SAUTER flexotron800 V2
Heating user program

User guide
P100013572

Contents

1 About this user guide

This user guide covers all the models in the flexotron800 series used for heating control. The functions described here are for users with the **Operator** access level or **lower**.

Version A, August 2014

Software status: 3.3

More information on the flexotron800 can be found in the following documents:

flexotron800 ventilation user manual – complete user manual for configuring and operating the flexotron800 ventilation controller, available in English, German and French.

CASE flexotron user manual – user manual for configuring the controllers using the CASE flexotron PC software, available in English, German and French.

Network variables – list of variables for Modbus and BACnet communication, available in English.

CE declaration of conformity, flexotron800

This information can be downloaded from http://www.sauter-controls.com/de.

1.1 Disclaimer

The information in this user manual has been carefully checked and judged to be correct. Fr. Sauter AG makes no guarantee regarding the content of this manual and requests the reader to report any errors, inaccuracies or unclear formulations so that they can be corrected. The information in this document is subject to change without notice.

1.2 Trademark

flexotron is a registered trademark of Fr. Sauter AG.

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1.3 Safety information

1.3.1 Compulsory note

A compulsory note contains important information that must be considered. It can contain the following:

- A regulation
- Important information

A compulsory note appears after this symbol. If it is not adhered to, serious errors can occur in the software.

1.3.2 General note

A general note is information that aids understanding and can contain the following:

- Background information
- A particular scenario

A general note could appear here.

1.4 Information on using the user guide

1.4.1 Mark-ups

Syntax	Use	Action
[SHIFT]	Press key	Press the “shift” key once
[SHIFT] + [SELECT]	Key combination pressed simultaneously	Press the “shift” and “select” keys simultaneously
[SHIFT] [SELECTION]	Press key sequence	First press the “shift” key, then the “selection” key
Operation	Cross-reference, name of chapter	See chapter *Operation*

1.4.2 Activity instructions

Activity instructions describe work steps that are to be carried out in sequence.

Prerequisite:
Informs the target group about prerequisites that must be fulfilled before the actual activity is carried out.

1. First step

2. Second step
➲ Intermediate result

3. Third step

4. Last step
➲ Final result of activity

2 Regarding the flexotron800

The flexotron800 devices comprise a series of pre-programmed, configurable controllers for various applications.

The flexotron800 series is available in three model sizes, with 8, 15 or 28 inputs/outputs.

The controllers are available with or without a display and buttons. For all controllers, an external display with buttons (RDB800) can be connected.

All the standard functions can be carried out using the display and buttons, or with the CASE flexotron configuration tool. CASE flexotron is installed on a computer and connected via a cable to the controller.

Fig. 1 Picture of flexotron800

2.1 Heating control: Summary of functions

The controller has programs for heating, domestic hot water, cooling and boiler control.

The temperature controller is based on PI controllers with pre-programmed control functions. Various control functions and analogue and digital input and output functions can be activated in this controller. Certain functions are mandatory, while others can be selected as options. This means that the display varies according to the model and the selected functions.

Changes to functions cannot be made with the Operator access level described in this manual, but only by users with administrator rights. Also, this should only be done by trained staff. The same goes for all other configurations.

The following functions are among those included in the heating control:

Heating control
The flexotron800 can be configured for 1-3 heating systems (HS1, HS2 and HS3).

The controllers have individual control characteristics for the relationship between the supply temperature and the outside temperature. The heating systems have individually adjustable minimum and maximum temperature limits for the supply and return.

