



Providing sustainable energy solutions worldwide

Installation- and maintenance instruction

## **CTC 380 IC**

Oil condensing boiler unit

Models 35/43



**Enertech** Group



# CTC 380 IC

Models 35/43





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**Burner manual at the latter part of this folder**



# 1. Introduction

## 1.1 General information

- CTC 380 IC is a 3-stroke oil condensing boiler unit which meets the progressive demands on profitability, convenience and environmental sustainability.
- CTC 380 IC was designed to minimise polluting emissions.
- CTC 380 IC is available in six sizes from 18 to 45 kW.
- CTC 380 IC provides the heating and hot water supply for the entire house.
- CTC 380 IC has heating connections directed upwards and backwards to facilitate installation.
- CTC 380 IC is equipped with an aligned and enhanceable comfort control which comprehensively meets the need for convenient and energy-saving operation.
- CTC 380 IC is equipped with a highly efficient Spiro-Condens system for effective calorific value usage.
- CTC 380 IC can be easily cleaned thanks to the generous door and even-wall heating surface.
- The type name of the boiler can be found on the product data plaque on the top of the boiler.

# 2. Important points

**Read and observe this installation and operating manual before installing and starting the boiler.**

## 2.1. Important points

The following important points must be checked during installation:

- Unpack CTC 380 IC on delivery and check whether the product was not damaged in transit.
- Any transport damage must be reported to the supplier (carrier).
- Check whether an overflow line was laid from a possible installed safety valve to the floor drainage.
- Examine the condition of the chimney, take measures against condensation water formation.

## 2.2 Safety instructions

The following safety instructions must be observed when handling, installing and operating the boiler:

- An unlockable safety valve which corresponds to the applicable norms must be installed in an enclosed system; please refer to Section INSTALLATION.
- Ensure that the boiler is disconnected from the mains supply before making changes.
- The boiler and the regulation equipment must not be rinsed with water.
- The smoke duct and the boiler room duct for ventilation must not be blocked.
- Check whether the burner and its oil duct are leakproof.
- The boiler's switch must be deactivated when the oil burner is swivelled out, e.g. during cleaning or maintenance.

## 2.3 General installation conditions

Smooth operation of the boiler series CTC 380 IC and the manufacturer's warranty are only ensured if installation and operation are performed in compliance with these instructions and the boiler is regularly cleaned.

Faults and damages which are caused by improper and violent damage do not release the manufacturer from this warranty obligation.

Please hand over these instructions to your customer after installation.

### **Regulations:**

**The boiler and the heating system must be installed in compliance with the applicable standards and construction regulations by respective specialist companies only.**

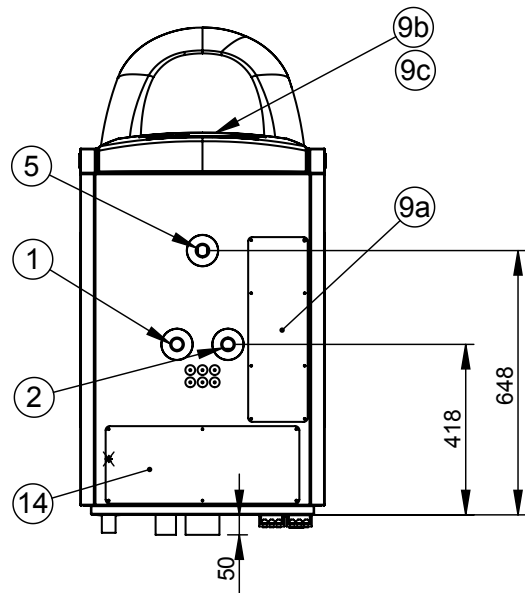
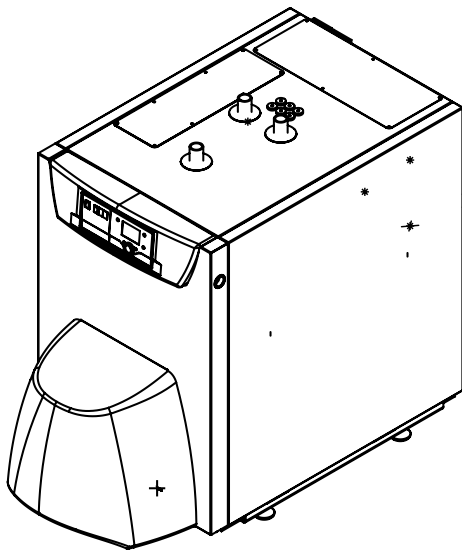
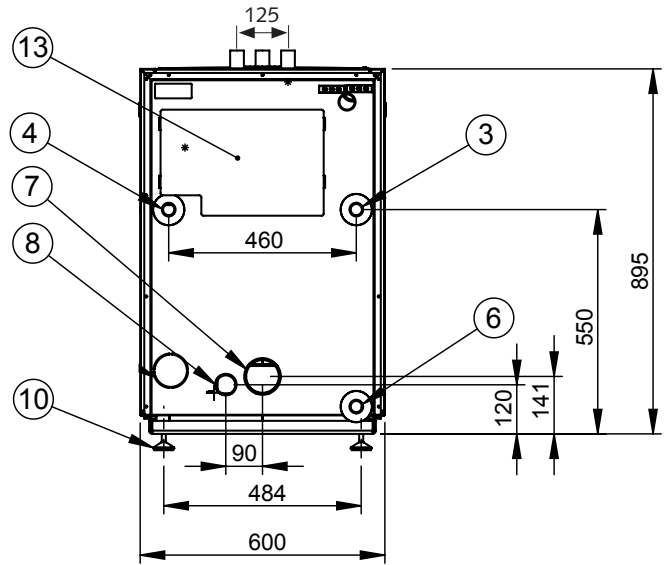
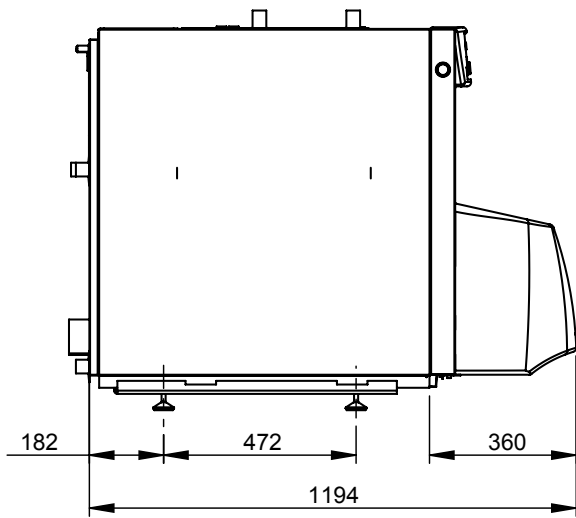


# 3. Technical data

## 3.1 Technical data

CTC 380 IC		35	43
Rated input	kW	35,6	43,8
Rated output 50/30 °C	kW	36,4	44,7
Rated output 80/60 °C	kW	34,4	42,3
Oil supply	g/h	2450	3010
Flue gas mass flow rate	g/s	12,52	15,38
Boiler water resistance ( $\Delta T$ 20K)	mbar	250	325
Boiler efficiency 50/30 °C	%	102	102
Flue gas temperature 50/30 °C	°C	45	44
Flue gas temperature 80/60 °C	°C	64	63
Max boiler operating pressure	bar	3	3
Max operating temperature	°C	110	110
Water content	l	93	93
Weight	kg	253	253
Number of flue gas heat exchangers	units	2	2
Number of turbulators.	units	9	9
Turbulator type		27/45 XS	27/45 XS
Electric data		230V 1N~	230V 1N~
Oil burner type		BF1 N1V	BF1 N1V

### 3.2 Measurements



**Legend**

- 1. Primary flow R 1"
- 2. Return flow R 1"
- 3. Primary flow R 1"
- 4. Return flow R 1"
- 5. Expansion connection R 1"
- 6. Drainage connection R 1"
- 7. Flue gas outlet  $\varnothing$  100 mm inside
- 8. Condensation water drainage  $\varnothing$ 50 outside

- 9a. Basic unit Siemens RVS43.143
- 9b. Operating unit Siemens AVS37.294
- 9c. Power pack Siemens AVS16.290
- 10. Levelling feet M10
- 13. Rear cover plate – spiral finned tube
- 14. Top cover plate – spiral finned tube

### 3.3 Description

The principle parts of the construction are made from tailor-made steel panel.

The boiler was subject to a pressure and leakage test and coated with close heat insulation and powder-covered cladding panels.

#### 1. Flue gas outlet

Connection to the rear.

#### 2. Heat insulation

The entire boiler is equipped with a special heat insulation in order to minimise heat loss.

#### 3. Combustion chamber

The generous layout of the combustion chamber provides the coordinated unit oil burner with ideal combustion properties.

#### 4. DUOPLUS temperature system

The combustion chamber or heat recovery adjuncts are surrounded by two coatings which allow dewpoint corrosion-safe low temperature and a long lifecycle.

#### 5. Ripples

Boiler sizes 35 and 43 kW are equipped with ripples. This increases the heat exchanger surface and allows optimum heat transmission to the heating water.

#### 6. Turbulators

The task of the turbulators is to provide turbulence in the heating gases so that more heat energy is transmitted to the boiler water. All boiler sizes are equipped with standard turbulators ex works which are ideally aligned to every size. The turbulators can be accessed from the front.

#### 7. Cleaning door

Thanks to the generous cleaning door, the turbulators can be easily accessed and the heat recovery adjunct can at the same time be easily accessed for maintenance and cleaning.

#### 8. Swivelling arm

The cleaning door is equipped with hinges which serve as swivelling arm. This makes removing the oil burner for inspection and service.

#### 9. Levelling feet

The boiler is equipped with four adjustable feet.

#### 10. Power pack

The power pack of the boiler control panel – Siemens AVS16.290. For further information, please refer to Section Electric installation – comfort control.

#### 11. Basic unit

The basic unit of the comfort control – Siemens RVS43.143. For further information, please refer to Section Electric installation – comfort control.

#### 12. Operating unit

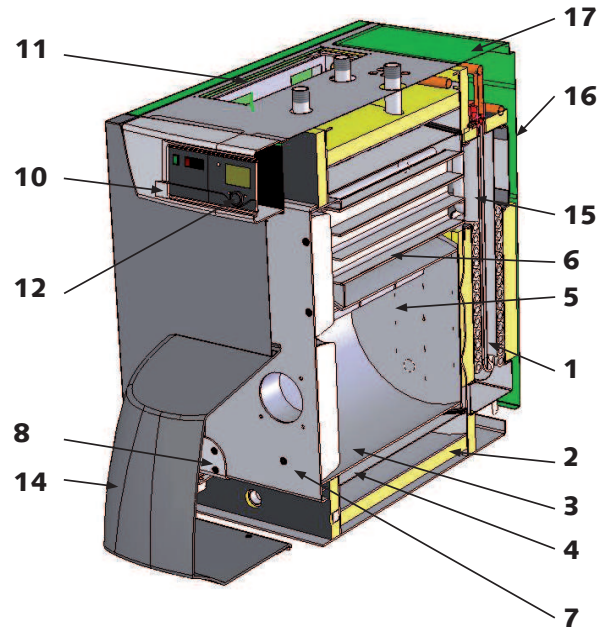
The operating unit of the comfort control – Siemens AVS37.294. For further information, please refer to Section Electric installation – comfort control separate attached instructions.

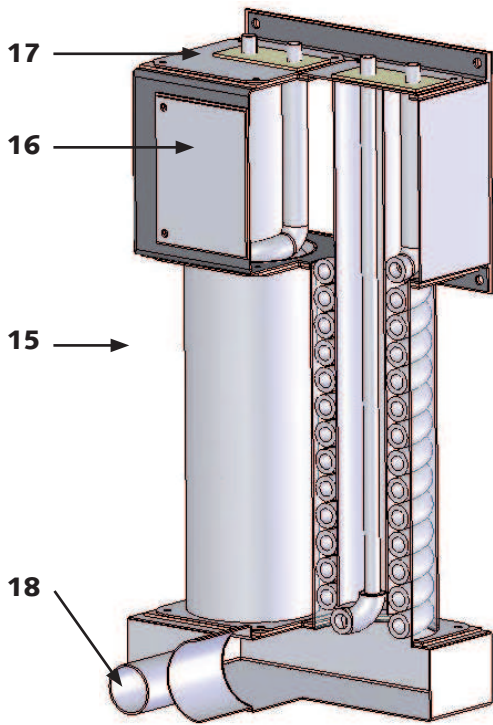
#### 13. Oil burner

For further information, please refer to Section Oil burner.

#### 14. Hood

The hood is an integrated, nicely shaped component of the boiler.





**16. Cleaning – spiral finned tube**

Spiro-Condens system is easily accessible, through the the cover plate, for cleaning .

**17. Removal – spiral finned tube**

It is possible to remove and clean the spiral finned tube of the exhaust heat exchanger.

**18. Condensation water drainage**

The boiler is equipped with a  $\varnothing$  50 mm (exterior diameter) connection for condensation water drainage.

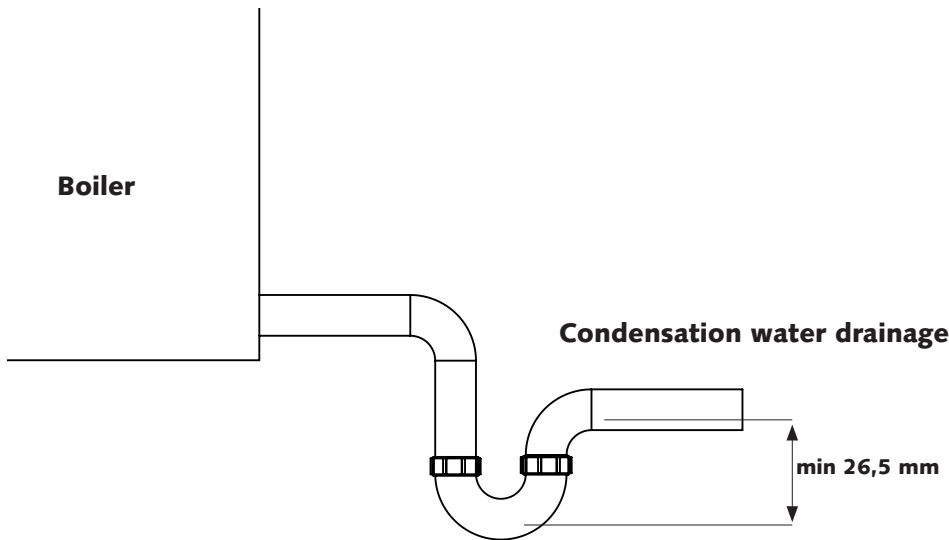
A suitable siphon with a diameter of at least 13 mm must be fitted.

The siphon must be filled with water during boiler operation.

Maintenance of the siphon must be performed annually.

**After the maintenance of the siphon, it must be filled with water.**

If fitting a neutralisation system is required, the country-specific regulations must be observed.



# 4. Installation

## 4.1 General information

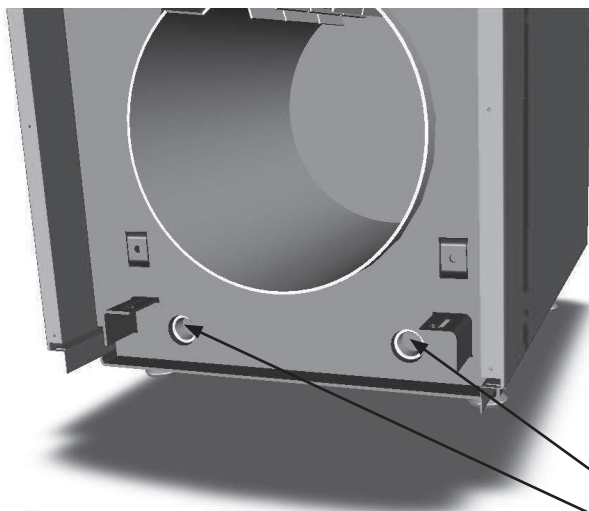
The installation must be performed in compliance with the applicable standards and construction law regulations by respective specialist companies only.

The boiler must be connected to an expansion vessel in an open (with high positioned expansion vessel and safety and return duct) or closed system. For an open system, the distance between the expansion vessel and the expansion connection on top of the boiler should not be less than 2.5 m in order to prevent an oxygen enrichment in the system.

## 4.2 Transport

To avoid transport damage, do not unpack the boiler until it has been transported to its site in the boiler room. The boiler can be handled and lifted in the following way:

- ▶ Forklift
- ▶ Lift band round the pallet. Note! Only with the packing on.
- ▶ Sack barrow
- ▶ 1" pipes can be mounted in the lifting sleeves at the front and rear (see picture below).



Bracing bushes

## 4.3 Unpacking

To prevent transport damage the packaging must not be removed from the boiler until it is in the boiler room at the place of installation. After removing the packaging, check whether the boiler was damaged during transit. Any transport damage must be reported to the supplier (carrier).

### Standard delivery:

- ▶ Oil condensing boiler unit CTC 380 IC
- ▶ Cleaning tools
- ▶ Flow temperature sensor
- ▶ DHW tank temperature sensor
- ▶ Outdoor sensor

## 4.4 Boiler room

The boiler room must comply with the applicable construction law regulations, in particular the fire regulation, of the respective country. The boiler room must be equipped with an opening for ventilation. The ventilation diameter should be at least 6.5 cm<sup>2</sup> per 1 kW of boiler power.

