation to the automatic mode again (symbol of stars). The red light on the indicator on button “B” - see chap. 2 - also stops blinking.

5.8.1. INFLUENCE OF THE OUTSIDE TEMPERATURE ON REGULATION

Actual outside temperature is relevant to the activation of the “Frost protection” mode.

Modified outside temperature is influenced by the **Time constant building** parameter. It is relevant to the regulation of the flow temperature (B1 or B12) and to the daily heating limit, which influences when the heating turns OFF – see chap. 6.4.3.

Attenuated outside temperature is influenced by the **Time constant summer/winter** parameter. It is relevant to the summer-winter mode switchover – see chap. 6.4.3.



T_{AKT} – Actual outside temperature
T_{UPR} – Modified outside temperature
T_{TL} – Attenuated outside temperature

5.9. B10 CASCADE SENSOR

The line **B10 Cascade sensor** specifies the instantaneous value of the heated water temperature behind the hydraulic equalizer of dynamic pressures (HEDP – torus) or the temperature of water flowing from the buffer storage tank.
This sensor is compulsory if the configuration is Cascade - YES and it is connected to the control equipment of boiler 1 “Master” instead of the sensor B3 DHW.

5.10. B2 BOILER TEMPERATURE

Boiler temperature specifies the instantaneous value of heated water temperature at the boiler outlet.

After clicking on the line **B2 Boiler temperature** it is possible to enter the menu concerning the boiler temperature:

Actual required temperature shows the water temperature, at which the boiler wants to heat heated water at the moment.

Minimum boiler temperature is the lowest temperature, at which the boiler which is in operation can heat heated water, regardless of the demands of individual appliances.
The parameter setting is ranging from 65°C to the setting value of the **Maximum boiler temperature**; the default value is 65°C.
The instructions for changing this parameter can be found in chapter 4.

Maximum boiler temperature is the highest temperature, at which the boiler which is in operation can heat heated water, regardless of the demands of individual appliances.
This parameter setting is ranging from the setting value of the **Minimum boiler temperature** to 85°C; the default value is 80°C.
The instructions for changing this parameter can be found in chapter 4.

Hysteresis ON boiler is a decrease in heated water temperature compared to the **Actual required temperature** parameter, after which the boiler is put back into operation to heat heated water.
The parameter setting is ranging from 0 – 10°C; the default value is 1°C.
The instructions for changing this parameter can be found in chapter 4.

Hysteresis OFF boiler is an increase in heated water temperature compared to the **Actual required temperature** parameter, after which the boiler is put out of operation.
The parameter setting is ranging from 1 – 10°C; the default value is 3°C.
The instructions for changing this parameter can be found in chapter 4.

Excess heat draw defines the temperature, at which the forced draw of excess heat starts.
The parameter setting is ranging from 80 – 95°C; the default value is 90°C.
The instructions for changing this parameter can be found in chapter 4.

External input defines the setting boiler output temperature B2 if the external input is active.
The activation source of external input can be any binary contact (pool thermostat, room thermostat, DHW storage tank thermostat, etc.)
It is another appliance in addition to the weather-compensated HC1, HC2, DHW.
The parameter setting is ranging from **Minimum boiler temperature** to **Maximum boiler temperature**; the default value is 65°C.
The instructions for changing this parameter can be found in chapter 4.

5.11. B7 RETURN TEMPERATURE

Return temperature specifies the instantaneous value of water temperature at the boiler inlet. It determines the degree of mixing valve opening Y7 in the primary boiler circuit (if the mixing valve is a part of the heating system and if it is controlled by the control equipment.

After clicking on the line **B7 Return temperature** it is possible to enter the menu concerning the return valve:

Required return temperature determines the return temperature that the mixing valve Y7 in the primary circuit tries to maintain when the boiler is in operation. This parameter can be set only after entering the service password (see chap. 5.24.).
The parameter setting is ranging from 53 - 65°C; the default value is 55°C.
The instructions for changing this parameter can be found in chapter 4.

B7 Return temperature shows the instantaneous value of the return temperature.
Return valve determines the percentage of heat that the mixing valve Y7 draws off from the primary circuit into the heating system at the moment.

After entering the service password (see chap. 5.24.) and after the configuration selection **Cascade – NO** and **Buffer - NO** (see chap. 7.1.) it is possible to set the **Return compensation** parameter**,** which is related to the function “Influence of appliance on return temperature” – see chap. 7.1. It is an increase in return temperature compared to the **Required return temperature** parameter, at which the ‘Influence of appliance on return temperature’ function activates.
The parameter setting is ranging from 1 – 15°C; the default value is 2°C.
The instructions for changing this parameter can be found in chapter 4.

5.12. B8 FLUE GAS TEMPERATURE

B8 Flue gas temperature specifies the instantaneous value of the flue gas temperature at the chimney inlet. It also determines when the automatic ignition is put into operation.

Automatic boilers BENEKOV should be operated in such a way that the flue gas temperature is ranging from 100 to 200°C according to the instantaneous boiler power.

If the flue gas temperature is lower than 100°C over a long period of time, there is a high risk of condensation of flue gases in the boiler and chimney, resulting in increased corrosion of the boiler body and other metal parts of the flue ways including the chimney.

That is why the boiler must not be oversized when compared to the heated room and why it is not recommended to operate the boilers at very low power. In BENEKOV R, BENEKOV C and BENEKOV S boilers high flue gas temperatures can be achieved by opening the flue damper.

If the flue gas temperature is higher than 200°C, the boiler operation is uneconomical and the effectiveness is reduced. This may be caused by overheating the boiler, clogging the boiler body (with fly ash, soot or coal tar) or by unnecessary opening of the flue damper.
Further information – see chap. 7.6. Flue gas outlet.

5.13. O2 CONCENTRATION

The oxygen sensor - so-called lambda sensor - is an additional attachment to the boiler, which measures the amount of oxygen in flue gas. Based on this information, the control equipment

automatically optimizes the combustion process. According to the boiler type the oxygen sensor may be a part of the basic or optional equipment.

O2 concentration shows the instantaneous value of the amount of oxygen in flue gas at the chimney inlet.

After clicking on the line **O2 concentration** it is possible to enter the menu where the following parameters can be set:

The **Required O2 minimum power** parameter defines the amount of oxygen in flue gas that is optimal if the boiler power is minimal.
The parameter setting is ranging from 5 – 13 %; the default value is 11 %.
The instructions for changing this parameter can be found in chapter 4.

The **Required O2 maximum power** parameter defines the amount of oxygen in flue gas that is optimal if the boiler power is maximal (rated).
The parameter setting is ranging from 5 – 13 %; the default value is 8 %.
The instructions for changing this parameter can be found in chapter 4.

The **O2 influence** parameter determines the influence of the instantaneous value of oxygen in flue gas on the combustion process. If the value of 0 % is set, the amount of oxygen in flue gas is measured but does not regulate the combustion process.
The parameter setting is ranging from 0 – 70 %; the default value is 25 %.
The instructions for changing this parameter can be found in chapter 4.

The line **State of O2 sensor** (OFF/Run up/OK) displays the instantaneous state of operation of the oxygen sensor.

After entering the service password (see chap. 5.24) it is possible:

The **O2 calibration** selection (OFF/First calibration/Standard calibration) performs calibration of the oxygen sensor.

WARNING!!! Calibration can be performed ONLY IF the oxygen sensor is in clean air, i.e. 20.9% O_2. It means that the furnace is completely extinct and the boiler door is open. The control equipment is connected to the electric power network.

The line **State of calibration** (OFF/Progress/Completed) signalizes the actual state of calibration process.

The line **O2 sensor heating** (Auto/OFF/ON/Standby) selects the operating mode of the oxygen sensor.

The value **Heating-up of O2 sensor** is the time (max. 240 s) that is necessary for heating up the oxygen sensor from room temperature to its operating temperature.

After entering the factory password (see chap. 5.24) it is possible:

The line **Delete message** concerns power supply failures. It is possible to reset the sensor and to try to put it back into operation. If the attempt is unsuccessful it is necessary to replace the sensor.

The line **Sensor power supply (0,0V)** (4.0V/4.2V/4.35V/4.5V) is selected according to the type of

the used sensor. The standard value is 4.5 V. The figure in brackets in the middle of the line informs about the actual value of the sensor voltage.

The line **Power supply save** (OFF/ON). If the actual power supply of the sensor is lower than 4.3V, it is necessary to perform the power supply save. If the power supply of the sensor is still lower than 4.3 V, it is necessary to check the connection and the dimensions of the cables.

The line **PCB temperature** informs about the actual converter temperature of the oxygen sensor. The temperature must be lower than 85°C otherwise the control equipment indicates an error message.

The line **O2 operating hours** informs about the operating time of the oxygen sensor. If it is necessary (e.g. after replacing the sensor with a new one), the figure can be zeroed after clicking on the line.

5.14. B4 TOP BUFFER

B4 Top buffer displays the instantaneous value of the water temperature in the upper part of the buffer storage tank.

After clicking on the line **B4 Top buffer** it is possible to enter the menu concerning the buffer storage tank:

The **Minimum buffer temperature** parameter defines the lower limit of temperature and if the temperature falls below this limit the appliances turn off (heating circuits, DHW heating, etc.).
The parameter setting is ranging from 25 – 55°C; the default value is 35°C.
The instructions for changing this parameter can be found in chapter 4.

Hysteresis ON B4 is a decrease in heated water temperature in the upper part of the buffer storage tank compared to the **Actual required temperature** parameter, after which the boiler is put back into operation to heat heated water.
The parameter setting is ranging from 0 – 15°C; the default value is 5°C.
The instructions for changing this parameter can be found in chapter 4.

Hysteresis OFF B41 is an increase in water temperature in the bottom of the storage tank compared to the **Actual required temperature** parameter, after which the boiler is put out of operation.
The parameter setting is ranging from -10 to 15°C; the default value is 0°C.
The instructions for changing this parameter can be found in chapter 4.

Example: Actual required temperature is 66 °C, Hysteresis ON B4 is set to 5°C, Hysteresis OFF B41 is set to 2°C.
The boiler is put into operation if the temperature in the upper part of the buffer storage tank falls to a temperature 61°C (66-5=61).
The boiler if put out of operation if the temperature in the bottom of the buffer storage tank rises to 68°C (66+2=68).

Boost buffer determines the increase in water temperature B2 compared to the required temperature B4 that is necessary to charge the buffer storage tank.
The parameter setting is ranging from 0 – 10K; the default value is 2K.

The instructions for changing this parameter can be found in chapter 4.

The **Minimum charging temperature B41** parameter ensures that the buffer storage tank will always be charged at this minimum temperature even if the demands of the appliances are lower than this parameter.
The parameter setting is ranging from 25 – 80°C; the default value is 60°C.
The instructions for changing this parameter can be found in chapter 4.

Example: Minimum charging temperature is 65°C, the demand of the heating circuits is only 40 °C. Nevertheless, the buffer storage tank will be charged at the temperature 65 °C.

The selection **Buffer full charge – ON** enables the buffer storage tank to be fully charged even if the demands of the appliances deactivate during charging.
The selection **Buffer full charge – OFF** stops charging of the buffer storage tank and the boiler operation immediately after the loss of the demands of the appliances.

Actual limits of buffer display the instantaneous temperatures at which the charging of the buffer storage tank turns ON/OFF.

5.15. B41 BOTTOM BUFFER

B41 Bottom buffer displays the instantaneous value of the water temperature in the bottom of the buffer storage tank.

5.16. B1 FLOW HC1

B1 Flow HC1 displays the instantaneous value of the water temperature at the heating circuit 1 inlet.

5.17. A6 ROOM HC1

A6 Room HC1 displays the instantaneous value of the air temperature in the reference room of the heating circuit 1.

After clicking on the line **A6 Room HC1** it is possible to directly enter the menu concerning the room parameters of the heating circuit 1 – see chap. 6.4.

5.18. B12 FLOW HC2

B12 Flow HC2 displays the instantaneous value of the water temperature at the heating circuit 2 inlet.

5.19. A7 ROOM HC2

A7 Room HC2 displays the instantaneous value of the air temperature in the reference room of the heating circuit 2.

After clicking on the line **A7 Room HC2** it is possible to enter directly the menu concerning the room parameters of the heating circuit 2 – see chap. 6.5.

5.20. B3 DHW

B3 DHW displays the instantaneous value of the water temperature in the DHW storage tank.

After clicking on the line **B3 DHW** it is possible to enter directly the menu concerning the DHW parameters:

The **DHW regulation** parameter determines whether the mode of the DHW heating will be **Auto** according to the TSP DHW or whether only **Frost protection** of the DHW storage tank should be active.
The default value is **Auto**.
The instructions for changing this parameter can be found in chapter 4.

After clicking on the line **TSP DHW** it is possible to enter the menu where the timetable of the required DHW temperature for all week days can be set (comfort or reduce). It is possible to set up to 6 entries within 24 hours. Between midnight and the first entry of the following day the mode is always “reduce”.

The **Comfort DHW** parameter defines the temperature at which the DHW storage tank is heated at the time when the mode set in the TSP DHW is “comfort”.
The parameter setting is ranging from 30 – 65°C; the default value is 55°C.
The instructions for changing this parameter can be found in chapter 4.

The **Reduce DHW** parameter defines the temperature at which the DHW storage tank is heated at the time when the mode set in the TSP DHW is “reduce”.
The parameter setting is ranging from 30 – 65°C; the default value is 40°C.
The instructions for changing this parameter can be found in chapter 4.

After entering **the service password** (see chap. 5.24.) it is possible to set:

The **Overheating limit** parameter defines the temperature at which the alarm “Overheating DHW storage tank” activates.
The parameter setting is ranging from 65 – 80°C; the default value is 80°C.
The instructions for changing this parameter can be found in chapter 4.

The **Switch differential** parameter is an increase in the DHW storage tank temperature compared to the parameter **Comfort DHW** or **Reduce DHW** (according to the values set in the **TSP DHW** menu), after which the DHW pump is put back into operation to heat the DHW storage tank.
The parameter setting is ranging from 0 – 20°C; the default value is 5°C.

The instructions for changing this parameter can be found in chapter 4.

The **Boost source** parameter is an increase in the required water temperature compared to the parameter **Comfort DHW** or **Reduce DHW** (according to the values set in the **TSP DHW** menu), which ensures that the DHW storage tank is heated at the required temperature.
The parameter setting is ranging from 3 – 15°C; the default value is 10°C.
The instructions for changing this parameter can be found in chapter 4.

DHW priority (No/Absolute/Shifting) defines the order in which the DHW storage tank is heated compared to the rating circuits.
If the mode **No** is selected, heating of the DHW storage tank is in parallel with heating of the heating circuits. This selection is recommended by the manufacturer.
If the mode **Absolute** is selected, heating of the DHW storage tank takes precedence over heating of the heating circuits.
The default value is **No**.
If the mode **Shifting** is selected, heating is reduced only if the boiler power is insufficient for the demand of all the appliances.
The instructions for changing this parameter can be found in chapter 4.

WARNING!!! If the boilers are connected in a cascade it is not possible to use the B3 sensor in the controlling boiler 1 (“Master“) for DHW heating. This input is used for the cascade sensor B10. DHW can be heated in other boilers of the cascade (boiler 2, boiler 3, and boiler 4).

5.21. FUEL

It displays the selected fuel type for combustion (**Wood pellets/Brown coal/Other fuel**). Based on this selection, the control equipment determines the fuel feeding speed and the fan power according to the default values – see chap. 5.6. and 5.7.

5.22. USER MENU

After clicking on this line it is possible to enter the user menu; no password is required.

5.23. SERVICE MENU

After entering **the service password (**see chap. 5.24.) it is possible to enter the service menu.

5.24. PASSWORD ENTER

After entering **the service password** it is possible to enter the service menu and to modify all

service parameter of the program. This mode is indicated by a pictogram of a “key” in the upper right corner of the display. After 10 min. without pressing any button on the control panel the program “locks” again.

After entering **the factory password** it is possible to modify the system parameters, PID (boiler, valves, and cascade) or the password. This mode is indicated by a pictogram of three “keys” in the upper right corner of the display. After 10 min. without pressing any button on the control panel the program “locks” again.

