



Providing sustainable energy solutions worldwide

Installation- and maintenance instruction

## **CTC 950 IC Condens**

Oil condensing boiler unit



Installation- and maintenance instruction

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Oil condensing boiler unit



### For your own reference

Fill in the information below. It may be useful if anything should happen

Product	Manufacturing No.
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Plumber	Name
Date	Telephone No.

Electrician	Name
Date	Telephone No.

Chimney sweep	Name
Date	Telephone No.

With reservation for typing errors. Subject to alterations in design.

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## Welcome



Congratulations! You have just bought a CTC 950 IC Condens, a wall mounted oil-condensing heating boiler unit for progressive heating. The CTC 950 IC Condens really corresponds to the present market demands of low energy consumption, comfort and low environmental influence. We hope you will be very pleased with your CTC 950 IC Condens and you can read about how to operate your boiler in the following pages.

The CTC 950 IC Condens is designed to last for many years, and it is here you will find the information you need to operate and maintain the boiler unit correctly and ensure its longevity.

- The CTC 950 IC Condens is designed for heating with a minimum of ecologically harmful emissions and energy losses.
- The CTC 950 IC Condens is available in the size 13,6 kW.
- The CTC 950 IC Condens supplies the total requirement of heating and DHW of the house.
- The CTC 950 IC Condens is equipped with an integrated heating circuit mixing valve, heating circuit pump, expansion vessel and safety valve.
- The CTC 950 IC Condens is equipped with an adapted, extensional weather-compensated Comfort-control which totally fulfils the requirements of a comfortable and energy-saving operation.
- The CTC 950 IC Condens is equipped with an adapted and fully integrated HG-Compact oil burner.
- The CTC 950 IC Condens is equipped with a high efficient Spiro-Condens System.
- The CTC 950 IC Condens is thanks to the space-generous burner door and easily accessible combustion surfaces very maintenance-friendly.

# Important to remember!

Especially check the following points at delivery and installation:

- The installation must be carried out by authorized personnel according to existing engineering standards and building regulations.
- A correct function of the CTC 950 IC Condens, as well as the manufacturer warranty to be valid is only guaranteed when the installation, handling and maintenance are made as by the recommendations in this technical manual.
- Operation disturbances and defects which are caused by a not workmanlike handling as well as direct violent handling of the product, liberates the manufacturer from its warranty commitments.
- Remove the packaging. Before installation, check that the product has not been damaged during transport. Notify the forwarding agent of any transport damage.
- Check that a safety valve drain pipe to the floor drain is being fitted at the installation.
- Check the condition of the chimney and secure its durability against condensate.
- Please read the chapter about cleaning and maintenance in the end of this manual.
- Check the pressure in the expansion vessel annually.
- Please, hand over this technical manual to the customer after the installation!

## Safety Instructions

The following safety instructions should be followed when handling, installing and using the CTC 950 IC Condens:

- Ensure that the boiler is currentless before any interventions.
- Do not flush the boiler or any of its control equipment with water.
- The flue gas channel and the ventilation duct of the boiler room for air supply must not be blocked.
- Check that the burner and its oil tubes are tight.
- The operating switch of the boiler must be off if the oil burner is opened and in maintenance position, for example during cleaning or service.

## General installation conditions

A correct function of the CTC 950 IC Condens, as well as the manufacturer warranty to be valid is only guaranteed when the installation, handling and maintenance are made as by the recommendations in this technical manual. Operation disturbances and defects which are caused by a not workmanlike handling as well as direct violent handling of the product, liberates the manufacturer from its warranty commitments. Please, hand over this technical manual to the customer after the installation!

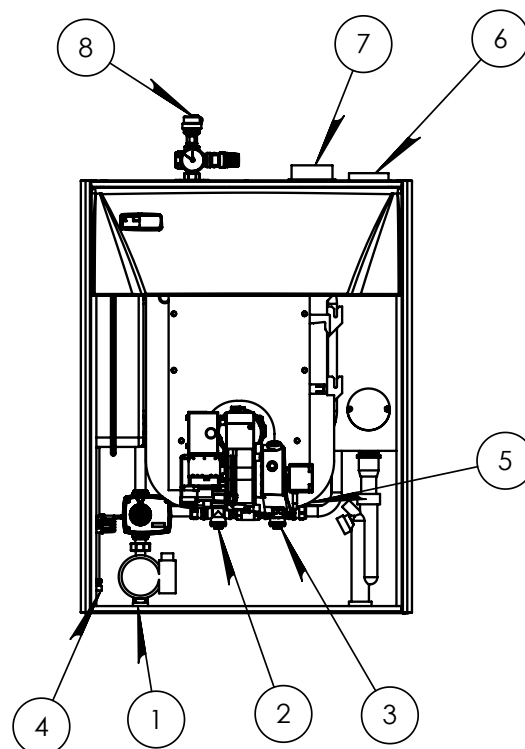
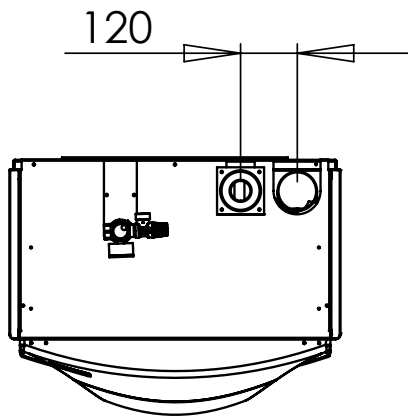
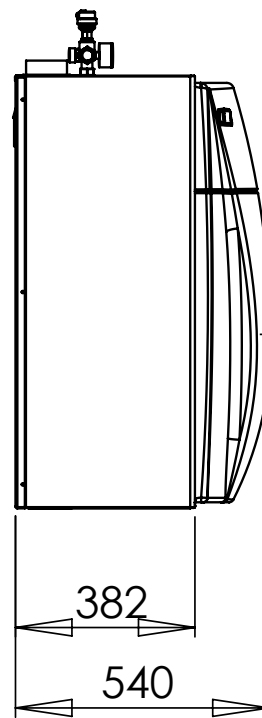
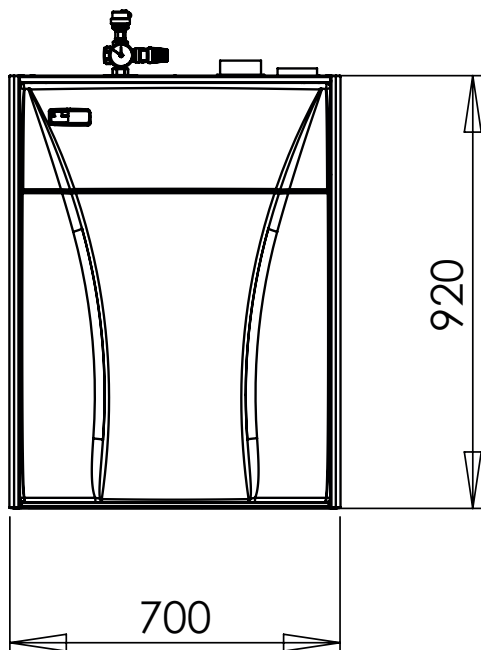
 Regulations: The installation of the boiler and the heating system must be carried out by authorized personnel according to existing engineering standards and building regulations.

# 1. Technical information

## 1.1 Technical data

Oil-Condensing boiler CTC 950 IC Condens		
Oil burner		BF1 M1V 87-20
Rated output 50/30 °C	kW	13,6
Rated input 50/30 °C	kW	13,3
Rated output 80/60 °C	kW	12,9
Rated input 80/60 °C	kW	13,2
Oil supply	kg/h	1,12
Flue gas mass flow	g/s	5,47
Boiler resistance	mbar	0,5
Flue gas losses 50/30 °C	%	0,9
Radiation losses $\Delta = 50k$	W	144
Radiation losses $\Delta = 30k$	W	76
Boiler efficiency 50/30 °C	%	102,5
Flue gas temperature 50/30 °C	°C	40
Flue gas losses 80/60 °C	%	1,8
Boiler efficiency 80/60 °C	%	97,0
Flue gas temperature 80/60 °C	°C	60
Max. Operation pressure boiler (PS)	Bar	2,5
Max. Operation temperature boiler	°C	110
Water content	l	18
Weight	kg	90
Number of Baffle plates	Pcs.	2
Electrical data		230V 1N~

## 1.2 Measurements

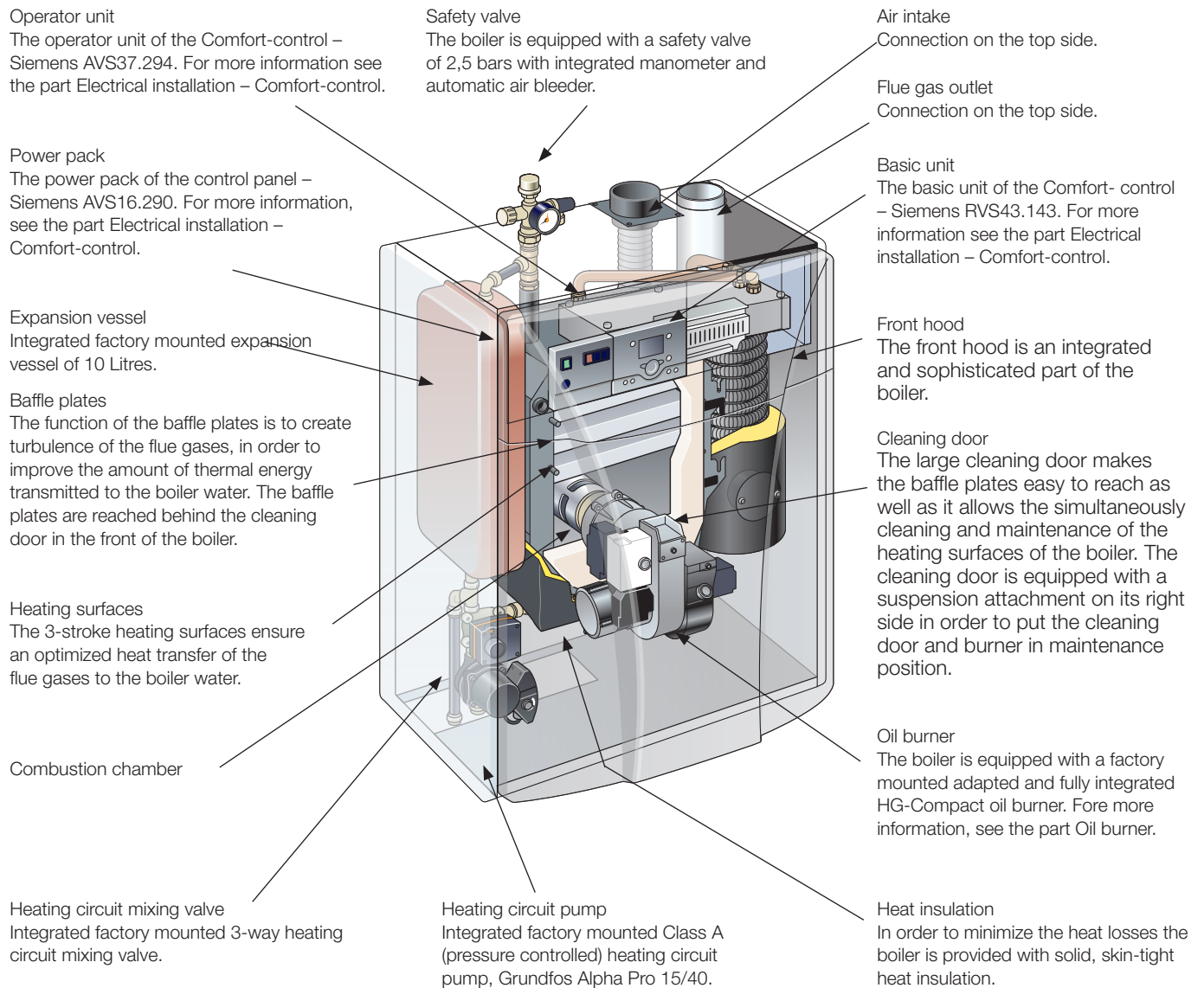


1. Primary flow G 1"
2. Return flow R 3/4"
3. Return flow DHW storage tank R 3/4"
4. Primary flow DHW storage tank G 3/4"
5. Drain valve G 1/2"
6. Flue gas outlet 81 mm (inside)
7. Air intake
8. Safety valve 2,5 bar



### 1.3 Description

The principle parts of the design consist of measure made steel/stainless steel plates. The boiler has been pressure- and tightness tested and is provided with skin-tight heat insulation as well as powder coated covers plates.