## 4.5 Connection to chimney

The boiler is designed for open operation. Existing engineering standards and building regulations for the design/installation of the chimney must be taken into consideration. Important conditions:

- ▶ Good thermal insulation in order to as much as possible avoid temperature losses from the connection between the boiler and the chimney.
- ▶ Accurate sealing of the flue gas connections.
- ▶ Heat-shock resistance as well as water- and steam tight.

## 4.6 Flue gas temperatures

**The respective country-specific regulations regarding the flue gas systems must be observed.**

In some cases it is necessary to install a flue gas temperature thermostat, follow the local regulations for flue gas systems. (Installation instructions are attached to the flue gas temperature thermostat).

## 4.7 Hydraulic connection boiler

The dimensioning and plumbing of the system shall be accomplished according to the measurements and datas in the part Technical information.

## 4.8 Shut-off valves

Shut-off valves must be installed between the heating circuit and heating boiler in order to facilitate an eventual dismantling of the flue gas heat exchanger coil.

## 4.9 Boiler safety valve

In a closed system a certified safety valve must be installed in accordance with the applicable regulations. The maximum operating pressure of the boiler is 3 bar. The hydraulic connection between boiler and safety valve must be designed so that no increase in pressure is possible. The overflow pipe must be free and visible. Any escaping heating water must be drained without danger. **(Warning! Risk of scalding).**

## **4.10 Heating circulation pump**

A heating circuit pump must be mounted on the flow of the boiler. The pump is supplied with power from the boiler. For further information regarding systems principles and connections, see Electric installation – comfort control.

## **4.11 Heating circuit mixing valve**

A heating circuit mixing valve must be mounted on the flow of the boiler. The heating circuit mixing valve is supplied with power from the boiler. For further information regarding system principles and connections, see Electric installation – convenience regulation.

## **4.12 Connection of domestic hot water (DHW) or additional heating circuits**

The connections on the rear of the boiler allow connecting the boiler directly to additional heating circuits. It is possible to connect the boiler to a DHW system.

## **4.13 Drainage/draining valve**

Drainage/draining valve shall be mounted on the drainage connection at the rear of the boiler.

## **4.14 Connection of domestic water heater (storage)**

If the CTC 380 IC is combined with a domestic hot water heater, it must be ensured that its size and capacity correspond to the installed boiler capacity. The connection must comply with the applicable construction law regulations. Usually to be connected to the rear flow and return connections of the boiler.

For further information regarding the system principles and connections, see Electric installation – comfort control.

## **4.15 Filling**

Filling is performed via a filling valve for the heating system. Alternatively, filling can also be carried out via an emptying valve.

## **4.16 Manometer**

The manometer shall be connected to the expansion line of the boiler.

## **4.17 Siphon**

See 3.3 Description, Section 18.

## **4.18 Neutralisation box**

See 3.3 Description, Section 18.

# 5. Electric installation

## 5.1 General information

The electric installation of the boiler must be performed by a specialist. The lines must be laid in compliance with applicable regulations. The boiler is ready ex works for connection.

## 5.2 Heating circuit pump

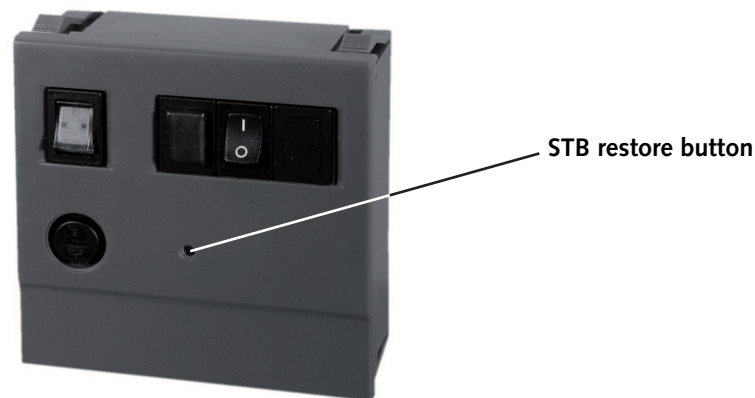
The heating circuit pump for the heating system is connected to the connection fastener in the basic unit. The switch for the pump is on the comfort control of the boiler.

## 5.3 Heating circuit mixing valve

The heating circuit mixing valve for the heating system is connected to the connection fastener in the basic unit.

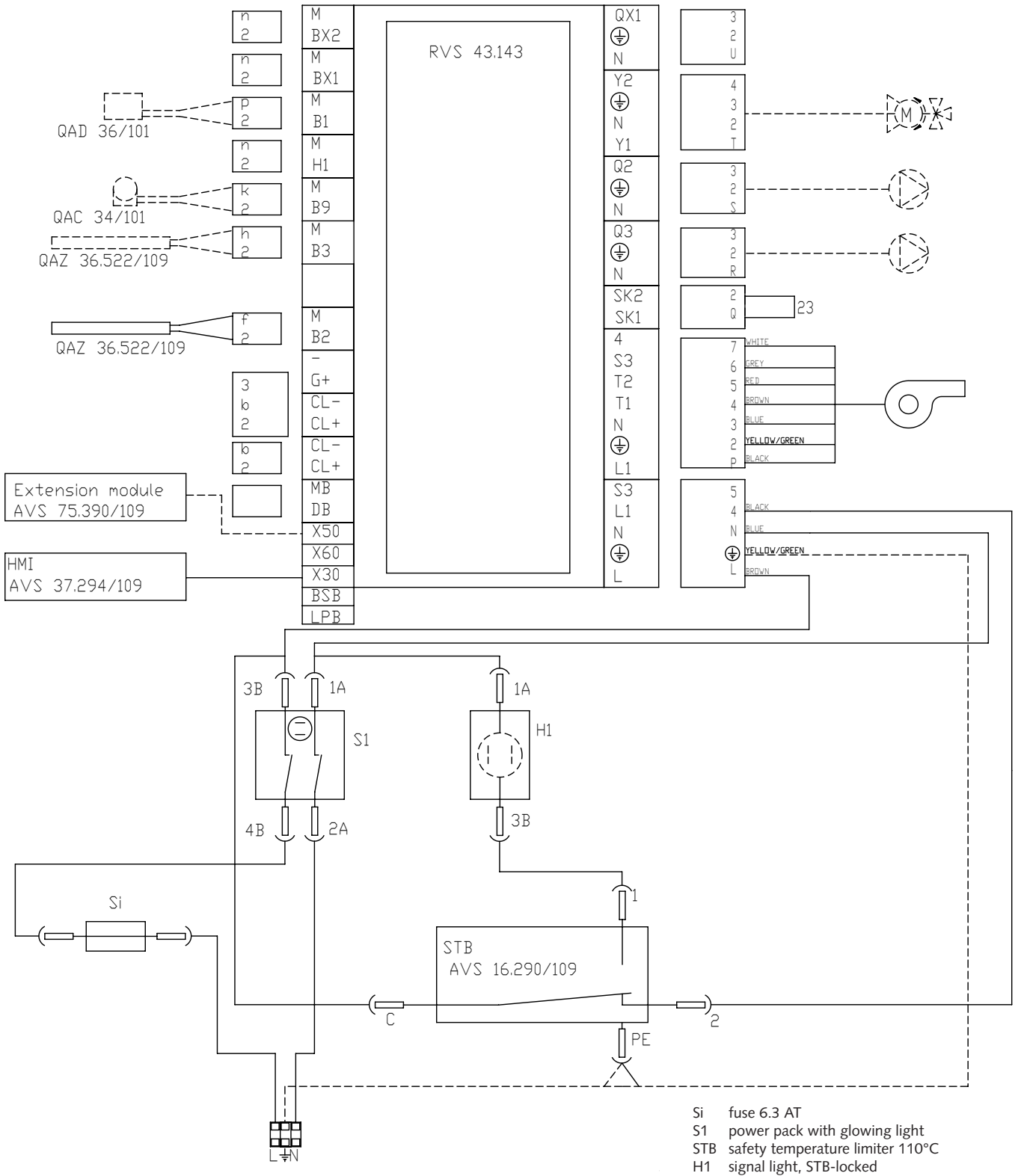
## 5.4 Safety temperature limiter (STB)

For extremely cold storage of the boiler, the safety temperature limiter can be initiated. It is restored with the button at the front of the power pack.





## 5.5 Wiring diagram E-582450

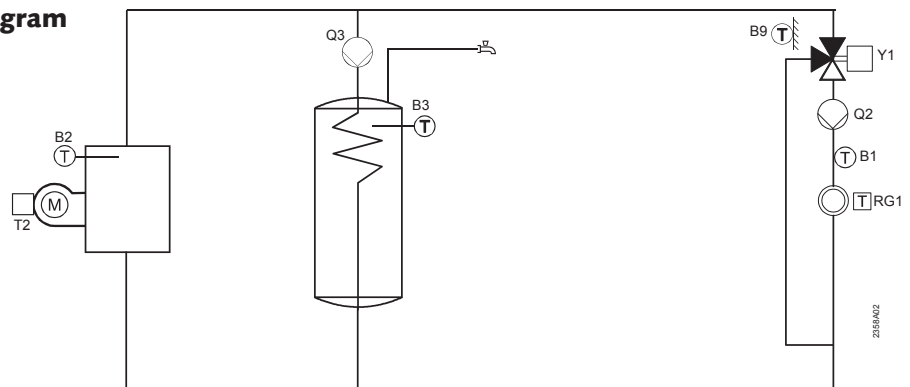


## 5.6 Plant diagrams

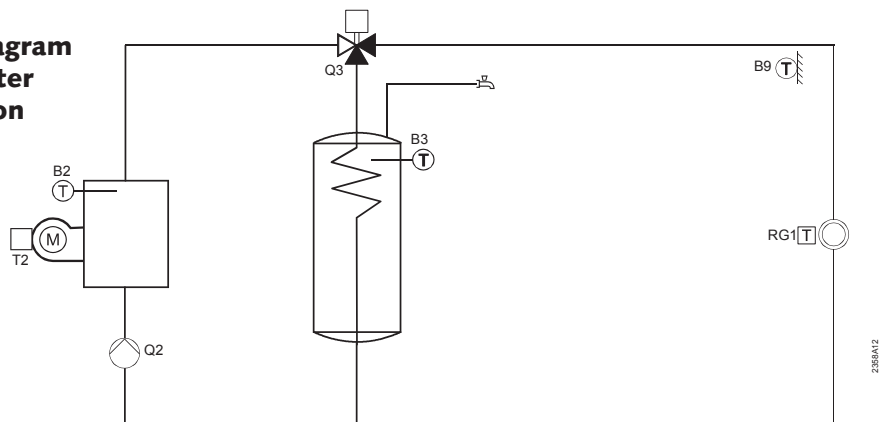
The applications are displayed as basic diagrams with additional functions. The basic diagrams are possible applications which can be implemented without multiple function outputs.

### RVS43.143 basic diagram

**Standard diagram**



**Standard diagram  
Drinking water  
with diversion  
valve**



# 6. Comfort-control

## 6.1 General information

The boiler is factory equipped with the Comfort-control Siemens Albatros2.

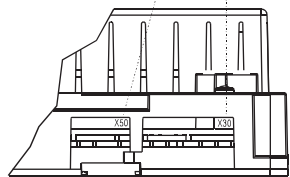
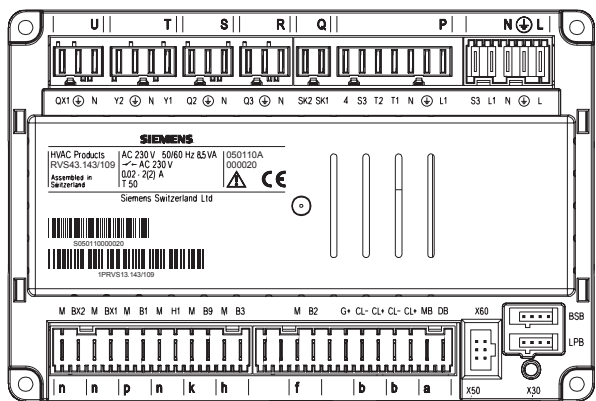
The Comfort-control consists of a basic unit, power pack and operator unit. The power pack and operator unit creates together the control panel of the boiler. Part 6. describes the principal information concerning the Comfort-control. For more information concerning functions, programming, system principles etc., please see the Albatros2 Boiler Controller User Manual.

## 6.2 Basic unit RVS43.143



### 6.2.1 Terminal markings

QX1	U	T	S	R	Q	P	N	L
+	+	+	+	+	+	+	+	+
N	Y2	N	Y1	Q2	N	Q3	+	N
+	+	+	+	+	+	+	+	+
SK2	SK1	4	S3	T2	T1	N	+	L1
+	+	+	+	+	+	+	+	+
S3	L1	N	+	N	+	L		



M	BX2	M	BX1	B	B1	M	H1	M	B9	M	B3	M	B2	G+	CL-	CL+	CL-	CL+	MB	DB	X50	X60	X30	BSB
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

## Mains voltage

	Use	Termininal	Type of connector
L ⏏ N L1 S3	Phase AC 230 V basic unit Protective earth Neutral conductor Phase AC 230 V burner Output burner fault	N ⏏ L	AGP4S.05A/109
L1  N T1 T2 S3 4	Phase burner Protective earth Neutral conductor Phase 1 st burner stage 1 st burner stage on Input burner fault Input burner stage 1 hours run	P	AGP8S.07A/109
SK1 SK2	Safety loop Safety loop	Q	AGP8S.02E/109
N ⏏ Q3	Neutral conductor Protective earth DHW charging pump / diverting valve	R	AGP8S.03A/109
N ⏏ Q2	Neutral conductor Protective earth 1st heating circuit pump	S	AGP8S.03B/109
Y1 N ⏏ Y2	1st heating circuit mixing valve opening Neutral conductor Protective earth 1st heating circuit mixing valve closing	T	AGP8S.04B/109
N ⏏ QX1	Neutral conductor Protective earth 1st multifunctional output	U	AGP8S.03C/109

## Low voltage

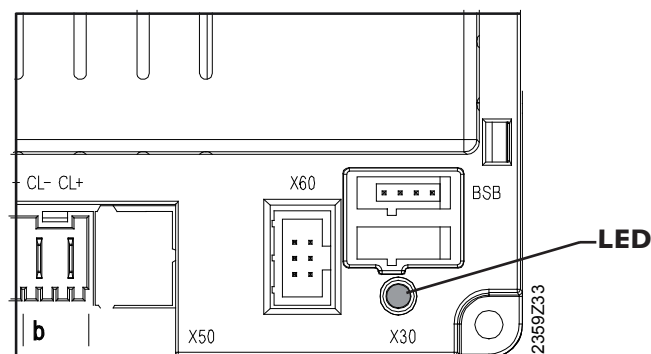
	Use	Steckplatz	Type of connector
BSB	Service tool OCI700	-	-
LPB	Local process bus	-	-
X60	Radio module AVS71.390	-	-
X50	Extension module AVS75.390	-	AVS82.490/109
X30	Operator unit / boiler control	-	AVS82.491/109
DB	LPB data	a	AGP4S.02H/109
MB	LPB ground		
CL+	Room unit 2 data	b	AGP4S.02A/109
CL-	Room unit 2 ground		
CL+	Room unit 1 data	b	AGP4S.02A/109
CL-	Room unit 1 ground		AGP4S.03D/109
G+	Room unit power supply 12V		
B2	Boiler sensor	f	AGP4S.02B/109
M	Ground		
B3	DHW sensor top	h	AGP4S.02C/109
M	Ground		
B9	Outdoor sensor	k	AGP4S.02D/109
M	Ground		
H1	Digital-/0..10V input	n	AGP4S.02F/109
M	Ground		
B1	Flow sensor	p	AGP4S.02G/109
M	Ground		
BX1	Multifunctional sensor input 1	n	AGP4S.02F/109
M	Ground		
BX2	Multifunctional sensor input 2	n	AGP4S.02F/109
M	Ground		