5.25. APPLICATION NAME

This line enables the user to name the application (boiler installation). It is used primarily for identification when sending SMS messages and for remote visualization over the Internet.
As **Application name** it is recommended to use 12 characters at the maximum (it is possible to use letters without diacritics and numbers).
To end and save the setting is it necessary to use the symbol #.

6. DESCRIPTION OF THE USER MENU

6.1. MANUAL CONTROL

Feeder and fan manual control is used primarily during ignition (it is not necessary if the functions of automatic feeding and emptying during ignition are activated in the **Configuration** - see chap. 7.1.), when the fuel must be transported from the storage tank to the burner.

The **Feeding manually** parameter puts the fuel feeder into continuous operation; the exact time for the feeder to operate is set in **Feeding time manually**.
The parameter setting of **Feeding time manually** is ranging from 0 – 10 min; the default value is 4 min.
The instructions for changing both parameters can be found in chapter 4.

The **Fan manually** parameter puts the combustion air fan into continuous operation; the exact time for the combustion air fan to operate is set in **Fan on time**.
The parameter setting of **Fan on time** is ranging from 0 – 30 min; the default value is 10 min.
The fan speed when it is in the manual operation mode is set in **Fan power manually**.
The parameter setting of **Fan power manually** is ranging from 20 – 100 %; the default value is 30 %.
The instructions for changing all three parameters can be found in chapter 4.

The function **Blowing-through** is used during cleaning the boiler after removing the grate, when it is necessary to clean (blow) the air way between the fan and the grate. Activation of this function puts the combustion air fan into continuous operation and the fan power is set to the maximum. If the operator does not turn it off, the function **Blowing-through** automatically deactivates after 1 min.

6.2. REDUCE

Reduce is the economical boiler operation when only the minimal amount of fuel is fed into the furnace and the cycles are **Feeding time during reduce** and **Delay time during reduce**. This prevents the boiler from dying out and prevents the fuel in the storage tank from backfire. The fan operation is reduced only at the time when the feeder is on.

There are two ways to put the boiler into reduce operation:

A) Reduce from temperature - if the instantaneous value of **Boiler temperature** exceeds the **Actual required temperature** by the value of the temperature hysteresis set in **Hysteresis OFF boiler** (see chap. 5.10.).

B) External reduce - if the room thermostat or the external input is undone. This does not happen if the function **Ignition – YES**, **Emptying – YES is activated** in the configuration (see chap. 7.1.).

The parameter setting of **Feeding time during reduce** is ranging from 2 – 15 s; the default value is 5 s.
The instructions for changing this parameter can be found in chapter 4.

The parameter setting of **Delay time during reduce** is ranging from 1 – 60 min; the default value is 5 min, which is the recommended value if wood pellets are used. If brown coal is used, it is recommended to change this value to 30 min.
The instructions for changing this parameter can be found in chapter 4.

The fan speed at the feeding time during reduce is set in **Fan power**.
The parameter setting of **Fan power** is ranging from 20 – 100 %; the default value is 40 %.
The instructions for changing this parameter can be found in chapter 4.

Turning off of the fan after the feeding time during reduce is delayed and it is set in **Fan overrun time**.
The parameter setting of **Fan overrun time** is ranging from 0 – 300 sec; the default value is 30 sec.
The instructions for changing this parameter can be found in chapter 4.

6.2.1. FLAME CONTROL

This function controls the furnace (flame) according to the difference between **B8 Flue gas temperature** and **B2 Boiler temperature**. The furnace is controlled primarily during these operation states of the boiler:

- reduce during configuration **Ignition – YES**
- reduce during configuration I**gnition – NO**
- operation during configuration **Ignition – NO**

After entering the service password (see chap. 5.24.) it is possible to set these parameters:

The **Minimum flue gas temperature** means that if the temperature is lower than this limit, the boiler is put out of operation and the error mode “Low flue gas temperature B8” is activated.

The parameter setting is ranging from 0 – 190°C; the default value is 35°C.
The instructions for changing this parameter can be found in chapter 4.

The **Differential B2 B8 reduce** parameter determines the maximal difference (in Kelvin) between the boiler temperature B2 during reduce and the flue gas temperature B8. The setting 25 K means that the difference between the flue gas temperature during reduce and the boiler temperature can be 25 K at the maximum, otherwise the error mode “Loss of flame – reduce“ is activated.
The parameter setting is ranging from -30 to 60 K; the default value is 25 K.
The instructions for changing this parameter can be found in chapter 4.

The **Error delay number cycles** parameter determines how many cycles of feeding during reduce must pass before the error mode “Loss of flame – reduce” is activated. It is determined according to the difference between the boiler temperature B2 and the flue gas temperature B8 (see the **Differential B2 B8 reduce** parameter).
The parameter setting is ranging from 0 – 20 cycles; the default value is 3 cycles.
The instructions for changing this parameter can be found in chapter 4.

The **Delay time of ignition after reduce** parameter determines how long the temperature conditions for ignition are ignored after the switchover from reduce to operation and determines the time which is necessary for the boiler to begin to burn. If this time passes and the conditions for the boiler operation are not met, the automatic ignition is activated.
This parameter can be found only in the configuration **Ignition – YES**.
The parameter setting is ranging from 0 - 600 s; the default value is 280 s.
The instructions for changing this parameter can be found in chapter 4.

The **Differential B8 B2 operation** parameter determines the minimal difference (in Kelvin) between the flue gas temperature B8 and the boiler temperature B2 in operation. The setting 1 K means that the flue gas temperature B8 in operation must be by 1 K higher than the boiler temperature, otherwise the error mode “Loss of flame - operation” is activated.
This parameter can be found only in the configuration **Ignition – NO**.
The parameter setting is ranging from -10 to 30 K; the default value is 1 K.
The instructions for changing this parameter can be found in chapter 4.

The **Hysteresis differential B8 B2 operation** parameter determines when the acceptable operation state of the boiler is re-evaluated.
In order to deactivate the error mode “Loss of flame – operation“, the flue gas temperature must be higher than **Differential B8 B2 operation** + **Hysteresis differential B8 B2 operation**.
This parameter can be found only in the configuration **Ignition – NO**.
The parameter setting is ranging from 1 - 30 K; the default value is 1 K.
The instructions for changing this parameter can be found in chapter 4.

The **Delay of loss of flame** parameter determines how long the flue gas temperature B8 can be beyond permitted limits compared to the boiler temperature B2, without activation of the error mode “Loss of flame – operation“.
This parameter can be found only in the configuration **Ignition – NO**.
The parameter setting is ranging from 0 – 800 s; the default value is 400 s.
The instructions for changing this parameter can be found in chapter 4.

If for any reasons (e.g. a lack of fuel in the storage tank) the boiler temperature falls below the limit **Low boiler temperature** for the duration of **Delay**, the boiler is put out of operation and reports a failure. During the first 30 min. of ignition this condition does not apply.

This parameter can be found only in the configuration **Ignition – NO**.

The parameter setting of **Low boiler temperature** is ranging from 10 – 55 °C; the default value is 30 °C.
The instructions for changing this parameter can be found in chapter 4.

The parameter setting of **Delay** is ranging from 0 – 120 min; the default value is 60 min.
The instructions for changing this parameter can be found in chapter 4.

6.3. DEASHER

If any additional attachment of the boiler is used (e.g. a deasher, a rotary grate, an additive feeder, etc.), which is put into operation at regular intervals, it is possible to control this additional attachment by the binary output DEASHER.

The **Number of feeding** parameter determines how often the additional attachment is put into operation. The **Time of deashing** parameter determines how long the additional attachment is in operation.
The values of **Actual number of feeding** are monitored, i.e. how many times the fuel feeder turns on. If the number reaches the value set in the **Number of feeding** parameter, the additional attachment is put back into operation for the duration of **Time of deashing**. **Actual number of feeding** is at the same time automatically zeroed and the counting starts again.

The parameter setting of **Number of feeding** is ranging from 1 – 400x; the default value is 40x.
The instructions for changing this parameter can be found in chapter 4.

The parameter setting of **Time of deashing** is ranging from 5 – 120 s; the default value is 15 s.
The instructions for changing this parameter can be found in chapter 4.

6.4. HEATING CIRCUIT 1

All parameters related to the heating circuit 1 control can be set here.

6.4.1. HEATING CIRCUIT 1

The **Heating circuit 1** parameter determines whether the mode of the heating circuit 1 control will be:

- **Auto** – HC1 is controlled according to the TSP HC1
- **Frost protection** – the constant internal temperature in the reference room is held as set in **Frost protection**
- **Reduce** – the constant internal temperature in the reference room is held as set in **Reduce**
- **Comfort** – the constant internal temperature in the reference room is held as set in **Comfort**
- The default value is **Auto**.

The instructions for changing this parameter can be found in chapter 4.

6.4.2. TSP HC1

After clicking on the line **TSP HC1** it is possible to enter the menu where the TSP of the required temperature of the room HC1 can be set (comfort or reduce) for all week days. It is possible to set up to 6 entries within 24 hours. Between midnight and the first entry of the following day the mode is always “reduce”.

6.4.3. ECO HC1

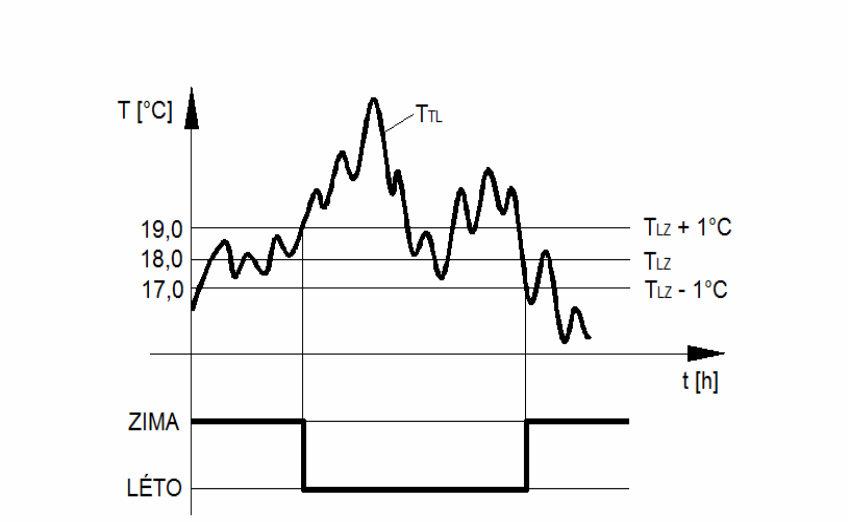
After clicking on the line **ECO HC1** it is possible to enter the menu where the ECO mode parameters of the weather-compensated circuit can be set according to the development of the outside temperature. The ECO functions are locked if the selection is constantly set as “comfort”.

A) SUMMER/WINTER switchover

The **Summer/winter limit** defines the summer/ winter temperature (see chap. 5.8.1.), which represents the limit for the summer-winter mode switchover.
When the setting is changed, these periods are either shortened or lengthened:

Increase in value:	Earlier switchover to the winter mode.
	Later switchover to the summer mode.
Decrease in value:	Later switchover to the winter mode.
	Earlier switchover to the summer mode.

The parameter setting is ranging from 5 – 30°C; the default value is 18°C.
The instructions for changing this parameter can be found in chapter 4.



T_{TL} – Attenuated outside temperature
T_{LZ} – Summer/winter limit

B) Daily limit

Daily limit turns on or off the heating according to the development of the outside temperature in

the course of the day. This function is active primarily during the transition periods such as spring or autumn. It prevents the immediate reactions of the system to the outside temperature fluctuation.

The **HC1 limit comfort** parameter defines the modified outside temperature (see chap. 5.8.1.) that represents the limit for granting the permission to heat in the mode **Comfort.**
The parameter setting is ranging from 5 – 30°C; the default value is 18°C.
The instructions for changing this parameter can be found in chapter 4.

The **HC1 limit reduce** parameter defines the modified outside temperature (see chap. 5.8.1.) that represents the limit for granting the permission to heat in the mode **Reduce**.
The parameter setting is ranging from 2 – 30°C; the default value is 17°C.
The instructions for changing this parameter can be found in chapter 4.

C) Summer/winter switch

If the user does not want the system to automatically switch to the summer mode according to the development of the outside temperature, s/he can define the “summer” and “winter” modes manually.

6.4.4. ROOM PARAMETERS HC1

After clicking on the line **Room parameters HC1** it is possible to enter the menu where all parameters related to the internal temperatures of the room HC1 can be set, which are monitored by the room temperature sensor (e.g. room unit A6 - SIEMENS POL 822.70).

The **Frost protection HC1** parameter defines the internal temperature at which the reference room HC1 is heated at the time when according to the TSP HC1 the mode “frost protection” is active.
The parameter setting is ranging from 4 – 19°C; the default value is 10°C.
The instructions for changing this parameter can be found in chapter 4.

The **Reduce HC1** parameter defines the internal temperature at which the reference room HC1 is heated at the time when according to the TSP HC1 the mode “reduce” is active.
The parameter setting is ranging from 10 – 21°C; the default value is 19°C.
The instructions for changing this parameter can be found in chapter 4.

The **Comfort HC1** parameter defines the internal temperature at which the reference room HC1 is heated at the time when according to the TSP HC1 the mode “comfort” is active.
The parameter setting is ranging from 19 – 35°C; the default value is 21°C.
The instructions for changing this parameter can be found in chapter 4.

The **Room influence** parameter defines the influence of the room HC1 temperature (expressed as a percentage) at the expense of the outside temperature B9 on reaching the required temperature for heating and for heating shutdown in the reference room HC1.

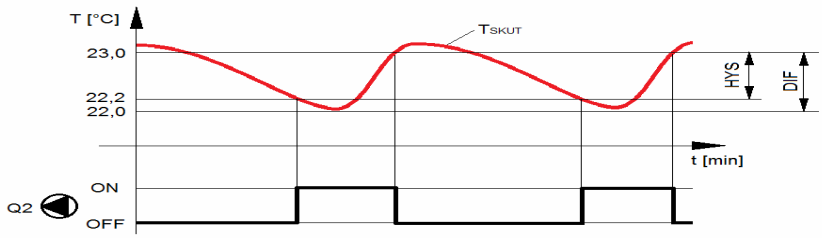
Room influence	Control mode
0 %	Only weather-compensated control.
1 – 99 %	Weather-compensated control and room influence.
100 %	Only room control, the outside temperature B9 is not taken into account.

The parameter setting is ranging from 0 – 100%; the default value is 20%.
The instructions for changing this parameter can be found in chapter 4.

The **Room differential** parameter determines when the weather-compensated heating is put out of operation according to the moment when the required temperature in the reference room HC1 is exceeded.
The parameter setting is ranging from 0 – 5°C; the default value is 1°C.
The instructions for changing this parameter can be found in chapter 4.

The **Hysteresis** parameter is related to the **Room differential** parameter. It determines when the weather-compensated heating is put back into operation according to the required temperature in the reference room HC1.
The parameter setting is ranging from 0 – 5°C; the default value is 0.5°C.
The instructions for changing this parameter can be found in chapter 4.

Example: *- The **Comfort HC1** parameter is 22°C*
*- The **Room differential** parameter is 1°C*
*- The **Hysteresis** parameter is 0.8°C*
The heating turns off if the temperature in the reference room is 23°C (22+1=23).
The heating turns on again if the temperature in the reference room falls to 22.2°C (22+1-0.8=22.2).