## 1.4 Cleaning device

The CTC 950 IC Condens is equipped with an integrated cleaning device for the Spiro-Condens System.

### Flue gas channel

The flue gas channel connects the boiler heating surfaces and flue gas heat exchanger.

### Spiro-Condens System

The CTC 950 IC Condens is equipped with an integrated flue gas heat exchanger, Spiro-Condens System. The Spiro-Condens System guarantees an efficient and reliable utilization of the latent heat of the flue gases.

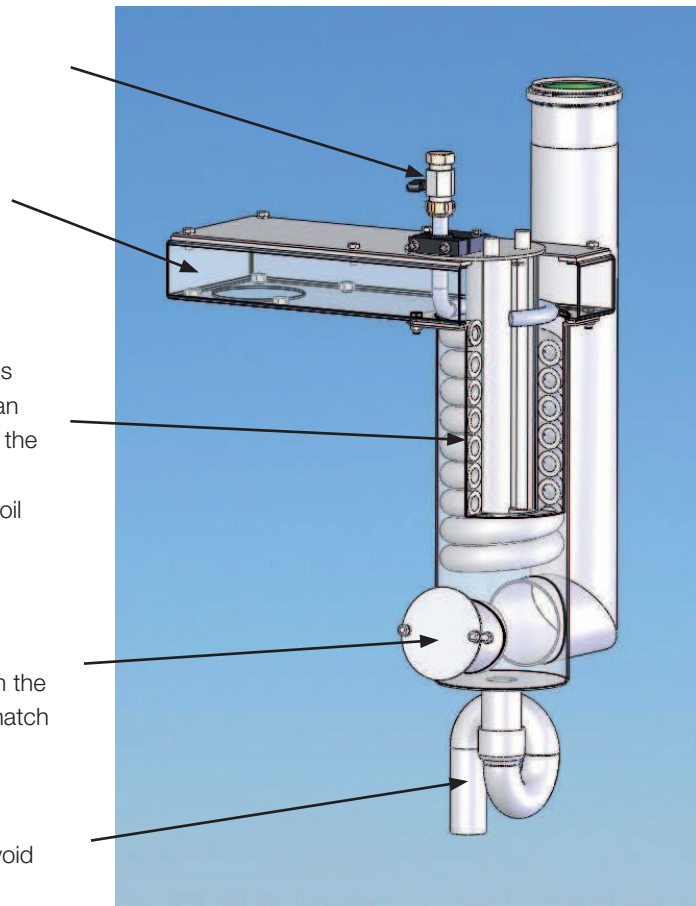
The Spiro-Condens System consists of a finned coil heat exchanger with surrounding housing, both in stainless steel.

### Cleaning hatch

In order to be able to remove soot and waste from the flue gas heat exchanger and chimney a cleaning hatch is placed on the front side of the housing.

### Siphon

The boiler is equipped with a siphon in order to avoid flue gases from exhaust via the condensate drain connection.



Material coil tubing	Stainless steel 1.4539
Material fins & housing	Stainless steel 1.4404

## 2. Installation

### 2.1 General information

The installation must be carried out by authorized personnel according to existing engineering standards and building regulations.

### 2.2 Boiler room

The boiler room must correspond to existing building regulations and particularly then the firing regulations of the present country.

By open operation the boiler room must be equipped with a vent hole for air supply. The cross section area of the vent hole must be at least 6,5 cm<sup>2</sup> pro 1 kW boiler output.

### 2.3 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

### 2.4 Unpacking

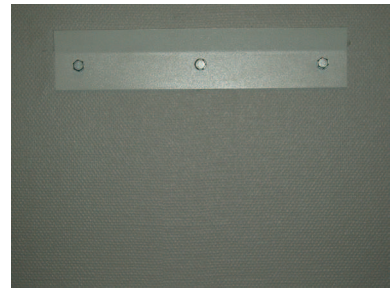
To avoid damage in the handling, do not unpack the boiler until it has reached its site in the boiler room. After the unpacking check, that the boiler has not been damaged during transport. Report eventual transport damages to the transporter.

Standard delivery:

- Oil-condensing boiler CTC 950 IC Condens
- Safety valve
- Siphon
- Primary flow sensor
- Outdoor sensor
- DHW storage tank sensor

### 2.5 Wall-mounting

1. Mount the wall bracket on the wall with the attached screws. The top of the boiler will be placed appr. 130 mm over the screwed connection of the wall bracket. In order to perform maintenance on the flue gas heat exchanger, the distance between ceiling and top of the boiler must not be below 250 mm.



2. In order to decrease the lift weight of the boiler, remove the burner and cleaning door during the wall mounting.



3. Lift the boiler in the lower corners.



Do not lift/put load on the bottom casing centre of the boiler. It will then collapse!



4. When the boiler is positioned, reassemble the cleaning door and burner. Attach the burner cable and air intake hose.



Continue the heating boiler installation with the hydraulic-, chimney- and electrical work.

## 2.6 Connection to chimney

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 avoids temperature losses from the connection between the boiler and chimney.
- Accurate sealing of the flue gas connections.
- Heat-shock resistance as well as water- and steam tight.

Under “Chimney solutions” there are examples of chimney connections.

## 2.7 Hydraulic connection boiler

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

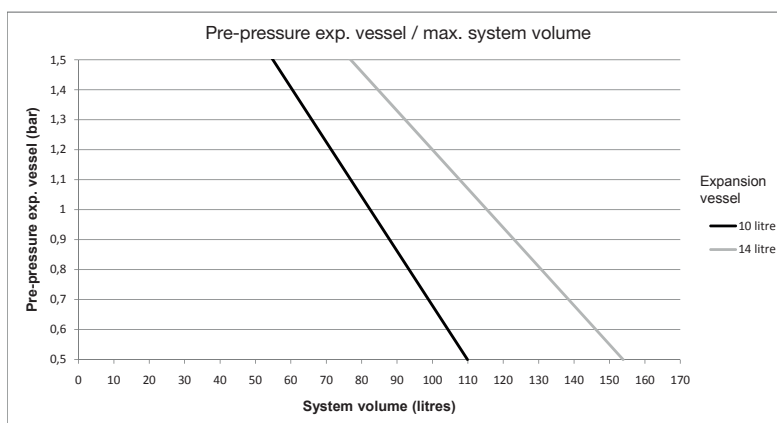
## 2.8 Shut-off valves

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.

## 2.9 Expansion vessel

Installation of the expansion vessel must be carried out according to existing regulations. At installation, the pressure must be adjusted to correspond to the static pressure existing at the vessel location. The adjustment is performed without the influence of system pressure (no pressure on the system side).

The curve below shows the maximum allowed system size according to the pre-pressure in the expansion vessel. Larger systems must have larger expansion vessels. CTC 950 IC Condens has a 10 litre vessel as standard.



**!** Check the pressure in the expansion vessel annually.



If the size of the system exceeds the limits according to the diagram, the volume of the expansion vessel must increase.

### 2.10 Heating circuit pump

The heating boiler is equipped with an integrated heating circuit pump.

### 2.11 Heating circuit mixing valve

The heating boiler is equipped with an integrated heating circuit mixing valve.

### 2.12 Connection domestic hot water (DHW) and secondary heating circuit

The connection located on the right side of the boiler makes it possible to connect the boiler to a DHW storage tank (water heater). This connection offers also the possibility to connect the boiler to a secondary heating circuit. By the connection to a DHW storage tank, it is of high importance that its size and power capacity corresponds to the installed boiler output. The installation must correspond to existing building regulations.

### 2.13 DHW charging pump

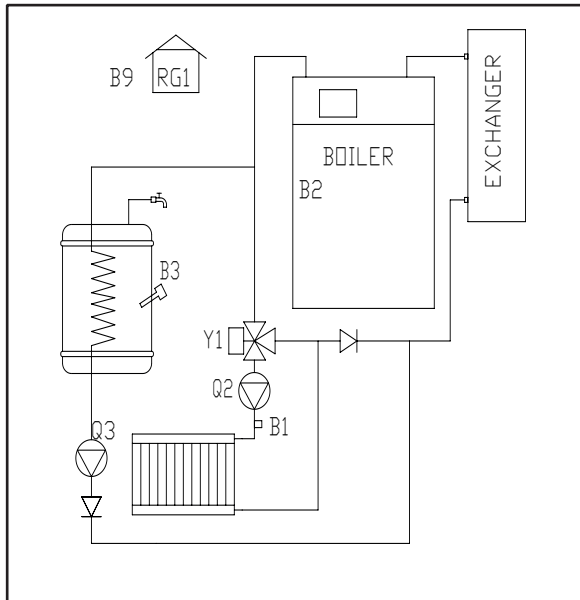
When connecting a DHW storage tank, a DHW charging pump must be mounted on the primary flow DHW storage tank connection of the boiler. The pump is being supplied with electric current from the boiler, see the part Electrical installation.

For more information concerning hydraulic system principles and connections, see the system diagrams on the next page.

## 2.14 System diagrams

### Standard:

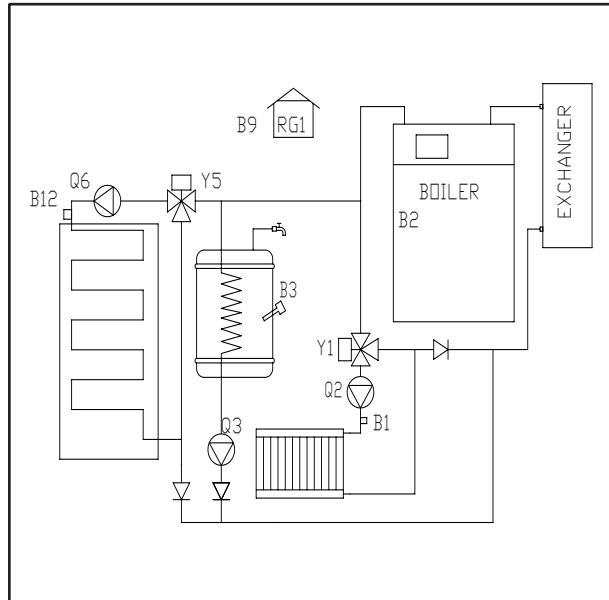
1 heating circuit and DHW storage tank:



### Option

Extension module AVS75.390

2 heating circuits and DHW storage tank:



For a legend to the system diagrams, see the part Electrical installation Comfort-control – Terminal markings.

## 2.15 Drainage/Drain valve

The drain valve is factory mounted on the underside of the boiler.

## 2.16 Filling

Filling is performed via the heating system filling valve.

## 2.17 Siphon

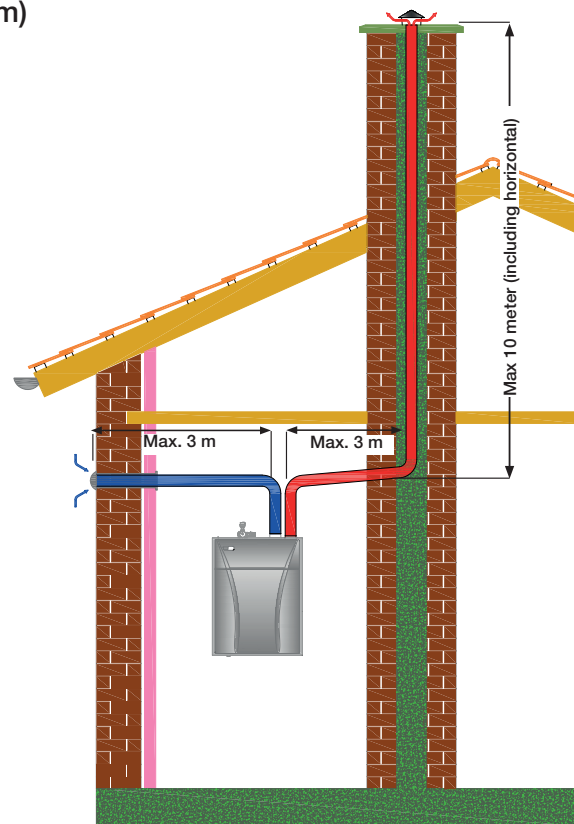
The heating boiler is supplied with a siphon. The siphon must be mounted on the condensate drain of the Spiro-Condens system (flue gas heat exchanger).

## 2.18 Neutralisation box

By prescription of existing engineering standards and building regulations a neutralisation box must be installed in connection to the Spiro-Condens system, mounted in connection to the siphon.