### 6.2.2 Checking the LED

LED off: No power supply

LED on: Ready to operate

LED flashes: Local faults



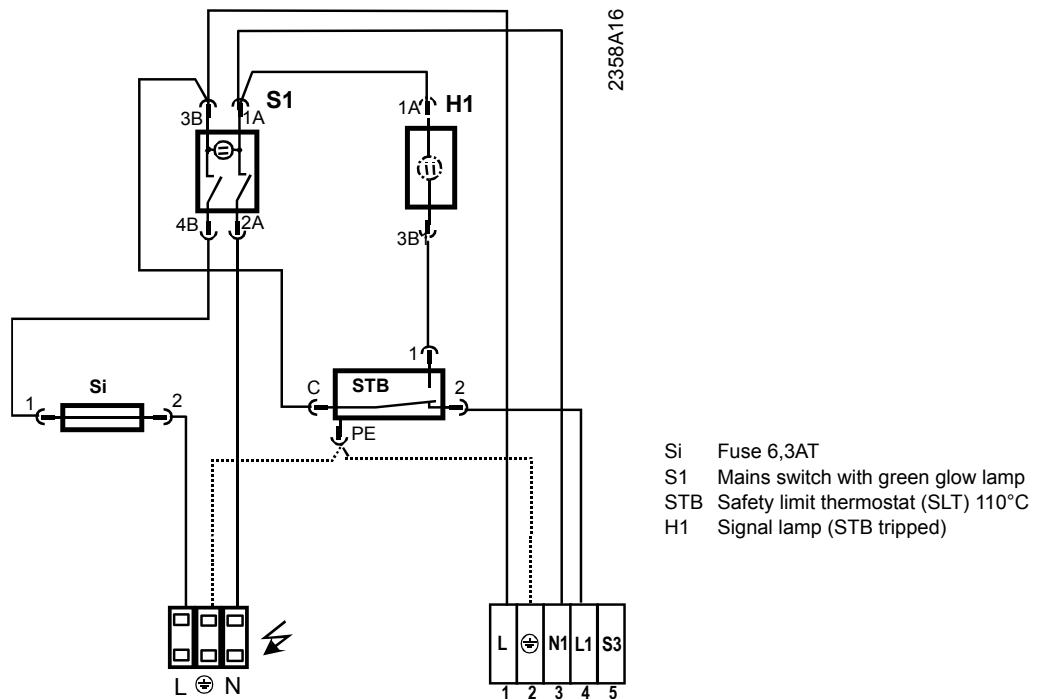
## 6.3 Power pack AVS16.290



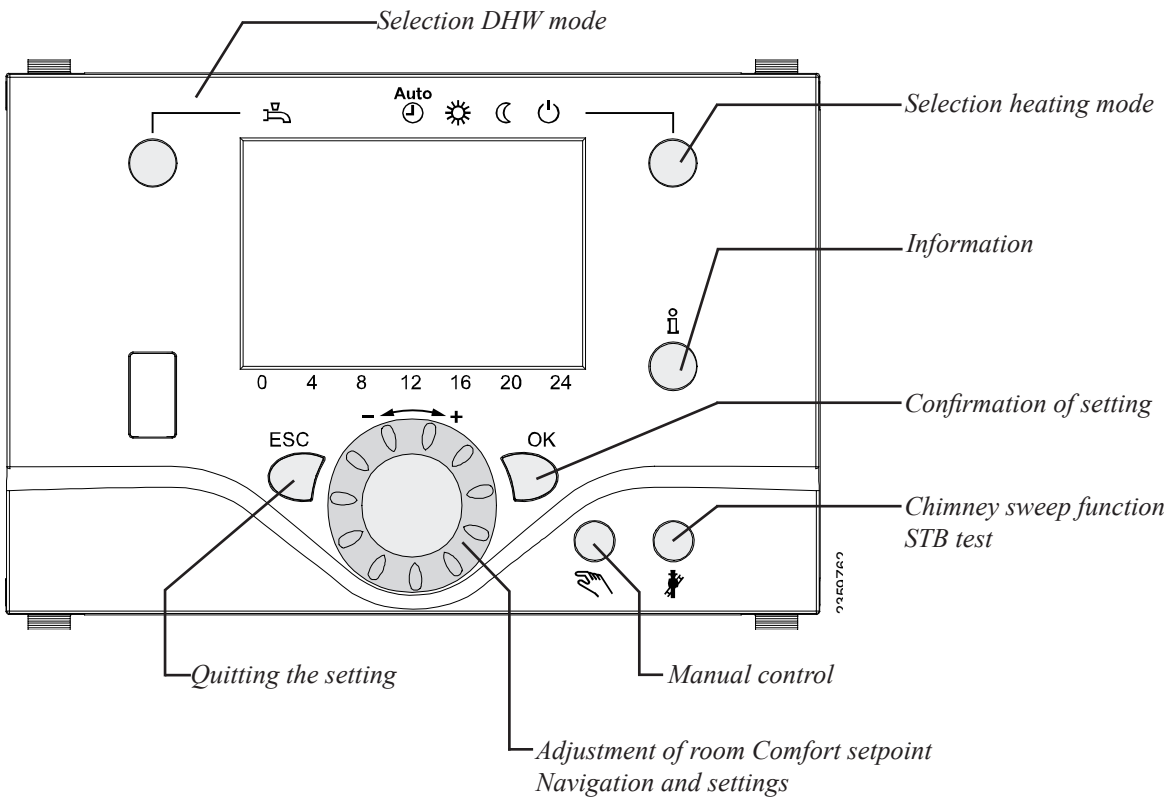
Terminal	Name	
L	Phase AC 230 V	brown
⊕	Protective earth	green + yellow
N	Neutral conductor	blue

### Connection to basic unit

Terminal	Name		
1	L	Phase AC 230 V basic unit	brown
2	⊕	Protective earth	green + yellow
3	N	Neutral conductor	blue
4	L1	Phase AC 230 V burner	black
5	S3	Input burner fault	-



## 6.4 Operator unit AVS37.294



### Display choices

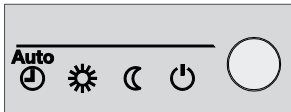
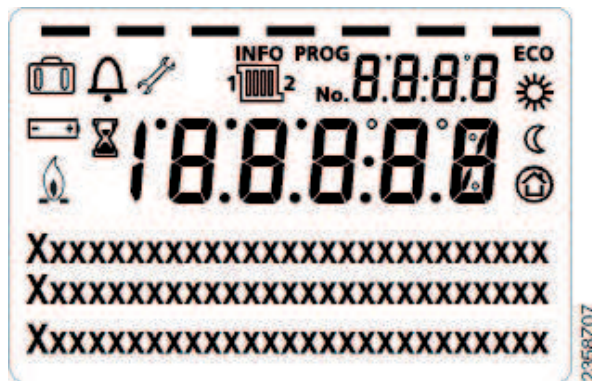
- |   |   |
|---|---|
| Heating to the Comfort setpoint           | <b>INFO</b> Info level activated                                  |
| Heating to the Reduced setpoint           | <b>PROG</b> Programming activated                                 |
| Heating to the frost protection setpoint  | <b>ECO</b> Heating function temporarily off<br>ECO function activ |
| Process running - please wait             | Holiday function active   |
| Change battery                            | Reference to heating circuit                                      |
| Burner in operation (only oil/gas burner) | Maintenance / special mode  |
|   | Error messages  |

## 6.5 Change Language

- Press the "OK-button"
- Press the "i-button" for 3 seconds, the text "Endbenutzer" shall be visible.
- Select "Endbenutzer" and press "OK".
- Select "Bedieneinheit" and press "OK". "Bedieneinheit sprache" shall be visible.
- Press OK and select language and press "OK".
- Press "ESC" and "ESC" again.

### Indication

Display showing all available segments.



## 6.6 Selecting heating mode

Press the button to switch between the different operating modes. The choice made is indicated by a bar which appears below the symbols.

### Automatic mode AUTO

Automatic mode controls the room temperature according to the time program.

Characteristics of automatic mode:

- Heating mode according to the time program
- Temperature setpoints according to heating program  
"Comfort setpoint" or "Reduced setpoint"
- Protective functions active
- Automatic summer / winter changeover (ECO functions)

### Continous operation or

Continous operation maintains the room temperature at the selected operating level.

- Heating to the Comfort setpoint
- Heating to the Reduced setpoint

Characteristics of continous operation:

- Heating mode with no time program
- Protective functions active
- Automatic summer / winter changeover (ECO functions)  
and 24-hour heating limit inactive in the case of continuous operation with Comfort setpoint



## Protection

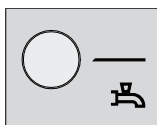
When using Protection, the heating system is off. But it remains protected against frost (frost protection temperature), provided there is no power failure.

Characteristics of Protection:

- Heating off
- Temperature according to frost protection
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit active

## 6.7 Selecting DHW heating mode

The button is used to switch DHW heating mode on and off. The choice is indicated by a bar which appears below the symbol.



### DHW mode

#### ▶ On

The DHW is heated according to the selected switching program.

#### ▶ Off

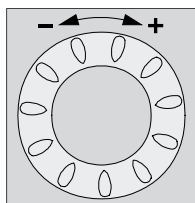
No DHW heating, the protective function is active.

### DHW push

To do this, keep the DHW operating mode button depressed for at least 3 seconds.


The DHW push can also be started when:

- ▶ The operating mode is "Off"
- ▶ Operating mode changeover acts via H1 or centrally (LPB)
- ▶ All heating circuits have assumed the holiday mode



## 6.8 Adjusting the room temperature setpoint

Turn the setting knob to increase or decrease the **Comfort setpoint** .

For the **Reduced setpoint** 

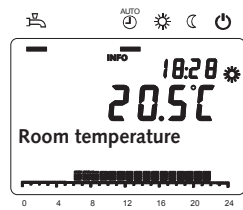
- Press the OK button
- Choose operating page "Heating circuit" and
- Adjust the "Reduced setpoint".



Each time you make a readjustment, wait at least 2 hours, allowing the room temperature to adapt.

## 6.9 Displaying information

The button is used to display information.



### Possible displays

Depending on the type of unit, unit configuration and operating state, some of the info lines listed below may not appear.

#### Displays

- Possible error messages from the error code list.
- Possible maintenance alarms from the maintenance code list.
- Possible special mode messages

#### Other displays:

- Room temperature
- State DHW
- Room temperature minimum
- State boiler
- Room temperature maximum
- Boiler temperature
- Outside temperature
- Outside temperature min
- Date and time of day
- Outside temperature max
- Telephone customer service
- DHW temperature 1
- State heating circuit 1
- State heating circuit 2

#### Exceptional cases

In exceptional cases, the display shows one of the following symbols:



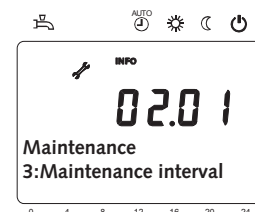
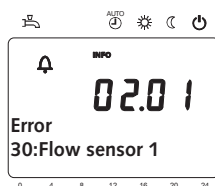
#### Error messages

If this symbol appears, a plant fault has occurred. In this case, press the Info button to obtain more information.



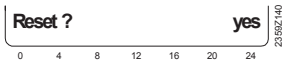
#### Maintenance or special mode

If this symbol appears, a maintenance alarm is delivered or the plant has changed to special mode. In this case, press the Info button to obtain more information.

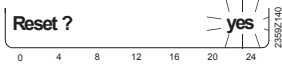


## 6.10 Reset function

The reset function for meters and the reset table parameters appears on the bottom line of the display, provided a reset is permitted on the current operating line (enduser / commissioning / heating engineer).



After activation with the OK button, the display shows a flashing “Yes“.



After confirmation with the OK button, the relevant parameter or meters will be reset.

## 6.11 Manual control

When manual control is active, the relays are no longer energized and deenergized according to the control state, but are set to a predefined manual operating state depending on their function.

The burner relay energized in manual control can be deenergized by the electronic temperature controller (TR).

### Setpoint adjustment with manual control

After manual control has been activated, a change to the basic display must be made. There, the maintenance / special mode symbol appears. Setpoint adjustment with manual control Press the Info button to switch to info display “Manual mode“, where the setpoint can be adjusted.

## 6.12 Chimney sweep function

The chimney sweep function is activated by a short press (maximum 3 seconds) on the chimney sweep button. It produces the operating state required for making flue gas measurements.

### STB test

The STB test (STB = safety limit thermostat) is activated by a long press (longer than 3 seconds) on the chimney sweep button. The button must be kept depressed during the entire test. If released, the test will be aborted. The STB test is shown on the display.

The test must be made by qualified staff since the boiler temperature will be raised above the maximum limitations.



## 6.13 Programming

### Setting principle

Settings that cannot be made directly with the help of operating elements are made through programming. For this purpose, the individual settings are structured in the form of operating pages and operating lines, thus forming practical groups of settings. The following example which shows the setting of the time of day and date shall explain this.

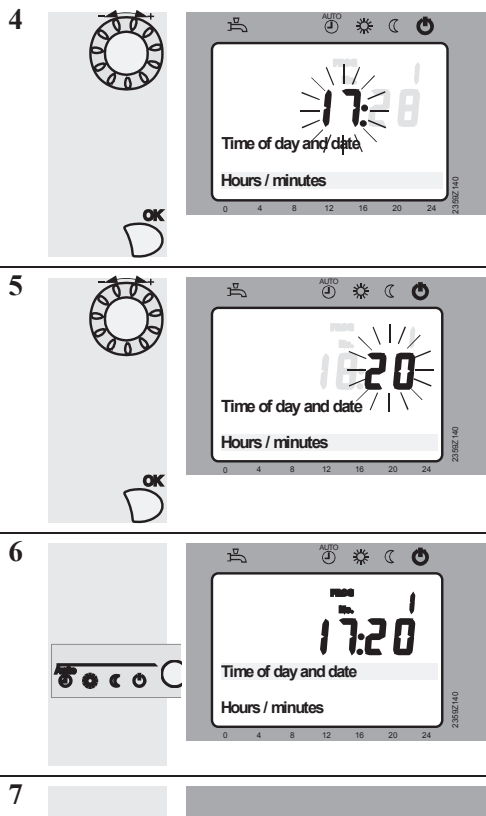


### Example "Setting the time of day"

- ▶ When pressing the ESC button, you go back one step; adjusted values will not be adopted
- ▶ If no setting is made for 8 minutes, the unit will automatically return to the basic display
- ▶ Operating lines may be hidden, depending on the type of unit, their configuration and user level

Operation	Display example	Description
1		<p>You see the basic display.</p> <p>If the basic display is not shown, press the ESC button to return to it.</p>
2		<p>The bottom section of the display shows a number of operating pages. Turn the setting knob until operating page "Time of day and date" appears.</p>
		To confirm, press the OK button.
3		<p>In the bottom section of the display, the first operating line of operating page "Time of day and date" appears.</p> <p>Turn the setting knob until operating line "Hours / minutes" appears.</p>
		To confirm, press the OK button.

**Operation Display example**



**Description**

The display shows the hours flashing.  
Turn the setting knob until the hours of the time of day are correct.

To confirm, press the OK button.

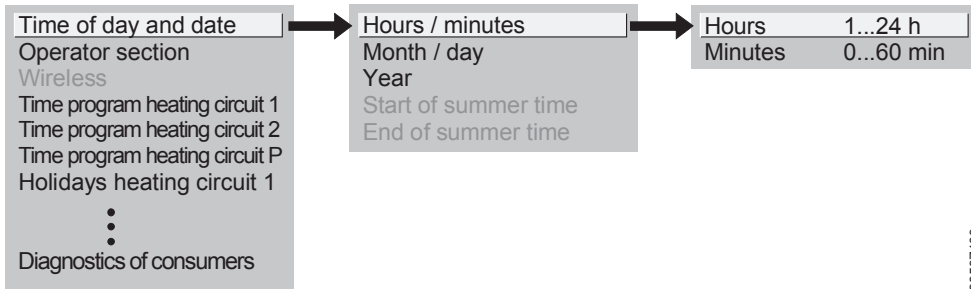
The display shows the minutes flashing.  
Turn the setting knob until the minutes of the time of day are correct.

To confirm, press the OK button.

The settings are saved, the display stops flashing.  
You can continue to make other settings, or you press the operating mode button to return to the basic display.

Now, you have returned to the basic display.