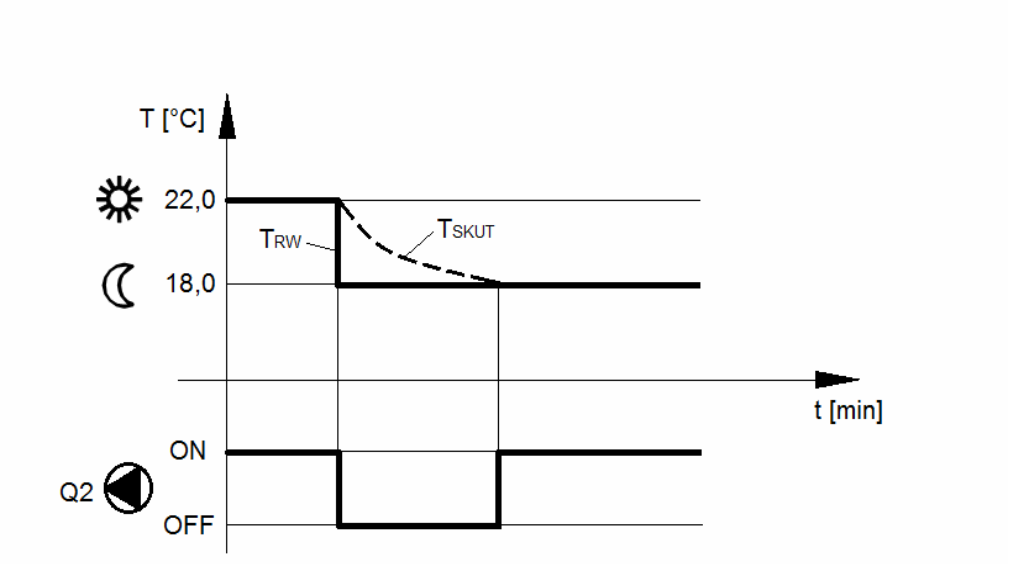


T_{SKUT} - Real temperature in the reference room
DIF - Room differential
HYS - Hysteresis
Q2 - Pump HC1

The function **Quick setback** offers selections **OFF** and **ON**.
The selection **OFF** causes an increase in the heating curve according to the set parameters of the required room temperatures during the transition to the mode “reduce”. However, the room is still tempered. (It concerns the operation of the weather-compensated circuit without the installed room temperature sensor.)
The selection **ON** causes that during the transition to the mode “reduce” the pump Q2 of the heating circuit 1 turns off (if it is a mixing circuit) and the mixing valve Y1 is closed.

a) Function with the room temperature sensor – heating is off till the room temperature falls to the required temperature of the mode “reduce”. Then the pump Q2 of the heating circuit 1 is activated and the mixing valve is opened – see picture below.
b) Function without the room temperature sensor – the quick setback turns off heating for a certain period of time that depends on the outside temperature and the time constant of the

building.
The default value is **OFF**. The instructions for changing this parameter can be found in chapter 4.



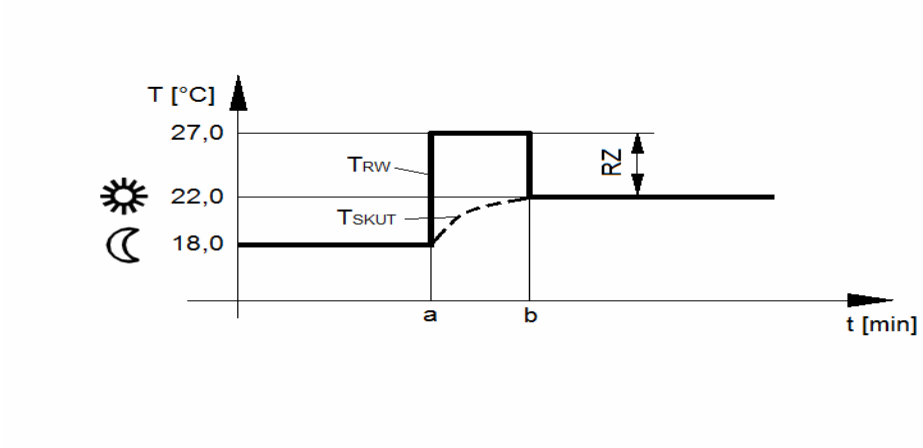
T_{SKUT} - Real temperature in the reference room
T_{RW} - Required temperature in the reference room

The function **Boost heating** enables to reach the new required temperature in the reference room faster when the required temperature during the reduce mode is switched to the required temperature during the comfort mode. During boost heating the required temperature is increased by the **Boost heating** value. Increase of this value leads to the shorter time of heating to the required temperature, decreasing leads to the longer time. The function **Boost heating** is active till the required temperature during comfort mode is reached.

The parameter setting is ranging from 0 – 10°C; the default value is 5°C.
The instructions for changing this parameter can be found in chapter 4.

Example: - *The **Reduce HC1** parameter is 18°C*
- *The **Comfort HC1** parameter is 22°C*
- *The **Boost heating** parameter is 5 K*

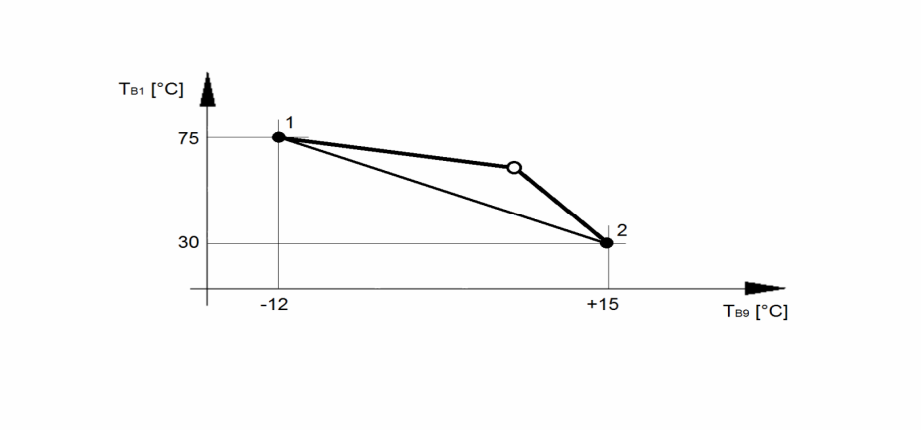
During the switch from the "reduce" to the "comfort" temperature in the reference room the required temperature will be 27°C (22+5=27) from the moment "a" to the moment "b", then it returns to the temperature 22°C.



T_{SKUT} - Real time in the reference room
T_{RW} - Required temperature in the reference room
RZ - Boost heating

After entering the service password (see chap. 5.24.) the function **Room unit** (Released/Locked) is displayed. It enables to lock the controlling buttons on the appliance POL822.70. It is used when the room unit is located in public space, such as schools, hospitals, etc.

6.4.5. HEATING CURVE HC1



T_{B9} – Outside temperature
T_{B1} – Flow temperature

After clicking on the line **Heating curve HC1** it is possible to enter the menu where all parameters concerning the weather-compensated curve HC1 can be set. It defines two limits of the outside temperature (**Outside temperature B9 - point 1** and **Outside temperature B9 - point 2**), to which the required temperature of the heated water at the HC1 inlet is assigned (**Initial flow temperature B1 - point 1** and **Initial flow temperature B1 - point 2**).
The parameter setting of the **Outside temperature B9 - point 1** is ranging from -50 to +10°C; the default value is -12°C.
The parameter setting of the **Initial flow temperature B1 - point 1** is ranging from 25 to 85°C; the default value is 75°C.
The parameter setting of the **Outside temperature B9 - point 2** is ranging from 5 to 30°C; the default value is 15°C.
The parameter setting of the **Initial flow temperature B1 - point 2** is ranging from 25 to 85°C; the default value is 30°C.
The instructions for changing this parameter can be found in chapter 4.

The parameter **Curve exponent** sets the curvature of the weather-compensated curve according to the used system of heating (radiator, floor, or convector). This parameter takes the nonlinear transfer of heat into account. The following table summarizes the values for commonly used heating systems:

Heat transfer through:	Recommended value of the curve exponent
Floor heating	1.05 – 1.1
Panel radiator	1.26 – 1.33

Radiators according to DIN 4703	1.3
Heating convectors	1.25 – 1.45

The parameter setting is ranging from 1 – 2; the default value is 1.3.
The instructions for changing this parameter can be found in chapter 4.

After entering the service password (see chap. 5.24) it is possible to set:

The **Minimum required temperature B1** parameter defines the minimal value of the required temperature of the heated water at the HC1 inlet.
The parameter setting is ranging from 20 – 40°C; the default value is 20°C.
The instructions for changing this parameter can be found in chapter 4.

The **Maximum required temperature B1** parameter defines the maximal value of the required temperature of the heated water at the HC1 inlet.
The parameter setting is ranging from 40 – 85°C; the default value is 80°C.
The instructions for changing this parameter can be found in chapter 4.

The **Boost source** parameter sets an increase in the required temperature of the heated water of a source (boiler) compared to the instantaneous value of the required temperature of the heated water at the HC1 inlet.
The parameter setting is ranging from 0 – 20 °C; the default value is 5 °C.
The instructions for changing this parameter can be found in chapter 4.

6.4.6. PUMP HC1

After clicking on the line **Pump HC1** it is possible to enter the menu where all parameters concerning the pump HC1 can be set:

The **Frost protection** parameter activates or deactivates the operation of the pump HC1 at low temperatures.
The instructions for changing this parameter can be found in chapter 4.

The **HC1 overrun time** parameter defines the delay of switching off the pump HC1 when the demands on heating the heating circuit 1 are met.
The parameter setting is ranging from 0 – 1200s; the default value is 120s.
The instructions for changing this parameter can be found in chapter 4.

6.4.7. ROOM THERMOSTAT H1 HC1

After clicking on the line **Room thermostat H1 HC1** it is possible to enter the menu where the polarity (the operating logic) of external contact H1 can be set. The default value is **Operating**; i.e. if the contact of the room thermostat is closed, the heating is switched to the “frost protection” mode.

The selection **Idle** is the reversed operating logic; i.e. if the contact of the room thermostat is opened, the heating is switched to the "frost protection" mode. This selection is more common in practice. It is set when the standard room thermostat (e.g. SIEMENS REV24DC or cordless SIEMENS REV24RFDC/SET) is used and when closing the contact means "heating".

If HC1 is not configured and the heating system should be controlled by the room thermostat, it is necessary to set **External input - YES** in the configuration (see chap. 7.1.) and to connect the room thermostat with the **External input** pins (see chap.5.10.).

6.5. HEATING CIRCUIT 2

The heating circuit 2 control is analogous to the heating circuit 1 control – see chap. 6.4.

Only the identification marks are different:

- Mixing valve HC2 is marked as Y5 (not Y1)
- Pump HC2 is marked as Q6 (not Q2)
- Flow temperature HC2 sensor is marked as B12 (not B1)
- Room temperature HC2 sensor is marked as A7 (not A6)
- Room thermostat HC2 is marked as H3 (not H1)

6.6. STATE OF BINARY INPUTS

The user can comprehensively check the operating states of all the binary inputs at the moment.

It includes these appliances:

- External input ON/OFF
- Safety thermostat OK/Error
- Backfire sensor OK/ Error
- Boiler hopper lid OK/ Error
- Room thermostat H1 HC1 Active/Passive
- Room thermostat H3 HC2 Active/Passive

6.7. STATE OF BINARY OUTPUTS

The user can comprehensively check the operating states of all the binary outputs at the moment.

It includes these appliances:

- Feeder 1 ON/OFF
- Feeder 2 ON/OFF
- Deasher ON/OFF
- Ignition ON/OFF
- Flue gas outlet ON/OFF
- Boiler pump ON/OFF
- Pump HC1 ON/OFF

- Pump HC2 ON/OFF
- DHW pump ON/OFF

6.8. STATE OF ANALOG INPUTS

The user can comprehensively check the values that are monitored by all the analog inputs at the moment.

It includes these values:

- B9 Outside temperature °C
- B2 Boiler temperature °C
- B7 Return temperature °C
- B8 Flue gas temperature °C
- O2 concentration %
- B4 Top buffer °C
- B41 Bottom buffer °C
- B1 Flow HC1 °C
- B12 Flow HC2 °C
- A6 Room HC1 °C
- A7 Room HC2 °C
- B3 DHW °C
- B10 Cascade sensor °C

6.9. STATE OF ANALOG OUTPUTS

The user can comprehensively check the values that are transmitted to the analog outputs at the moment.

It includes these values:

- Fan %
- Return valve %
- Valve HC1 %
- Valve HC2 %

6.10. DIAGNOSTICS OF CASCADE

This file includes all information about the cascade.

The line **B10 Cascade sensor** provides information about the difference between the required and the real temperature of the cascade B10.

The line **ON cascade** defines the limit when the boilers in the cascade are activated based on the value of the temperature B10.

The line **OFF cascade** defines the limit when the boilers in the cascade are deactivated based on the value of the temperature B10.

The line **Cascade power** defines the actual state of the required cascade power. It can range from 0 to 100% and the number of the boilers in the cascade can vary.

The line **Absolute cascade power** defines the absolute required power expressed as a percentage. Its range depends on the actual number of boilers in the cascade, e.g. if 2 boilers are in the cascade, the range is 0 to 200%; if 4 boilers are in the cascade, the range is 0 to 400%.

The line **K1 diagnostics** informs about the actual state of boiler K1 in the cascade. Its power, state (Released/Not released/Put out of operation/Out of service).

The line **Demand active** states whether the appliances' demand (of heating circuits and of DHW) is active or inactive in the respective boiler K1.

K2 diagnostics, **K3 diagnostics**, **K4 diagnostics** – see **K1 diagnostics**.
The line **Sequencing priority** informs about the principles of boilers sequencing in the cascade. The mode **Auto** means that the switching is automatic according to the operating hours. If a specific boiler is displayed, it means that it is permanently placed as the first one in the cascade.

The line **Actual sequencing** states which of the boilers is placed as the first one at the moment.

The line **Actual time** states how much time has passed since the last sequencing switched in the cascade.

The line **Sequencing period** informs about the required interval of the sequencing change in the cascade.

The line **Time to change cascade priority** informs about the time when the sequencing in the cascade changes.

6.11. DIAGNOSTICS OF SOURCE

This file includes all information about the source, i.e. about the boiler and the buffer storage tank.

After clicking on the line **Diagnostics of boiler** it is possible to enter the site where all basic information about the boiler operation is summarized:

- State of boiler — Out of operation / Operation / Reduce from temperature / External reduce / etc.
- Actual required temperature — °C
- Temperature boiler ON — °C
- Temperature boiler OFF — °C

After clicking on the line **Diagnostics of buffer** it is possible to enter the site where all basic information about the buffer storage tank is summarized:

- Buffer — Charging active / Charged
- Top buffer B4 boiler ON — °C

- Bottom buffer B41 boiler OFF °C

Furthermore, the demands of the appliances on heating, the so-called **Demands from users**, are summarized here:

- HC1 demand °C
- HC2 demand °C
- DHW demand °C
- External input °C

6.12. DIAGNOSTICS OF APPLIANCE

This file includes all information about the appliances, i.e. heating circuit 1, heating circuit 2, DHW heating and external input.

After clicking on the line **Heating circuit 1** it is possible to enter the site where all basic information about the heating circuit 1 is summarized:

- Operating mode Auto / Manually
- Mode Frost protection / Reduce / Comfort
- Cause Room required / Room limit / Anti-freeze / Boost heating / Quick setback / Summer limit / Return temperature limitation / Excess heat draw etc.
- State of room OFF / ON / Room limit / Anti-freeze / Heat up / Quick setback / ECO1 / ECO 2

Furthermore, the required and measured temperature values are displayed here:

- B1 Flow HC1 °C
- A6 Room HC1 °C
- HC1 correction room °C
- Room thermostat H1 HC1 Active / Passive
- Pump HC1 ON/ OFF
- Valve HC1 %

After clicking on the line **Heating circuit 2** it is possible to enter the site where all basic information about the heating circuit 2 is summarized, it is analogous to the information about the heating circuit 1.

After clicking on the line **DHW** it is possible to enter the site where all basic information about DHW heating is summarized:

- Operating mode Auto / Frost protection
- Mode Comfort / Reduce
- Cause Charging active / Charged

Furthermore, the setting and measured values of the DHW temperatures are displayed here.

- DHW pump ON/ OFF

After entering the line **External input** it is possible to enter the site where the setting temperature of the external input is displayed.

The line **HZ 1 demand** displays the actual temperature demand of the eventually used controller of other heating circuits (maximum is 4 heating circuits + DHW).

The line **HZ 2 demand** displays the actual temperature demand of the eventually used controller of other heating circuits (maximum is 4 heating circuits + DHW).