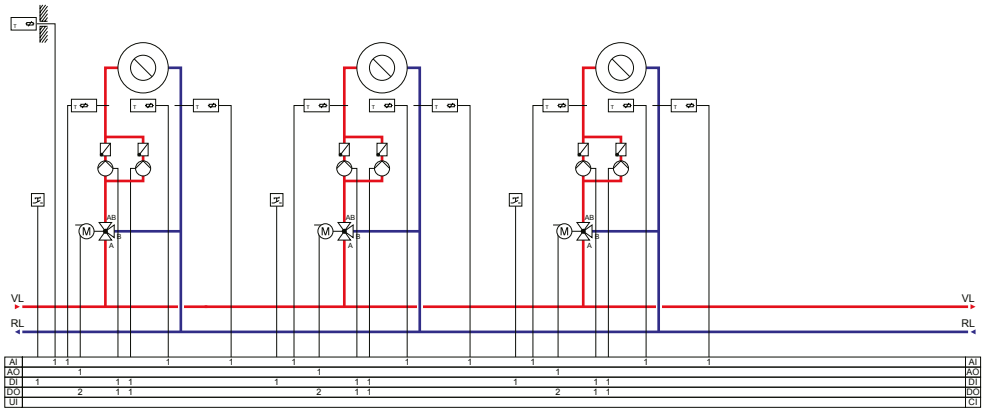


Fig. 2 Heating circuits with the maximum number of available elements

Pump control
Each circuit can be equipped with single or twin pumps. With twin pumps, only one of the pumps is operated at a time. They automatically switch over once a week. If the active pump fails, the inactive pump is automatically started up.

Frost-protection facility
If a controller is in OFF or MANUAL mode and the outside temperature falls below a set value, an adjustable minimum supply temperature is maintained and the pump starts up.

Night reduction

The night reduction is set using the room temperature.

Cooling system

A cooling system can be configured using the controller. The setpoint for the cooling system can be fixed or weather-dependent.

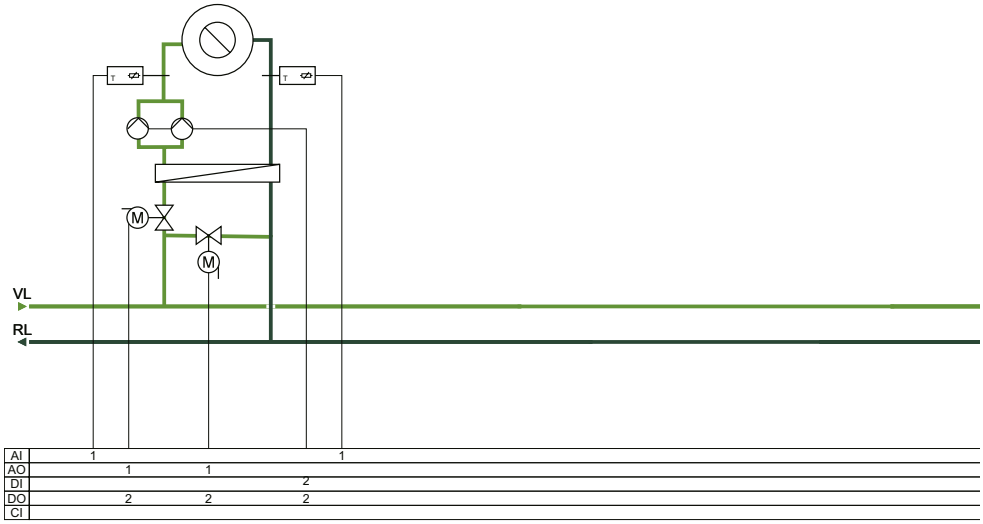


Fig. 3 Cooling circuit with the maximum number of available elements

Pump control

A digital output can be used in the cooling system to control the pump. The pump can be configured either for continuous operation or with pump stops.

Temperature limiter

The supply temperature can be assigned a value as a fixed upper limit. It is also possible to set upper and lower limits for the return temperature.

Domestic hot water

The flexotron800 can be configured for either one or two domestic hot water circuits, HW1 and HW2. These are regulated using a constant supply temperature.