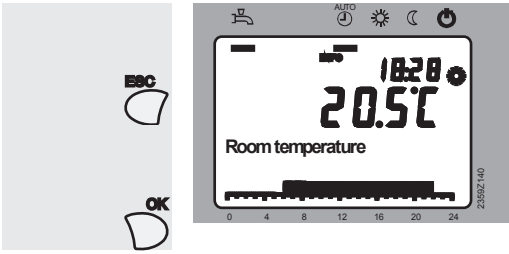
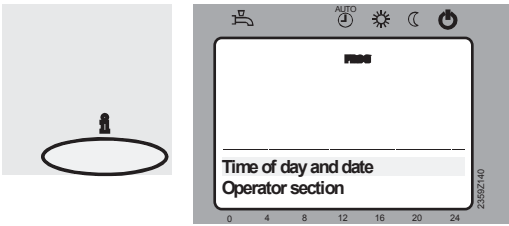
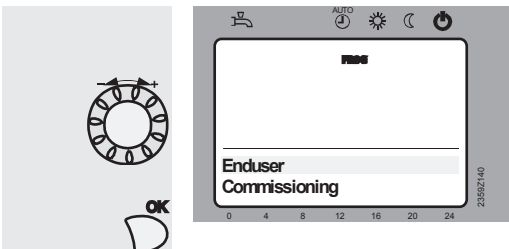
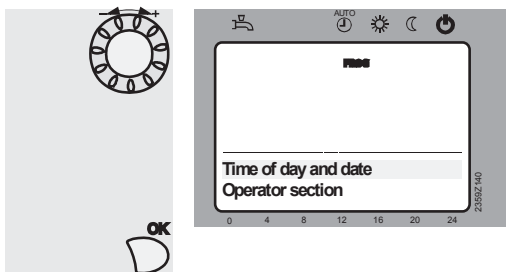
**Example of menu structure**



2359Z139

## 6.14 User levels

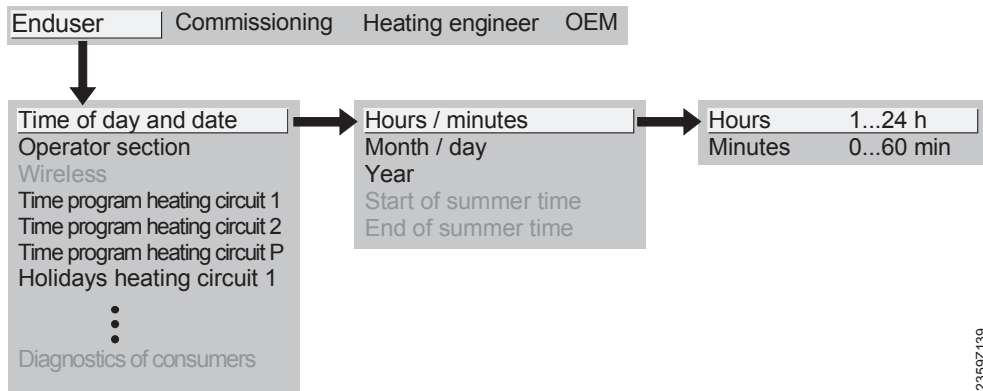
Certain user levels only allow certain user groups to make settings. To reach the required user level, proceed as follows:

Operation	Display example	Description
1		<p>You see the basic display.</p> <p>If the basic display is not shown, press the ESC button to return to it.</p> <p>Press the OK button.</p>
2		<p>You are on user level "Enduser".</p> <p>Press the Info button for 3 seconds.</p>
3		<p>You are given a choice of user levels.</p> <p>Turn the setting knob until the required user level is reached.</p> <p>Press the OK button.</p>
		<p>You are now on the required user level.</p>

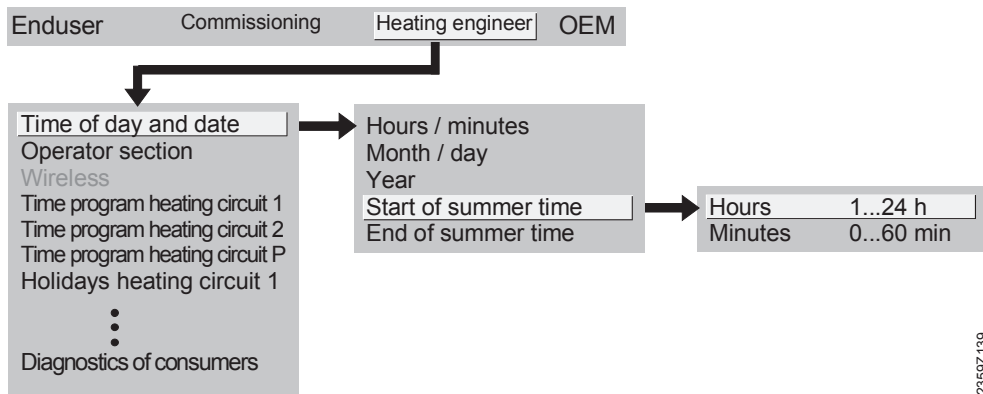
To reach the OEM level, enter the relevant code.

## Setting structure for "Enduser"

The example given here shows that certain user levels do not allow certain settings to be made. The example shows them highlighted. On the unit, they are hidden.



## Setting structure for "Heating engineer"



## 6.15 Commissioning

### Prerequisites

To commission the units, the following steps must be carried out:

- ▶ Prerequisite is correct mounting and correct electrical installation and, in the case of wireless systems, correctly working radio links to all the auxiliary units
- ▶ Make all plant-specific settings. Special attention must be paid to operating page "Configuration".  
For that purpose, the relevant operating level is to be selected as follows:  
Press the OK button on the operator unit to switch to programming.  
Press the Info button for at least 3 seconds and select operating level "Commissioning" with the setting knob. Then, press the OK button.
- ▶ Make the functional check as described below
- ▶ Reset the attenuated outside temperature  
(operating page "Diagnostics of consumers", operating line "Outside temp attenuated" (line 8703))

### Functional check

To facilitate commissioning and fault tracing, the controller allows output and input tests to be made. This allows to test the outputs and inputs. To make the tests, select operating page "Input/output test" and go through all available operating lines.

### Operating state

The current operating state can be checked on operating page "State".

### Diagnostics

For detailed diagnostics of the plant, check operating pages "Diagnostics heat source" and "Diagnostics consumer".



## 6.16 Time programs

For the heating circuits and DHW heating, a number of switching programs are available. They are activated in "Automatic" operation and control the change of the temperature levels via the selected switching times.

The switching times can be set in a combined way, that is, either commonly for several days or separate times for individual days. When preselecting groups of days like for instances Mo...Fr and Sa...Su that use the same switching times, setting of the switching programs is simplified.

- Press the "OK-button"
- Select "Time prog heating circuit 1" and press "OK".
- The text "Preselection" is shown.
- Press "OK" and the selection starts flashing.
- You can select between program for Mo-Su, Mo-Fr, Sa-Su, or each day separately
- Select "1 st phase on" and press "OK".
- The time starts flashing and you can select the start time for heating "comfort setpoint" Press "OK"
- Select "1 st phase off" and press "OK".
- The time starts flashing and you can select the stop time for heating "comfort setpoint" Press "OK"
- Phase off means that "Reduced setpoint" is active.
- It is possible to select 3 phases for each day.
- Press "ESC" and "ESC" again.

All time programs can be reset to the default settings. Each time program has its own operating line to make this reset.

In that case, individual settings will be lost!

## 6.17 Heating curve

The heating curve is used to generate the flow temperature setpoint, which is used to maintain a certain flow temperature depending on the prevailing weather conditions. The heating curve can be adjusted with a number of settings, thus matching heat output and room temperature to individual needs.

As the heating curve slope is raised, the flow temperature increases the quicker the lower the outside temperature or, in other words, if the room temperature is not correct at low outside temperatures but correct at higher outside temperatures, the heating curve slope requires readjustment.

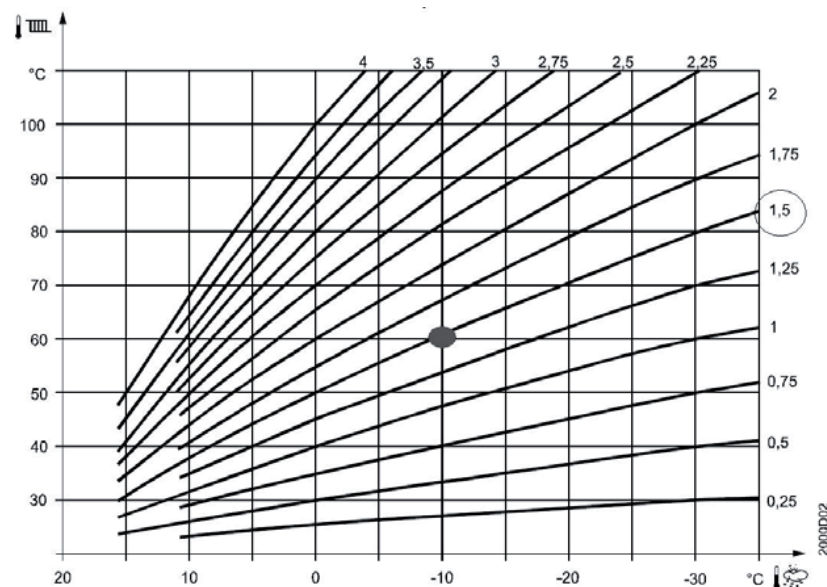
Increase adjustment: Raises the flow temperature, especially when outside temperatures are low.

Decrease adjustment: Lowers the flow temperature, especially when outside temperatures are low.

Default setting 1,5

Parallel displacement of the heating curve is used to change the flow temperature evenly across the entire outside temperature range or, in other words, if the room temperature is always too high or too low, a readjustment must be made with the help of the parallel displacement.

- Press the “OK-button”
- Select “Heating circuit 1” and press “OK”
- Select Menu 720 “Heating curve slope” and press “OK”
- Select setpoint and press “OK” for confirm
- Select Menu 721 “Heating curve displacement” and press “OK”
- Select setpoint and press “OK” for confirm
- Press “ESC” and “ESC” again



## 6.18 Flow temperature limitation

Using this limitation, a temperature range for the flow temperature setpoint can be defined. If the flow temperature setpoint demanded by the heating circuit reaches the relevant limit and the heat request increases or decreases, the flow temperature setpoint will be maintained at the maximum or minimum limit.

If you want to have floor heating in the summer for example in a basement or a bathroom you set the "Flow temp min" to a higher temperature.

Notice that the value for "Summer/winter setpoint stops the heating circuit at chosen temperature, in "Automatic mode". So you maybe have to select a higher temperature on this as well.

To select a value for the set points do as follow:

- Press the "OK-button"
- Press the "i-button" for 3 seconds.
- Select "Commissioning" and press "OK".
- Select "Heating circuit 1" and press "OK".
- Select "Flow temp setpoint min" (Menu 740) and press "OK"
- The temperature starts flashing.
- Select a temperature for min flow temp, and press "OK" to confirm.
- Select "Flow temp setpoint max" (Menu 741) and press "OK"
- Select a temperature for max flow temp, and press "OK" to confirm.
- Press "ESC" and "ESC" again.

## 6.19 Domestic Hot Water DHW

The a DHW can be heated up according to different set points.

The charging is default set to time program. If you want to have hot water 24 hours a day you have to select this.

You can also change the charging temperature, default 55°C.

- Press the "OK-button".
- Press the "i-button" for 3 seconds.
- Select "Commission" and press "OK".
- Select "Domestic hot water" and press "OK".
- Select "Release" (Menu 1620) and press "OK".
- Select "24h/day" and press "OK".
- Select "Nominal setpoint" (Menu 1610) and press "OK"
- Select a temperature for hot water and press "OK" to confirm.
- Press "ESC" and "ESC" again.

## 6.20 Reset to default parameters

- Press the "OK-button".
- Press the "i-button" for 3 seconds.
- Select "Engineer" and press "OK".
- Select "Configuration" and press "OK".
- Select "Reset to default parameters" (Menu 6205) and press "OK".
- Select "Yes" and press "OK".
- Press "ESC" and "ESC" again.

Selection for Date, Time and Time programs will not be restored.

## 6.21 List of displays

Priorities are assigned to pending errors. From priority 6, alarm messages are delivered, which are used by remote supervision (OCI). In addition, the alarm relay will be set.

### Error code

Error code	Description of error	Priority
0	No error	
10	Outside temperature sensor error	6
20	Boiler temperature 1 sensor error	9
25	Solid fuel boiler temperature (wood) sensor error	9
26	Common flow temperature sensor error	6
28	Flue gas temperature sensor error	6
30	Flow temperature 1 sensor error	6
32	Flow temperature 2 sensor error	6
38	Flow temperature primary controller sensor error	6
40	Return temperature 1 sensor error	6
46	Return temperature cascade sensor error	6
47	Common return temperature sensor error	6
50	DHW temperature 1 sensor error	9
52	DHW temperature 2 sensor error	9
54	DHW primary controller sensor error	6
57	DHW circulation temperature sensor error	6
60	Room temperature 1 sensor error	6
65	Room temperature 2 sensor error	6
68	Room temperature 3 sensor error	6
70	Buffer storage tank temperature 1 sensor error	6
71	Buffer storage tank temperature 2 sensor error	6
72	Buffer storage tank temperature 3 sensor error	6
73	Collector temperature 1 sensor error	6
74	Collector temperature 2 sensor error	6
81	Short-circuit LPB	6
82	LPB address collision	3
83	BSB wire short-circuit	6
84	BSB address collision	3
85	BSB radio communication fault	6
98	Extension module 1 fault (common fault status message)	6
99	Extension module 2 fault (common fault status message)	6
100	2 clock time masters (LPB)	3
102	Clock time master without backup (LPB)	3
105	Maintenance message	5
109	Boiler temperature supervision	9
110	Lockout by SLT	9

Error code	Description of error	Priority	Error code	Description of error	Priority
117	Upper pressure limit (crossed)	6	339	Collector pump Q5 missing	3
118	Critical lower pressure limit (crossed)	6	340	Collector pump Q16 missing	3
121	Flow temperature 1 (HC1) supervision	6	341	Collector sensor B6 missing	3
122	Flow temperature 2 (HC2) supervision	6	342	Solar DHW sensor B31 missing	3
126	DHW charging supervision	6	343	Solar integration missing	3
127	Legionella temperature not reached	6	344	Solar controlling element buffer K8 missing	3
131	Burner fault	9	345	Solar controlling element swimming pool K18 missing	3
146	Configuration error common message	3	346	Solid fuel boiler pump Q10 missing	3
171	Alarm contact 1 (H1) active	6	347	Solid fuel boiler comparison sensor missing	3
172	Alarm contact 2 (H2) active	6	348	Solid fuel boiler address error 3	3
173	Alarm contact 3 (EX2/230VAC) active	6	349	Buffer return valve Y15 missing	3
174	Alarm contact 4 (H3) active	6	350	Buffer storage tank address error	3
176	Upper pressure limit 2 (crossed)	6	351	Primary controller / system pump address error	3
177	Critical lower pressure limit 2 (crossed)	6	352	Pressureless header address error	3
178	Temperature limiter heating circuit 1	3	353	Cascade sensor B10 missing	3
179	Temperature limiter heating circuit 2	3			
217	Sensor error common message	6			
218	Pressure supervision common message	6			
243	Swimming pool temperature sensor error	6			
320	DHW charging temperature sensor error	6			
321	Instantaneous DHW heater outlet temperature sensor error	6			
322	Upper pressure limit 3 (crossed)	6			
323	Critical lower pressure limit 3 (crossed)	6			
324	BX same sensors 3	3			
325	BX/extension module same sensors	3			
326	BX/mixing valve group same sensors	3			
327	Extension module same function	3			
328	Mixing valve group same function	3			
329	Extension module / mixing valve group same function	3			
330	Sensor BX1 no function	3			
331	Sensor BX2 no function	3			
332	Sensor BX3 no function	3			
333	Sensor BX4 no function	3			
334	Sensor BX5 no function	3			
335	Sensor BX21 no function	3			
336	Sensor BX22 no function	3			
337	Sensor BX1 no function	3			
338	Sensor BX12 no function	3			

# 7. Oil burner

## 7.1 General information

CTC 380 IC is equipped with an adjusted oil unit burner. The start, settings and maintenance of the burner may be performed by a heating specialist only and in compliance with the operating instructions of the burner (see section Oil burner).

# 8. First start - Commissioning

## 8.1 Before first start

### Check that:

1. the boiler and heating system are filled with water.
2. all connections are tight and that the chimney connection is made in an correct way.
3. the oil tank is inspected according to existing regulations.
4. an oil filter is fitted to the burner.
5. the electrical connections are made in an correct way.
6. all sensors, burner, mixing valve and pumps are connected to the power supply.

## 8.2 First start

1. Switch on the current with the mains switch.
2. By commissioning applies the Comfort-control the factory pre-set standard values for set points, time program and operating modes. Though is it prerequisite to make settings of the time of the day and date. Further adjustments for personal requirements are performed according to the technical manual of the Comfort-control.  
See also the part Electrical installation – Comfort-control.
3. Check that the oil burner starts.
4. When the boiler has reached its operating temperature, check and adjusts the oil burner in accordance with its technical manual.  
See also the part Oil burner.

## 8.3 After first start

### Check that:

1. all pipe connections are tight, tighten if necessary.
2. the flue duct is tight and well insulated.
3. the boiler temperature rises upon first start.
4. heat goes out to the heating system
5. the heating circuit pump is running and can be controlled from the Comfort-control of the boiler.
6. the tapping points of the house are provided with hot water as the boiler has turned warm.
7. the function of the safety valve is faultless.
8. the boiler and the heating system are well vented. Re-check after a few days.



# 9. Operation

## 9.1 General information

Check after installation with the installer whether the system is fully operational.

Let the installer explain all regulation and control elements of the heating boiler and the operation of the comfort control so that you are familiar with the boiler system and know how the boiler system works and needs to be maintained.

The radiators must be deaired after approx. 3 days and water must be added, if required.

## 9.2 Regular checks

The regular checks should include the following points:

- Manometer check. With too low pressure, add water to the heating system filling and emptying cocks.
- Check heating oil level in the tank.
- Check comfort control settings.
- Check boiler, pre-run and flue gas temperature.
- Check burner in accordance with the instructions.
- Check and maintain neutralisation device (neutralisation box), its functions and pH value in accordance with the respective instructions and regulations.
- Check the function of the siphon.

In order to ensure that the system works well, in a power-saving manner and ensures low levels of emissions, the system should (recommended once a year) be maintained and checked with regard to settings values.

## 9.3 Standstill

If the system should be deactivated, this is performed with the operating switch, see Section Electric installation – comfort control.

## 9.4 Risk of frost

Never activate the boiler if it is suspected that the boiler or parts of the heating system may have frozen. This results in damage to the boiler and the pipes in the house. Consult your heating installer.

Regarding protective operation, see Section Electric installation – comfort control.

## 9.5 Boiler cleaning

Shut off the operation switch before carrying out any service or maintenance on boiler or peripheral equipment.