At the end of the site the instantaneous values of the outside temperatures are displayed:

- B9 Outside temperature °C
- Modified outside temperature °C
- Attenuated outside temperature °C

6.13. DIAGNOSTICS OF CONTROLLER

This file includes other information and possibilities, such as:

- program version
- save/load
  - set application default

  After entering **the service password** (see chap. 5.24.) it is even possible:
  - save custom setting
  - restore custom setting
- restart counter of the control equipment
- internal temperature of the control equipment

After entering **the service password** (see chap. 5.24.) it is possible to display:

- operating hours of the control equipment
- MSR started up Yes/No

6.14. DATE AND REAL TIME SETTINGS

It is possible to set the date and the real time here.
The date is displayed in the “DD. MM. YY” format.
The real time is displayed in the “h:min:s” format.
Their correct setting is primarily used for the back specification of the failure reported by the control equipment.
The instructions for setting the date and the real time can be found in chapter 4.

6.15. QUICK ACCESS

The function **Quick access** is active only if the selection **Ignition - YES, Emptying - YES** is made in the file **Configuration** (see chap. 7.1.) in the service menu.

If it is necessary to prematurely turn off Feeder 1 and Feeder 2 during the **First feeding** before ignition (see chap. 7.5.), button “A” (see chap. 2.) must be pressed, which enable us to enter the file **Quick access**.

The selection **First feeding** (Continue/Finish) defines whether the process of the first feeding should continue or should be prematurely turned off and the ignition should immediately start.
The default value is **Continue**. The instructions for changing this parameter can be found in chapter 4.
Demand displays the operating period of the first feeding.
Reality displays how much time of the first feeding operating period has already passed.

The quick access function works analogously if it concerns **Emptying** of the screw fuel feeder - see chap. 7.1.5.

The selection **Emptying** (Continue/Finish) defines whether the process of emptying fuel from the screw feeder should continue or should be prematurely turned off and the boiler should immediately switch to the “External OFF” mode.
The default value is **Continue**. The instructions for changing this parameter can be found in chapter 4.
Demand displays the operating period of the emptying.
Reality displays how much time of emptying operating period has already passed.

7. DESCRIPTION OF THE SERVICE MENU

After entering the service password (see chap. 5.24.) it is possible to use this link and enter the service menu.

7.1. CONFIGURATION

IMPORTANT NOTICE: Before putting the boiler with the CLIMATIX 2 control equipment into operation for the first time, the service technician must define the correct configuration (equipment) of the boiler and the heating system according to the actual situation in the boiler room.

After clicking on the line **Configuration** it is possible to enter the site where the following components and function can be found:

- Cascade — OFF / Boiler 1 Master / Boiler 2 / Boiler 3 / Boiler 4
- SMS server — Yes / No
- Oxygen sensor — No / Version 3 / Version 4
- Ignition — Yes / No
- Emptying — Yes / No
- Flue damper — Yes / No
- Influence of appliance on return temp. — Yes / No
- Buffer — Yes / No
- DHW — Yes / No
- Heating circuit 1 — No / Mixing HC1 / Pump HC1
- A6 Room HC1 — Yes / No
- Heating circuit 2 — No / Mixing HC2 / Pump HC2
- A7 Room HC2 — Yes / No

- External input Yes / No
- Substitute operation Yes / No
- B9 outside sensor Auto / Not used

After selecting the configuration of the boiler and the heating system, it is necessary to confirm this selection by **Save configuration**.
If the operator does not make any other selections within 30 s. after making the last selection, the configuration is saved automatically. The remaining time until the configuration is saved automatically is indicated on the last line **Autosave in: … s**.
If the selected configuration is saved, the control equipment is restarted and only the newly selected equipment of the boiler and the heating system (including specific functions) is loaded. Everything else remains hidden and does not affect the boiler operation.
If the selected configuration is incompatible with some functions, the control equipment is restarted once again and the incompatible settings are cancelled, e.g. the function 'buffer' cannot be selected for the boilers 2, 3, 4 in the cascade.

7.1.1. CASCADE CONFIGURATION

The selection **Cascade** (OFF / Boiler 1 Master / Boiler 2 / Boiler 3 / Boiler 4) defines the number of boilers in the heating system that are connected to a cascade.
If there is only one boiler in the heating system, it is necessary to select **OFF**.
In the case of a cascade, it is necessary to select **Boiler 1 "Master"** for the first boiler in the cascade, **Boiler 2** for the second boiler, **Boiler 3** for the third boiler, and **Boiler 4** for the fourth boiler.
In the case of a cascade, the heating system must include a hydraulic equalizer of dynamic pressures (HEDP - torus) or a buffer tank with a sensor **B10** installed at the outlet into the heating system. The sensor **B10** is installed in the control equipment of boiler 1 "Master" instead of the sensor **B3 DHW.**
The default value is **OFF**. The instructions for changing this parameter can be found in chapter 4.

7.1.2. SMS SERVER CONFIGURATION

The selection **SMS server** (YES/NO) enables to send certain information about the boiler operation to a mobile phone.
This additional attachment is currently being developed and it is not a part of the existing boilers.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.3. OXYGEN SENSOR CONFIGURATION

The selection **Oxygen sensor** (YES/NO) defines whether the boiler is equipped with this sensor or not.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

Version 3 is a former version of the oxygen sensor and it stopped being used in 2013. Currently, version 4 of the oxygen sensor is used.

Which of the versions is used in the particular boiler is written on the printed circuit board of the converter that is installed in the installation box on the rear side of the boiler.

7.1.4. IGNITION CONFIGURATION

The selection **Ignition** (YES/NO) defines whether the boiler is equipped with the automatic ignition or not. If NO is selected, the function **Emptying - NO** is automatically set.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.5. EMPTYING CONFIGURATION

The selection **Emptying** (YES/NO) defines the boiler operation during ignition and when all the appliances are heated up.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

The selection **Ignition – YES**, **Emptying – YES** is used if it is expected that it will be necessary to put the boiler into operation again and not earlier than several hours after the moment when the system was heated up. It primarily concerns the operation of a boiler with a buffer storage tank.
If the boiler is turned on, at the same time feeder 1 and feeder 2 are put into operation. The duration of their operation is set in **First feeding** (see chap. 7.5.); this period of time is indicated with the mode **"Feeding"** on the display and with the yellow light of the indicator on button "A". During this time the feeders are being fed with fuel; they are automatically turned off and the automatic ignition is put into operation. This period of time is indicated with the mode **"Ignition"** on the display and with the yellow-green blinking light of the indicator on button "A". After ignition the boiler switches to normal operation, which is indicated with the mode **"Operation"** on the display and with the green light of the indicator on button "A".
If all the appliances and the buffer storage tank are heated up, the control equipment puts feeder 2 (top) out of operation and empties feeder 1 (bottom); the emptying speed depends on the actual power. This period of time of is indicated with the mode **"Emptying"** on the display and with the blinking yellow light of the indicator on button "A". If this process is finished, the boiler stops working and the display indicates the mode **"External OFF"**. The boiler remains in this mode until it receives a demand for heating from any of the appliances.
If such a demand is received, feeder 1 and feeder 2 are put back into operation. The duration of their operation is set in **First feeding** (see chap. 7.5.) and the entire process of **"Feeding"**, **"Ignition"** and **"Operation"** repeats.
If a demand for heating from an appliance is received during the process of **"Emptying"**, emptying continues until the very end of this process, and then the program of automatic **"Feeding"** and **"Ignition"** starts.

The selection **Ignition – YES**, **EMPTYING – NO** is primarily used during the operation of a boiler without a buffer storage tank. It also must be selected if a boiler is not equipped with feeder 2 (e.g. boilers BENEKOV C).
Before the boiler is turned on, it is necessary to use the manual control (see chap. 6.1.) to transport the fuel to the burner and to turn on the boiler. Then the automatic ignition is put into operation. This process is indicated with the mode **"Ignition"** on the display and with the blinking yellow-green light of the indicator on button "A". After ignition the boiler switches to normal operation, which is indicated with the mode **"Operation"** on the display and with the green light of the

indicator on button “A”.
If all appliances are heated up, the boiler switches to ‘reduce’ - see chap. 6.2. It is indicated with the mode **“External OFF”** on the display and with the blinking green light of the indicator on button “A”.
If a demand for heating from any appliance is received, the furnace is blown by the fan and the normal operation of the boiler continues. It is indicated with the mode **“Operation”** on the display and with the green light of the indicator on button “A”.
When the boiler switches to the mode ‘normal operation’, the furnace begins to burn again. If the furnace burns insufficiently even if the time set in **Delay time of ignition after reduce** (see chap. 6.2.1.) has already passed, the automatic ignition is put into operation.

7.1.6. FLUE DAMPER CONFIGURATION

The selection **Flue damper** (YES/NO) defines whether the boiler is equipped with the flue damper, which is automatically controlled according to the flue gas temperature in the chimney, or not.
This additional attachment is currently being developed and it is not a part of the existing boilers.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.7. INFLUENCE OF APPLIANCE ON RETURN TEMPERATURE CONFIGURATION

The selection **Influence of appliance on return temperature** (YES/NO) is a special way to protect the return valve of the boiler against the low-temperature corrosion.

The selection **Influence of appliance on return temperature – YES** is used if the boiler is installed into the heating system according to the instructions described in chap. 11.3. It means that the primary circuit of the boiler does not include the mixing valve Y7 that would control the return valve temperature but the temperature is controlled by switching the individual appliances (heating circuits, DHW storage tank).
This setting cannot be used if the boiler has a buffer storage tank or if more boilers are connected in a cascade!

The selection **Influence of appliance on return temperature – NO** is used if the boiler is protected against low-temperature corrosion by the mixing valve Y7 in the primary circuit of the boiler– see instructions in chap. 11.1., 11.2., or 11.4.

The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.8. BUFFER CONFIGURATION

The selection **Buffer** (YES/NO) defines whether the heating system is equipped with a buffer storage tank or not.
The setting **Cascade – boiler 2, boiler 3, boiler 4** is incompatible with the configuration setting **Buffer** (see chap. 7.1.).
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.9. HEATING DHW CONFIGURATION

The selection **DHW** (YES/NO) defines whether the heating system is equipped with a DHW storage tank or not.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.
The setting **Cascade – boiler 1 Master** is incompatible with the configuration setting **DHW** (see chap. 7.1.).

7.1.10. HC1 CONFIGURATION

The selection **Heating circuit 1** (No/Mixing HC1/Pump HC1) defines whether the heating system is equipped with the heating circuit 1 or not. If **YES**, it is necessary to specify whether it is the mixing circuit with the mixing valve Y1 or if it is the circuit controlled only by the pump Q2– see chap. 11.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.11. A6 ROOM UNIT CONFIGURATION

The selection **A6 Room HC1** (YES/NO) defines whether the room unit A6 (SIEMENS POL 822.70) is installed in the reference room of the heating circuit 1 or not.
Warning! Do not confuse the room unit A6 and the standard room thermostat. If the room thermostat is used in the heating circuit 1, it is connected to terminals H1.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.12. HC2 CONFIGURATION

The selection **Heating circuit 2** (No/Mixing HC2/Pump HC2) defines whether the heating system is equipped with the heating circuit 2 or not. If **YES**, it is necessary to specify whether it is the mixing circuit with the mixing valve Y5 or if it is the circuit controlled only by the pump Q6 – see chap. 11.
Heating circuit 2 – Mixing HC2 cannot be selected if the boiler has a buffer storage tank.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.13. A7 ROOM UNIT CONFIGURATION

The selection **A7 Room HC2** (YES/NO) defines whether the room unit 7 (SIEMENS POL 822.70) is installed in the reference room of the heating unit 2 or not.
Warning! Do not confuse the room unit A7 and the standard room thermostat. If the room thermostat is used in the heating circuit 2, it is connected to terminals H3.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.14. EXTERNAL INPUT CONFIGURATION

The selection **External input** (YES/NO) defines whether an additional input (e.g. heating of a pool) is connected to the control equipment or not.
The default value is **YES**. The instructions for changing this parameter can be found in chapter 4.

7.1.15. SUBSTITUTE OPERATION CONFIGURATION

The selection **Substitute operation** (YES/NO) defines whether another heating source (e.g. electric boiler) can be used for heating or not.
Cascade – YES is incompatible with this selection.
The default value is **NO**. The instructions for changing this parameter can be found in chapter 4.

7.1.16. B9 OUTSIDE SENSOR TEMPERATURE

The selection **B9 Outside sensor** (Auto/Not used) activates the outside sensor B9. If in the cascade heating circuits are not used in other boilers (2, 3, 4), it is possible to select B9 Outside sensor - **Not used**.
The default value is **Auto**. The instructions for changing this parameter can be found in chapter 4.

7.2. CASCADE

The **Differential ON B10** parameter defines to which value the required temperature must fall so that the cascade regulation can be turned ON.
The parameter setting is ranging from 0 – 10 °C; the default value is 0 °C.
The instructions for changing this parameter can be found in chapter 4.

The **Differential OFF B10** parameter defines to which value the required temperature must rise so that the cascade regulation can be turned OFF.
The parameter setting is ranging from 1 – 10 °C; the default value is 6 °C.
The instructions for changing this parameter can be found in chapter 4.

The **Maximum cascade temperature** parameter determines the maximum temperature of the heated water in the cascade (B10).
The parameter setting is ranging from 75 – 90 °C; the default value is 85 °C.
The instructions for changing this parameter can be found in chapter 4.

The **Minimum cascade temperature** parameter determines the minimum temperature of the heated water in the cascade (B10).
The parameter setting is ranging from 65 – 85 °C; the default value is 65 °C.
The instructions for changing this parameter can be found in chapter 4.

The **Release integral** parameter determines how fast the boiler turns on after its releasing from temperature (B10).
The parameter setting is ranging from 0 – 500; the default value is 10.
The instructions for changing this parameter can be found in chapter 4.

The **Run Up time** parameter determines how much time passes from the moment when the demand of the boiler on switching on is received to the moment when the boiler starts to transmit heat into the system.
The parameter setting is ranging from 0 – 90 min; the default value is 4 min.
The instructions for changing this parameter can be found in chapter 4.

The **Reverse integral** parameter determines how fast the boiler turns off after its reduce from temperature (B10).
The parameter setting is ranging from 0 – 500; the default value is 10.
The instructions for changing this parameter can be found in chapter 4.

The **Restart after blackout** parameter determines the speed (expressed in %/s) of the gradual releasing of the cascade power (2 boilers – cascade power from 0 to 200%, 4 boilers – cascade power from 0 to 400%).
The parameter setting is ranging from 0 – 20; the default value is 0.5.
The instructions for changing this parameter can be found in chapter 4.

The **Boost lead boiler** parameter determines the value to which the required temperature of the lead boiler in the cascade can rise from the value of the required temperature of the sensor B10.
The parameter setting is ranging from 5 – 20 K; the default value is 10 K.
The instructions for changing this parameter can be found in chapter 4.

The **Boost lag boiler** parameter determines the value to which the required temperature of other boilers in the cascade can rise from the value of the required temperature of the sensor B10.
The parameter setting is ranging from 5 – 20 K; the default value is 15 K.
The instructions for changing this parameter can be found in chapter 4.

The selection **Boiler sequence** (Auto/Boiler 1/ Boiler 2/ Boiler 3/ Boiler 4) determines which of the boilers will be the first one in the cascade. The selection **Auto** is based on the operating hours of the boilers; the defined boiler will be the first one in the cascade regardless of the operating hours.
The instructions for changing this parameter can be found in chapter 4.

The **Sequencing period** parameter determines how much time passes before the automatic sequencing of boilers in the cascade changes.
The parameter setting is ranging from 0 – 1000 h; the default value is 500 h.
The instructions for changing this parameter can be found in chapter 4.

The **Minimum ON time of a boiler** parameter determines how long the boiler is in operation after being turned on.
The parameter setting is ranging from 0 – 30 min; the default value is 10 min.
The instructions for changing this parameter can be found in chapter 4.

The **Minimum OFF time of a boiler** parameter determines how long the boiler is out of operation after being turned off.
The parameter setting is ranging from 0 – 30 min; the default value is 5 min.
The instructions for changing this parameter can be found in chapter 4.

The **Delay of boiler hopper lid** parameter determines how long the opening of the boiler hopper lid is ignored and the idle boiler is not replaced by another boiler in the cascade.
The parameter setting is ranging from 0 – 600 s; the default value is 0 s.
The instructions for changing this parameter can be found in chapter 4.