## 2.19 Chimney solutions

Separate flue outlet (80 mm) and air inlet (80 mm)



The installation must be performed according to the local regulations



Each bend of 90 degrees, reduces the total length by 1 meter.





## 3. Electrical installation boiler

### 3.1 General information.

The installation and wiring of the boiler must be carried out by an authorized electrician and in accordance with valid regulations. The internal boiler wiring is from factory prepared for the installation.

### 3.2 Power supply

The boiler should be connected to 230V 1N~ and protective earth.

### 3.3 Main switch

A main switch should be installed.

### 3.4 Heating circuit pump

The heating circuit pump for the heating system is from factory connected to the connection terminal on the basic unit. The pump is controlled via the comfort-control of the boiler.

### 3.5 Heating circuit mixing valve

The heating circuit mixing valve for the heating system is from factory connected to the connection terminal on the basic unit. The mixing valve is controlled via the comfort-control of the boiler.

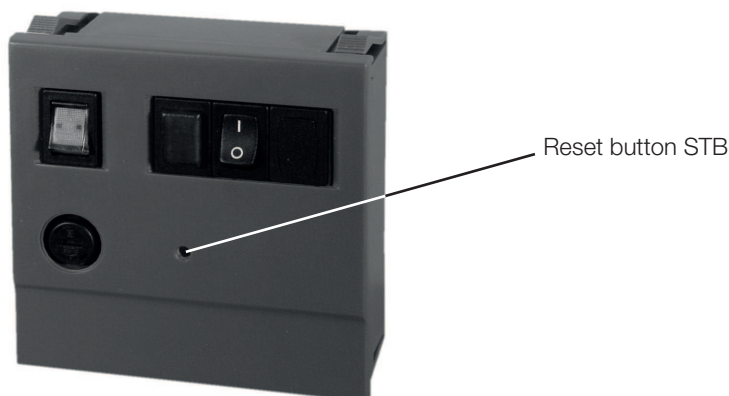
### 3.6 DHW charging pump

The DHW charging pump for the DHW storage tank is being connected to the connection terminal on the basic unit. The pump is controlled via the comfort-control of the boiler.

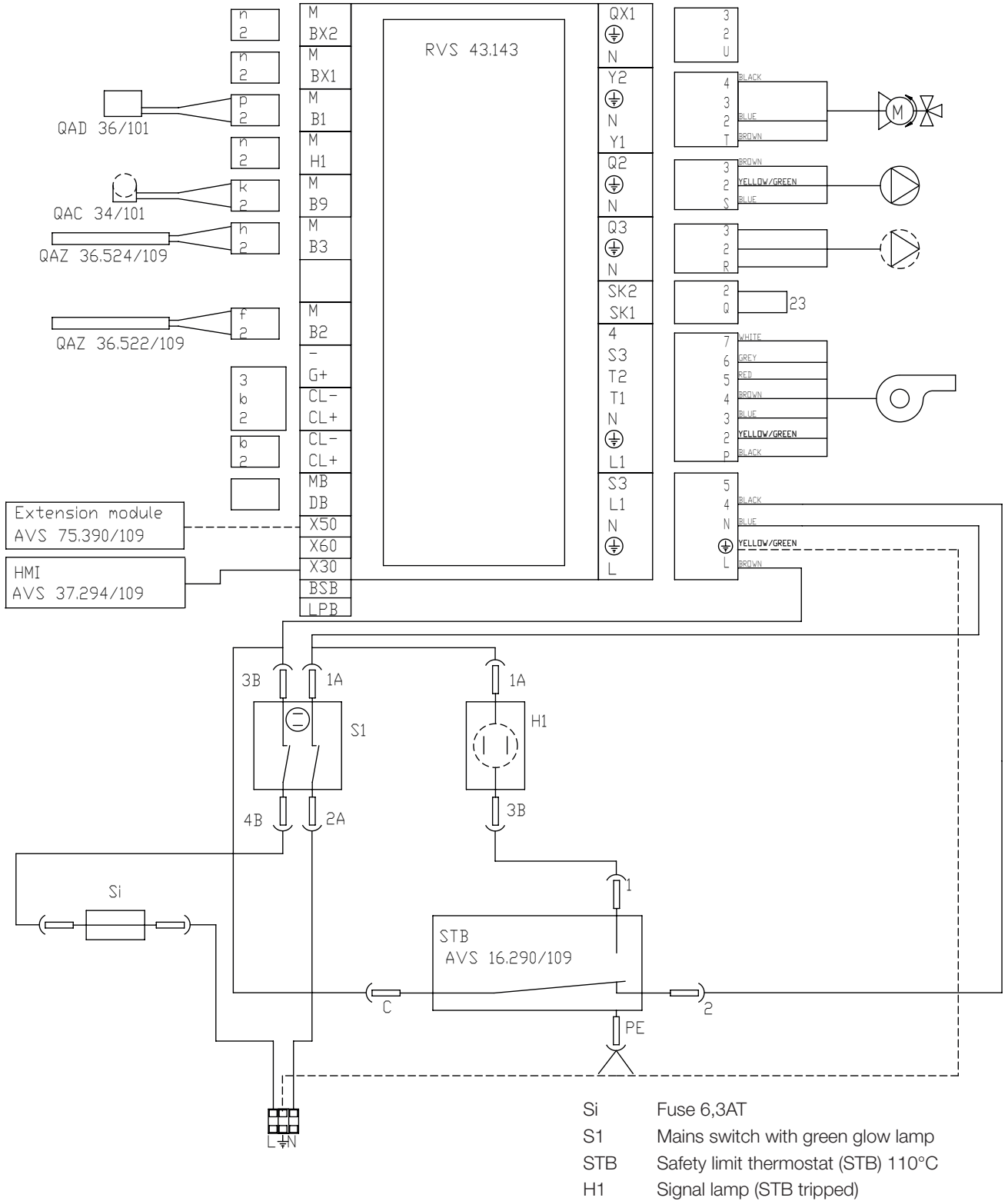
### 3.7 Safety limit thermostat (STB)

If the boiler has been stored extremely cold the safety limit thermostat may have released.

Reset by pressing the button on the power section.



### 3.8 Electrical diagram 582451/1



## 4. First start - Commissioning

### 4.1 Before first start

**Check that:**

- The boiler and heating system are filled with water.
- All connections are tight and that the chimney connection is made in an correct way.
- The oil tank is inspected according to existing regulations.
- An oil filter (type Tigerloop) is fitted to the burner.
- The electrical connections are made in an correct way.
- All sensors, burner, mixing valve and pumps are connected to the power supply.

### 4.2 First start

- Switch on the current with the mains switch.
- 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.)
- Check that the oil burner starts.
- When the boiler has reached its operating temperature, check and adjust the oil burner in accordance with its technical manual. (See also the part Oil burner.)

### 4.3 After first start

**Check that:**

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

## 5. Operation

### 5.1 General information

After the installation check together with the installer that the installation is fully ready for operation. Let the installer show you all important regulation devices, etc. so that you are well aware of how the boiler installation functions and should be maintained. Vent the radiators after app. 3 days of operation and fill up with more water if necessary.

### 5.2 Regular inspection

**The regular inspection should include following items:**

- Check control of the pressure gauge (manometer). By too low pressure, fill-up water in the heating system by means of charging- and drainage device.
- Check control of the heating oil level in the tank.
- Check control of the settings of the Comfort-control.
- Check control of the temperature of the heating boiler, primary flow and flue gas.
- Check control of the burner according to the instructions manual for the burner
- In a closed system, check control of the safety valve by means of turning the regulation device of the valve. Check if water run out from the safety valve drain pipe.
- Neutralisationbox: Check its function and pH-value according to its manual and existing regulations.

### 5.3 Standstill

If the installation should be put out of operation, use the mains switch.

(See the part Electrical installation – Comfort-control.)

### 5.4 Frost risk

Never put the boiler in operation if its pose a risk that the boiler or parts of the heating system is frozen. This leads to damages on the boiler and piping in the house. Consult your heating technician for advice.

Concerning protection mode.

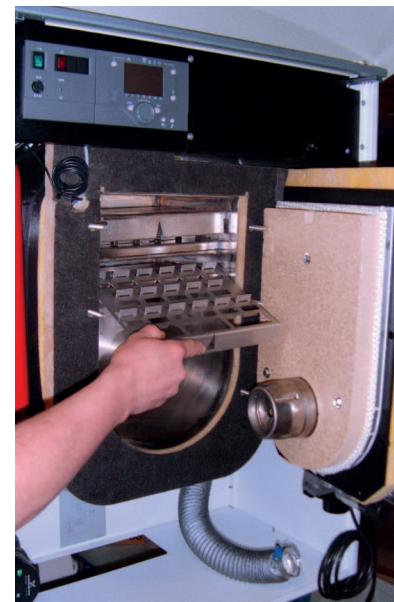
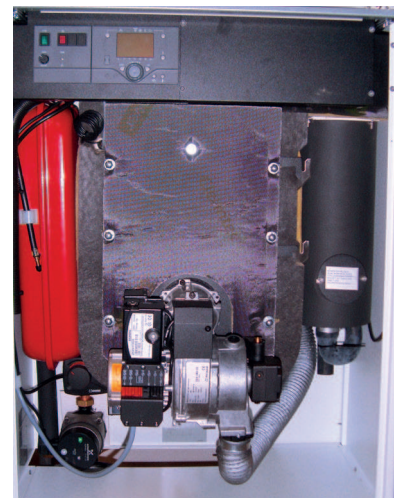
(See the part Electrical installation – Comfort-control.)

### 5.5 Boiler cleaning

The boiler must be currentless by the boiler cleaning by switching of the main switch!

The combustion chamber is from the front easily cleaned:

1. Remove the front hood by opening the upper part and releasing the lower part with its screw hooks.
2. Pull out the burner Eurostecker on the burner left side. Undo and remove the burner door screws. The cleaning door/burner may now be put in its maintenance position by using the suspension attachment on its right side.
3. Remove the baffle plates. Clean the combustion chamber and heating surfaces by using cleaning equipment (soft brush etc.). Notify that all baffle plates are not similar, arrows must be put in upper direction.
4. Reassemble the baffle plates, close the burner door and put back the screws and tighten after finishing the cleaning.
5. Connect the burner Eurostecker.
6. Attach the front hood.
7. Switch on the main switch.



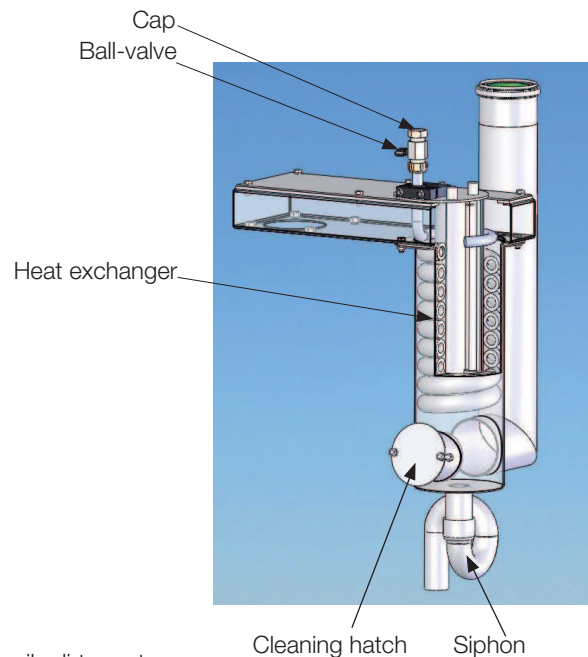
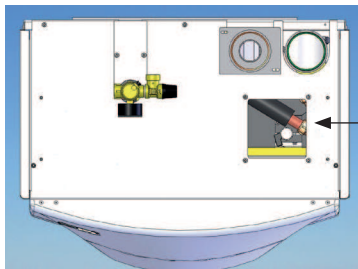
**!** The boiler cleaning must be performed according to existing regulations.

## 5.6 Spiro-Condens system cleaning

By normal operation the Spiro-Condens system is self-cleaning. By regularly operation disturbances and arising flue gas temperatures it might be necessary to clean the flue gas heat exchanger coil. The Spiro-Condens system can be cleaned in two different ways: With built in cleaning device or disassembly the Spiro-Condens system.