The combustion chamber of the boiler is easily cleaned from the front:

- Deactivate operating switch.
- Remove hood.
- Remove euro plug for burner.
- Loosen the screws of the cleaning door. The door can now be swivelled out with out dismantling the burner.
- Remove turbulators.
- Clean combustion chamber and heat recovery adjuncts with supplied cleaning brush.
- After cleaning refit the turbulator, close the cleaning door again and evenly tighten the screws.
- Reconnect the euro plug of the burner.
- Refit the hood.
- Activate operating switch.

The boiler cleaning must be performed according to existing regulations..

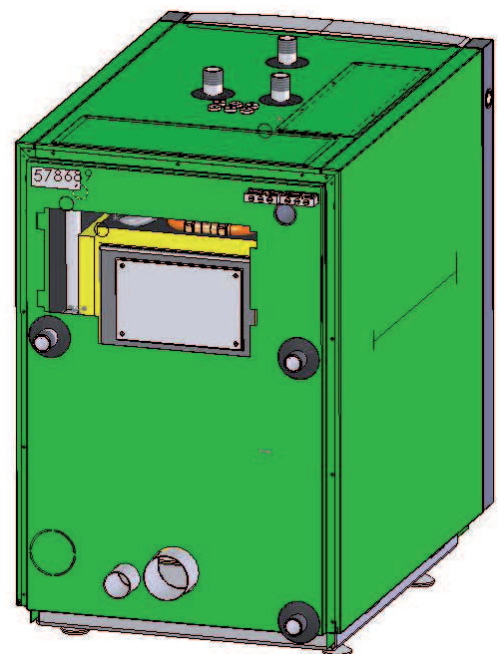
## 9.6 Spiro-Condens system cleaning

In normal operation the Spiro-Condens system is self-cleaning. For recurring operation faults and increasing flue gas temperatures, it is probably necessary to clean the spiral finned tube of the flue gas heat exchanger. The cleaning is performed by rinsing or for very severe dirt by removing the spiral finned tube and cleaning.

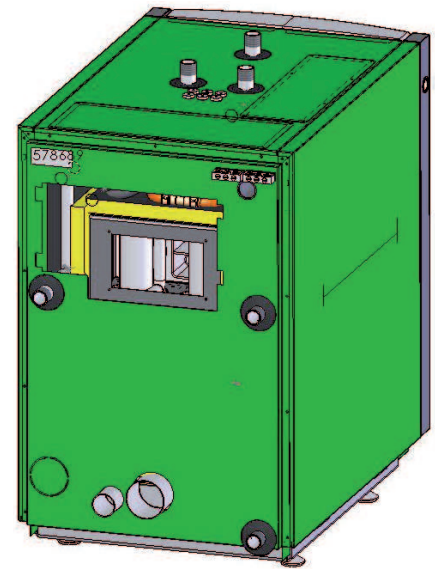
The boiler must be disconnected from the mains when cleaning it.

**Standard cleaning - once a year in connection with maintenance (regular checks, boiler cleaning, etc.) recommended:**

1. Deactivate operating switch.
2. Remove rear cover plate.

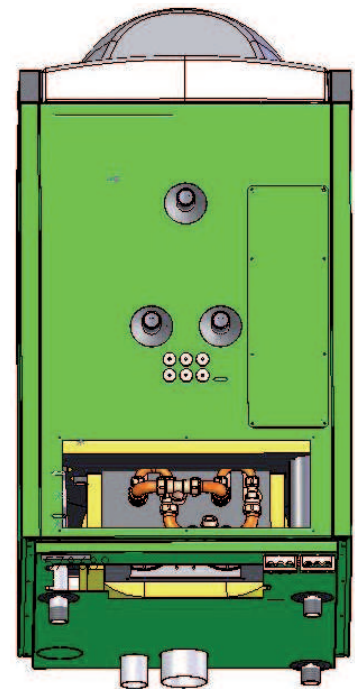


3. Unscrew and remove interior cleaning cover plate.
4. The flue gas heating exchanger can now be easily accessed from the rear and can be rinsed.
5. Mount the cover plates after cleaning.
6. Activate operating switch.

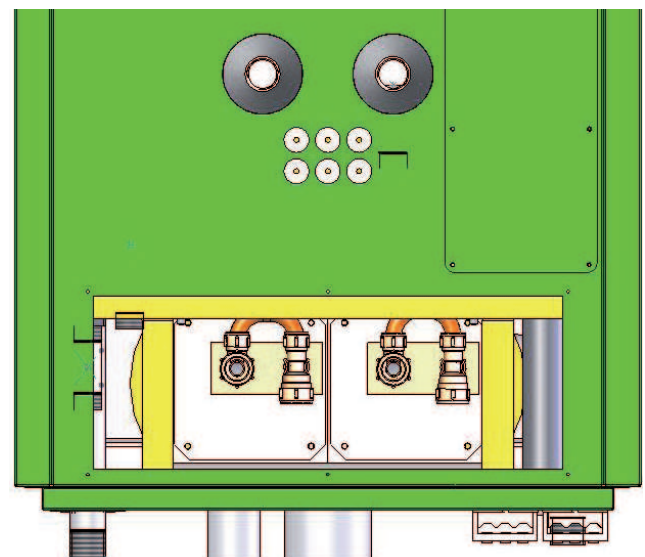


**Cleaning exceptional case – for very severe soiling:**

1. Deactivate operating switch.
2. Close locking valves, open drainage valve and empty boiler.
3. Unscrew and remove cover plate.
4. Remove heat insulation.



5. Unscrew and dismount couplings.
6. Unscrew flue gas heat exchanger (spiral finned tube) (4 screws/flue gas heat exchanger) and lift out.
7. Clean flue gas exchanger by rinsing or scrubbing it.
8. Mount flue gas heat exchanger and couplings
9. Open locking valves and fill boiler.
10. Check whether all pipe connections are waterproof, tighten if required.
11. Mount heat insulation and cover plate.
12. Activate operating switch.



## 9.7 Drainage

The boiler must be disconnected from the mains before drainage of water. The emptying connection/drainage valve is under the rear of the boiler. When emptying the entire system, the heating circuit mixer must be fully open. For an enclosed system air must be added.

## 9.8 Oil operation

General information: Settings and maintenance of the oil burner must be made in compliance with the burner's operating manual.

In order to ensure that the burner works well, in a power-saving manner and ensures low levels of emissions, the system should (recommended once a year) be maintained and check with regard to settings values.

**If you have any questions regarding the service, please contact our heating installer.**

## 9.9 Faults

### **Burner fault:**

- *Check whether oil is in the tank.*

### **Burner fault light is on:**

- *Check whether the oil filter is dirty: Observe the special instructions of the burner manufacturer.*

### **Boiler fault:**

- *The safety temperature limiter triggered. Press the restore button on the mains adapter. See Electric installation.*

### **Power supply to the boiler interrupted:**

- *Check the fuse on the mains supply. Check whether the power pack is on. See Electric installation.*

### **Heating of the rooms unsatisfactory:**

- *Check the settings of the comfort control. See Electric installation – Comfort control.*

### **Hot water temperature unsatisfactory:**

- *Check the settings of the comfort control. See Electric installation – Comfort control.*

**If all above mentioned checking measures to clear the fault prove insufficient, please contact your responsible heating specialist company or CTC.**



**Försäkran om överensstämmelse**  
**Déclaration de conformité**  
**Declaration of conformity**  
**Konformitätserklärung**

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Enertech AB  
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försäkrar under eget ansvar att produkten  
confirme sous sa responsabilité exclusive que le produit,  
declare under our sole responsibility that the product,  
erklären in alleiniger Verantwortung, dass das Produkt,

**CTC EcoSwiss 380 IC, CTC 380 IC**

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som omfattas av denna försäkran är i överensstämmelse med följande direktiv,  
auquel cette déclaration se rapporte est en conformité avec les exigences des normes suivantes,  
to which this declaration relates is in conformity with requirements of the following directive,  
auf das sich diese Erklärung bezieht, konform ist mit den Anforderungen der Richtlinie,

**EC directive on:**

**Pressure Equipment Directive 97/23/EC, § 3.3**  
**(AFS 1999:4, § 8)**

**Electromagnetic Compatibility (EMC) 89/336/EEC**

**Low Voltage Directive (LVD) 2006/95/EC (and 93/68/EEC)**

**Efficiency Directive 92/42/EWG**

**Machinery Directive 98/37/EC**

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Överensstämmelsen är kontrollerad i enlighet med följande EN-standarder,  
La conformité a été contrôlée conformément aux normes EN,  
The conformity was checked in accordance with the following EN-standards,  
Die Konformität wurde überprüft nach den EN-normen,

EN 1418	EN 61000-3-2
EN 287-1:2004	EN 55014-1/-2
EN 10204:2005, 3.1B	EN 60335-1
EN 10025:2004, S 235 Jr-G2	EN 50165
EN 15034:2006	EN 303-1 /-2/ -3 /-4
	EN 304

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Ljungby 2007-11-13

Kent Karlsson

Technical Manager



**Installation and Operating Instructions**

**OIL BURNER BF1**

**CTC 380IC35**

**CTC 380IC43**

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# 1. GENERAL

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## 1.1 Warnings



- The manual must be read before installation and start-up.
- This manual should be followed by anyone who for any reason performs work on the installation or its component parts.
- The manual is to be considered as part of the burner and must always be kept in the vicinity of the installation site.
- Ensure that the fresh air inlet to the room where the burner is located is always open.
- The burner may only be installed by authorized personnel.
- The burner is designed for oil viscosities ranged between 1.2 and 8.0 cSt at 20°C.
- No burner safety system may be disconnected.
- Cut the power and shut-off the fuel supply before performing service.
- Enertech recommends that the burner be shut down when the oil tank is filled, and for six hours thereafter, to reduce the risk of blockages.
- Ensure that the burner is protected from water spills, as its design will not withstand such.
- Oil filters should be used.
- Only use spare parts recommended by Enertech.

## Assembly and Service

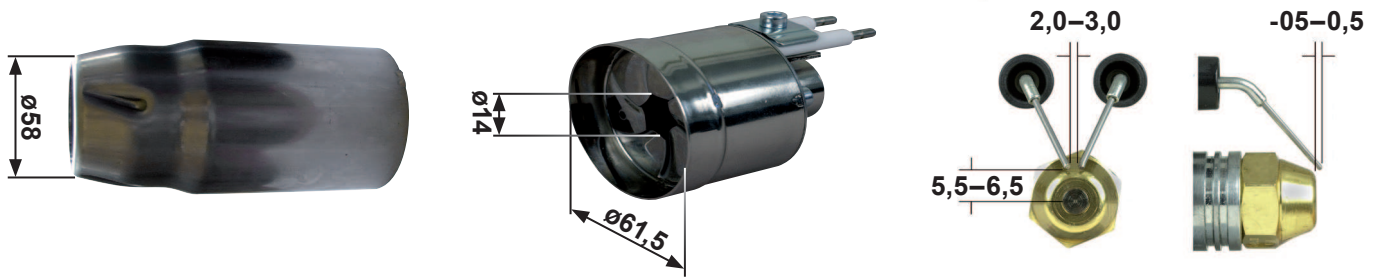
- Filters must be fitted to the oil supply line.
- Shut-off cocks must be fitted to the oil supply line.
- Oil lines must adhere to the current national standards of each respective country.

## Adjusting the burner

In order to achieve correct adjustment flue gas analysis and temperature measurements must be carried out. Otherwise there is a risk of soot build-up, poor efficiency or condensate precipitation in the flue.

## 2. TECHNICAL DATA

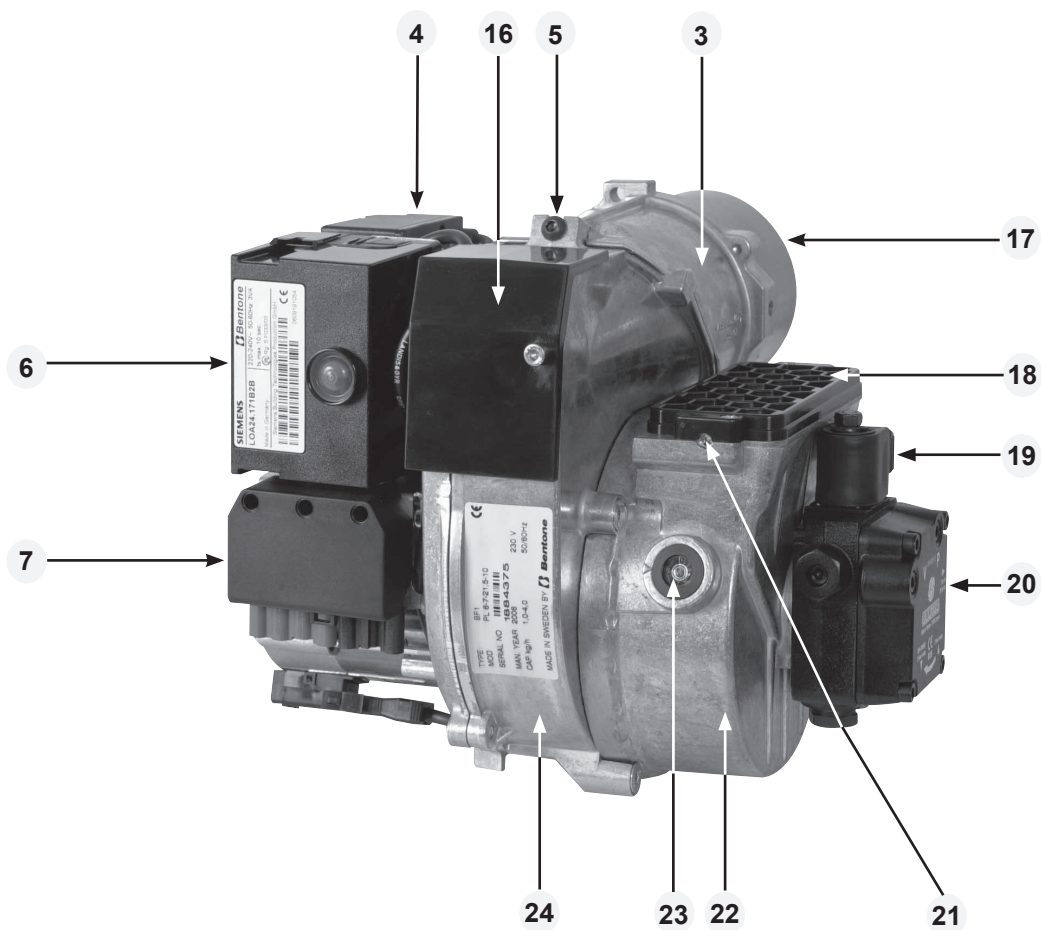
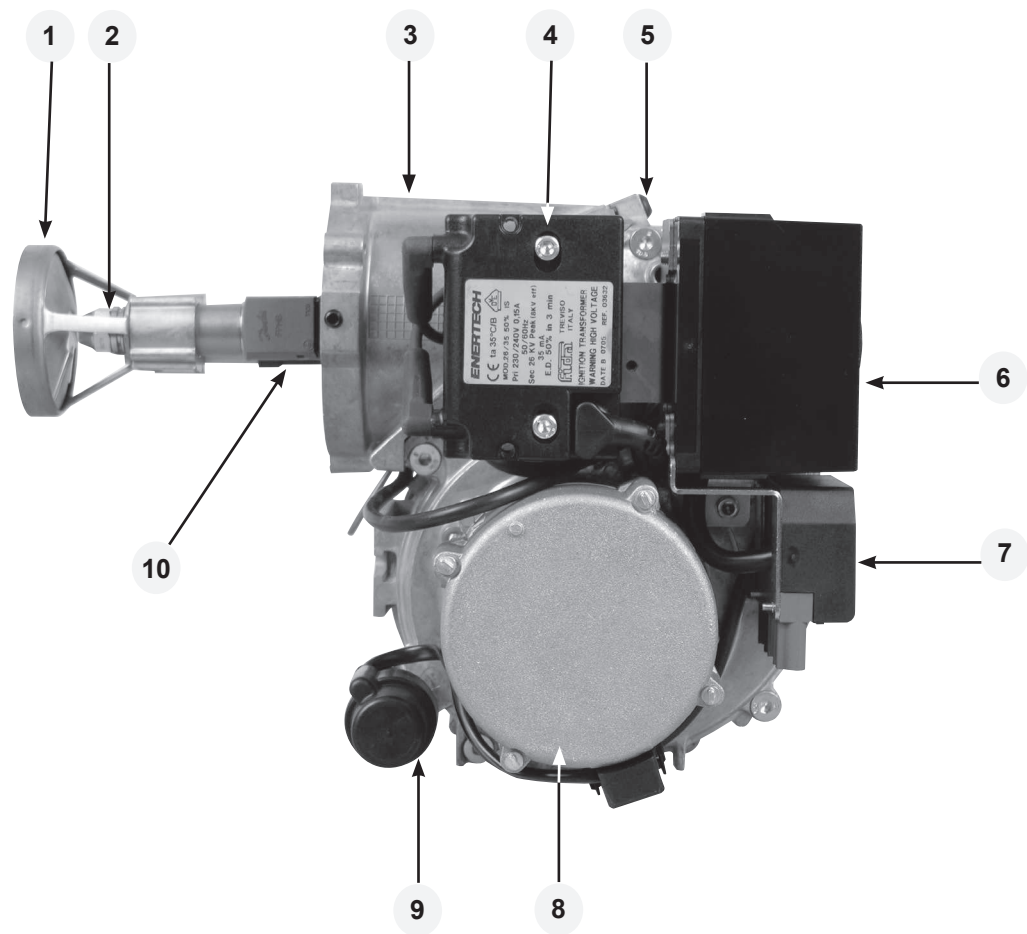
### 2.1 Model BF1 N1V 58-14