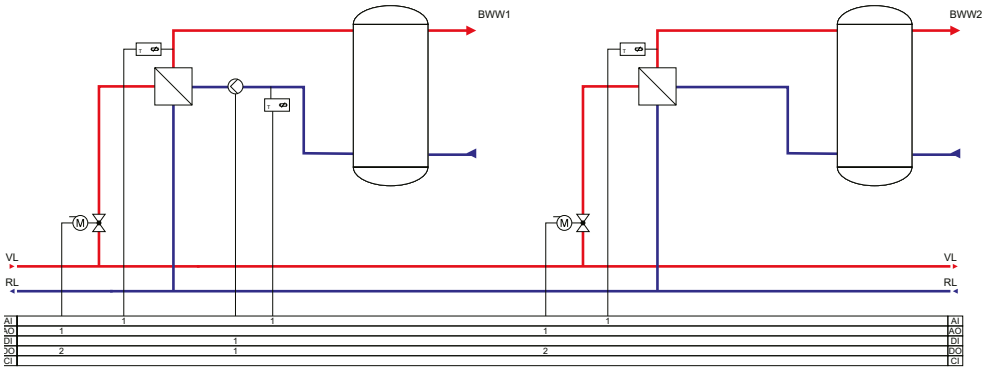


Fig. 4 Domestic hot water with the available elements

The circulation pump of the first circuit can be controlled using a digital output signal.

To prevent the risk of legionella bacteria, the anti-legionellae function for the first circuit, HW1, can be activated.

Boiler control

The flexotron800 can be configured to control up to 4 boilers. The burners for each boiler can be set to 1-step, 2-step or modulating regulation, depending on the type of boiler control.

The boiler control setpoint can be adjusted to a fixed value or according to the heating/domestic hot water control loop.

To minimise the risk of condensation in the boiler, the return temperature can be regulated.

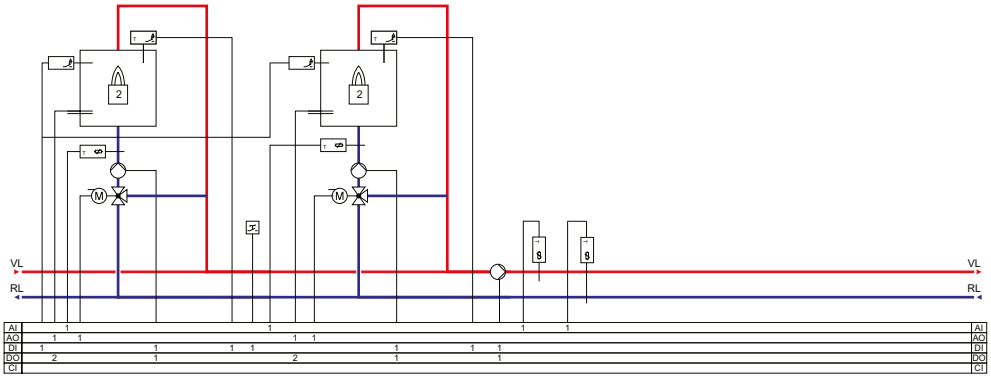


Fig. 5 Boiler circuits with two of the maximum four available boilers.

Consumption measurements

Measurements and monitoring of cold water consumption, energy consumption, leak monitoring and electricity meters can be configured using pulse inputs.

3 Display, buttons and LEDs

This chapter applies to flexotron800 controllers with display and buttons, as well as to RDB800 external displays, which can be connected to flexotron800 units without display and buttons.

RDB800F002

3.1 Display

The display has four rows of 20 characters and is backlit. The lighting is normally off. The lighting is activated when the buttons are pressed, and is switched off again after a certain period with no activity.

```
Heating controller
 2013-11-27 14:10
HS1
Sp: 52.0 Act: 52.5
```

Display, buttons and LEDs

3.2 Buttons and LEDs

ARROW up [Up button]:
Scroll up the menu.
(Increase parameter value)

ARROW down [Down button]:
Scroll down the menu.
(Decrease parameter value)

ARROW right [Right button]:
Open submenu.
(Set cursor to the right of the parameter)

ARROW left [Left button]:
Quit submenu.
(Set cursor to the left of the parameter)

OK:
Opens/activates the selected menu or setting.
(Confirms a parameter value)

Alarm:
List of alarms.

Correction:
Reset or cancel a change to parameter values if it has not been confirmed with [OK].