**!** The boiler must be currentless by the cleaning by switching of the main switch!

### Cleaning device

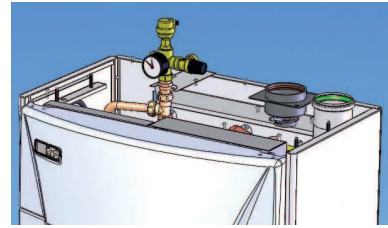


1. Dismount the service plate from the top of the boiler
2. Check that the ball valve is closed (horizontal position)
3. Dismount the cap from the ball valve
4. Assemble a water hose on the ball valve (1/2")
5. Open the boiler door
6. Pressurize the water hose
7. Open the ball valve
8. At too high flow or if the heat exchanger or siphon is heavily dirty, water may pour into the combustion chamber. Decrease then the water flow by turning the ball valve. If the heat exchanger is totally clogged cleaning must be done according to 8.6.2
9. Wash water until the heat exchanger is clean (the heat exchanger can be checked through the cleaning hatch)
10. Turn off the pressure in the water hose
11. Close the ball valve
12. Dismount the water hose and, assemble the cap on the ball valve and the service plate on the top of the boiler

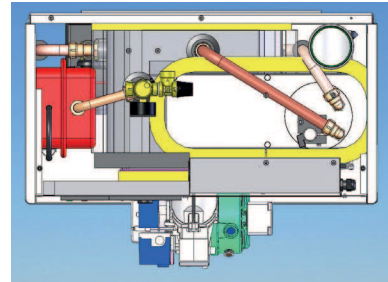
### Disassembly of the Spiro-Condens system

The Spiro-Condens system is from the top easily cleaned:

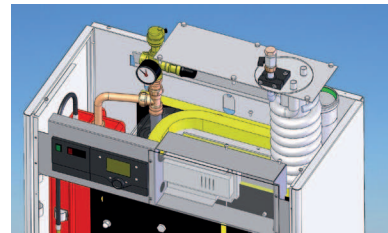
1. Close the shut-off valves to the heating circuit open the drain valve and drain the boiler from water.
2. Undo the screws and remove the safety valve connection cover plate
3. Undo the screws and remove the top casing plate of the boiler.
4. Undo the pipe fittings of the coil, remove the longer pipe and push the shorter in counter-clockwise position towards the wall.



5. Remove the insulation.
6. Undo the screws and lift up and remove the flue gas heat exchanger part (consisting of the flue gas channel top plate and finned coil) from the boiler.
7. Remove soot and waste by flushing the coil.



8. Remove the cleaning hatch positioned on the lower front side of the Spiro-Condens system.
9. Remove soot and waste by using cleaning equipment (brush etc.) or a vacuum cleaner.



**!** By using a vacuum cleaner, secure that the soot/waste is not warm.



10. Reassemble the cleaning hatch.
11. Reassemble the removed flue gas heat exchanger, piping and upper insulation.
12. Fill up the boiler with water. Check for eventual leakages in the fittings.
13. Reassemble the casing plate.
14. Attach the front hood.
15. Switch on the main switch.



## 5.7 Drainage

The boiler must be currentless upon drainage. The drainage connection/ drain valve is located on the underside of the boiler. By drainage of the whole system the heating circuit mixing valve must be fully open. In a closed system air must be supplied.

## 5.8 Oil operation

General information: Adjustments and maintenance of the oil burner must always be performed according to the technical manual of the burner. In order to secure that the installation operates correctly, has low energy consumption and minimizes the harmful emissions, it is of great importance that maintenance with a check control in consideration of the setting values is performed on a regularly basis (recommended annual).

### Meku burner tube

- Cleaning of inner assembly, accessible by boiler cleaning door put in maintenance position.
- Maintenance/adjustments of outer visible burner parts, accessible by boiler cleaning door put in maintenance position.
- Maintenance/adjustments of inner assembly (nozzles, ignition electrodes etc.) and less visible outer burner parts, accessible by burner put in maintenance position.

**!** The burner has different maintenance positions depending on whether it's equipped with standard burner tube or Meku burner tube (inner assembly).



**!** If you have questions concerning maintenance or any product defaults, please address to your installer.

### 5.9 Operations disturbance

#### **Burner disturbance:**

- Check if there is oil in the tank.

#### **Burner disturbance signal lamp lights:**

Check if the oil filter is dirty. Take necessary actions according to instructions in the technical manual of the burner.

#### **Boiler disturbance:**

The safety limit thermostat has released. Reset by pressing the button on the power pack. See also Electrical installation.

#### **Power supply to boiler disconnected:**

Check the fuse on the power pack. Check if the mains switch on the power pack is switched on. See also Electrical installation.

#### **Uninsufficient room heating:**

Check the settings of the Comfort-control. See also Electrical installation – Comfort-control.

#### **Uninsufficient DHW:**

Check the settings of the Comfort-control. See also Electrical installation – Comfort-control.

**If none of the above mentioned actions corrects the fault, we request you to contact your authorized installer.**

# 6. Comfort-control

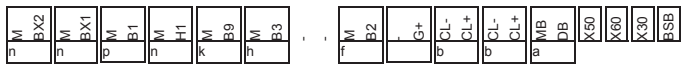
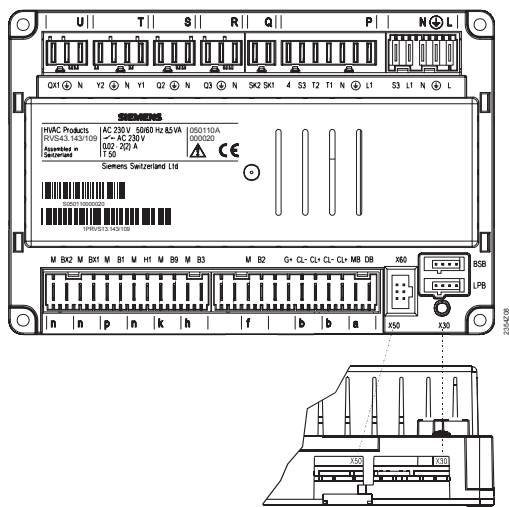
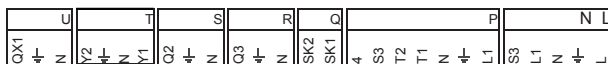
## General information

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.

## Basic unit RVS43.143



## Terminal markings



### Mains voltage

	Use	Terminal	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

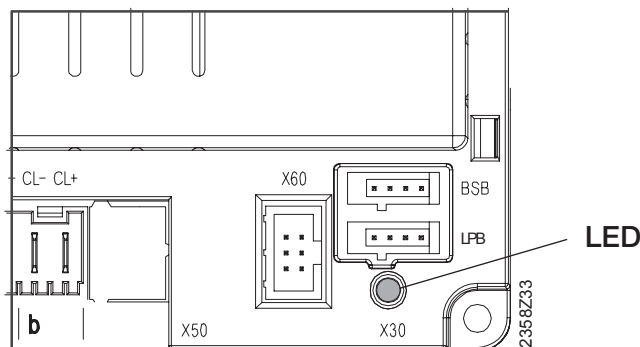
Low voltage			
	Use	Steckplatz	Type of connector
BSB	Service tool OCI700	-	-
LPB	Local process bus	-	-
X60	Radio module AVS71.390	-	-
X50	Extension module AVS75.390	-	AVS82.490/109
X30	Operator unit / boiler control	-	AVS82.491/109
DB	LPB data	a	AGP4S.02H/109
MB	LPB ground		
CL+	Room unit 2 data	b	AGP4S.02A/109
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		

### Checking the LED

LED off: No power supply

LED on: Ready to operate

LED flashes: Local faults



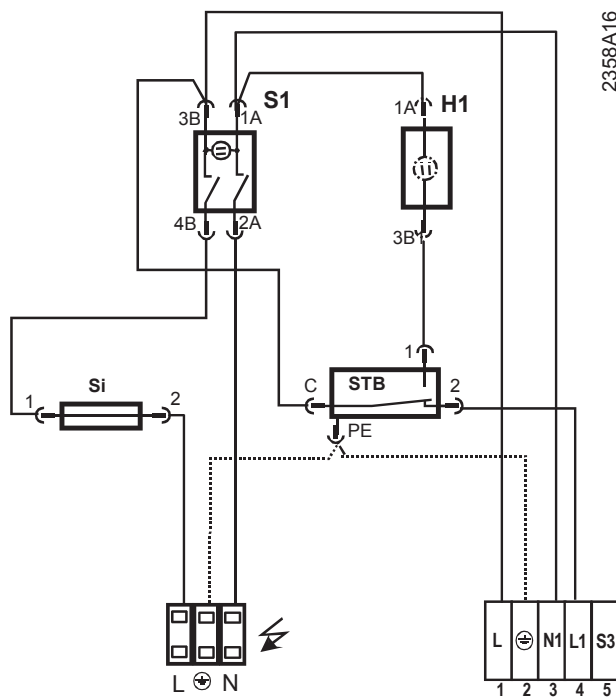
## Power pack AVS16.290



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

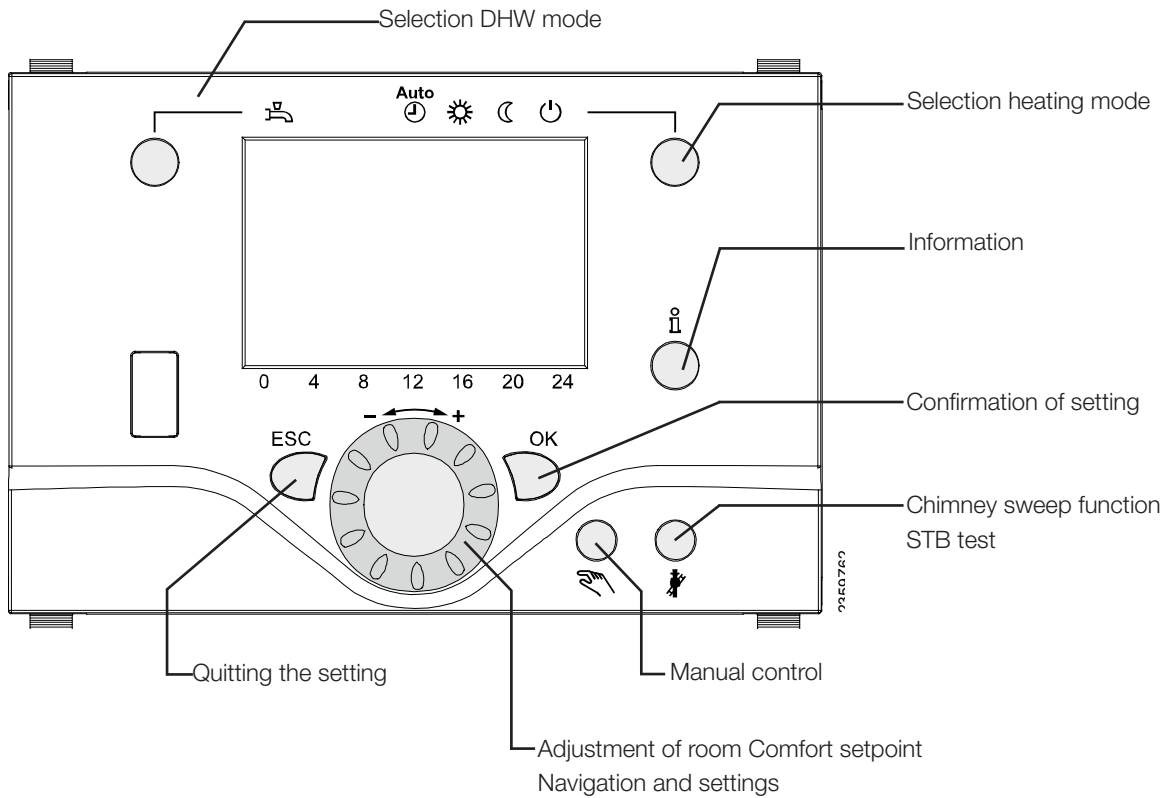
### Connection to basic unit

Terminal	Name	
1	L	Phase AC 230 V basic unit
2	$\perp$	Protective earth
3	N	Neutral conductor
4	L1	Phase AC 230 V burner
5	S3	Input burner fault













- Si Fuse 6,3AT
- S1 Mains switch with green glow lamp
- STB Safety limit thermostat (SLT) 110°C
- H1 Signal lamp (STB tripped)

## 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 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               |





## Protection

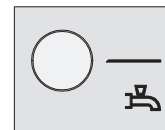
When using Protection, the heating system is off. But it remains protected against frost (frost protection temperature), provided there is no power failure.

Eigenschaften des Schutzbetriebs:

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

## 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..



### Trinkwasserbetrieb

- On

The DHW is heated according to the selected switching program.