Factory setting						
Boiler	Burner	Burner Output	Air	Nozzle assembly	Oil pressure	Nozzle
		kW			bar	
CTC 380IC35	BF1N1V 58-14	35,6	15	10	10,0	0,85x80°S
CTC 380IC43	BF1N1V 58-14	43,8	20	12,5	11,5	1,00x80°S

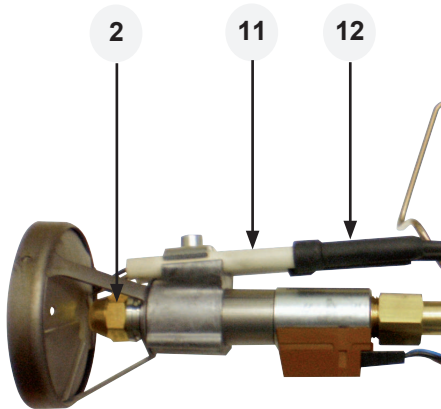
## 2. TECHNICAL DATA

### 2.2 Description

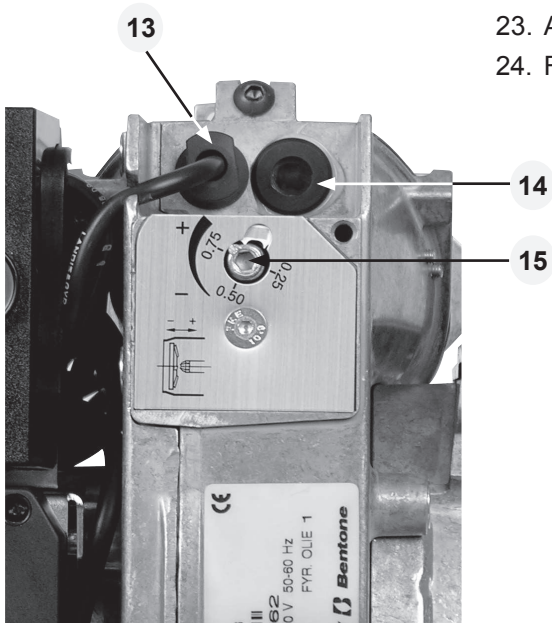


## 2. TECHNICAL DATA

### 2.2.1 Components



1. Brake plate
2. Nozzle
3. Fan housing, front
4. Ignition transformer
5. Separating screw
6. Oil burner control
7. Electrical contact X1 (refer to wiring diagram)
8. Motor
9. Capacitor
10. Preheater, where fitted
11. Ignition electrode
12. Ignition cable
13. Photoresistor
14. Inspection glass. Measuring nipple, fan pressure (option)
15. Nozzle assembly adjustment
16. Cover plate
17. Blast tube
18. Grid
19. Solenoid valve
20. Oil pump
21. Air regulator
22. Air intake
23. Air flow indicator
24. Fan housing, rear



## 2. TECHNICAL DATA

---

### 2.3 Declaration of concordance/conformity

Manufacturer: Enertech AB, Bentone Division  
Street address: Näsvägen  
SE-341 34 Ljungby, Schweden  
Postal address: Box 309  
SE-341 26 Ljungby, Sweden  
Product: Oil burner  
Type: BF1, B 1, B 2, B 9, B 10, B 11, B 20, B 30,  
B 40, B 45, B 50, B 55, B 60, B 65, B 70, B 80,  
ST 97, ST 108, ST 120, ST133, ST 146

Certificate TÜV Süddeutschland

Certificate No	Burner
08128915006	BF1
0111110535004	B1
0207110535005	B2
02119815001	ST97, ST108, ST120, ST133, ST146
02119815002	B9, B10, B11
02119815003	B20, B30, B40, B45
02119815004	B50, B60, B70, B80
040588622001	B55
040588622002	B65

Enertech AB declares under its sole responsibility that the above-named products are in conformity with the following standard(s) or other normative document(s) and fulfil the applicable provisions of the below-mentioned EC Directives.

Document:	EN 267	
EC directive:	89/336/EG	Electromagnetic compatibility
	73/23/EG	Low voltage Directive
	89/392/EG	Machinery Directive
	92/42/EG	Boiler Efficiency Directive

Because the burner is deemed to conform to the above-mentioned standards and directives, it holds the CE marking.

Enertech AB Bentone Division is quality certified according to SS-EN ISO 9001:2000.

Ljungby, den 16.10.2007

Sven-Olov Lövgren



## 3. INSTALLATION

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### 3.1 Oil supply

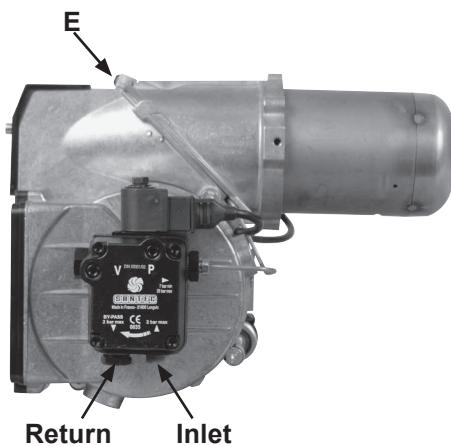
In order to achieve good operational reliability it is important that the oil supply system is laid out correctly.

Observe the following:

- Choice of pipe diameters, pipe lengths and height differences (refer to pump instructions).
- Piping should be run with a minimum of joints/compression fittings.
- Pipework must be laid out so that oil hoses are not subjected to tension or overbending when the burner is swung out or removed for service.
- The oil filter should be installed so that the filter cartridge can easily be replaced

### 3.2 Burner installation

#### 3.2.1 Oil pipes



1. Check the oil pipe dimensions. (Refer to Pump Instructions.)
2. The oil filter should be installed in the oil supply line. If an air separator is fitted, the oil filter should be installed before the air filter to increase the life span of the filter.
3. For one-pipe systems the return plug must be removed. (Refer to Pump Instructions.)
4. When installing oil hoses, check that the supply and return hoses are connected to the correct connections on the oil pump. The hoses must be run so that they are not bent or tensioned.
5. Purge the oil system. The oil pump will be damaged if it is run dry.
6. The vacuum should not be lower than 0.3 bar depression in the suction line at start up.

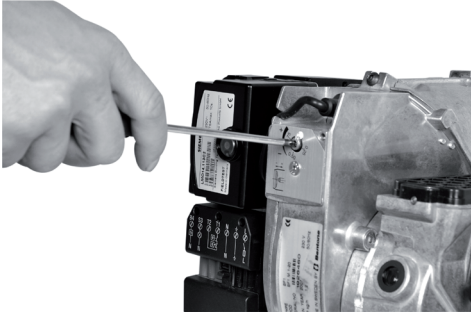
## 4. BASIC SETTINGS

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### 4.1.1 Nozzle assembly adjustment

The burner is fitted with a regulator which changes the brake plate position in the blast tube. This is used to set the correct pressure drop across the combustion assembly and thereby achieve good combustion without pulsation. The setting to be chosen is dependent among other things on set output and furnace pressure.

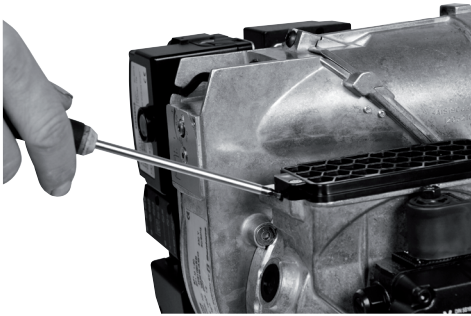
#### Brake plate setting



- Less diffusion: turn screw to left.
- More diffusion: turn to right.

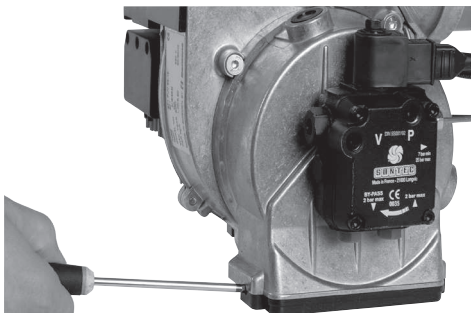
Setting brake plate position affects air flow. It is therefore always necessary to adjust the air with the burner air regulator afterwards.

### 4.1.2 Air intake adjustment



Air settings are very important for achieving good combustion with neither too much, nor too little, air. Adjustment of combustion airflow is carried out by turning the air regulator with a hex key. How far open the air regulator must be is determined by output, furnace pressure and other burner settings such as blast tube position.

### 4.1.3 Method of adjusting air quantity



Setting the air regulator is dependent on how the screw (with which air regulation is adjusted) is installed. If the air intake is installed underneath as shown in the illustration, turning the screw clockwise will reduce air-flow, and anticlockwise increase it.



## 5. BURNER SERVICING

### 5.1 Service



Service must be carried out after 3,000 operating hours, or at least once per year.

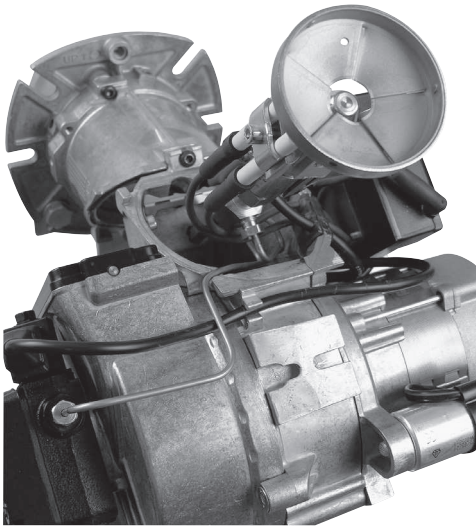
Only authorized personnel may perform service.

Before any type of service work is begun, switch of the power at the main switch and shut off the oil.

Exercise caution as parts which are exposed when the burner is taken apart can be hotter than 60°C. The installation engineer must be especially careful to ensure that no electrical wiring or oil lines are pinched or damaged during installation or service.

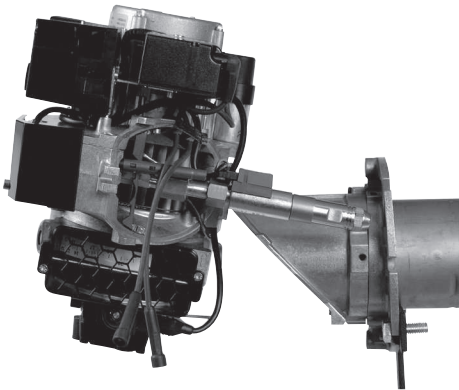
#### 5.1.1 Service position

##### 5.1.1.1 Service position 1



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Undo the screw which fastens the burner front piece to the fan housing, but only so much as to allow the fan housing to be removed from the burner front piece.
3. Remove the fan housing from the burner front piece and pull it backwards until the combustion assembly is free of the burner front piece.
4. Suspend the fan housing by the fan housing attachment point (for joining the front piece to the fan housing) on the screw (for joining the front piece to the fan housing) as illustrated to the left. If necessary, tighten the screw somewhat to ensure that the burner is suspended safely.

##### 5.1.1.2 Service position 2



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Undo the screw which fastens the burner front piece to the fan housing, but only so much as to allow the fan housing to be removed from the burner front piece.
3. Remove the fan housing from the burner front piece and pull it backwards until the combustion assembly is free of the burner front piece.
4. Turn the screw into the front piece until there is a gap of approx. 5 mm between the metal and the screw head.
5. Suspend the fan housing by the fan housing service attachment on the screw used for joining the front piece to the fan housing, with the motor upwards, as shown in the illustration to the left.

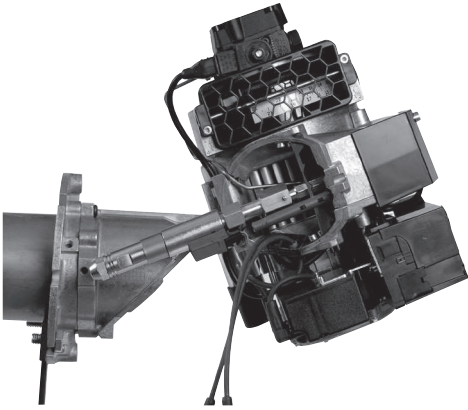
Note:

\* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

## 5. BURNER SERVICING

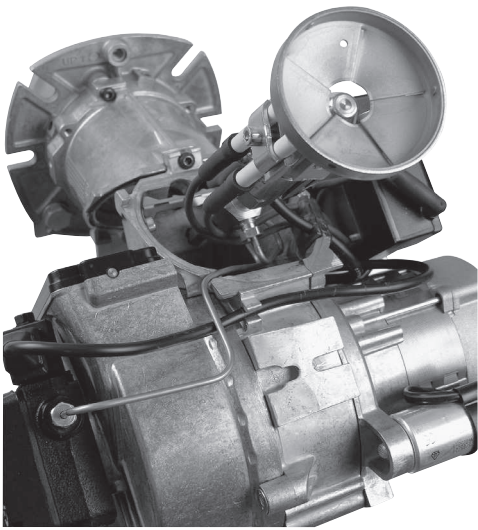
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### 5.1.1.3 Service position 3



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Undo the screw which fastens the burner front piece to the fan housing, but only so much as to allow the fan housing to be removed from the burner front piece.
3. Remove the fan housing from the burner front piece and pull it backwards until the combustion assembly is free of the burner front piece.
4. Turn the screw into the front piece until there is a gap of approx. 5 mm between the metal and the screw head.
5. Suspend the fan housing by the fan housing service attachment on the screw used for joining the front piece to the fan housing, with the air intake upwards, as shown in the illustration to the left.

### 5.1.2 Combustion assembly service



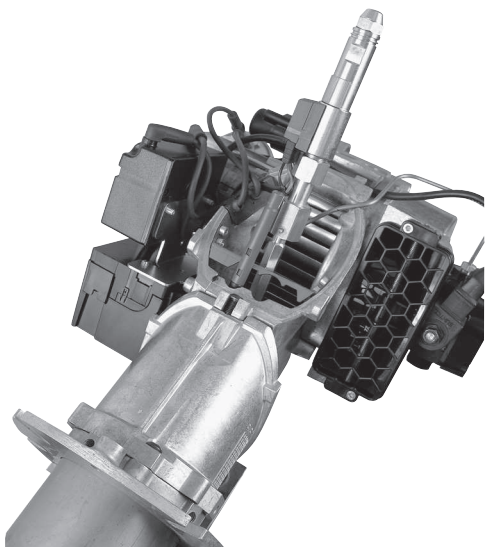
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 1 may be used.
3. Carry out a visual inspection of the combustion assembly and check the various parts for defects.
4. Undo and remove the brake plate and the electrode package from the oil pipe. Clean the brake plate as necessary.
5. Screw off the nozzle.
6. Install the nozzle. The nozzle may not be cleaned; it must be replaced with a new nozzle if the existing one is considered defective.
7. Check the ignition electrodes. Replace as necessary (refer to Technical data for electrode settings).
8. Install the brake plate and electrode package. Check that the distance between the nozzle and brake plate is correct (refer to Technical data).
9. Undo the screw that the fan housing is suspended from. Reassemble the front piece and the fan housing and fasten them together.
10. Connect the Eurostecker and switch on the power at the main switch.
11. Start the burner and check the combustion\*.

#### Note:

- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

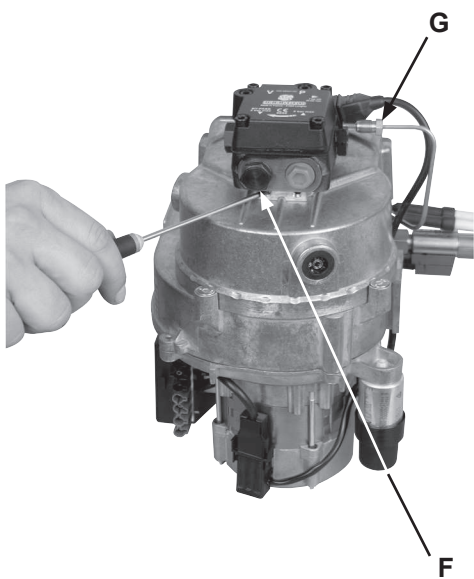
## 5. BURNER SERVICING

### 5.1.3 Preheater replacement



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 1 may be used.
3. Remove the brake plate and electrode package.
4. Disconnect the preheater cable from the preheater.
5. Screw off the nozzle.
6. Undo the nut that connects the oil pipe to the preheater.
7. Install the new preheater. Check the condition of the O-ring; replace as necessary.
8. Connect the preheater cable.
9. Install the nozzle.
10. Install the brake plate and electrode package. Check that the distance between the nozzle and brake plate is correct (refer to Technical data).
11. Re-assemble the burner.
12. Connect the Eurostecker and switch on the power at the main switch.
13. Start the burner and check the combustion\*.