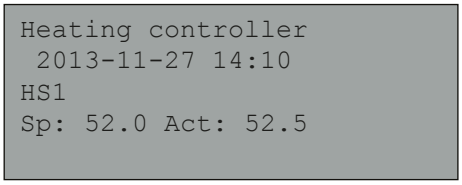
Alarm LED:
The alarm indicator flashes red for unacknowledged alarms. The alarm indicator lights up constantly for alarms that have been acknowledged but not reset.

Input LED:
Some menus have adjustable values. These are indicated by the flashing yellow LED. The value can be changed by pressing the [OK] button.

4 The menu system

4.1 Menu navigation

Depending on the user/access level, the corresponding menu is displayed.



The start menu is on the basic level of the menu tree. The appearance of the start menu depends on the settings in the configuration. The text in the first line can also be changed with CASE flexotron.

The abbreviations Sp and Act stand for the setpoint and actual value of the controller.

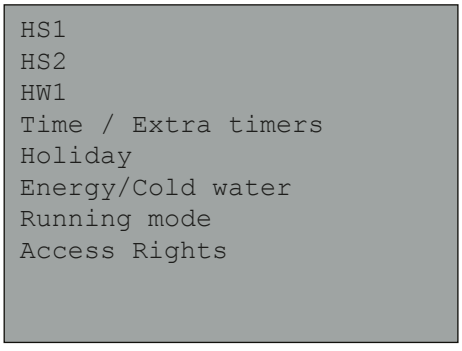
Actual value = the currently measured temperature.

Setpoint = the desired/set temperature.

Press the [Down button] to go through the menus to the lowest level. Press the [Up button] to go back up.

Depending on your access level, various menus are displayed (see section 4.7 *Access levels* for more information on logging into a higher access level).

On the basic level, which is displayed without a user logging in, a limited number of menus and submenus are displayed. The operating mode of the device can be changed and alarms can be acknowledged.



Sometimes there are further submenus linked to a menu or menu item.

Additional menus are indicated by an arrow symbol in the right corner of the display. Use the [Right button] to select them. Use the [Left button] to go back one menu level.

HS1..HS3, HW1..2, CS1, … (controller systems)
The setpoints and actual values can be viewed in the various controller systems, the controller properties can be set, and manual mode can be activated.

Time/Extra timers
The time, date and set periods of use are shown here. Values can only be changed with Operator, Service or Admin access level.

Holiday
Holiday times are displayed here. Up to 24 separate holiday periods can be configured for a whole year in advance. Values can only be changed with Operator or Admin access level.

Running mode
Access to the alarm tab for reading the current values and the alarm log.

The Inputs/Outputs submenu displays the raw values from the sensors, the signals at the analogue outputs and the current status of the digital inputs and outputs.

Access rights
In this menu you can change to a higher access level. In addition, you can change the password or log out of the current access level and continue on the basic level.

4.1.1 Editing parameters

You can edit parameters in some menus. This option is indicated by the flashing yellow LED  .

If the LED flashes rapidly (twice per second), the parameters can be changed using the current access level.

If the LED flashes more slowly (once per second), a higher access level is required to edit the parameter.

To edit a parameter, first press the [OK] button. If you need a higher access level to edit the parameters, a corresponding login menu appears (see below). Otherwise, the cursor appears next to the editable values. Press the [Up button] and [Down button] to edit the value.

In numbers containing several digits you can move between the digits using the [Left button] and [Right button].

When the required value is displayed, press [OK].

If there are other editable values, the cursor automatically moves to the next one.

To skip a value without editing it, press the [Right button].

To reverse a change and return to the original setting, press and hold the [C] button until the cursor disappears.

The following section contains some of the menus which display controller systems, timer outputs, holidays, alarms and the status of inputs and outputs.

4.2 HS1..HS3, HW1..2, CS1, …

```
Actual/setpoint
Temp control
Manual/auto
HS1 ECO/comf mode
```

If you select one of the various controller systems, four submenus are displayed, with the exception of the extra control loop and HP, where only two submenus (Actual/setpoint and Manual/auto) are available.

The systems that you can then access depend on which inputs and outputs are configured.

4.2.1 Actual/setpoint

HS1, HS2 and HS3

```
Outside temp: -5 °C
HS1
Act: 49.8 °C Setp.→
Setp.: 55.0 °C
```

Weather-dependent setpoint submenu:
Here you can set the supply temperature for a particular outside temperature. You can set eight schedule start points for each system.