- Off

No DHW heating, the protective function is active.

### Trinkwasser-Push

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

The DHW push can also be started when: 

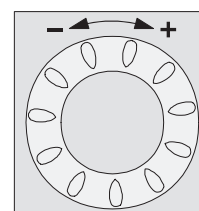
- The operating mode is "Off"
- Operating mode changeover acts via H1 or centrally (LPB)
- All heating circuits have assumed the holiday mode

## 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".



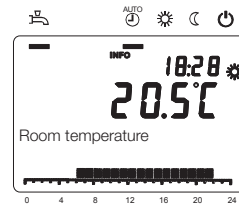
Each time you make a readjustment, wait at least 2 hours, allowing the room temperature to adapt.

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

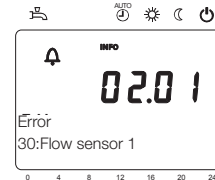
#### Exceptional cases

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



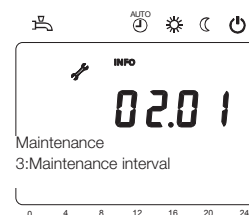
##### Error messages

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.

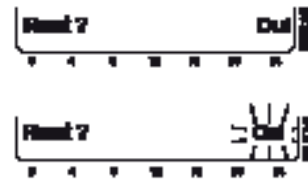


## Reset function

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.



## 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.

## 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.




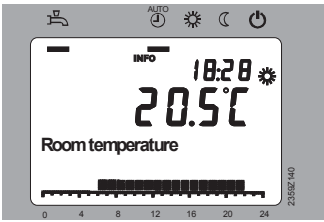
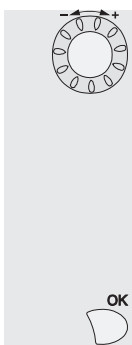
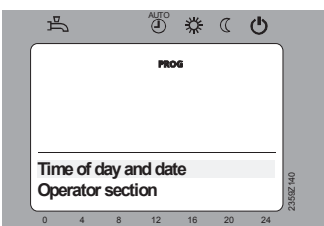
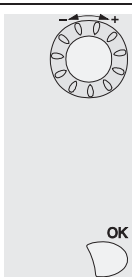
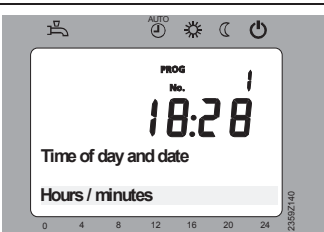
## Programming

### 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.

#### **i** Example “Setting the time of day“

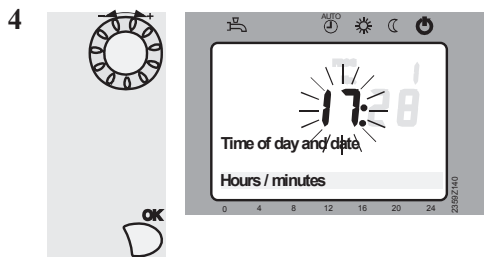
- When pressing the ESC button, you go back one step; adjusted values will not be adopted
- If no setting is made for 8 minutes, the unit will automatically return to the basic display
- Operating lines may be hidden, depending on the type of unit, their configuration and user level

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

Operation

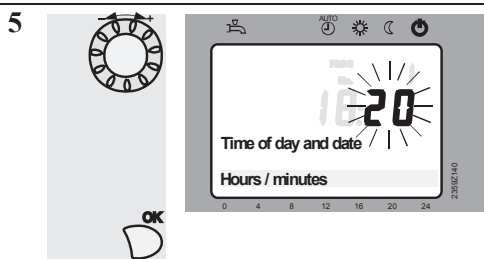
Display example

Description



Turn the setting knob until the hours of the time of day are correct.

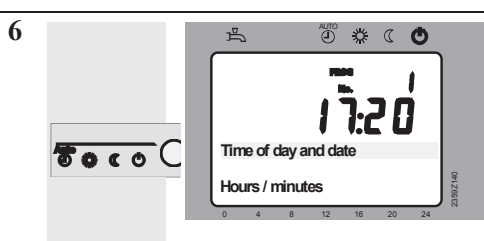
To confirm, press the OK button.



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.



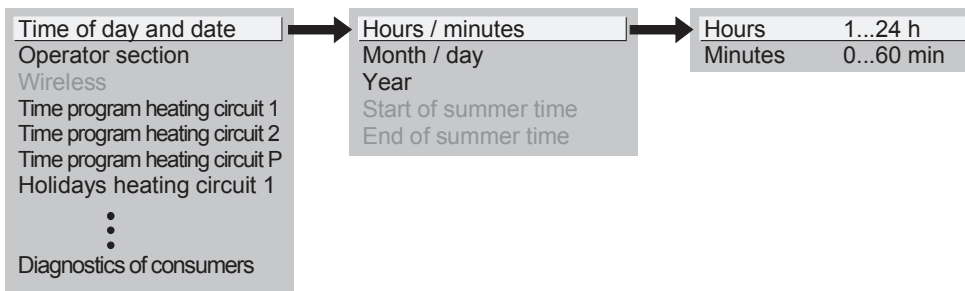
The settings are saved, the display stops flashing.

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.

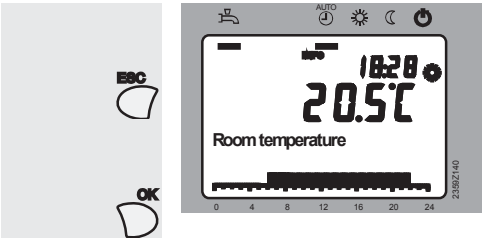
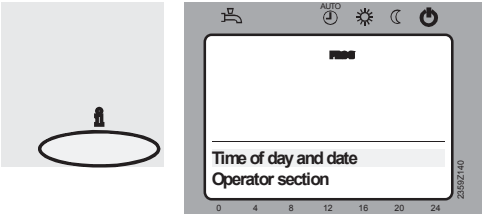
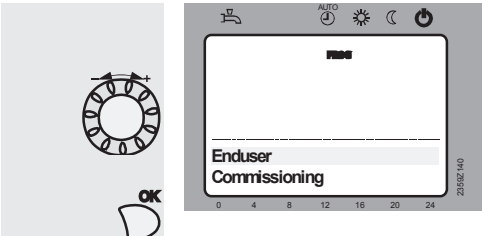
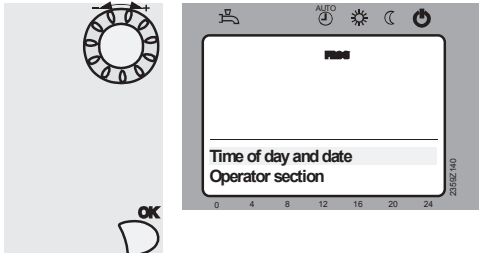
Example of menu structure



2359Z139

## User levels

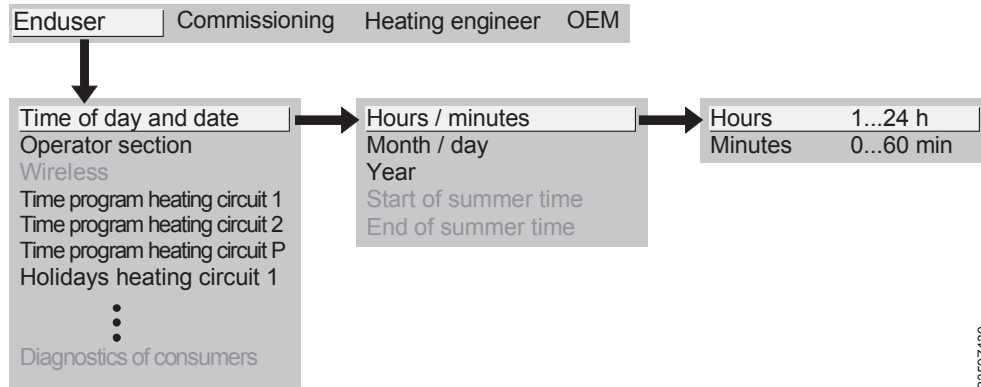
Certain user levels only allow certain user groups to make settings. To reach the required user level, proceed as follows:

Operation	Display example	Description
1		<p>You see the basic display. 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>

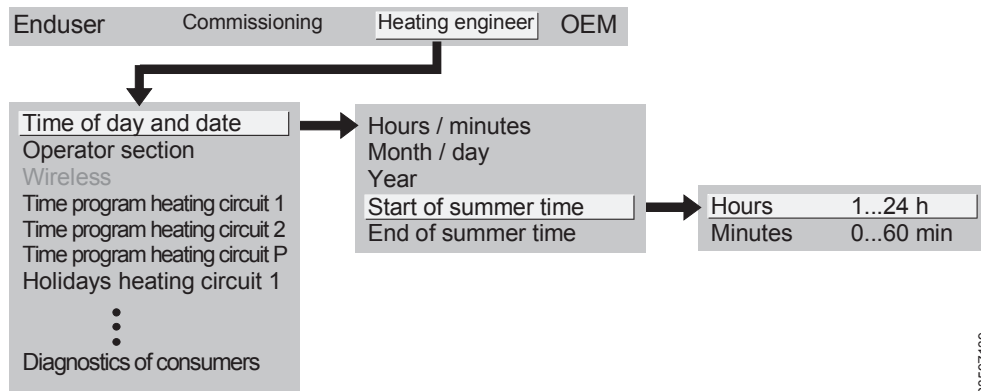
To reach the OEM level, enter the relevant code.

### 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"



# 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".



## Time programs

For the heating circuits and DHW heating, a number of switching program 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 start 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 start flashing and you can select the start time for heating "comfort setpoint" Press "OK"
- Select "1 st phase off" and press "OK".
- The time start 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 phase 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!

### 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.

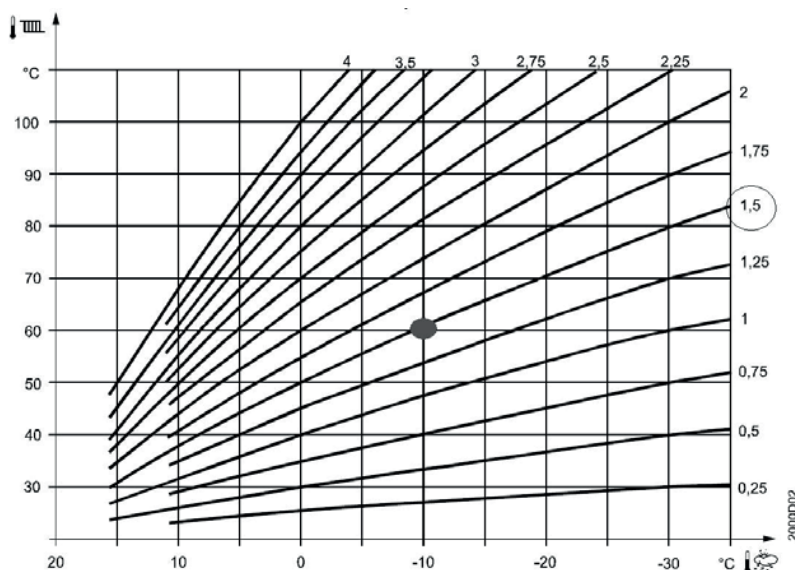
The heating curve can be adjusted with a number of settings, thus matching heat output and room temperature to individual needs.

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



## 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.

### 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	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
117	Upper pressure limit (crossed)	6
118	Critical lower pressure limit (crossed)	6
121	Flow temperature 1 (HC1) supervision	6
122	Flow temperature 2 (HC2) supervision	6
126	DHW charging supervision	6
127	Legionella temperature not reached	6
131	Burner fault	9
146	Configuration error common message	3
171	Alarm contact 1 (H1) active	6
172	Alarm contact 2 (H2) active	6
173	Alarm contact 3 (EX2/230VAC) active	6
174	Alarm contact 4 (H3) active	6
176	Upper pressure limit 2 (crossed)	6
177	Critical lower pressure limit 2 (crossed)	6
178	Temperature limiter heating circuit 1	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

Error code	Description of error	Priority
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
339	Collector pump Q5 missing	3
340	Collector pump Q16 missing	3
341	Collector sensor B6 missing	3
342	Solar DHW sensor B31 missing	3
343	Solar integration missing	3
344	Solar controlling element buffer K8 missing	3
345	Solar controlling element swimming pool K18 missing	3
346	Solid fuel boiler pump Q10 missing	3
347	Solid fuel boiler comparison sensor missing	3
348	Solid fuel boiler address error 3	3
349	Buffer return valve Y15 missing	3
350	Buffer storage tank address error	3
351	Primary controller / system pump address error	3
352	Pressureless header address error	3
353	Cascade sensor B10 missing	3



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

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Enertech AB  
 Box 313  
 S-341 26 LJUNGBY

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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,

**950 Condens**

---

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**

**Electromagnetic Compatibility (EMC) 2004/108/EC**

**Low Voltage Directive (LVD) 2006/95/EC**

**Efficiency Directive 92/42/EEC**

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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 303-1-2:1999

EN 55014-1 /-2

EN 304:1993 +A1+A2

EN 61 000-3-2:2006

EN 15034:2006

EN 60335-1

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Ljungby 2010-12-08

Kent Karlsson

Technical Manager





Installation and Operating Instruction

**Oil burner BF1 M1V**  
**CTC 950 IC Condens**



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## Important to think about!