### 5.1.4 Oil pump replacement



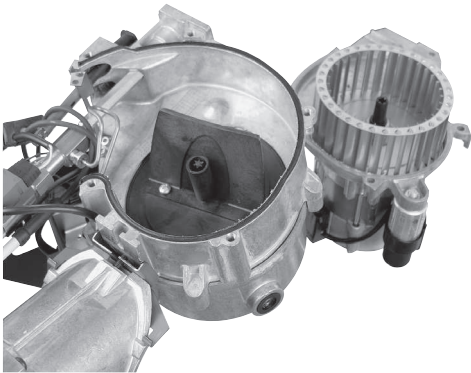
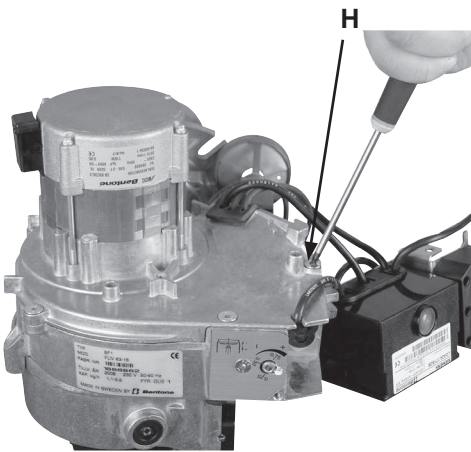
1. Switch off the power at the main switch and disconnect the Eurostecker
2. Disconnect the oil hoses from the oil pump.
3. If so desired, service position 3 may be used.
4. Remove the solenoid cable from the pump.
5. Remove the connecting pipe from the pump.
6. Undo the screws (F) and pull out the oil pump.
7. Install the oil pump in the burner. Tighten the screws and attach the connecting pipe (G). (It is important that the splines engage the pump coupling correctly.)
8. Connect the oil hoses. (For conversions from one- and two-pipe systems refer to the Pump instructions.)
9. Connect the Eurostecker and switch on the power at the main switch.
10. Start the burner, purge the pump, adjust to correct pressure and check combustion.

#### Note:

- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

## 5. BURNER SERVICING

### 5.1.5 Fan motor replacement



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 2 may be used.
3. Remove the electrical connection from the motor.
4. Remove the electrical box retaining screw.
5. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
6. Undo the screws (H) to the motor flange, 5 pcs.
7. Lift away the motor.
8. Remove the drive coupling end from the motor shaft, loosen and remove the fan wheel.
9. Install the fan wheel on the new motor, tighten the locking screw. The fan wheel must be installed in the bottom position toward the motor shaft. Install the drive coupling end.
10. Align and fit the motor flange to the fan housing. Pay attention to the drive coupling so that it does not fall out, and also that it aligns correctly in the drive coupling end of the motor and pump.
11. Bolt the motor flange and fan housing together. Tighten the screws diagonally, and do not tighten hard one at a time. This is in order to ensure the fan housing and the motor flange assume the correct relative positions.
12. Place the cable conduit entry and the photocell cable in position.
13. Screw the electrical console in place.
14. Connect the motor wiring.
15. Join together the fan housing and the burner front piece.
16. Connect the Eurostecker and switch on the power at the main switch.
17. Start the burner and check the combustion\*.

**Note:**

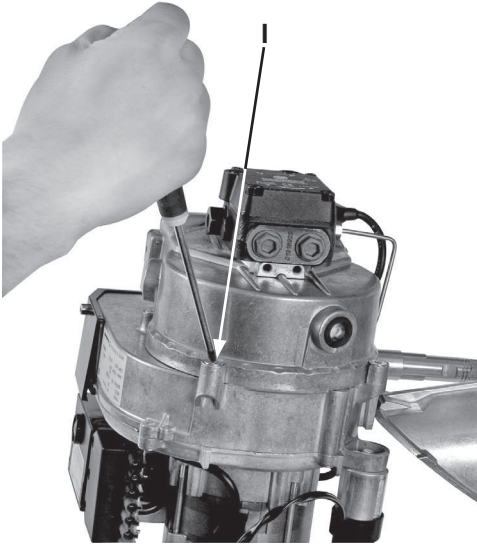
- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.



## 5. BURNER SERVICING

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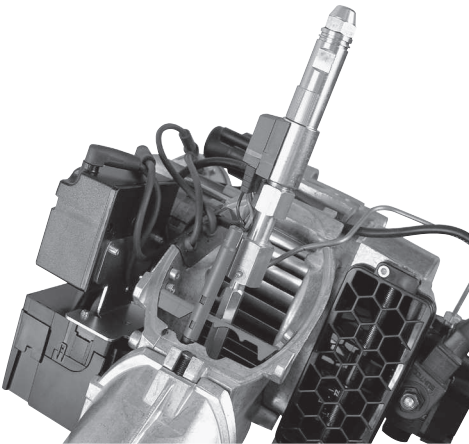
### 5.1.6 Air intake and intake cone service



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 3 may be used.
3. Remove the solenoid cable from the pump.
4. Remove the connecting pipe from the pump.
5. Undo the air intake retaining screws (I).
6. Remove the air intake.
7. Undo the inlet cone retaining screw; make note of the inlet cone position.
8. Remove the inlet cone from the fan housing.
9. Check the function and visual condition of the various air regulator components. Clean and replace components as necessary.
10. Re-assemble the burner. Be especially careful when installing the inlet cone; install it in the same position it had at removal.
11. Fit the O-ring in the groove between the fan housing and inlet cone. Ensure that it is properly located in the groove and is not damaged when the air intake is fitted.
12. Connect the Eurostecker and switch on the power at the main switch.
13. Start the burner and check the combustion\*.

### 5.1.7 Fan wheel checks

#### 5.1.7.1 Inspection



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 1 may be used.
3. Perform a visual inspection of the fan wheel. Spin the fan wheel with your finger, or carefully using a tool.
4. If the fan wheel is not very dirty, clean it carefully where possible.
5. If thorough cleaning is required, refer to point 5.1.7.2 or alternatively 5.1.7.3.
6. If cleaning is not necessary, re-assemble the burner.
7. Connect the Eurostecker and switch on the power at the main switch.
8. Start the burner and check the combustion\*.

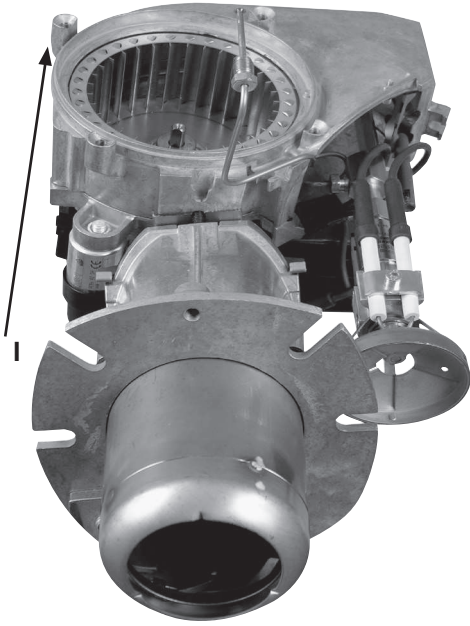
#### Note:

- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

## 5. BURNER SERVICING

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### 5.1.7.2 Cleaning, alternative 1



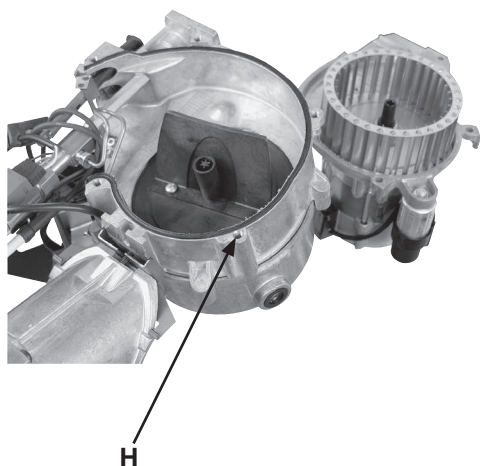
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 3 may be used.
3. Remove the solenoid cable from the pump.
4. Remove the connector pipe from the pump.
5. Undo the air intake retaining screws (I).
6. Remove the air intake.
7. Undo the inlet cone retaining screw; make note of the inlet cone position.
8. Remove the inlet cone from the fan housing.
9. Clean the fan wheel. Undo and if necessary remove the fan wheel for more thorough cleaning of the fan and fan housing.
10. Install the fan wheel; tighten the retaining screw. The fan wheel must be installed in the bottom position toward the motor shaft. Install the drive coupling end.
11. Re-assemble the burner. Pay attention to the drive coupling so that it does not fall out, and also that it aligns correctly in the drive coupling end of the motor and pump.
12. Fit the inlet cone in the same position as before disassembly
13. Fit the O-ring in the groove between the fan housing and inlet cone. Ensure that it is properly located in the groove and is not damaged when the air intake is fitted.
14. Connect the Eurostecker and switch on the power at the main switch.
15. Start the burner and check the combustion\*

Note:

- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

## 5. BURNER SERVICING

### 5.1.7.3 Cleaning, alternative 2



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 2 may be used.
3. Remove the electrical connection from the motor.
4. Remove the electrical box retaining screw.
5. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
6. Undo the motor flange retaining screws (H), 5 pcs.
7. Lift away the motor.
8. Clean the fan wheel and the fan housing. For more thorough cleaning remove the drive coupling from the motor shaft and loosen and remove the fan wheel.
9. Install the fan wheel on the motor and tighten the locking screw. The fan wheel must be installed in the bottom position toward the motor shaft. Install the drive coupling end.
10. Align and fit the motor flange to the fan housing. Pay attention to the drive coupling so that it does not fall out, and also that it aligns correctly in the drive coupling end of the motor and pump.
11. Screw the motor flange and the fan housing together. Tighten the screws diagonally, and do not tighten hard one at a time. This is in order to ensure the fan housing and the motor flange assume the correct relative positions.
12. Place the cable conduit entry and the photocell cable in position.
13. Screw the electrical box in place.
14. Connect the motor wiring.
15. Join together the fan housing and the burner front piece.
16. Connect the Eurostecker and switch on the power at the main switch.
17. Start the burner and check the combustion\*.

### 5.1.8 Electrical module



Check that the electrical console retaining screw is tight so that good contact to earth is established between the console and the burner body.

Only use electrical components recommended by Enertech.

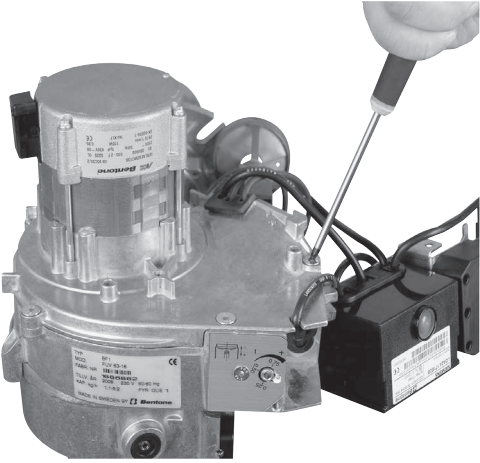
Note:

\* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.

## 5. BURNER SERVICING

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### 5.1.8.1 Replacement of complete electrical package



1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 2 may be used.
3. Remove the electrical connection from the motor.
4. Remove the electrical box retaining screw.
5. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
6. Install the new electrical package.
7. Place the cable conduit entry and the photocell cable in position.
8. Screw the electrical box in place.
9. Connect the motor wiring.
10. Assemble the fan housing and burner front piece.
11. Connect the Eurostecker and switch on the power at the main switch.
12. Start the burner and check the combustion\*.

### 5.1.8.2 Replacement of individual electrical components

1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. If so desired, service position 2 may be used.
3. Remove the oil burner control.
4. Disconnect the wires to the components that are to be replaced.
5. Insert the new wires.
6. Install the oil burner control.
7. Assemble the fan housing and burner front piece.
8. Connect the Eurostecker and switch on the power at the main switch.
9. Start the burner and check the combustion\*.

When replacing the electrical components transformer and control box included in the electrical package, the junction box lid need not be removed.

#### Note:

- \* When servicing or replacing components that affect combustion, analyses and soot tests must be carried out on the installation.



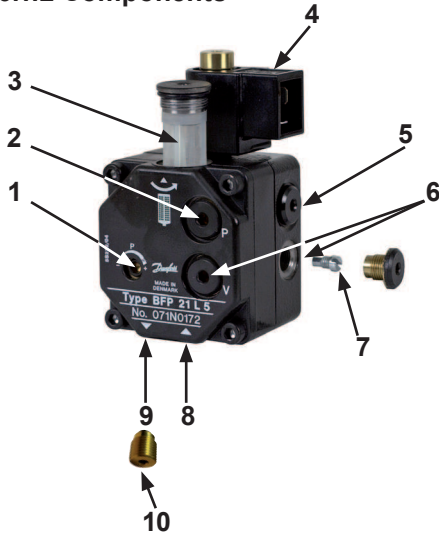
## 6. PUMP INSTRUCTIONS

### 6.1 Danfoss BFP 21 LE-S

#### 6.1.1 Technical data

Viscosity range:	1,3–12,0 mm <sup>2</sup> /s
Pressure range:	7–15 bar
Oil temperature:	–10 bis +70°C

#### 6.1.2 Components



1. Pressure regulation
2. Manometer connection G 1/8"
3. Filter
4. Solenoid valve
5. Nozzle connection G 1/8"
6. Vacuum manometer connection G 1/8"
7. Horseshoe washer/Return plug
8. Suction line G 1/4"
9. Return line G 1/4"
10. Metal plug G 1/4"

#### 6.1.3 Filter replacement BFP 21LE-S

Cut off the power and shut off the oil supply. Remove the filter screw from the cover with a 4 mm Allen key and pull out the filter insert. If necessary a screwdriver may be used between the filter and the screw to carefully pry out the filter. Replace the old filter with a new one by pressing the new filter down onto the filter screw. Replace the insert, tighten lightly.

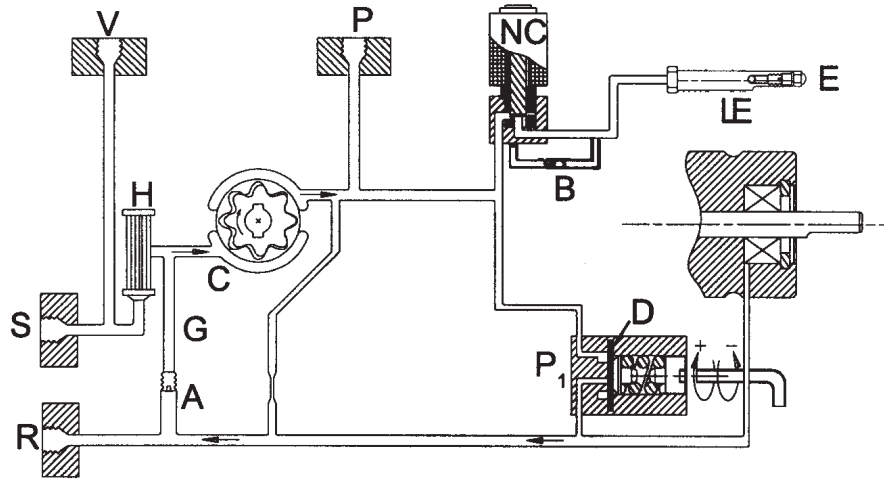
Do not forget to replace the O-ring. Open the oil supply and switch on the power.

##### 6.1.3.1 One-pipe system

Remove the return plug (7), plug the return line (9) with the metal plug (10) G 1/4"

## 6. PUMP INSTRUCTIONS

### 6.1.4 Function BFP 21 LE-S



When the pump is started, oil is drawn from the suction port (S) through the filter (H) to the suction port (C) of the gear-set.

The oil then moves to the pressure side of the gearwheel and is thus pressurised. The pressure is controlled and maintained at a constant pre-set level by diaphragm (D) of the control valve ( $P_1$ ).

The control valve ( $P_1$ ) distributes the oil supplied by gear-set (C) between the nozzle connection (E) and the return port of the pump (R).

The amount of oil consumed is determined by the pressure set on the control valve ( $P_1$ ) and by the size of the oil nozzle in the nozzle line.

#### **The control valve ( $P_1$ ) operates as follows:**

- When the oil attains opening pressure, the port to the return side opens.
- The diaphragm and the spring keep a constant pump pressure at the set value.
- If the pump becomes overloaded, i.e. if an attempt is made to take out more oil than the gear-set can deliver in the prevailing circumstances, the oil pressure will fall below the set value causing the valve to close, by diaphragm (D), to the return port (R) and return to the starting position.

#### **This can be remedied by:**

- Lowering the pump pressure.
- Reducing the amount of oil delivered, i.e. changing to a smaller nozzle.
- Changing to a pump with higher capacity.

The check valve B allows the oil trapped between solenoid valve NC and the LE valve in the preheater to expand backwards in the system to the return port.

The cut-off valve does not cause any extra pressure drop, i.e. at a pump pressure of 10 bar the spraying pressure will also be 10 bar.