The values in between must be calculated by linear interpolation. Only the values for the supply temperature can be changed on the flexotron800. The outside temperature values can be changed using CASE flexotron.

```
Outd comp setp HS1
-20 °C = 67 °C
-15 °C = 63 °C
-10 °C = 59 °C
```

The heating systems have individual pump stop temperatures for day and night.

```
Pump stop HS1:On
Stop temp day: 17°C
Stop temp night: 17°C
Hysteresis: 2.0 °C
```

Submenu: Room temperature sensor
Room temperature setpoint configuration. This menu is only available if the room temperature sensor is configured.

```
Room sensor HS1
 Act: 20.8 °C
Setp: 21.0 °C
```

Submenu: Return temperature

```
Return temp
HS1: 28.0 °C
```

CS1
The setpoint for the cooling system can be fixed or weather-dependent. With a constant setpoint:

```
CS1
Act: 13.0 °C
Setp:13.0 °C
```

With a weather-dependent setpoint:

```
Outside temp: 21.8°C
CS1
Act: 13.2°C Setp. ->
Setp: 13.0°C
```

Press the [Right button] to go to set the supply temperatures for particular outside temperatures when a weather-dependent setpoint is selected. You can set up to eight schedule start points.

```
Outd comp setp CS1
 20 °C = 15 °C
 22 °C = 14 °C
 24 °C = 13 °C
```

The cooling system has individual pump stop temperatures for day and night.

```
Pump stop CS1:On
Stop temp day: 15°C
Stop temp night 15°C
Hysteresis: 2.0 °C
```

HW1 and HW2

Actual value and setpoint for domestic hot water.

```
Supply temp. HW1
 Act: 53.0 °C
Setp: 55.0 °C
```

HP1

Actual value and setpoint for hot water preparation

```
Supply HP1
55.0°C
```

Boiler

Different screen displays appear, depending on the type of setpoint selected for boiler control.

Alternative 1 – constant setpoint:

```
HB setp:
36 °C
HB act.:
36.5 °C
```

Alternative 2 – control loop setpoint:

```
HS-depending setp
 + 5.0 °C
HB setp: 43.0 °C
HB act.: 43.2 °C
```

Alternative 3 – weather-dependent setpoint:

```
Outside temp: 5 °C
HB
Act.: 43.3 °C Setp ->
Setp: 43.0 °C
```

To set the weather-dependent characteristic, eight points:

```
Outd comp setp HB
 -20 °C = 67 °C
 -15 °C = 63 °C
 -10 °C = 59 °C
```

4.2.2 Temperature control

P-band and I-time settings of the various controllers.

```
HS1
P-band: 100.0 °C
I-time: 100.0 s
```

Submenu: Only available for HS1 and HS2.

```
HS1 Return temp.
P-band: 100.0 °C
I-time: 100.0 s
```

4.2.3 MANUAL/AUTO

All configured control loops can be manually controlled between 0 and 100%. All configured pumps can be set to AUTO, ON or OFF.

If an output is manually controlled, it means that normal regulation is disabled. For this reason, an alarm is generated whenever an output is set to an operating mode other than AUTO.

The menu display depends on the configuration, which is why not all the screens are shown here.

HS1..3, HW1..2, CS1
Manual operation / reading control signals for the actuators.

```
Manual/auto
HS1
Auto
Manual mode: 37
```

Submenu: For manual operation or reading the pumps

```
Manual/auto HS1
P1A: Auto
P1B: Auto
```

Boiler
Menu for setting the burners, circulation pumps, return valves and transport pumps to manual mode. The menu structure depends on the configuration.