Read this manual

### 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

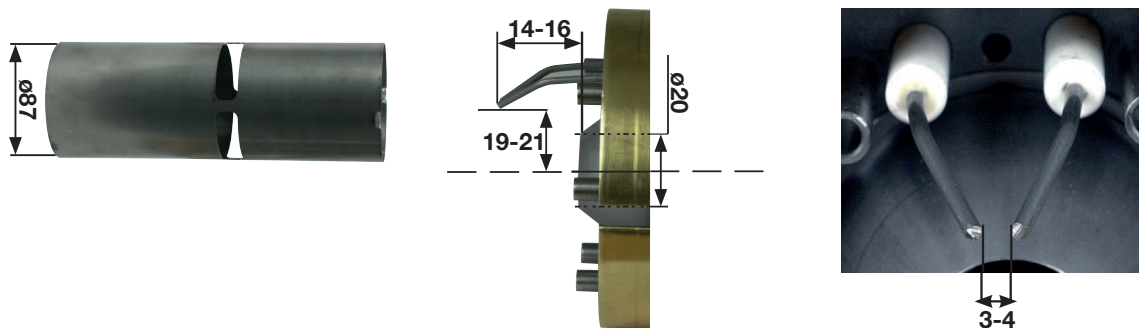
- If the boiler is equipped with an inspection hatch, the hatch should be fitted with an interlock.
- Filters must be fitted to the oil supply line.
- Shut-off cocks must be fitted to the oil supply line.
- Oil lines must adhere to the current national standards of each respective country.

### 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.

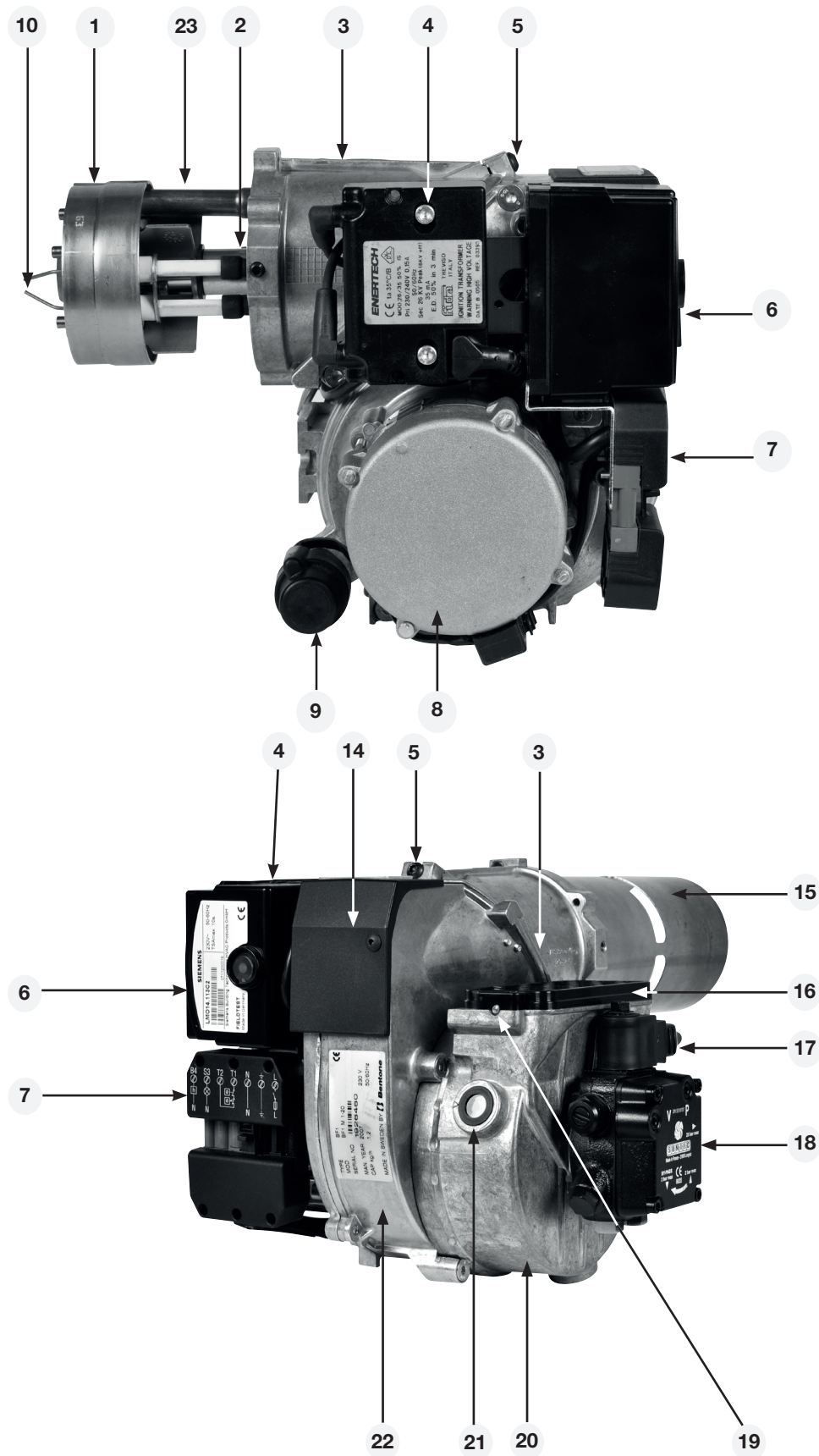
# 1. TECHNICAL DATA

## 1.1 Model BF1 M1V 87-20



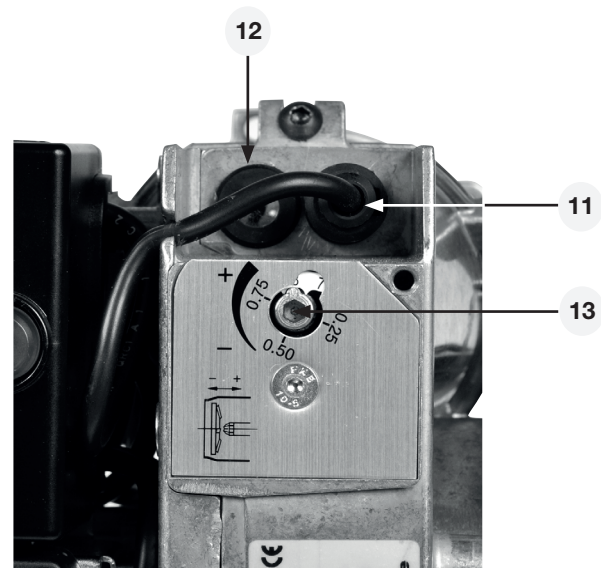
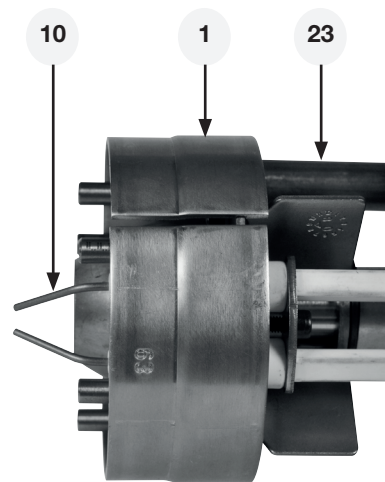
Factory setting						
Boiler	Burner	Burner Output	Air	Nozzle assembly	Oil pressure	Nozzle
		kW			bar	
CTC 950 IC Condens	BF1M1V 87-20	13,3	1	8	10	0,40x60°S

## 1.2 Description



### 1.2.1 Components

1. Brake plate
2. Ignition cable
3. Fan housing, front
4. Ignition transformer
5. Separating screw
6. Eldningsautomat
7. Electrical contact X1 (refer to wiring diagram)
8. Motor
9. Capacitor
10. Ignition electrode
11. UV-detector
12. Inspection glass
13. Nozzle assembly adjustment
14. Cover plate
15. Blast tube
16. Grid
17. Solenoid valve
18. Oil pump
19. Air regulator
20. Air intake
21. Air flow indicator
22. Fan housing, rear
23. Light guide tube



Försäkran om överensstämmelse  
Declaration of conformity  
Konformitätserklärung  
Déclaration de conformité



Brännare, Burner, Ölbrenner, Brûleur  
Certifikat TÜV Süddeutschland

Certifikat nr.	Typ, Type:	Certifikat nr.	Typ, Type:
08128915006	BF 1	02119815003	B 20, B 30, B 40, B 45
0111110535004	B 1	02119815004	B 50, B 60, B 70, B 80
0207110535005	B 2	040588622001	B 55
02119815001	ST 97, ST 108, ST 120, ST 133, ST 146	040588622002	B 65
02119815002	B 9, B 10, B 11	13129815007	B 45 MF, B 45-2 MF

Enertech AB försäkrar under eget ansvar att ovannämnda produkter är i överensstämmelse med följande standarder eller andra regelgivande dokument och uppfyller tillämpliga delar i EU direktiv.

Enertech AB declares under sole responsibility that the above mentioned product is in conformity with the following standards or other normative documents and follows the provisions of applicable parts in the following EU Directives.

Enertech AB erklårt in eigener Verantwortung, dass obenstehende Produkte mit folgenden Normen oder anderen normativen Dokumenten und anwendbare Teile in EU-Direktiven in Übereinstimmung stehen

Enertech AB déclare sous sa seule responsabilité que les produits désignés ci-dessus sont conformes aux normes et aux documents normatifs suivants et satisfont aux critères applicables des directives CE suivantes:

Dokument: EN 267  
EN 60335

EU direktiv. EU Directives, EU-Direktiven, CE suivantes:

2004/108/EC	Elektromagnetisk kompatibilitet, Electromagnetic compatibility EC-Richtlinie, Compatibilité électromagnétique
2006/95/EC	Lågspänningsdirektivet, Low-voltage directive, Niederspannungs-Richtlinie, Directive sur les basses tensions
2006/42/EC	Maskindirektivet, Machinery directive, Maschinen-Richtlinie, Directive sur les machines
92/42/EEC	Verkningsgradsdirektivet, Efficiency directive, Wirkungsgrad-Richtlinie, Directive sur les exigences de rendement

Genom att brännaren uppfyller ovannämnda standarder och direktiv erhåller brännaren CE - märkningen.

In that the burner conforms to the above mentioned standards it is awarded the CE mark.

Indem der Brenner die obengenannten Normen und Richtlinien erfüllt, erhält der Brenner die CE-Kennzeichnung.

Du fait de leur conformité aux directives mentionnées ci-dessus, les brûleurs Bentone bénéficient du marquage CE.

Enertech AB, Bentone Division/  
är kvalitetscertifierat enligt/  
is quality certified according to/  
ist nach dem Qualitätsmanagement /  
est certifiée à la norme de qualité  
SS-EN ISO 9001:2008

Ljungby, Sweden, 150227 (27/02/15)

**ENERTECH AB Bentone Division**

Box 309  
SE-341 26 Ljungby Sweden

Håkan Lennartsson



## 2. INSTALLATION

### 2.1 Oil supply

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

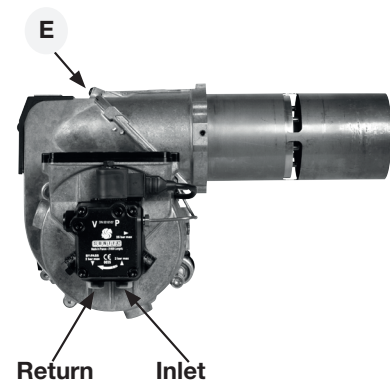
Observe the following:

- 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

### 2.2 Burner installation

#### 2.2.1 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.



## 3. BASIC SETTINGS

### 3.1 Nozzle assembly adjustment

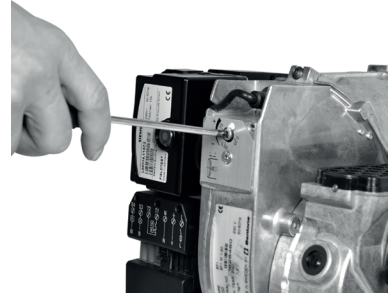
The burner is fitted with a regulator which changes the brake plate position in the blast tube. This is used to set the amount of recirculation to obtain a good combustion without pulsations.