### 6.1.5 LE-S System

#### **Note!**

The LE-S pump has an integrated check-valve function at the solenoid valve, allowing the oil pressure to expand backwards during standstill. The desired function of avoiding the formation of drops on the nozzle can only be achieved by using both the LE-S pump and the LE valve built into the FPHB-LE preheater.

The system is only used on the BFP pump fitted with a solenoid valve. The pumps are given a different designation, e.g. BFP 21 LE-S, but do not differ on the outside from the normal BFP pump.

BFP LE-S pumps cannot be converted into standard pumps, and the standard BFP pump cannot be converted to the LE-S system.

The LE valve must be fitted when using the LE-S pump. The LE valve may not be excluded unless a BFP standard pump without the LE-S function is used instead.

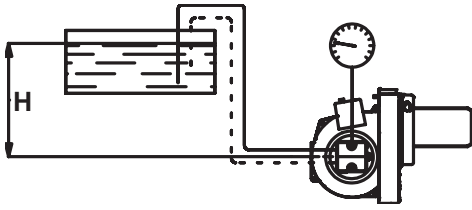
### 6.1.6 Purging

Purging air is only necessary in single-pipe systems. In two-pipe systems the pump purges air automatically through the return line.

## 6. PUMP INSTRUCTIONS

### 6.1.7 Suction pipe tables BFP 21 LE-S

#### 6.1.7.1 Overhead tank



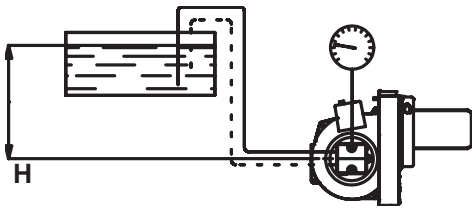
#### One-pipe system

Height m \ Line diameters	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
ø 4 mm	51	45	38	32	26	19	13	6
ø 5 mm	100	100	94	78	62	47	31	16
ø 6 mm	100	100	100	100	100	97	65	32

#### Two-pipe system

Height m \ Line diameters	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
ø 6 mm	33	31	29	27	25	23	21	19
ø 8 mm	100	98	91	85	79	72	66	60
ø 10 mm	100	100	100	100	100	100	100	100

#### 6.1.7.2 Underlying tank



#### One-pipe system

For reliable operations, use of a Tigerloop is recommended in underlying tanks.

#### Two-pipe system

Height m \ Line diameters	0	-0,5	-1,0	-1,5	-2,0	-2,5	-3,0	-3,5	-4,0
ø 6 mm	17	15	13	11	9	7	5	3	1
ø 8 mm	53	47	41	34	28	22	15	9	3
ø 10 mm	100	100	99	84	68	53	37	22	6

The suction line tables comprise theoretically calculated values where pipe dimensions and oil flow are adapted to prevent turbulent flows from occurring. Turbulent flows can result in pressure losses and noise in the pipework.

A typical pipe system usually comprises pipe runs with 4 bends, a non-return valve, a shut-off valve and a pre-filter.

The total resistance of these items is such that it can be disregarded. In the tables no run longer than 100 m is listed, as experience shows this not to be required.

The tables apply to standard heating oil of normal grade merchantable according to existing norms. When starting operations with an empty pipe system, the pump should not be run without oil for more than 5 min. (This presupposes that the pump is lubricated with oil when running.)

The tables give the total suction line length in meters with a nozzle capacity of 2.5 kg/h. Max. permissible pressure on the suction and pressure lines is 2.0 bar.

## 7. PREHEATER

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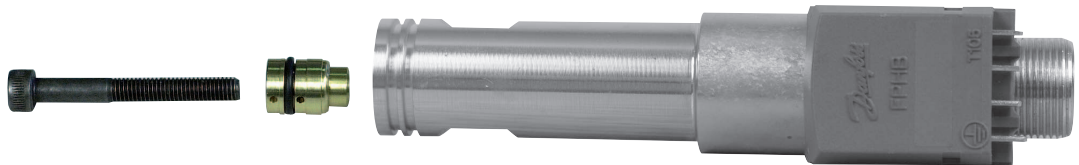
### 7.1.1 Function FPHB 5-LE

When the boiler thermostat connects, the PTC element is energized and oil begins to preheat. When the oil has reached the correct temperature, the preheater thermostat closes and the burner receives the start signal. During operations the PTC element compensates its output so that the temperature does not become too high. If the oil temperature is low and the oil flow high, the preheater thermostat may open owing to the PTC element's inability to maintain oil temperature. In this case it is important to use oil burner controls with a preheater holding circuit.

#### 7.1.1.1 LE-valve

FPHB 5-LE has an integrated shut-off valve which prevents oil drips at start and stop. When a normal preheater is used before start, the oil expands and a small quantity of oil flows out of the nozzle orifice and wets the outside of the nozzle. Also, when the burner stops, a small quantity of oil forces its way out after the flame has gone out, especially when there are hot components which radiate heat back to the nozzle. The cut-off valve in the FPHB 5-LE is located immediately behind the nozzle. It opens at  $\approx 6.5$  bar and closes at  $\approx 2.5$  bar.

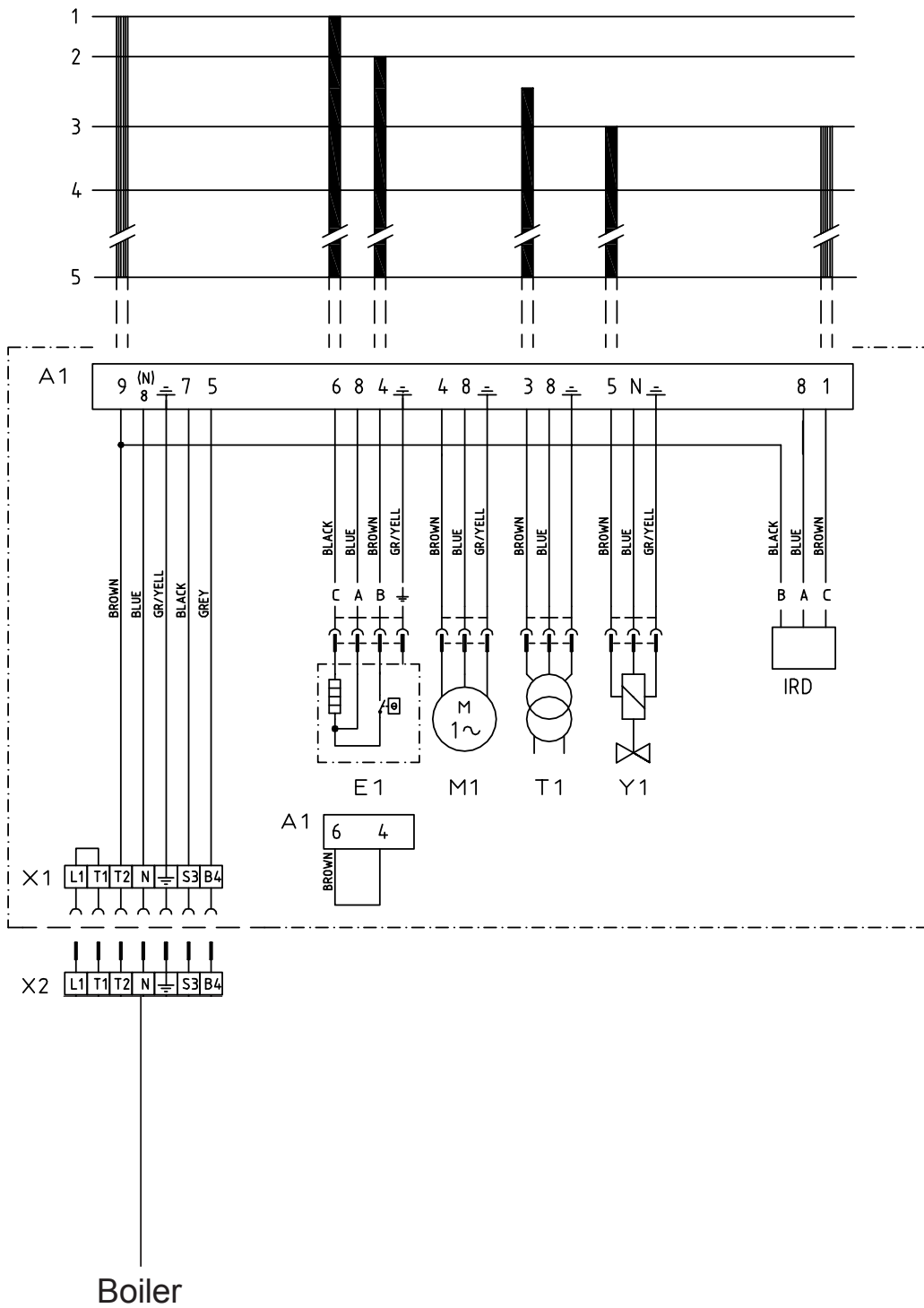
In order to achieve the intended effect when the pressure of the trapped oil increases, it must be evacuated back to the pump. This is made possible by the pump solenoid valve's return-valve function.



The cut-off valve can be pulled out of the preheater with the aid of an M5 screw as illustrated. When the valve is re-installed, oil pressure pushes it to a position all the way forward behind the nozzle filter so that the volume in front of the valve is as small as possible.

# 8. ELECTRICAL EQUIPMENT

## 8.1 Wiring diagram SATRONIC TF 834E/TF 834E.2/TF834E.3



## 8. ELECTRICAL EQUIPMENT SATRONIC

### 8.1.1 Component list

A1	Oil burner control	T1	Ignition transformer
E1	Preheater	Y1	Solenoid valve
F1	Fuse, max. 10A	X1	Plug-in contact, burner
M1	Burner motor	X2	Plug-in contact boiler

Preheater wiring colours:      A Blue    B Brown    C Black

The installation must be connected to the mains and fused according to local regulations.

### 8.1.2 Function Satronic

- 1. Switch on operating switch and twin thermostat**  
Voltage is applied to the preheater and the preheating period starts. This period lasts till the operating temperature of the oil has been reached and the preheater thermostat closes (2)
- 2. Preheater thermostat closes**  
The burner motor starts, an ignition spark is formed, the prepurge goes on till the prepurge period expires and the solenoid valve opens (3)
- 3. Solenoid valve opens**  
Oil mist is formed and ignited. The photocell indicates a flame.
- 4 The safety time expires.**
  - a** If no flame is established before this time limit the control cuts out.
  - b** If for some reasons the flame disappears after this time limit, the burner will make an attempt to re-start.
- 4-5 Operating position**  
If the burner operation is interrupted by means of the main switch or the thermostat, a new start takes place when the conditions in accordance with point 1 are fulfilled.  
**The oil burner control cuts out**  
A red lamp in the control is lit. Press the reset button and the burner re-starts.

### 8.1.3 Technical data

	<b>TF 834</b>
Pre-ignition period:	12 s
Pre-purge time:	12 s
Safety lock-out time:	10 s
Reset time after lockout:	< 60 s
Reaction time on flame failure:	max 1 s
Ambient temperature:	0 - +60°C
Min. current with flame established:	24 µA
Enclosure:	IP 44

(Under voltage proof only TF 834E.2 and TF834E.3)

## 8. FLAME SUPERVISION FOR OIL BURNER CONTROL

### 8.1.4 Application

The flicker detector IR 911/IR 1010 is used for the supervision of the oil flame and is connected to a Satronic oil or gas burner control. The supervision function is based on the infra red flicker principle, i.e. only infra light is sensed and it does not react to the even radiation from the brick lining, if any, in the boiler.

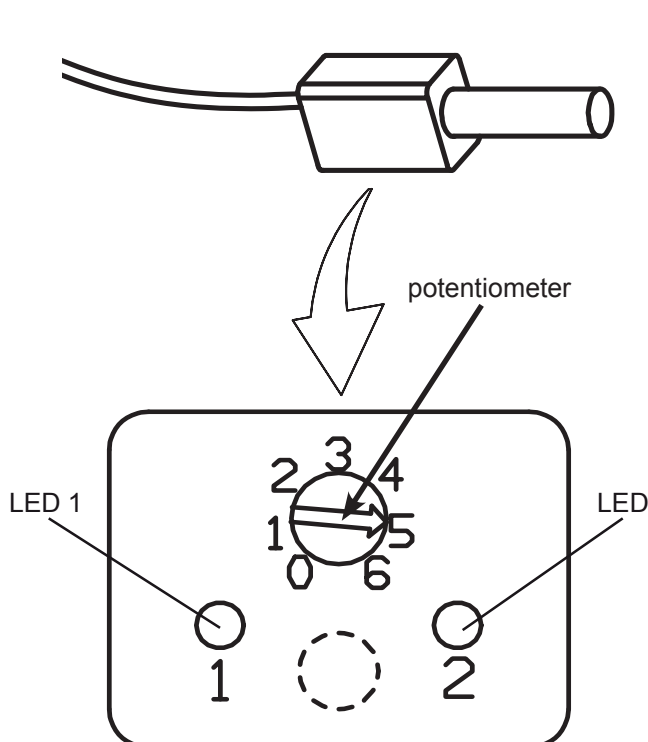
### 8.1.5 Technical Data

Ambient temperature:	-20...+60°C
Insulation standard:	IP 41
Mounting position:	optional
Weight:	40 g
Mounting of the flicker detector:	axially or radially
Spectral range:	800 - 1100 nm
Max. sensitivity:	950 nm
Frequency:	16 - 300 Hz
Max. sensitivity:	60 Hz

### 8.1.6 Commissioning and maintenance

On commissioning of the installation and after service ensure that the work has been carried out in the correct way:

1. Check that the oil burner control is correctly connected. Faulty connections jeopardize the safety and may cause damage to the oil burner control and the installation.
2. Adjust max. sensitivity and start the burner: After the initial start there must not be any flame indication during the pre-purge time.
3. Take out the flicker detector when the burner is in operating position and cover it well: The indication must go back to zero. The oil burner control locks out or goes to repetition.
4. Re-start with covered flicker detector: There must be no indication. The oil burner control must lock out when the safety time has expired.
5. Start the burner under the influence of extraneous light on the flicker detector, for example a fluorescence lamp, cigarette lighter, bulb (day-light is not strong enough): The oil burner control must lock out because of extraneous light (immediately or after the end of the pre-purge period depending on type of control).



6. When the burner is in operation carefully turn the potentiometer back from max. until LED 2 goes out. Then increase by one or two markings so that both LEDs are on. With this adjustment the quality of the flame is efficiently supervised. A change of the burner adjustment because of dirt etc. or the influence of extraneous light is easily noticeable.

Satronic IR 911/IR 1010 does not need any maintenance. As it is a safety device it is prohibited to open it.

Burner in operation=  
Burner in pre-purge=

both LEDs on  
both LEDs off

# 9. FAULT LOCATION

## 9.1 Burner will not start

Symptom	Causes	Remedies
Motor starts	Unstable flame	Adjust the damper
Burner pre-ventilates		
Flame formed		
Burner trips		
Motor starts	Excess air	Check the oil pressure
Burner pre-ventilates		
No flame formed	Low oil pressure	Check the nozzle in relation to the combustion apparatus dimensions and the ignition electrode position
Burner trips		
Motor starts	Incorrect combustion apparatus settings	Check the flame monitor is clean and can register light
Burner pre-ventilates		
No flame formed	Flame monitor does not register light	Check with using new photocell
Burner trips		
Motor starts	Defective flame monitor	Check using new oil burner control (Note: replacement of photocell recommended if oil burner control replaced)
Burner pre-ventilates		
No flame formed	Defective oil burner control	Check the oil supply to the burner and that there are no air bubbles in the pump
Burner trips		
Motor starts	No oil	Check function of solenoid
Burner pre-ventilates		
No flame formed	False light	Check flame monitor does not register ambient light
Burner trips		
Motor starts	No spark	Check high voltage wiring and ignition electrodes
Burner pre-ventilates		
No flame formed		
Burner trips		

## 9.2 Burner will not start after normal use

Burner does not start	Fuse blown	Check and replace fuse as necessary. Investigate cause of fault
	Boiler thermostat has not reset	Adjust thermostat
Burner pre-ventilates	Overheating protection has deployed	Reset the overheating protection. Investigate the cause of its deploying. Remedy fault
	Defective preheater	Check by replacing with new
	Defective oil burner control or flame monitor	
Burner stops	No oil supply	Check that tank, oil lines, solenoid valves, pump and nozzle are in good condition
	Too great a pressure drop at brake plate	Adjust the burner
	Too strong draught prevents flame forming	Correct the boiler draught
	No spark	Check the ignition transformer. Check the ignition electrode settings and ceramics

## 9.3 Delayed ignition, burner starts; pulsation

Burner pulsates at start with hot flue gases	Too strong a draught	Correct the boiler draught
	Too great a pressure drop at brake plate	Adjust the burner
	Nozzle partially blocked	Replace nozzle
Burner pulsates at start	Oil pressure too low	Check and adjust
	Flue blocked or damaged	Check and correct
	Fan wheel slipping on shaft	Check and tighten
	Pump coupling loose or worn	Replace
	Preheater clogged	Check ignition electrode adjustment (refer to technical data)
	Delayed ignition	Check ignition electrodes not damaged
	Too strong a draught	Check high voltage wiring
	Too great a pressure drop at brake plate	Check position of nozzle assembly adjustment
		Correct the boiler draught
		Adjust the burner