Alternative 1, OFF/ON:
Boilers 1 to 4 can be set to AUTO/MANUAL OFF/START1/START2 with 2-step burners and to AUTO/MANUAL OFF/MANUAL ON with 1-step burners.

```
Manual/auto
Boiler 1: Auto
```

Alternative 2, control with OFF/ON/MODULATING:
If a modulating burner has been selected for boiler 1:

```
Manual/auto
Modulating boiler
Auto
Manual set: 2 %
```

Alternative 3, modulating regulation:

```
Manual/auto
Modulating boiler
Auto
Manual set: 56 %
```

The AUTO/MANUAL OFF/MANUAL ON setting is for manual operation of boiler pumps 1 to 4.

```
Manual/auto
Boiler pump1:
Auto
```

The AUTO/MANUAL OFF/MANUAL ON setting is for manual operation of the transport pump.

```
Manual/auto
Transport pump:
Auto
```

The AUTO/MANUAL OFF/MANUAL ON setting is for manual operation of return valves 1 to 4.

```
Manual/auto
HB1 return temp
Auto
Manual mode: 0.0
```

4.2.4 ECO/comfort function

Two comfort temperature periods can be set for every day. When the heating system is outside its comfort periods, it is put into ECO (economy) mode.

HS1, HS2, HS3, HW1, HW2 and CS1

```
HS1 ECO/comf mode
On →
 5°C (room temperature)
```

Submenu: Setting the comfort periods.

Each controller system has eight separate setting menus – one for every day of the week and an additional one for the holiday programme. The holiday programme has priority over the other programmes.

For all-day operation, set a period of 00:00–24:00. To deactivate a period, set it to 00:00–00:00.

```
HS1 Comfort time
Monday
Per 1: 07:00 - 16:00
Per 2: 00:00 - 00:00
```

4.3 Time/Timer outputs

General information

The controller has a calendar programme where weekly schedules and holidays can be set for the whole year.
The switch between summertime and wintertime is performed automatically. To see timer outputs 1-5 in the display, they must first be configured.

```
Time/Date
Timer output 1
Timer output 2
Timer output 3
Timer output 4
Timer output 5
```

Time/Date

This menu enables you to view and change the time and date.
The time is shown in the 24-hour format.
The date is shown as YY:MM:DD.

```
Time: 18:21
Date: 13:11:25
Weekday: Wednesday
```

Timer outputs

Up to five separate digital timer outputs can be configured. Each has a weekly programme with two activation periods per day. Each channel has eight separate setting menus – one for every day of the week and an additional one for the holiday programme. The holiday programme has priority over the other programmes.

```
Timer output 1
Monday
Per 1: 07:00 - 16:00
Per 2: 00:00 - 00:00
```

4.4 Holiday

Up to 24 separate holiday periods can be configured for a whole year in advance.

A holiday period can be both a single day and up to 365 consecutive days. Holiday schedules take precedence over other schedules.

```
Holidays (mm:dd)
1: 01:01 - 02:01
2: 09:04 - 12:04
3: 01:05 - 01:05
```

4.5 Energy/Cold water

This menu displays the readings from the pulse meter inputs. The pulse constants (pulses per unit) are defined in the Configuration/Pulse constants menu.

```
Heating meter
Cold water meter 1
Cold water meter 2
Electricity meterLeakage
monitoring
```

Heating meter

```
Energy total
 1532.3 MWh
Hot water total
 387.02 m3
```

The values below can be reset.

```
Energy
 Today: 28.15 kWh
 Yesterday: 123.45 kWh
 D B Y-day: 132.11 kWh
```

```
Usage
     Today: 28.15 l
 Yesterday: 123.45 l
 D B Y-day: 132.11 l
```

```
Power usage
  Instant: 2100.0
Average/h: 3200.0
Max aver.: 5300.0
```

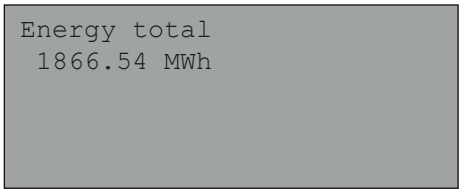
Cold water meters CW1 and CW2

```
CW1 Usage total
 276.22 m3
CW2 Flow
 156.4 l/min
```

```
CW1 Usage
     Today: 88.1 l
 Yesterday: 4123.4 l
 D B Y-day: 5012.1 l
```

```
Lowest CW1 usage
Today: 0.1 l/h
Yesterday: 0.2 l/h
```

Electricity meter

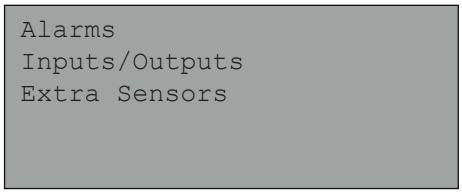


This value can be reset.