The line **Boiler operating hours** informs about the real operation of the boilers. If a boiler is replaced, it is necessary to zero the values of this particular boiler in the service menu, the line **Operating hours**.
The instructions for changing this parameter can be found in chapter 4.

The line **State of communication between boilers** (OK/Error) states whether the information transfer among the boilers works properly.
The instructions for changing this parameter can be found in chapter 4.

The **Lock signal** parameter determines for all the temperature values of the sensor B10 the percentage value at which the heat take-off from the cascade should be reduced.
The value 0 % means that the locking was cancelled.
The instructions for changing this parameter can be found in chapter 4.

The **PID cascade** determines the characteristics of the PID controller, which influences the dynamics of connecting and disconnecting of boilers in a cascade.
The instructions for changing this parameter can be found in chapter 4.

7.3. INPUT OUTPUT TEST

Here it is possible to check whether the connection and functionality of all electric aggregates controlled by the control equipment work properly:

- fans
- engines
- pumps
- valves
- ignition

After selecting a particular aggregate (e.g. Feeder 1 in the file Engines) and after clicking on it, the dialog box opens and offers three possible operating states of this aggregate:

- OFF
- ON
- Auto

The symbol of a hook on the left side of the line indicates which of the functions is active at the moment. The mode **Auto** must be active if the operating state is normal.
If **ON** is selected, the aggregate is put into continuous operation. This deviation from the automatic mode of the control equipment is indicated with the yellow-red blinking light of the indicator on button “A” and at the same time with the red blinking light of the indicator on button “B” - see chap. 2.
If **OFF** is selected, the aggregate is brought to a continuous standstill. This deviation from the automatic mode of the control equipment is indicated with the yellow-red blinking light of the indicator on button “A” and at the same time with the red blinking light of the indicator on button “B” - see chap. 2.

WARNING!!! After the functionality check, it is necessary to switch all the aggregates to the mode Auto again. The indicators on buttons "A" and "B" - see chap. 2 - stop blinking.

7.4. BOILER PUMP

The line **Boiler pump** is used to set all the parameters that are necessary for correct operation of the pump of the primary circuit.

The parameter **Switch ON temperature** determines the temperature at which the pump of the primary circuit is turned on if this pump is controlled by the control equipment of the boiler.
The parameter setting is ranging from 40 – 60 °C; the default value is 45 °C.
The instructions for changing this parameter can be found in chapter 4.

When water in the boiler is cooling, the pump of the primary circuit is turned off according to the hysteresis set in the **Differential OFF** parameter and after expiry of a period set in the **Pump overrun time** parameter.

The setting of the parameter **Differential OFF** is ranging from 1 to 10 °C; the default value is 5 °C.
The instructions for changing this parameter can be found in chapter 4.

The setting of the parameter **Pump overrun time** is ranging from 0 – 30 min; the default value is 2 min.
The instructions for changing this parameter can be found in chapter 4.

Example:
The values set in the control equipment are:
- *Switch ON temperature 45 °C*
- *Differential OFF 5 °C*
- *Pump overrun time 2 min*

If the boiler is put into operation, the temperature of water in the boiler starts to rise. If it reaches the value of 45 °C, the pump of the primary circuit turns on. If the temperature of water in the boiler starts to fall, for any reason, and if it reaches the value of 40 °C (45-5=40) and this value does not change for 2 min, the pump turns off.

After passing the time set in the **Pump overrun time** parameter, the pump also turns off if the boiler switches to the mode “External reduce” - see chap. 6.2. - or if the room thermostat of the external input disconnects. If they connect again, the pump automatically turns on.

If the temperature of water in the boiler rises above 85 °C, the boiler pump is in continuous operation, regardless of the operating mode of the boiler. It turns off if the temperature falls below 85 °C and the overrun time is 2 min.

The selection **Frost protection** (OFF/ON) defines whether pump of the primary circuit is in the mode “frost protection” or not. If **ON** is selected, the pump of the primary circuit is turned on according to the actual value of the outside temperature B9, even if no demand on heating is received.

Outside temperature	Pump mode
< -4 °C	The pump is permanently ON.
-4 to 1.5 °C	The pump turns on every 6 h for 10 min.
> 1.5 °C	The pump is permanently OFF.

The default value is **OFF**. The instructions for changing this parameter can be found in chapter 4.

7.5. IGNITION

This program enables to control and optimize the process of automatic ignition of the burner by using an ignition aggregate (a heat gun or an incandescent electrode) when the boiler is put into operation.
The ignition process is considered successful if at least one of the conditions set in the **Differential flue gas - water** or **Boost flue gas temperature** parameters is met.

After clicking on the line **Ignition** it is possible to enter the menu concerning the setting of ignition parameters:

The **First feeding** parameter determines how long Feeder 1 and Feeder 2 are in operation after the boiler is turned on (or after automatic emptying) and before the mode “Ignition” is activated. The length of this period depends on the feeder construction and it must be set in such a way that the fuel level reaches approximately the top surface of the grate when the time set in **First feeding** passes. If it is necessary to turn off Feeder 1 or Feeder 2 prematurely, during the **First feeding**, button “A” must be pressed (see chap. 2.), to enter the file **Quick access** (see chap. 6.15.).
This parameter can be found only in the configuration **Ignition – YES, Emptying - YES**.
The parameter setting is ranging from 10 – 600 s; the default value is 260 s.
The instructions for changing this parameter can be found in chapter 4.

The **Second feeding** parameter determines how long Feeder 1 and Feeder 2 are in operation between the cycles of the mode “Ignition”.
The parameter setting is ranging from 5 – 50 s; the default value is 10 s.
The instructions for changing this parameter can be found in chapter 4.

The **Ignition time** parameter determines how long the ignition aggregate can be in continuous operation during the process of “Ignition”.
The parameter setting is ranging from 1 – 15 min; the default value is 4.0 min.
The instructions for changing this parameter can be found in chapter 4.

The **Differential flue gas - water** parameter determines the minimum difference that must be between the flue gas temperature and the boiler temperature so that the ignition process can be considered successful.
The parameter setting is ranging from -5 to 30 K; the default value is 6 K.
The instructions for changing this parameter can be found in chapter 4.
The **Flue gas differential** parameter is related to the **Differential flue gas - water** parameter. It determines when the ignition turns off again according to the difference between the flue gas temperature and the water temperature.
The parameter setting is ranging from 1 – 30 K; the default value is 1 K.
The instructions for changing this parameter can be found in chapter 4.

Example: *- the boiler temperature is 50°C*
*- the **Differential flue gas - water** parameter is 6K*
*- the **Flue gas differential** parameter is 5K*
Ignition is activated if the flue gas temperature is below 56°C (50+6=56).
Ignition is deactivated if the flue gas temperature is above 61°C (50+6+5=61).

The **Boost flue gas temperature** parameter determines by how many degrees Celsius the flue gas temperature must rise during the mode “Ignition” so that the ignition process can be considered successful.
The parameter setting is ranging from 5 – 30 °C; the default value is 15 °C.
The instructions for changing this parameter can be found in chapter 4.

The **Fan during ignition** parameter determines the fan speed during the mode “Ignition”.
The parameter setting is ranging from 20 – 100 %; the default value is 60 %.
The instructions for changing this parameter can be found in chapter 4.

The **Fan delay time** parameter determines the delay time of putting the fan into operation compared to the ignition aggregate during the mode “Ignition”.
The parameter setting is ranging from 0 – 120 sec; the default value is 30 sec.
The instructions for changing this parameter can be found in chapter 4.

The **Ignition repetition** parameter determines how many cycles (ignition attempts) the boiler performs before it reports an ignition failure.
The parameter setting is ranging from 1 – 10 cycles; the default value is 3 cycles.
The instructions for changing this parameter can be found in chapter 4.

7.6. FLUE GAS OUTLET

It is an additional attachment of the boiler which increases the chimney draught. According to the type and size of the boiler, the flue gas outlet can be included in basic or optional equipment of the boiler.

After clicking on the line **Flue gas outlet** it is possible to enter the menu concerning the setting of flue gas outlet parameters:

The **Flue gas limitation** parameter defines the flue gas temperature at which the control unit starts to reduce the actual power of the boiler so that this certain temperature value will not be exceeded. This value represents a temperature limit above which the effectiveness of the boiler would start to decrease unacceptably and the risk of heat damage of internal (non-metallic) parts of the boiler would occur.
The setting of the **Flue gas limitation** parameter is ranging from 200 – 300 °C; the default value is 300 °C.
The instructions for setting the temperature can be found in chapter 4.

The function **Operating mode** (Ignition/ Ignition+Operation) defines the operating mode of the flue gas outlet.
If **Ignition** is selected, the flue gas outlet is in operation only during the mode “Ignition”. When this mode ends, the flue gas outlet turns off after its overrun time.
If **Ignition**+**Operation** is selected, the flue gas outlet is in operation during the mode “Ignition” as well as during the boiler mode “Operation”. The flue gas outlet and the combustion air fan work

simultaneously. When the boiler switches to the mode “Reduce” or when the boiler turns off, the flue gas outlet turns off after its overrun time.
The default value is **Ignition**. The instructions for changing this parameter can be found in chapter 4.

The **Overrun time of flue gas outlet** parameter determines the delay time of putting the flue gas outlet out of operation compared to the ignition aggregate (or the combustion air fan).
The parameter setting is ranging from 0 – 300 sec; the default value is 20 sec.
The instructions for changing this parameter can be found in chapter 4.

7.7. PARAMETERS FOR BACKFIRE

In order to minimize the risk of backfire of the fuel in the storage tank, the control equipment communicates with the backfire sensor which is installed in the feeding mechanism. If this sensor monitors the unacceptable increase in the feeder temperature (c. 100°C), the transport of fuel into the burner accelerates (as defined by the parameters **Feeding time** and **Delay time** described in this chapter) for the time that is defined by the parameter **Protection time**. After this time passes, during the **Intervention period,** the backfire control is not taken into consideration (this period is intended for cooling the feeding mechanism) and the boiler operates in the normal mode.

The **Feeding time** parameter determines how long the screw feeder is in operation during activation of the backfire sensor.
The parameter setting is ranging from 2 – 10 s; the default value is 5 s.
The instructions for changing this parameter can be found in chapter 4.

The **Delay time** parameter determines how long the screw feeder is out of operation during activation of the backfire sensor.
The parameter setting is ranging from 5 – 60 s; the default value is 20 s.
The instructions for changing this parameter can be found in chapter 4.

The **Protection time** parameter determines how long the accelerated fuel feeding is active after activation of the backfire sensor.
The parameter setting is ranging from 1 – 30 min; the default value is 5 min.
The instructions for changing this parameter can be found in chapter 4.

The **Intervention period** parameter determines how long it takes before the activation of the backfire sensor is re-evaluated. Then, the transport of fuel into the burner can be accelerated again.
The parameter setting is ranging from 10 – 120 min; the default value is 60 min.
The instructions for changing this parameter can be found in chapter 4.

7.8. SUBSTITUTE OPERATION

This function is activated only if the function **Cascade** in the **Configuration** (chap. 7.1.) is turned off.

The selection **Including boiler OFF - YES** enables to control the appliances even if the boiler is turned off. It is assumed that a substitute unit is available.

The **Switch ON delay** parameter defines the delay time of turning on of the substitute unit after the boiler is put out of operation or turned off.
The setting of the **Switch ON delay** parameter is ranging from 0 – 60 min; the default value is 1 min.
The instructions for changing this parameter can be found in chapter 4.

The selection **Substitute operation** (OFF/ON/Auto) enables to connect the contact for the substitute unit manually.
The default value is **Auto**. The instructions for changing this parameter can be found in chapter 4.

7.9. SENSOR CALIBRATION

The function **Sensor calibration** enables to correct the measured values:

- outside temperature (B9)
- temperature in the reference room HC1 (A6)
- temperature in the reference room HC2 (A7)

and to unify these temperature values which are shown on the display with other (more accurate) measuring instruments which are used in that particular room.

The setting of these parameters is ranging from -3 to +3 °C; the default value is 0 °C.
The instructions for changing this parameter can be found in chapter 4.

7.10. LANGUAGE

The function enables to select the language of the communication between the control equipment and the operator. In this program the version **Czech** and **English** languages are available.
The instructions for changing this parameter can be found in chapter 4.

7.11. OPERATING HOURS

The line **Operating hours** informs about the total time of the boiler operation. After clicking on this line the value can be zeroed if it is necessary.

7.12. IP CONFIGURATION

This menu can be accessed only after entering the service password (see chap. 5.24.). This function is used for setting the communication with the control equipment via the Internet – see chap. 9.3.

7.13. PID BOILER

This file is displayed only after entering the factory password (see chap. 5.24.). It enables to define the speed of the power modulation during the boiler operation. The parameters of this menu can be changed only by persons who were properly trained.

The setting of the **Boiler P factor** parameter is ranging from 0 – 20; the default value is 3.7.
The instructions for changing this parameter can be found in chapter 4.

The setting of the **Boiler I factor** parameter is ranging from 0 – 1500 s; the default value is 600 s.
The instructions for changing this parameter can be found in chapter 4.

7.14. PID VALVES

This file is displayed only after entering the factory password (see chap. 5.24.). It enables to define the speed of position changing of the mixing valves (Y7 in the return valve, Y1 in HC1, Y5 in HC2). The parameters of this menu can be changed only by persons who were properly trained.

The setting of the **Return valve P factor** parameter is ranging from -20 to +20; the default value is 5.0. If negative values are used, the direction of rotation of the mixing valve power changes.
The instructions for changing this parameter can be found in chapter 4.

The setting of the **Return valve I factor** parameter is ranging from 0 – 1000 s; the default value is 90 s.
The instructions for changing this parameter can be found in chapter 4.

The setting of the **HC1 P factor** and **HC2 I factor** parameters is ranging from 1 – 20; the default value is 2.0.
The instructions for changing this parameter can be found in chapter 4.
The setting of the **HC1 P factor** and **HC2 I factor** parameters is ranging from 0 – 1000 s; the default value is 60 s.
The instructions for changing this parameter can be found in chapter 4.

7.15. PASSWORD HANDLING

This file is displayed only after entering the factory password (see chap. 5.24.). It is used for password changing. The parameters of this menu can be changed only by persons who were properly trained.

8. ERROR MESSAGES OF THE CONTROL EQUIPMENT

8.1. ERRORS OF HARDWARE OF THE CONTROL EQUIPMENT AND OF THE PERIPHERAL SENSORS

- All **binary inputs** can report an error of Climatix hardware (e.g. damage of a controller caused by a lightning strike).
- All **binary outputs** can report an error of Climatix hardware (e.g. damage of a controller caused by a lightning strike).
- All **analog inputs** (sensors, etc.) can report an error that they are defective, e.g. not connected, short circuit, procedural failure (e.g. room unit POL822.70) and they can also report an error caused by defective Climatix hardware (e.g. damage of a controller caused by a lightning strike).
- All **analog outputs** can report an error of Climatix hardware (e.g. damage of a controller caused by a lightning strike).

8.2. ERRORS GENERATED BY THE BOILER OPERATION

These errors inform about the incorrect and unacceptable states of the boiler and other units during the boiler operation.

- Every engine, fan, pump and other used equipment can be operated manually by using the function **Input output test** (see chap. 7.3.) in the service menu when they are being put into operation. During this mode, an error is reported that the particular appliance is controlled manually to remind the operator that after finishing the process the appliance must be switched to automatic operation again.
  - **Fan manually**
  - **Flue gas outlet manually**
  - **Feeder 1 manually**
  - **Feeder 2 manually**
  - **Deasher manually**
  - **Boiler pump manually**
  - **HC1 pump manually**
  - **HC2 pump manually**
  - **DHW pump manually**
  - **Return valve manually**
  - **HC1 valve manually**
  - **HC2 valve manually**
  - **Ignition manually**
- **Communication boiler 2** - when the cascade and boiler 2 are configured and the system reports that the communication with boiler 1 (Master) is not established.
- **Communication boiler 3** - when the cascade and boiler 3 are configured and the system reports that the communication with boiler 1 (Master) is not established.
- **Communication boiler 4** - when the cascade and boiler 4 are configured and the system reports that the communication with boiler 1 (Master) is not established.
- **DHW overheating** - when DHW is configured and the DHW temperature in the DHW storage tank is above the maximum temperature limit.
- **Asymmetry error** - a report from the oxygen sensor that the values are above the asymmetry limit. It this report occurs repeatedly, it is necessary to replace the oxygen sensor.
- **Backfire** - a report that the temperature of the boiler feeder is too high and that the algorithm initialization for protecting the boiler is activated.
- **Ignition error** – indicates that the entire ignition algorithm has passed but the ignition of the fuel in the boiler has been unsuccessful.