The best setting for achieving low emissions is, among other things, dependent on the output settings and overpressure in the boiler.

#### Brake plate setting

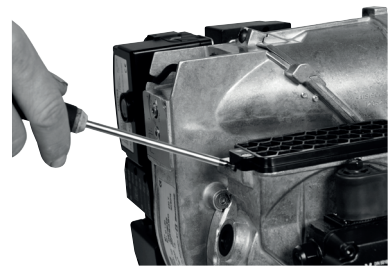
- Less diffusion: turn screw to left.
- More diffusion: turn to right.

The brake plate position affects the recirculation flow. It is therefore important to check start and running stability after making an adjustment.



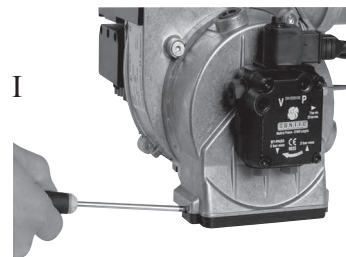
### 3.2 Air intake adjustment

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 an Allen key. How far open the air regulator must be is determined by output, furnace pressure and other burner settings.



### 3.3 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 illustration I, turning the screw clockwise will reduce airflow, and anticlockwise increase it.



## 4. BURNER SERVICING

### 4.1 Warning

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

Only authorized personnel may perform service.

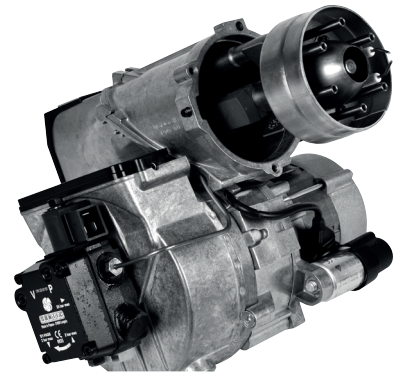
Before any type of service work is begun, switch of the power at the main switch and shut off the oil.

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.



#### 4.1.1 Combustion assembly service

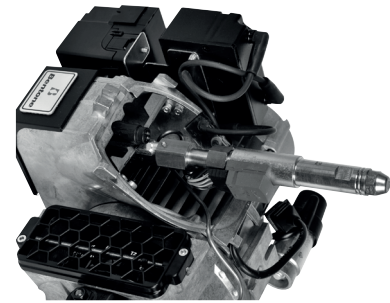
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Carry out a visual inspection of the combustion assembly and check the various parts for defects.
5. Undo and remove the brake plate and the electrode package from the oil pipe. Clean the brake plate as necessary.
6. Screw off the nozzle.
7. Install the nozzle. The nozzle may not be cleaned; it must be replaced with a new nozzle if the existing one is considered defective.
8. Check the ignition electrodes. Replace as necessary (refer to Technical data for electrode settings).
9. Install the brake plate and electrode package. Check that the distance between the nozzle and brake plate is correct (refer to Technical data).
10. Assemble the burner and install it in the boiler.
11. Connect the Eurostecker and switch on the power at the main switch.
12. Start the burner and check the combustion.



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

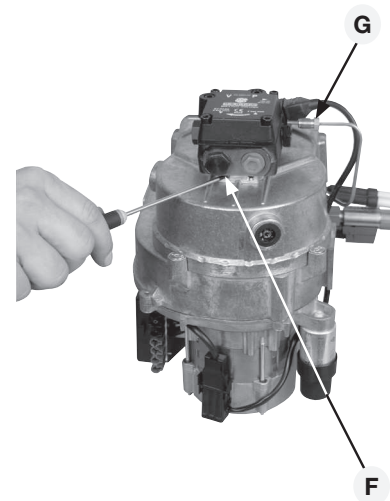
### 4.1.2 Preheater replacement

1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Remove the brake plate and electrode package.
5. Disconnect the preheater cable from the preheater.
6. Screw off the nozzle.
7. Undo the nut that connects the oil pipe to the preheater.
8. Install the new preheater. Check the condition of the O-ring; replace as necessary.
9. Connect the preheater cable.
10. Install the nozzle.
11. Install the brake plate and electrode package. Check that the distance between the nozzle and brake plate is correct (refer to Technical data).
12. Assemble the burner and install it in the boiler.
13. Connect the Eurostecker and switch on the power at the main switch.
14. Start the burner and check the combustion.



### 4.1.3 Oil pump replacement

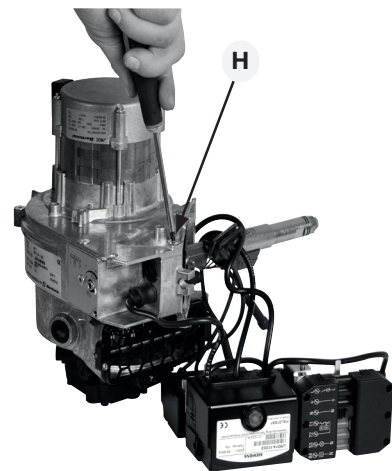
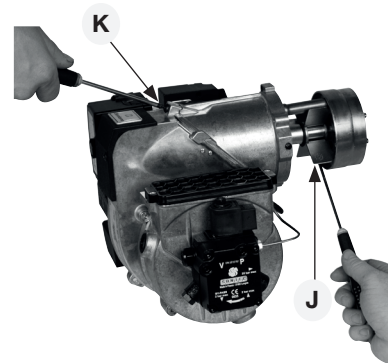
1. Switch off the power at the main switch and disconnect the Eurostecker
2. Disconnect the oil hoses from the oil pump.
3. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
4. Remove the solenoid cable from the pump.
5. Remove the connecting pipe (G) 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. Assemble the burner and install it in the boiler.
10. Connect the Eurostecker and switch on the power at the main switch.
11. Start the burner, purge the pump, adjust to correct pressure and check combustion.



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

#### 4.1.4 Fan motor replacement

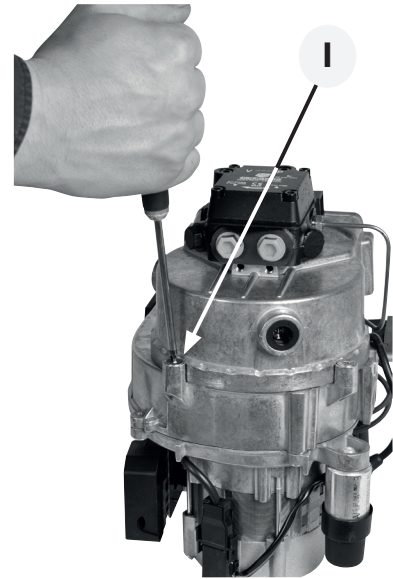
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Remove the brake plate/electrode packet (J). Loosen and remove the front section (K).
5. Remove the electrical connection from the motor.
6. Remove the electrical box retaining screw.
7. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
8. Undo the screws (H) to the motor flange, 5 pcs.
9. Lift away the motor.
10. Remove the drive coupling end from the motor shaft, loosen and remove the fan wheel.
11. 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.
12. 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.
13. 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.
14. Place the cable conduit entry and the photocell cable in position.
15. Screw the electrical console in place.
16. Connect the motor wiring.
17. Assemble the burner and install it in the boiler.
18. Connect the Eurostecker and switch on the power at the main switch.
19. Start the burner and check the combustion.



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

### 4.1.5 Air intake and intake cone service

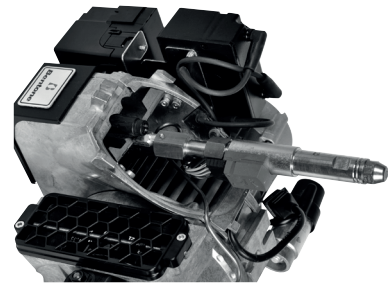
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Remove the solenoid cable from the pump.
4. Remove the connecting pipe from 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.



### 4.1.6 5.1.6 Fan wheel checks

#### 4.1.6.1 Inspection

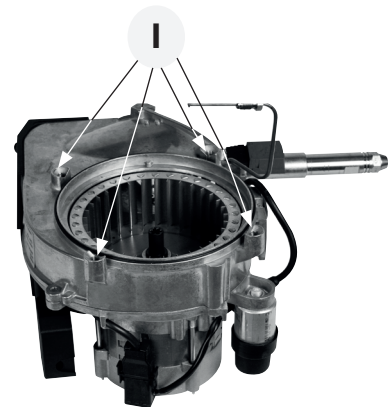
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Remove the brake plate/electrode packet. Loosen and remove the front section.
5. Perform a visual inspection of the fan wheel. Spin the fan wheel with your finger, or carefully using a tool.
6. If the fan wheel is not very dirty, clean it carefully where possible.
7. If thorough cleaning is required, refer to point 5.1.6.2 or alternatively 5.1.6.3.
8. If cleaning is not necessary, re-assemble the burner.
9. Connect the Eurostecker and switch on the power at the main switch.
10. Start the burner and check the combustion.



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

#### 4.1.6.2 Cleaning, alternative 1

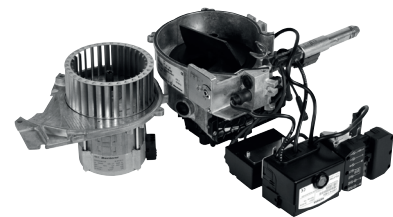
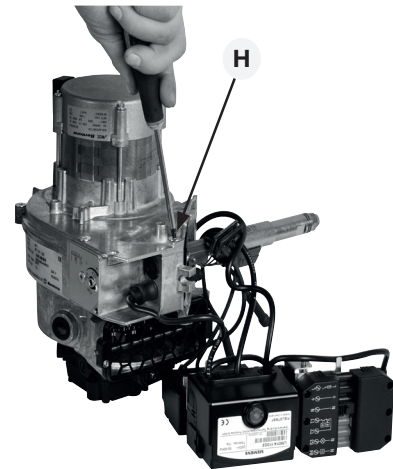
1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Inspect the degree of dirt on the fan wheel (see 5.1.6.1). If a closer cleaning is necessary, proceed as described below.
4. Remove the solenoid cable from the pump.
5. Remove the connector pipe from the pump.
6. Undo the air intake retaining screws (I).
7. Remove the air intake.
8. Undo the inlet cone retaining screw; make note of the inlet cone position.
9. Remove the inlet cone from the fan housing.
10. Clean the fan wheel. Undo and if necessary remove the fan wheel for more thorough cleaning of the fan and fan housing.
11. 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.
12. 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.
13. Fit the inlet cone in the same position as before disassembly
14. 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.
15. Connect the Eurostecker and switch on the power at the main switch.
16. Start the burner and check the combustion.



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

### 4.1.6.3 Cleaning, alternative 2

1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Remove the brake plate/electrode packet. Loosen and remove the front section.
5. Inspect the degree of dirt on the fan wheel (see 5.1.6.1). If a closer cleaning is necessary, proceed as described below.
6. Remove the electrical connection from the motor.
7. Remove the electrical box retaining screw.
8. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
9. Undo the motor flange retaining screws (H), 5 pcs.
10. Lift away the motor.
11. 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.
12. 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.
13. 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.
14. 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.
15. Place the cable conduit entry and the photocell cable in position.
16. Screw the electrical box in place.
17. Connect the motor wiring.
18. Assemble the burner and install it in the boiler.
19. Connect the Eurostecker and switch on the power at the main switch.
20. Start the burner and check the combustion.



### 4.1.7 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.



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



#### 4.1.7.1 Replacement of complete electrical package

1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
3. Loosen the blast tube and remove it.
4. Remove the brake plate/electrode packet. Loosen and remove the front section.
5. Remove the electrical connection from the motor.
6. Remove the electrical box retaining screw.
7. Remove the cable conduit entry to the ignition electrodes and the preheater (where fitted) and remove the photocell cable from the motor flange.
8. Install the new electrical package.
9. Place the cable conduit entry and the photocell cable in position.
10. Screw the electrical box in place.
11. Connect the motor wiring.
12. Assemble the burner and install it in the boiler.
13. Connect the Eurostecker and switch on the power at the main switch.
14. Start the burner and check the combustion.