Leakage monitoring

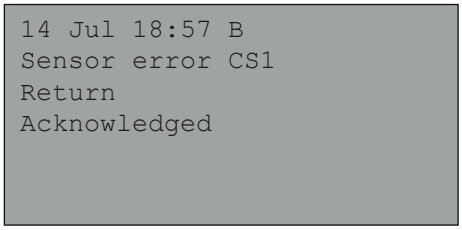
4.6 Running mode

You cannot make changes in the Running mode menu. It is simply for viewing the current values and alarm log.



Alarms

The alarm log of the flexotron800 contains the 40 most recent alarms. The latest event is at the top of the list. The alarm log is solely for viewing alarms in order to assist troubleshooting.



Inputs/Outputs

The Inputs/Outputs menu displays the raw values from the sensors, the signals at the analogue outputs and the current status of the digital inputs and outputs.

```
AI
DI
UI
AO
DO
```

```
AI1: -3.5 Outd temp
AI2: 53.7 HS1 Supply
AI3: 54.8 HW1 Supply
AI4: 50.6 HS1 Return
```

```
DO1: On HS1-PumpA
DO2: Off HS1-PumpB
DO3: Off Inc HS1-Act.
DO4: On Dec HS1-Act.
DO5: On HW1-Pump
DO6: On HS2-PumpA
DO7: On Sum alarm
```

Extra sensors

Up to five extra temperature sensors can be connected. They are only used to display the temperature. You can give the sensors any name you want. To do this, press the [OK] button and then use the [Up button] and [Down button].

```
Extra Sensor1
Act: 51.2 °C
```

4.7 Access rights

There are three different access levels:

- Basic (the lowest level, where no login is required)
- Operator
- Admin

Admin is the highest level with the most access rights. The access level determines which menus and editable parameters are displayed.

Basic level permits changes in the operating mode and read-only access to a limited number of menus.

Operator level gives access to all menus except “Configuration”.

Admin level gives full read/write access to all settings and parameters in all menus.

To log into the various access levels, repeatedly press the Down button in the start display until the arrow in the left of the display points to “Access rights”. Then press the [Right button].

```
Log on
Log off
Change code
```

4.7.1 Log on

In this menu it is possible to log into any access level by entering the appropriate 4-digit password (code). The menu is also displayed if you try to access a menu or carry out a function that requires a higher access level.

```
Log on
Enter code:****
Actual level: None
```

When you press the [OK] button, the cursor jumps to the first digit. Repeatedly press the [Up button] to set the digit.
Press the [Right button] to go to the next digit.
Repeat the procedure for all four digits of the password. Press [OK] to confirm. An info text with the current access level appears in the display. Use the [Left button] to quit this menu.

The code for the Operator access level is 3333.

4.7.2 Log off

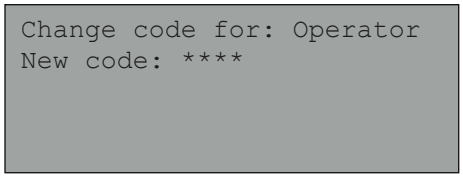
Use this menu to log out from the current access level to the Basic level that does not require a login.

4.7.3 Automatic logout

If the access level is Operator, Service or Admin, the user is automatically logged out and returned to Basic level after a period of inactivity. The time for this can be set.

4.7.4 Change code

The code can only be changed for the current access level or a lower one.



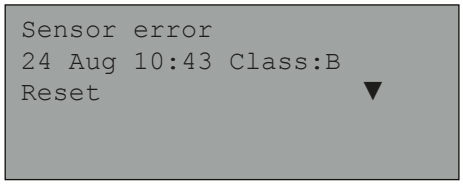
5 Other functions

5.1 Alarm handling

If an alarm occurs, the red alarm LED flashes either on the front panel of controllers with a display or on an external display. The LED flashes as long as there are unacknowledged alarms.