- **Simulation outside temperature** - if the function “Simulation outside temperature” is used during putting the boiler into operation or during resetting the modified or attenuated temperature and setting the new required value, the control equipment indicates that this function is being used for the service technician not to forget to turn off this function after finishing the process. If stars are set on the respective line, the function turns off.
- **Safety thermostat** - indicates that the boiler is overheated and its temperature exceeds the temperature set by the used safety thermostat – see chap. 9.2.
- **O2 Heater error** - if the oxygen sensor is used, this message indicates that heating of the monitoring part of the sensor does not work. It may be caused by the incorrect connection, by the loss of supply voltage or by the sensor damage, e.g. by silicone vapors in flue gases.
- **Boiler hopper lid** - indicates either the boiler hopper lid is opened (if the boiler hopper lid sensor is used) or that the thermocontact of the boiler feeder is overheated.
- **Loss of flame - operation** - it indicates that the fuel in the burner has burnt out (loss of flame) when the configuration of the boiler without ignition is used. It may be caused by the operator failure to refill the fuel storage tank, crust formation of caked fuel, by the incorrect setting of the fuel feeding during operation, etc. The limit for activating this error can be set in the service menu and it is necessary to find an optimal setting when the boiler is put into operation according to the type and quality of the fuel and according to the structure of the heating system.
- **Loss of flame - reduce** - it indicates that the fuel in the burner has burnt out (loss of flame) when the configuration of the boiler without ignition or without emptying is used. It may be caused by the operator failure to refill the fuel storage tank, crust formation of caked fuel, by the incorrect setting of the fuel feeding during reduce, etc. The limit for activating this error can be set in the service menu and it is necessary to find an optimal setting when the boiler is put into operation according to the type and quality of the fuel and according to the structure of the heating system.
- **Low flue gas temperature B8** - when the boiler is in the mode “reduce”, not only the difference between the flue gas temperature B8 and the water temperature at the boiler outlet B2 are monitored. The minimum flue gas temperature B8 is monitored as well. If the temperature values fall below this limit, the system reports an error and the boiler in the mode “reduce” is put out of operation. When this parameter is set, the real operating parameters, the type and quality of fuel and other aspects must be taken into consideration.
- **Modbus error** - it indicates the loss of communication of the converters of the oxygen sensor and of the Climatix controller while using the modbus communication protocol RTU (RS485).
- **Power supply of O2 sensor - error** - it indicates an error in the power supply circuit of the oxygen sensor. It is possible to try to correct this by the function “delete message” in the menu of the oxygen sensor. If it does not help, it is necessary to replace either the converter or the entire oxygen sensor.
- **O2 under 0.1%** - it indicates that the oxygen sensor has measured the O2 concentration lower than 0.1% for a longer time. This can result in damaging the sensor. This error can also be a parallel effect of a failure in sensor heating or of an error in the modbus communication.
- **PCB temperature** - it indicates that the temperature of the converter of the oxygen sensor is higher than 85°C. This means that the converter is overheated and it may be damaged. The temperature 85°C represents the limit. The cause of this may be an inconvenient installation of the converter which may be too close to the chimney body or the insufficient natural cooling (based on selection of the dimension or material of the assembly box).

9. OTHER

9.1. BOILER OVERHEATING

In a state of disrepair when the **Boiler** temperature, for any reason, exceeds the value 90 °C, the control equipment has a double protection against overheating:

1.) **Software protection against overheating**

Based on the information that the **Boiler temperature B2** is higher than the parameter **Excess heat draw (**see chap. 5.10.), the program automatically:

- stops the fuel feeding
- stops the fans
- opens all mixing valves
- maintains all pumps in operation

This state of disrepair is indicated with the red blinking light of the indicator on button “B” - see chap. 2. It can be cancelled only if the boiler temperature falls below 85 °C.

2.) **Safety thermostat**

The safety thermostat is installed on the switch-board of the control equipment.

The default value of the safety thermostat is 95 °C. If the boiler temperature reaches this limit, the thermostat is activated and shuts down the pumps and the entire control equipment from power supply. This state of disrepair is indicated with the red light of the indicator on button "B" - see chap. 2. The safety thermostat can be turned on only if the temperature falls above the set value by c. 20 °C by unscrewing the black cover of the safety thermostat and by pressing the colored button. After that the black cover must be screwed on again.
To prevent unwanted switching of the safety thermostat due to the thermal inertia of the boiler, the temperature of heated water at the outlet should not be higher than 80°C.
If the safety thermostat turns off repeatedly, it is necessary to put the boiler out of operation and to determine the cause of repeated overheating of the boiler.

9.2. CONNECTION OF ROOM THERMOSTATS

In addition to the room unit SIEMENS POL 822.70, other common room thermostats can be connected to the control equipment. They are connected to inputs H1 (for HC1), and H3 (for HC2) on the side wall of the switch-board of the control equipment.

Before connecting the room thermostat, it is necessary to select the right polarity of the contact (Operating/Idle) – see chap. 6.4.7. Only a thermostat that has a free contact without any potential (e.g. SIEMENS REV24DC, SIEMENS REV24RFDC/SET etc.) can be connected to the contact of the room thermostat. To these terminals no external voltage can be connected.

9.3. CONNECTION OF THE CLIMATIX CONTROL EQUIPMENT TO THE INTERNET

The CLIMATIX control equipment can be accessed:

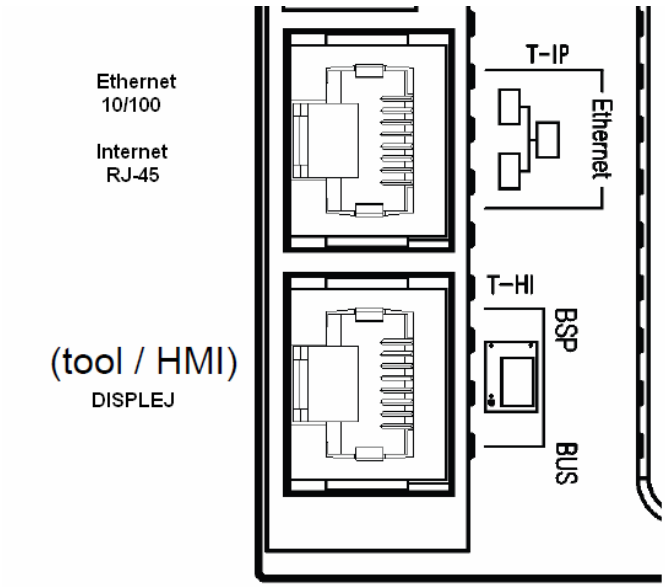
- from the computer that is connected to the same network
- from anywhere on the Internet, if the public address is set in CLIMATIX.

Equipment that is necessary for connecting the CLIMATIX to the Internet via LAN

- cable UTP - category 5.5., 5.5e or 6. If the environment is worse, it is advisable to use SFTP.
- connectors RJ-45 for connection to the rack and CLIMATIX.
- free port in the rack or router for cable connection.

Equipment of the rack

Rack must be equipped with a router which enables to translate the internal address of the boiler to the public address (unique and accessible from the Internet).
If the public address is set directly in CLIMATIX, a router is not necessary.



Cable with connector RJ-45

Description of connectors RJ-45

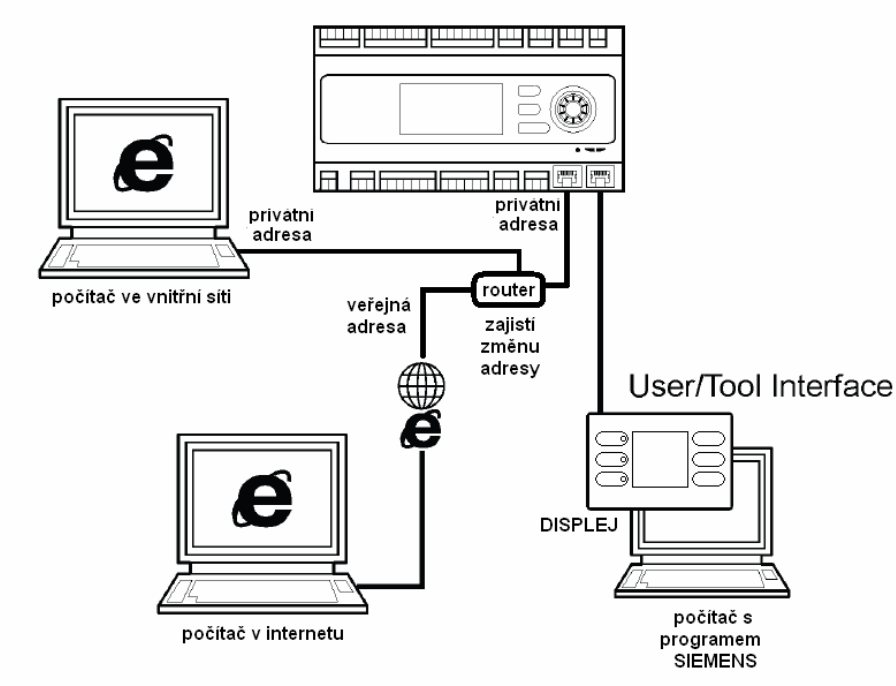
Lines for Internet connection: CDMA, ADSL, VDSL, GPRS, WiFi, LAN, etc.

The used router must enable the address translation. However, not all these routers can actually manage the translation (HUAWEI routers were often reported as problematic).

The router must have a free slot for connecting the cable to the boiler.

Software

The user must have at least one public address.
The ISP must enable the user to use this public address in their network.



Connection diagram

Setting of the network interface in CLIMATIX

It is necessary to set these IP addresses in the service menu in the line **IP configuration**:

- IP address of the boiler
- IP address of the mask
- IP address of the gateway

The IP address can be also set automatically using the server DHCP if the superior router enables this setting. However, it is not recommended.
During the electricity failure, the IP address may changes and the boiler may be then inaccessible.

Note: There are also other ways to connect the CLIMATIX control equipment to the Internet (mobile Internet, wireless connection WiFi). However, these ways are not common and special knowledge is required. Therefore, they are not included in the instruction manual.

9.4. SOFTWARE LOADING USING SD MEMORY CARD

Copying files to the SD memory card

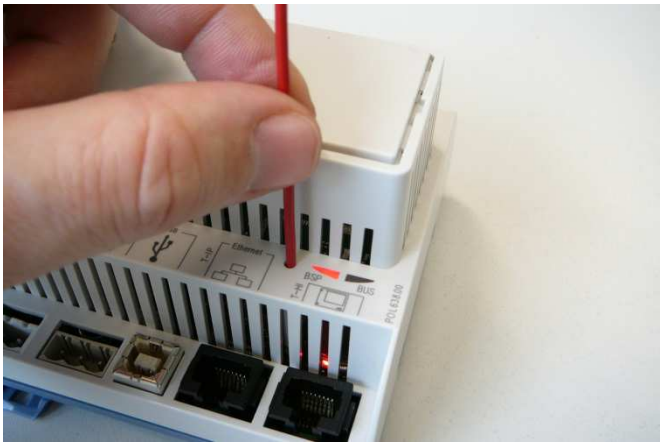
The application for the controller consists of these files:

- MBRTCode.BIN - own application
- HMI.bin - control panel
- OBH.bin - language support
- HMI4Web.bin - for Web Browser display

It is necessary to upload the files into the rood directory of the memory card, type SD, maximum 2 GB, format FAT16.

Application loading from the SD memory card to the controller

- to disconnect the controller from the power source.
- to insert the SD memory card with uploaded files into the controller using the connectors on the back side of the controller. It is necessary to push the SD memory card a little against spring resistance until it is properly inserted.



- to use a suitable tool (stick with diameter of 2 mm) and to press the service button. WARNING! If the pressure is too high, the button may damage the board of the control equipment.
- to connect the controller to the power source.
- to hold the service button. During loading, the color of the BSP LED indicator changes.
- uploading takes approximately 10 to 15 s.

- if the BSP LED indicator stops blinking and yellow light is continuously on, the uploading has finished.
- then the service button can be released.

- to disconnect the controller from the power source.
- to remove the SD memory card from the controller by repeatedly pressing the card.
- if the controller is turned on, the light of the BSP LED must be green.
- in the case of problems, it is necessary to repeat the procedure.

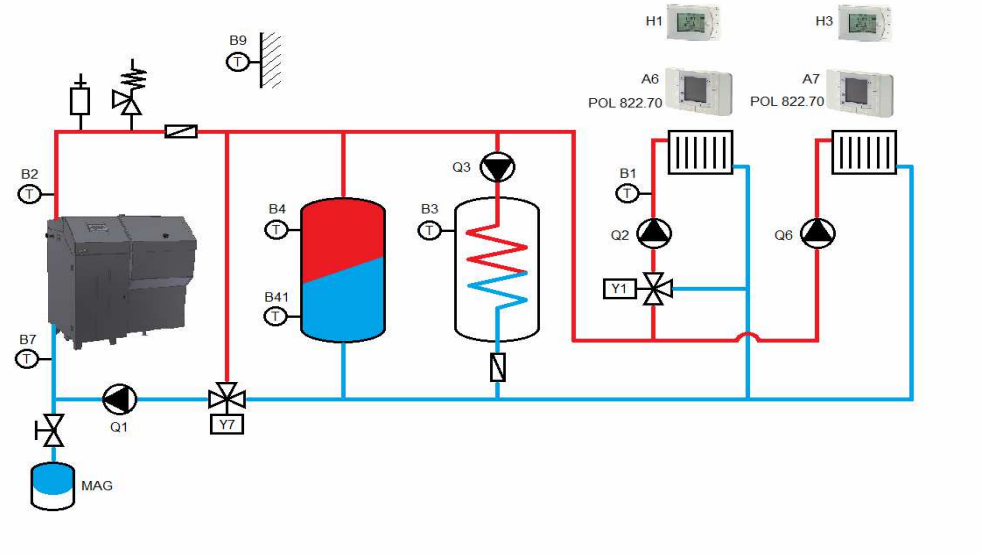
10. SAFETY INSTRUCTION

- Before installing, repairing or preserving the control equipment and before connecting additional attachments, it is necessary to disconnect the appliance from the power supply and to make sure that all the terminals and circuits are not under voltage.
- The control equipment must be installed in accordance with applicable standards and regulations.
- The control equipment may be used only in accordance with its intended use.
- The control equipment is designed to be installed in the boiler or close to the boiler.
- The control equipment can be used only in the heating systems that were designed in accordance with applicable standards and regulations.
- It is necessary to select the parameter values according to the type of the boiler and of used fuel. Furthermore, it is necessary to become thoroughly familiar with the instructions for setting these parameters. Incorrect parameter selection may result in disrepair of the boiler (its overheating, etc.).

- The parameters can be modified only by persons that are thoroughly familiar with this instruction manual.
- The electric installation of this control equipment must be a three-wire system and must be secured by an appropriate fuse.
- The control equipment cannot be used if its cover or the power line has been damaged. Condition of the cables should be regularly checked and if they are damaged, the control equipment must be put out of operation.
- Electric cables, and especially network cables, cannot touch or be near hot surfaces. They also cannot be mechanically overloaded.
- The control equipment cannot be subjected to vibration or to the direct sunlight.
- Do not put any object in the interior part of the control equipment.
- The control equipment must be protected against water and dust.
- The control equipment can be used only indoors.
- Before installing any peripheral appliances, the control unit must be disconnected from the power supply.
- No modification to the control equipment construction can be made.
- It is necessary to prevent children from accessing the control equipment and its appliances.
- The manufacturer assumes no responsibility for the damage resulting from failure to observe this manual.