#### 4.1.7.2 Replacement of individual electrical components

1. Switch off the power at the main switch and disconnect the Eurostecker from the burner.
2. Remove the screw securing the burner to the flange on the boiler. Draw out the burner head. Take care as this can become very hot.
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



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

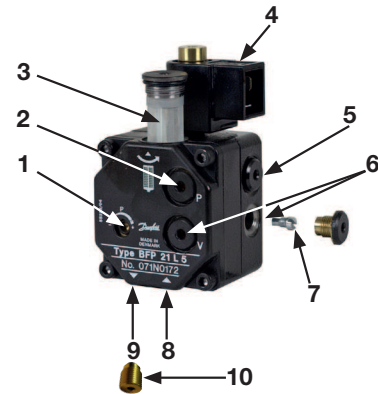
## 5. Danfoss BFP 21LE-S

### 5.1.1 Technical data

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

### 5.1.2 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"



### 5.1.3 Filter replacement BFP 21LE-S

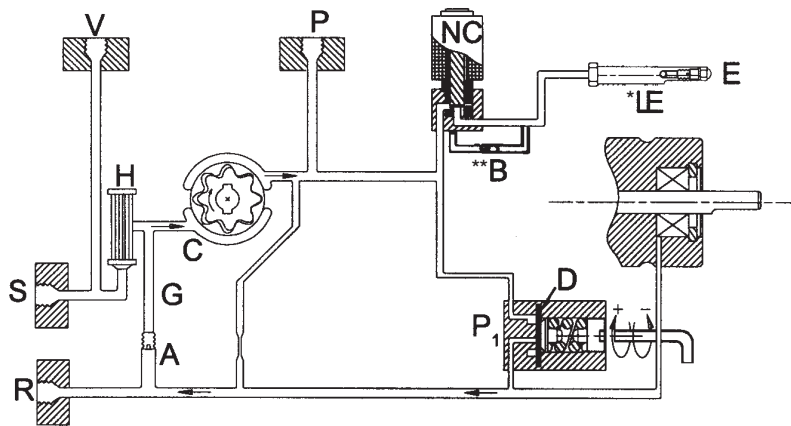
Cut off the power and shut off the oil supply. Remove the filter screw from the cover with a 4 mm Allen key and pull out the filter insert. If necessary a screwdriver may be used between the filter and the screw to carefully pry out the filter. Replace the old filter with a new one by pressing the new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

#### 5.1.3.1 One-pipe system

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

## 5.1.4 Function BFP 21LE-S



When the pump is started oil is drawn from the suction connection (S) through the filter (H) to the gear wheel pump's suction side (C). From there the oil is conveyed to the pressure side of the gear wheel pump, where the oil is pressurized. The pressure is controlled and held constant at a set value by the regulator valve (P<sub>1</sub>) via the membrane (D). The regulator valve (P<sub>1</sub>) distributes the oil from the gear wheel pump (C) to the nozzle connection (E) and the pump return side (R). The amount of oil used is determined by the pressure set at the regulator valve (P<sub>1</sub>) and by the size of the oil nozzle in the nozzle line.

**The valve (P<sub>1</sub>) functions as follows:**

- When the oil has reached opening pressure the passage to the return side opens.
- The membrane and the spring keep the pressure constant at the pre-set value.
- When the pump is overloaded, i.e. if more oil is demanded from the gear wheel pump than it is able to deliver under prevailing circumstances, the oil pressure drops below the set value, whereupon the valve shuts the return side (R) to the membrane (D) and reverts to the start position

**This can be remedied by:**

- Reducing the pump pressure.
- Reducing the amount of oil delivered, i.e. replacement with a smaller nozzle.
- Replacement with a larger capacity pump.

### 5.1.5 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 41L3 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.

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.

### 5.1.6 Purging

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

**Note!**

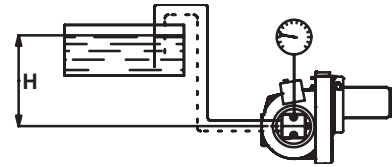
\*, \*\* See page 19

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

#### 5.1.7.1 Overhead Tank

##### One-pipe system

Height m	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
Line diameters								
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	4,0	3,5	3,0	2,5	2,0	1,5	1,0	0,5
Line diameters								
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

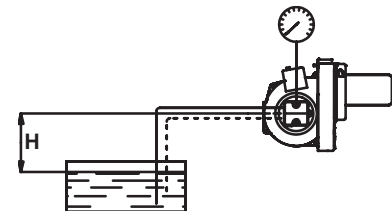
#### 5.1.7.2 Underlying Tank

##### One-pipe system

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

##### Two-pipe system

Height m	0,0	-0,5	-1,0	-1,5	-2,0	-2,5	-3,0	-3,5	-4,0
Line diameters									
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.

## 6. PREHEATER

### 6.1.1 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.

#### 6.1.1.1 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.

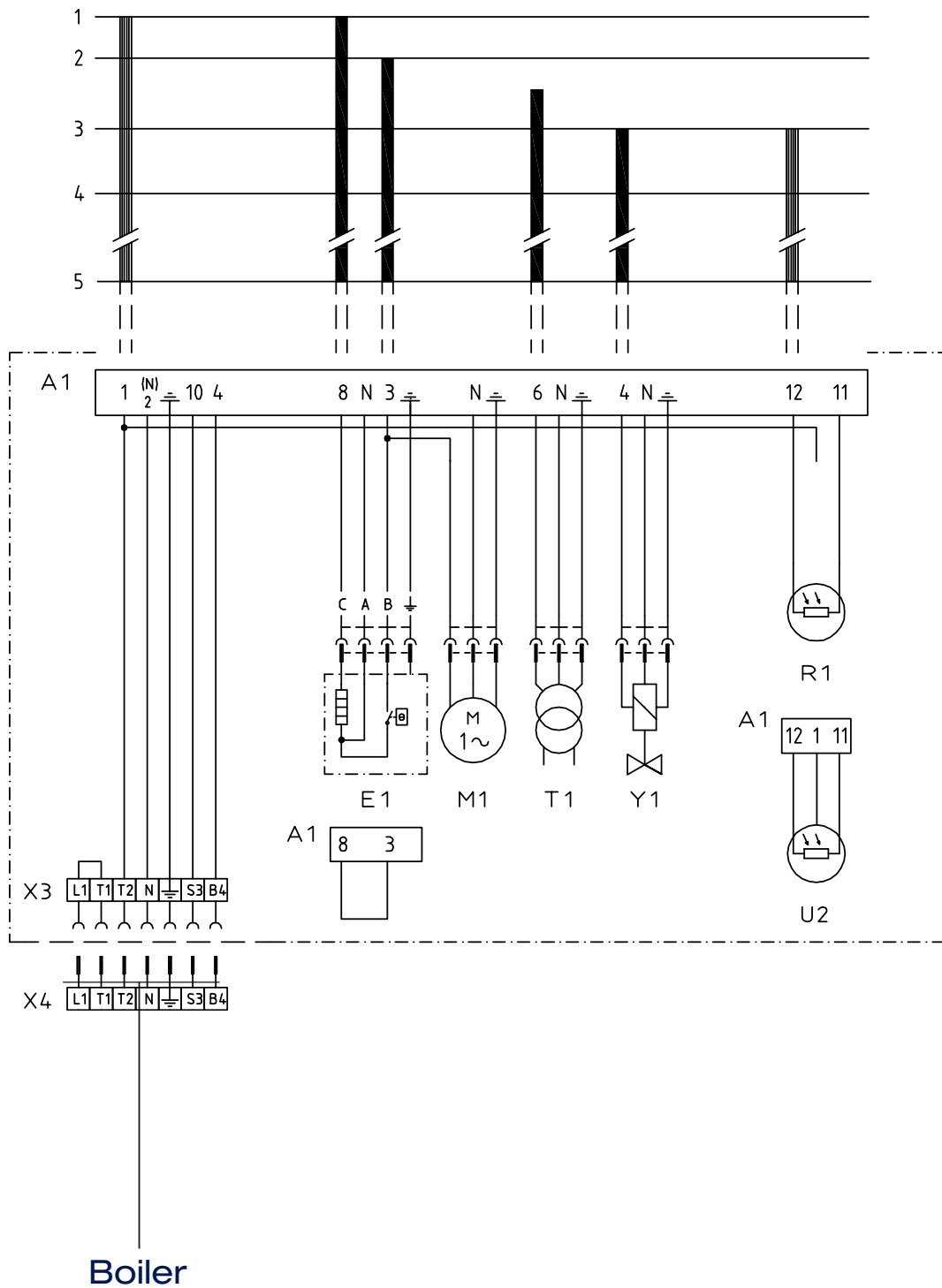
In order to achieve the intended effect when the pressure of the trapped oil increases, it must be evacuated back to the pump. This is made possible by the pump solenoid valve's return-valve function.



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.

## 7. ELECTRICAL EQUIPMENT LMO14..

### 7.1 Wiring diagram



### 7.1.1 Component list

A1	Oil burner control	T1	Ignition transformer
E1	Preheater	Y1	Solenoid valve
M1	Burner motor	X3	Plug-in contact, burner
R1	Photocell QRB	X4	Plug-in contact, boiler
U2	UV-Detector QRC		

Preheater wiring colours: A Blue B Brown C Black

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

### 7.1.2 Function LMO14..

- 1a. **Operations switch ON, thermostat ON**  
The burner motor starts, ignition sparks initiated and pre-ventilation continues until the set pre-ventilation period is over and the solenoid valve (2) opens..
- 1b. **Operations switch ON, thermostat ON**  
The preheater is energized and the pre-heating period begins. This continues until the operating temperature is reached and the preheater thermostat closes. The burner motor starts, ignition sparks initiated and pre-ventilation continues until the set pre-ventilation period is over and the solenoid valve (2) opens.
2. **Solenoid valve opens**  
The oil mist is formed and ignited. The photocell indicates flame. The ignition spark ceases 15 sec. after flame indication.
3. **Safety period runs out**
  - a If the flame is not present before the end of this period, the oil burner control blocks further operation.
  - b If the flame for any reason disappears after this time period, the burner will make a new start attempt.
- 4-5 **During operation**  
If burner operations are interrupted via the main switch or thermostat, a new start will be initiated when conditions according to point 1 are fulfilled.  
**Oil burner control blocks**  
Red light on the oil burner control illuminates. The burner is re-started by pressing the reset button.



### 7.1.3 Technical data

	<b>LMO14</b>
Pre-ignition period:	15 s
Pre-ventilation period:	16 s
Post-ignition period:	10 s
Safety period:	< 10 s
Re-connection after release:	< 1 s
Reaction time flame extinction:	< 1 s
Ambient temperature:	-5 - +60°C
Min. current with flame:	45 µA
Max current when dark, start:	5,5 µA
Ingress Protection:	IP 40

#### **Photocell current checks**

Photocell current is measured with a direct current ammeter (multimeter µA) connected in series with the photocell.

### 7.1.4 Colour codes LMO14/24

When the burner starts, three signal lights in the reset switch indicate the normal sequence, as well as provide indication if something abnormal is happening in accordance with the following table:

Preheater in operation	Solid yellow
Ignition switched on	Flashing yellow
Normal operation	Solid green
Operation, poor flame signal	Flashing green
Undervoltage	Flashing yellow-red
Fault, alarm	Solid red
False light	Flashing red-green
Communication mode	Fluttering red

### 7.1.5 Fault codes LMO14/24

When the red light for a blocked relay box comes on, you can get information about what has caused the problem by pressing and holding the reset button for 3 seconds.

The number of flashes below is repeated with a pause in between.

2 flashes	No flame signal when safety time expires
4 flashes	False light during start
7 flashes	3 x Losses of flame during operation
8 flashes	Time-out for preheater *
10 flashes	Incorrect wiring, internal fault or simultaneous occurrence of two faults

\* In order for this fault code to occur, the preheater shall not reach its cut-off temperature within 10 mins. from switch on.

To return to normal operation: Press the reset button for 1 second.

If the reset button is instead kept pressed a second time for at least 3 seconds, you can, via an interface, obtain the corresponding information on a computer or flue gas analyser.

To return to normal operation: Press the reset button for 1 second

# 8. FAULT LOCATION

## 8.1 Burner will not start

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

## 8.2 Burner will not start after normal use

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

## 8.3 Delayed ignition, burner starts; pulsation

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