Alarms are logged in the alarm list. The list shows the type of alarm, the date and the time, and the alarm class (A, B or C).

Press the [Alarm button] on the front panel to see the alarm list.



If there are several alarms, two arrows (up/down) appear on the right of the display.

Use the [Up button] and [Down button] to scroll to the other alarms.

The alarm status is shown in the bottom left of the display. For active, unacknowledged alarms this field is blank. Unacknowledged alarms that have been reset are marked as returned. Acknowledged alarms or alarms that are blocked but still active are indicated as acknowledged or blocked.

In order to acknowledge an alarm, you must first press [OK]. You can then either acknowledge the alarm or block it.

Acknowledged alarms remain on the alarm list until the cause of the alarm has been eliminated.

Blocked alarms remain on the alarm list until the cause of the alarm has been eliminated and the block has been removed. New alarms of the same type will not be activated as long as the block remains.

Because blocking alarms can be potentially hazardous, you need a high user access level to do this.

Class A and B alarms activate alarm outputs if these have been configured.

Class C alarms are removed from the alarm list when the alarm inputs are reset, even if they are not acknowledged.

5.2 Individual text field

If you press the [Right button] in the start menu, a display appears with a text that you can customise.

You can use the text for the name of the installing company, for service contacts and telephone numbers or other information.

The easiest way is to enter the text using CASE flexotron, but you can also use the buttons. Up to four lines, each with 20 characters, can be individually edited.

5.3 Version number

Press the [Right button] twice in the start menu to see the version number of the program and the ID number in the display.

5.4 Language

5. Go to the Start menu.

6. Press the [Right button] three times
➲ The menu for setting the language is displayed

7. Press the [OK] button.

8. Use the [Up button] or [Down button] to select the required language.

9. Confirm the selection using the [OK] button.
➲ The selected language is activated.

The various languages are stored in the controller application memory and are loaded to the RAM.

5.5 Indicator LEDs

The status is shown in the upper left corner of the controller. On controllers with a display, the alarm indicator and mode selection LEDs are beside the buttons.

5.5.1 Status indicator

Information	Colour	Description
P1 RxTx	Yellow/ green	Interface 1, send/receive
P2 RxTx	Yellow/ green	Interface 2, send/receive
TCP/IP (TCP models)	Yellow/ green	Green: Connection to other network devices Flashing green: Network data transfer Flashing yellow: For identification
P/B (power supply / battery)	Green/red	Power supply on / battery fault
Controller with built-in display:	-	-
	Red	Alarm display
	Yellow	Input mode

5.5.2 Changing the battery

The flexotron800 controller has a back-up battery for the memory and real-time clock in the event of a power failure.

If the “internal battery” alarm is triggered and the battery LED lights up red, the battery must be replaced. A back-up capacitor protects the content of the memory for at least 10 minutes without power.

The battery may only be changed by trained staff.

5.6 Start assistant

When the controller is switched on for the first time, it runs through a special procedure: Information on the type, communication settings and software version is displayed.

1. Use the [Down button] to select the Application entry. Press the [Right button] to confirm.

2. Select the application.

- ▶ flexotron800 Vent. (ventilation application)
- ▶ flexotron800 Heat. (heating application)
- ▶ Expansion unit 1
- ▶ Expansion unit 2

- ▶ Preloaded vtc-files (prepared configuration files)
  Use the [Down button] to put the cursor on flexotron800 Heat. Press the [Right button] to confirm.

3. Confirm with [OK] to activate the prepared configuration.
- ▶ The cursor flashes on Activate: NO

4. Press the [Up button] or [Down button] to set the Activate? entry to YES, and confirm with [OK].
- ➲ The program loads and the default display appears.

5.7 Basic configuration for heating

The start assistant (see previous section) selects a configuration for each type of device. This configuration can be applied without changes, or can be used as a starting point for individual customisations.

Illustrations

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Printed in Switzerland