11. HYDRAULIC DIAGRAMS OF BOILERS CONNECTION WITH THE CLIMATIX 2 CONTROLLER

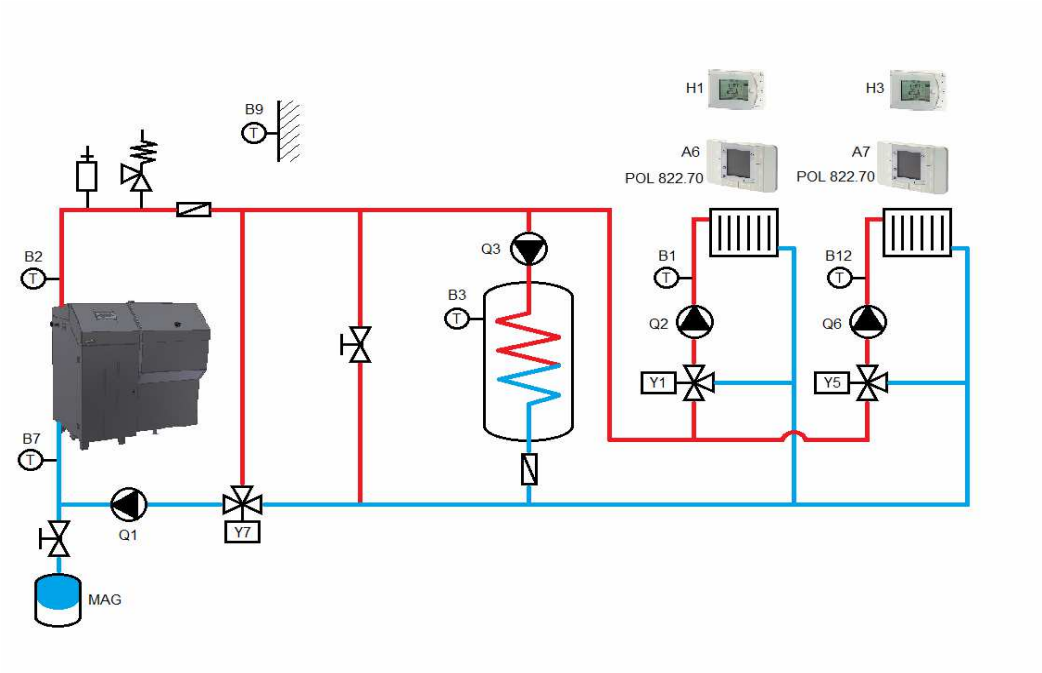
11.1. CONNECTION WITH BUFFER STORAGE TANK



Terminal board of the CLIMATIX II controller	Definition of input / output	Identification mark in the hydraulic diagram	Specification
M, B1	Boiler temperature sensor	B2	basic equipment of the boiler
M, B2	Flow temperature HC1 sensor	B1	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, B3	Return temperature sensor	B7	basic equipment of the boiler
M, X1	Flue gas temperature sensor	B8	basic equipment of the boiler (type: REGMET MA43PA-210)
M, X2	Outside temperature sensor	B9	type: SIEMENS QAC 34/101 (NTC 1 kΩ)
M, X3	DHW temperature sensor	B3	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ)
M, X4	Top buffer temperature sensor	B4	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ)
M, X5	Bottom buffer temperature sensor	B41	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ)
M, X6	Boiler fan		basic equipment of the boiler
M, X7	HC1 valve	Y1	up to 15 kW: SIEMENS DN20, kv=4,0, SXP45.20-4/DC up to 25 kW: SIEMENS DN25, kv=6,3, SXP45.25-6,3/DC up to 50 kW: SIEMENS DN32, kv=16, VXP45.32-16 + actuator SSC61 up to 100 kW: SIEMENS DN40, kv=25, VXP45.40-25 + actuator SSC61
M, X8	Return valve	Y7	see Valve HC1
M, D1	External input		
M, D2	Backfire thermostat		basic equipment of the boiler
M, DU1	Room thermostat HC1	H1	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
M, DU2	Room thermostat HC2	H3	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
A+, B- (RS485)	Oxygen sensor		basic equipment of the boiler (type: SST O2S-FR-T2-18C-103)
CE+, CE- (PB)	Room units	A6, A7	type: SIEMENS POL 822.70

Q1	HC1 pump	Q2	customer choice
Q2	HC2 pump	Q6	customer choice
Q3	DHW pump	Q3	customer choice
Q4	Flue damper		basic equipment of the boiler (developing)
Q5	Deasher		optional equipment of the boiler
Q6	Boiler pump	Q1	customer choice
Q7	Flue gas outlet		basic equipment of boilers BENEKOV R, S (otherwise optional)
Q8	Ignition		basic equipment of boilers BENEKOV R (otherwise optional)
DO1 (triac)	Feeder 1		basic equipment of the boiler
DO2 (triac)	Feeder 2		basic equipment of boilers BENEKOV R, S
DN, DL1	Boiler hopper lid		basic equipment of boilers BENEKOV R (otherwise optional)
DN, DL2	Safety thermostat (STB)		basic equipment of the boiler

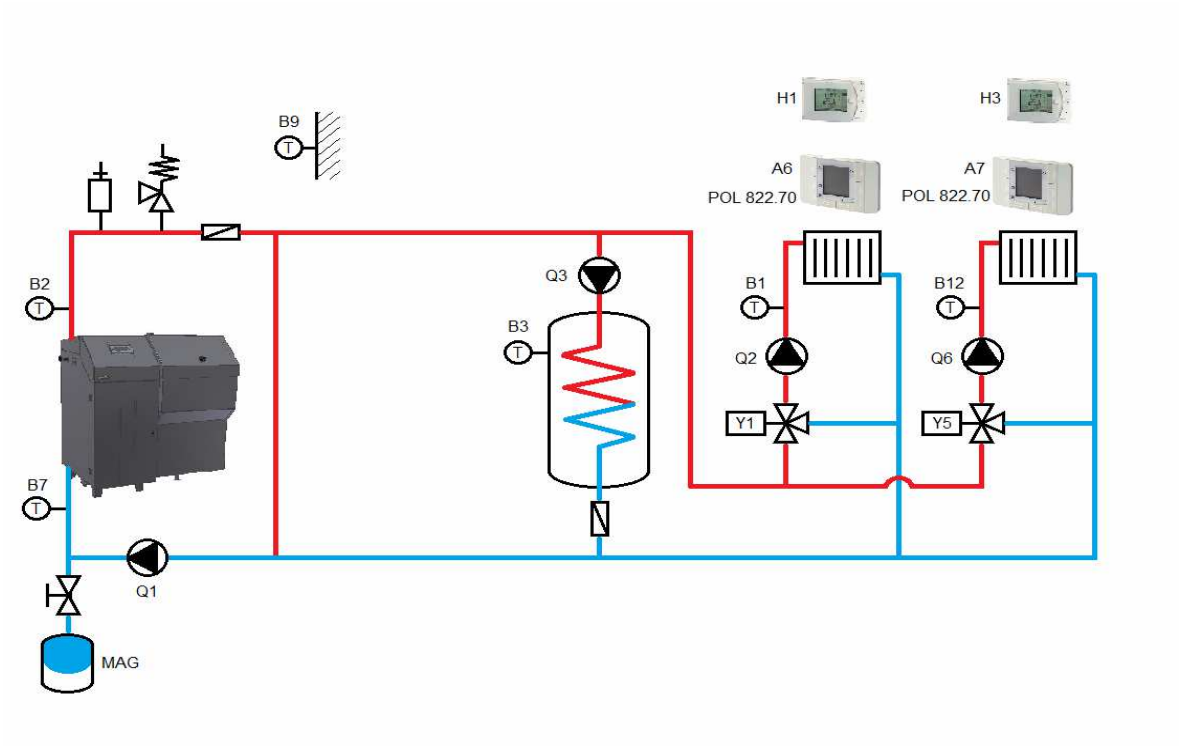
11.2. CONNECTION WITHOUT BUFFER STORAGE TANK (RETURN INFLUENCE MIXING VALVE)



Terminal board of the CLIMATIX II controller	Definition of input / output	Identification mark in the hydraulic diagram	Specification
M, B1	Boiler temperature sensor	B2	basic equipment of the boiler
M, B2	Flow temperature HC1 sensor	B1	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, B3	Return temperature sensor	B7	basic equipment of the boiler
M, X1	Flue gas temperature sensor	B8	basic equipment of the boiler (type: REGMET MA43PA-210)
M, X2	Outside temperature sensor	B9	typ: SIEMENS QAC 34/101 (NTC 1 kΩ)
M, X3	DHW temperature sensor	B3	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ)
M, X4	Flow temperature HC2 sensor	B12	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, X5	HC2 valve	Y5	see Valve HC1

M, X6	Boiler fan		basic equipment of the boiler
M, X7	HC2 valve	Y1	up to 15 kW: SIEMENS DN20, kv=4,0, SXP45.20-4/DC up to 25 kW: SIEMENS DN25, kv=6,3, SXP45.25-6,3/DC up to 50 kW: SIEMENS DN32, kv=16, VXP45.32-16 + actuator SSC61 up to 100 kW: SIEMENS DN40, kv=25, VXP45.40-25 + actuator SSC61
M, X8	Return valve	Y7	see Valve HC1
M, D1	External input		
M, D2	Backfire thermostat		basic equipment of the boiler
M, DU1	Room thermostat HC1	H1	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
M, DU2	Room thermostat HC2	H3	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
A+, B- (RS485)	Oxygen sensor		basic equipment of the boiler (type SST O2S-FR-T2-18C-103)
CE+, CE- (PB)	Room units	A6, A7	type: SIEMENS POL 822.70
Q1	Pump HC1	Q2	customer choice
Q2	Pump HC2	Q6	customer choice
Q3	DHW pump	Q3	customer choice
Q4	Flue damper		basic equipment of the boiler (developing)
Q5	Deasher		optional equipment of the boiler
Q6	Boiler pump	Q1	customer choice
Q7	Flue gas outlet		basic equipment of boilers BENEKOV R, S (otherwise optional)
Q8	Ignition		basic equipment of boilers BENEKOV R (otherwise optional)
DO1 (triac)	Feeder 1		basic equipment of the boiler
DO2 (triac)	Feeder 2		basic equipment of boilers BENEKOV R, S
DN, DL1	Boiler hopper lid		basic equipment of boilers BENEKOV R (otherwise optional)
DN, DL2	Safety thermostat (STB)		basic equipment of the boiler

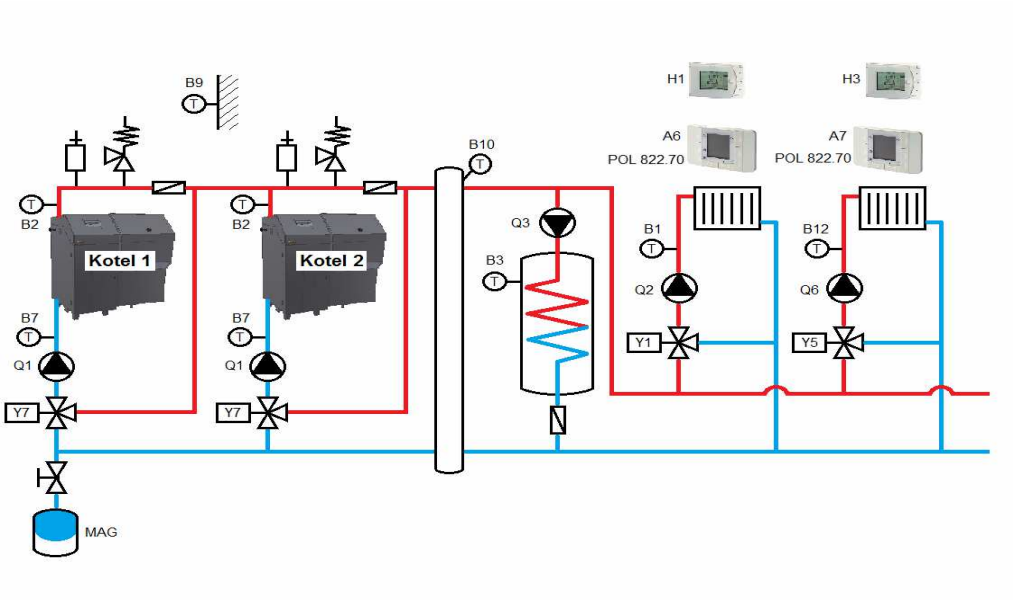
11.3. CONNECTION WITHOUT BUFFER STORAGE TANK (INFLUENCE OF APPLIANCE ON RETURN TEMPERATURE)



Terminal board of the CLIMATIX II controller	Definition of input / output	Identification mark in the hydraulic diagram	Specification
M, B1	Boiler temperature sensor	B2	basic equipment of the boiler
M, B2	Flow temperature HC1 sensor	B1	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, B3	Return temperature sensor	B7	basic equipment of the boiler
M, X1	Flue gas temperature sensor	B8	basic equipment of the boiler (type: REGMET MA43PA-210)
M, X2	Outside temperature sensor	B9	typ: SIEMENS QAC 34/101 (NTC 1 kΩ)
M, X3	DHW temperature sensor	B3	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ)
M, X4	Flow temperature HC2 sensor	B12	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, X5	Valve HC2	Y5	see Valve HC1
M, X6	Boiler fan		basic equipment of the boiler
M, X7	Valve HC1	Y1	up to 15 kW: SIEMENS DN20, kv=4,0, SXP45.20-4/DC up to 25 kW: SIEMENS DN25, kv=6,3, SXP45.25-6,3/DC up to 50 kW: SIEMENS DN32, kv=16, VXP45.32-16 + actuator SSC61 up to 100 kW: SIEMENS DN40, kv=25, VXP45.40-25 + actuator SSC61
M, X8			
M, D1	External input		
M, D2	Backfire thermostat		basic equipment of the boiler
M, DU1	Room thermostat HC1	H1	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
M, DU2	Room thermostat HC2	H3	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
A+, B- (RS485)	Oxygen sensor		basic equipment of the boiler (type SST O2S-FR-T2-18C-103)
CE+, CE- (PB)	Room units	A6, A7	type: SIEMENS POL 822.70
Q1	Pump HC1	Q2	customer choice
Q2	Pump HC2	Q6	customer choice

Q3	DHW pump	Q3	customer choice
Q4	Flue damper		basic equipment of the boiler (developing)
Q5	Deasher		optional equipment of the boiler
Q6	Boiler pump	Q1	customer choice
Q7	Flue gas outlet		basic equipment of boilers BENEKOV R, S (otherwise optional)
Q8	Ignition		basic equipment of boilers BENEKOV R (otherwise optional)
DO1 (triac)	Feeder 1		basic equipment of the boiler
DO2 (triac)	Feeder 2		basic equipment of boilers BENEKOV R, S
DN, DL1	Boiler hopper lid		basic equipment of boilers BENEKOV R (otherwise optional)
DN, DL2	Safety thermostat (STB)		basic equipment of the boiler

11.4. CONNECTION OF BOILERS IN A CASCADE

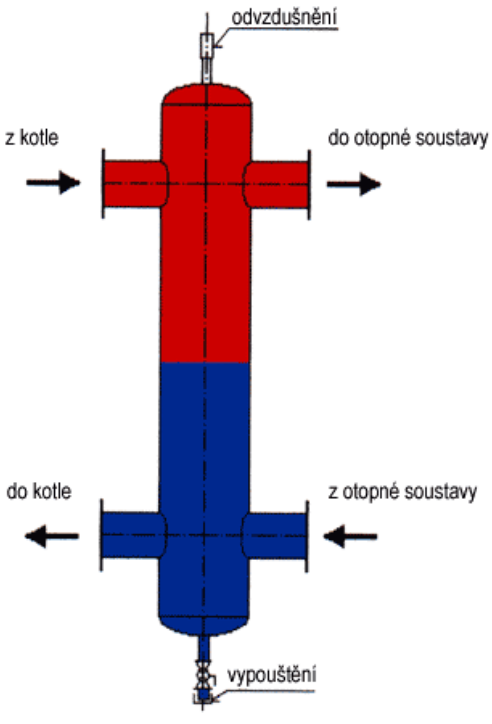


Terminal board of the CLIMATIX II controller	Definition of input / output	Identification mark in the hydraulic diagram	Specification
M, B1	Boiler temperature sensor	B2	basic equipment of the boiler
M, B2	Flow temperature HC1 sensor	B1	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, B3	Return temperature sensor	B7	basic equipment of the boiler
M, X1	Flue gas temperature sensor	B8	basic equipment of the boiler (type: REGMET MA43PA-210)
M, X2	Outside temperature sensor	B9	type: SIEMENS QAC 34/101 (NTC 1 kΩ)
M, X3	DHW/cascade temperature sensor	B3 / B10	part of the tank, type: SIEMENS QAZ 36.522/109 (NTC 10 kΩ) or to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, X4	Flow temperature HC2 sensor	B12	to be attached, type: SIEMENS QAD 36/101 (NTC 10 kΩ)
M, X5	Valve HC2	Y5	see Valve HC1
M, X6	Boiler fan		basic equipment of the boiler

M, X7	Valve HC1	Y1	up to 15 kW: SIEMENS DN20, kv=4,0, SXP45.20-4/DC up to 25 kW: SIEMENS DN25, kv=6,3, SXP45.25-6,3/DC up to 50 kW: SIEMENS DN32, kv=16, VXP45.32-16 + actuator SSC61 up to 100 kW: SIEMENS DN40, kv=25, VXP45.40-25 + actuator SSC61
M, X8			
M, D1	External input		
M, D2	Backfire thermostat		basic equipment of the boiler
M, DU1	Room thermostat HC1	H1	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
M, DU2	Room thermostat HC2	H3	type: SIEMENS REV24DC or REV24RFDC/SET (wireless)
A+, B- (RS485)	Oxygen sensor		basic equipment of the boiler (type SST O2S-FR-T2-18C-103)
CE+, CE- (PB)	Room units	A6, A7	type: SIEMENS POL 822.70
Q1	Pump HC1	Q2	customer choice
Q2	Pump HC2	Q6	customer choice
Q3	DHW pump	Q3	customer choice
Q4	Flue damper		basic equipment of the boiler (developing)
Q5	Deasher		optional equipment of the boiler
Q6	Boiler pump	Q1	customer choice
Q7	Flue gas outlet		basic equipment of boilers BENEKOV R, S (otherwise optional)
Q8	Ignition		basic equipment of boilers BENEKOV R (otherwise optional)
DO1 (triac)	Feeder 1		basic equipment of the boiler
DO2 (triac)	Feeder 2		basic equipment of boilers BENEKOV R, S
DN, DL1	Boiler hopper lid		basic equipment of boilers BENEKOV R (otherwise optional)
DN, DL2	Safety thermostat (STB)		basic equipment of the boiler

Other specifications of connection of boilers in a cascade can be found in chapters 1.2. and 7.2.

12. HYDRAULIC EQUALIZER OF DYNAMIC PRESSURES



The hydraulic equalizer of dynamic pressures (HEDP) separates the heating system from the heating circuit without interfering with the hydraulic stability of the heating circuit. Using HEDP helps decrease the excessive dynamic pressure of the circulation pumps of the boiler circuit which is transmitted to the heating system. HEDP ensures the hydraulic stability in the heating system. The flow of water in the boiler circuit is not affected by the heating system.

The hydraulic equalizer of dynamic pressures works best when the flow rate of the boiler circuit is by 5 to 10 % higher than the flow rate of the heating system.

The bottom of the upper part of the hydraulic equalizer is

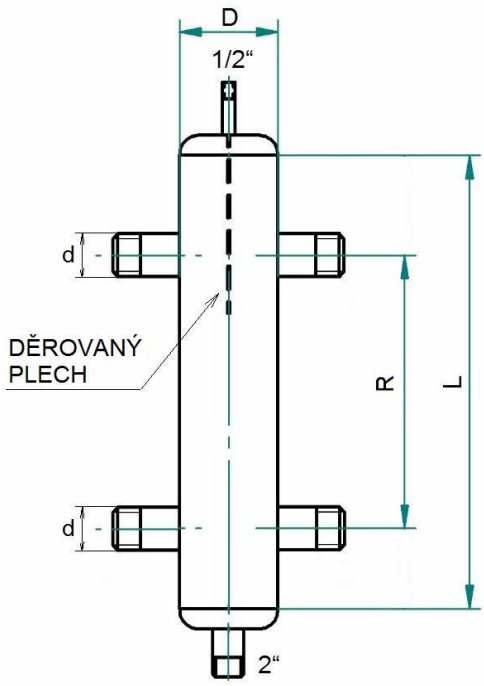
equipped with an automatic air release valve. It separates air and gases from the flowing water.

The hydraulic equalizer also collects sludge. The bottom of the lower part is equipped by a sludge draining fitting.

Sometimes it is also referred to as “hydraulic equalizer” (THR) or “torus”.

Principles for design of HEDP:

- The flow rate should range from 0.1 to 0.25 m/s.
- The circulation quantity of the boiler circuit should be by 20 to 50% higher than the nominal flow rate of the heating branches. The temperature gradient of the boiler circuit should be by c. 25% lower than the temperature gradient of the particular branches.
- The diameter of the inlet nozzles should be designed for a maximum speed of 1 m/s.
- The appliance must be installed in a vertical position.
- There is a perforated baffle plate between the upper nozzles.
- The tank for the water temperature sensor must be installed near the outlet nozzle of the heat transfer medium.



The following table for HEDP dimensioning can be used if the temperature gradient of the boiler circuit is 12 K; the temperature gradient of the branches is 15 K; the flow velocity in the distributor is c. 0.2 m/s.
Diameters “D“ and “d“ are internal diameters of the pipeline. Sizes “R” and “L” represent minimum values.

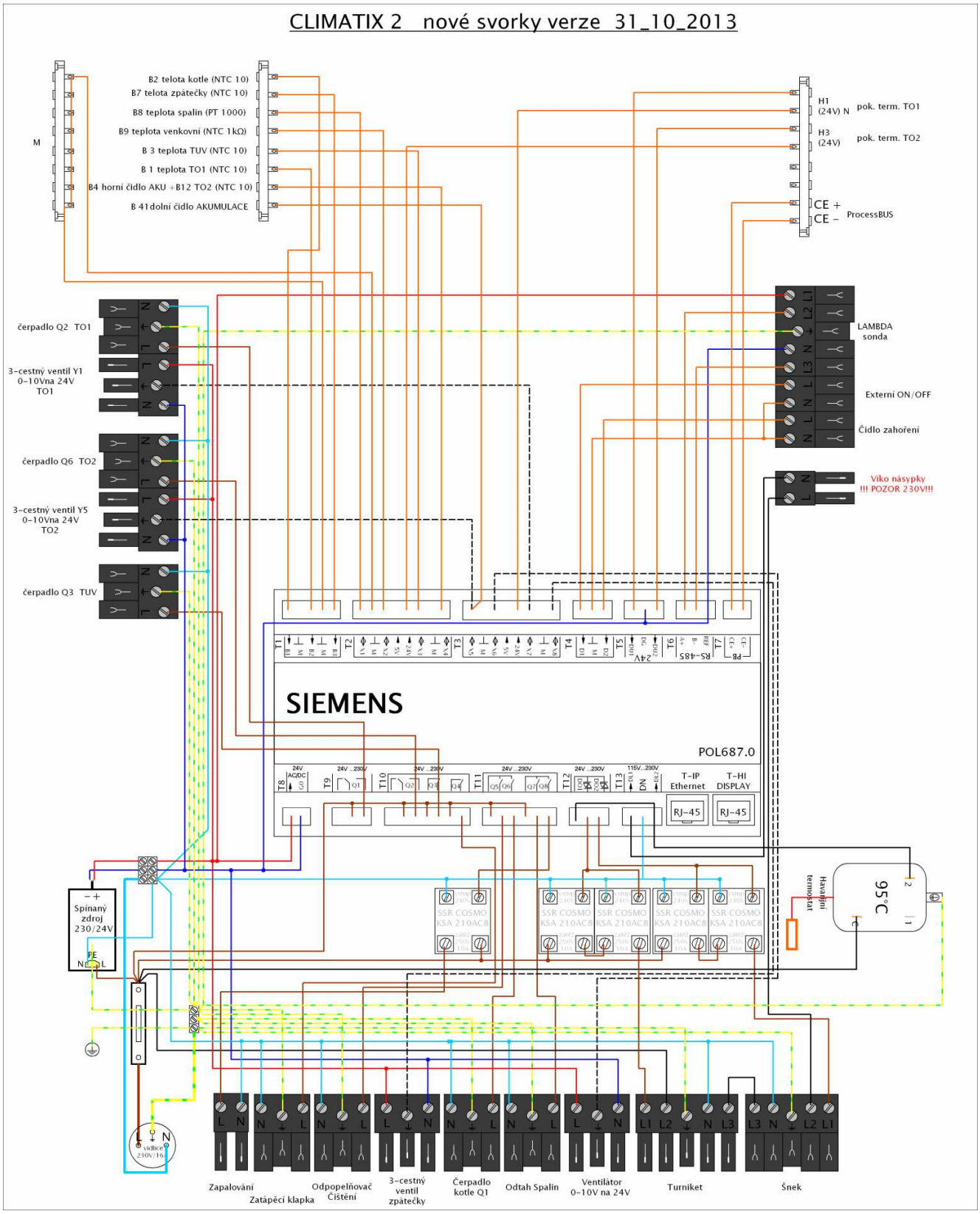
Total output of the heat source	kW	**50**	**80**	**100**	**180**	**250**	**400**	**600**	**850**	**1000**	**1500**	**2000**	**2500**
D	mm	80	100	100	150	200	200	250	300	350	425	480	480
d	mm	32	40	50	65	80	100	125	150	150	200	200	250
R	mm	220	290	320	440	515	620	750	890	970	1190	1370	1530
L	mm	370	480	540	730	860	1015	1250	1480	1610	1970	2270	2540

13. FITTINGS RECOMMENDED FOR CONNECTIONS WITH THE CLIMATIX CONTROL EQUIPMENT

Sensors	
fitting B1 - attached sensor SIEMENS QAD 36/101 (NTC 10 kΩ)	51105
fitting B3 - tank sensor SIEMENS QAZ 36.522/109 (NTC 10 kΩ)	55133
fitting B4 - tank sensor SIEMENS QAZ 36.522/109 (NTC 10 kΩ)	55133
fitting B41 - tank sensor SIEMENS QAZ 36.522/109 (NTC 10 kΩ)	55133
fitting B9 - outside sensor SIEMENS QAC 34/101 (NTC 1 kΩ)	51118
Fittings Y1 and Y7 - three-way mixing valves with actuator according to the boiler power	
fitting for the boiler power up to 15 kW, DN 20, kv = 4,0, SXP45.20-4/DC	51100
fitting for the boiler power up to 25 kW, DN 25, kv = 6,3, SXP45.25-6,3/DC	51184
fitting for the boiler power up to 50 kW, DN 32, kv = 16, VXP45.32-16 + actuator SSC61	79598+51181
fitting for the boiler power up to 100 kW, DN 40, kv = 25, VXP45.40-25 + actuator SSC61	79599+51181
Room thermostats and room units	
fitting H1, H3 - room thermostat REV24DC	51109
fitting H1, H3 - wireless room thermostat REV24RFDC/SET	51110
fitting A6, A7 - room unit POL 822.70	51195
Pump	
fitting Q1 - pump of the primary circuit Grundfos UPS 25-40	79509
fitting Q1 - pump of the primary circuit Grundfos UPS 25-65	79511
fitting Q3 - DHW pump Grundfos UPS 25-40	79509
fitting Q3 - DHW pump Grundfos UPS 25-65	79511
fitting Q2,Q6 - pumps of the heating circuits Grundfos ALPHA2 25-40	79513
fitting Q2,Q6 - pumps of the heating circuits Grundfos ALPHA2 25-60	79516

14. ELECTRICAL WIRING DIAGRAMS

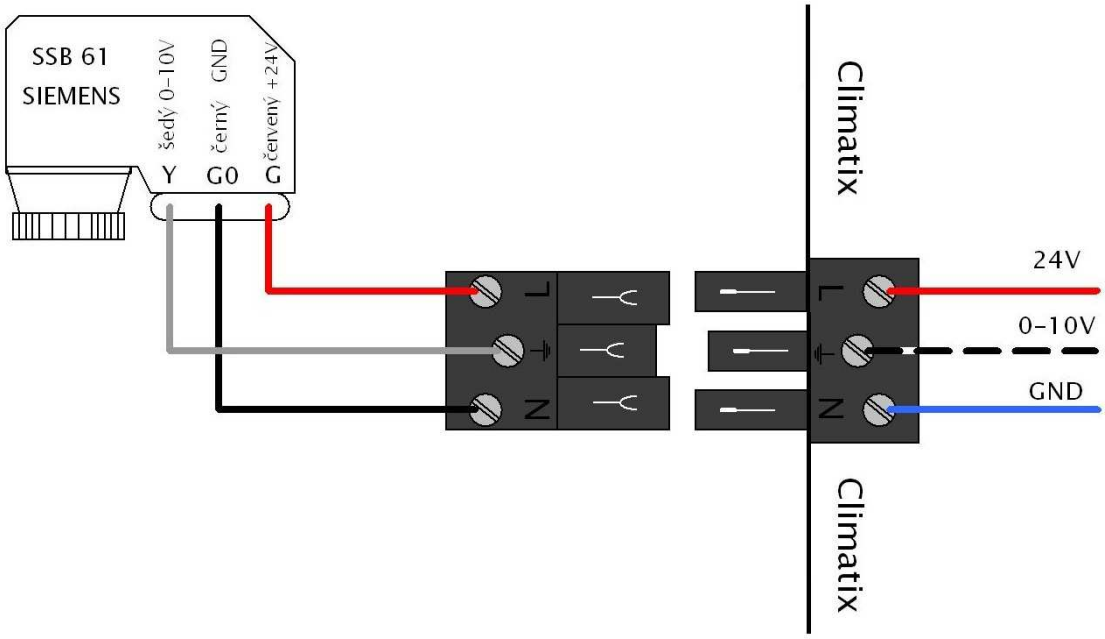
14.1. ELECTRICAL WIRING DIAGRAM OF CONNECTION OF THE CLIMATIX 2 CONTROLLER


CLIMATIX 2 nové svorky verze 31_10_2013
M
B2 telota kotle (NTC 10)
B7 telota zpátečky (NTC 10)
B8 teplota spalin (PT 1000)
B9 teplota venkovní (NTC 1kΩ)
B 3 teplota TUV (NTC 10)
B 1 teplota TO1 (NTC 10)
B4 horní čidlo AKU +B12 TO2 (NTC 10)
B 41dolní čidlo AKUMULACE
H1 (24V) N
pok. term. TO1
H3 (24V)
pok. term. TO2
CE +
CE –
ProcessBUS
čerpadlo Q2 TO1
3-cestný ventil Y1 0-10Vna 24V TO1
čerpadlo Q6 TO2
3-cestný ventil Y5 0-10Vna 24V TO2
čerpadlo Q3 TUV
LAMBDA sonda
Externí ON/OFF
Čidlo zahoření
Víko násypky
!!! POZOR 230V!!!
SIEMENS
POL687.0
T-IP Ethernet
T-HI DISPLAY
RJ-45
RJ-45
Spínaný zdroj 230/24V
Havarijní termostat
95°C
SSR COSMO KSA 210AC8
Zapalování
Zatápěcí klapka
Odpopelňovač
Čištění
3-cestný ventil zpátečky
Čerpadlo kotle Q1
Odtah Spalin
Ventilátor 0-10V na 24V
Turniket
Šnek

14.2. ELECTRICAL WIRING DIAGRAM OF CONNECTION OF MIXING VALVES ACTUATORS Y1, Y5, Y7

This applies to electric actuators **SIEMENS SSB 61** (for outputs from 0 to 40 kW) or **SIEMENS SSC 61** (for outputs from 40 to 100 kW):

- supply voltage AC / DC 24V
- control signal DC 0 – 10V
- if DC = 0V valve is fully closed (A => AB)
- if the supply voltage is disconnected, the actuator spindle maintains its current position
- actuator SSC 61 is supplied without a connecting cable



Captions:
Y – control signal DC 0-10V
G0 – system neutral GND 24V
G – system potential +24V

14.3. ELECTRICAL CONNECTION OF BOILERS IN A CASCADE INCLUDING CONNECTION OF ROOM UNITS POL 822.7 WITH INTERNET CONNECTION