

STREBEL

S-FX Boiler Range

Models 70 – 125 – 220 - 320

Floor Standing High Efficiency Condensing Boiler

Installation, Operating & Maintenance Manual



Please read and understand before commencing installation and leave the manual with the customer for future reference.

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1 INTRODUCTION

This manual is written for:

- The Installer.
- System Design Engineer.
- The Service Engineer.
- The User.

Strebel Ltd are not accountable for any damage caused by incorrect following these instructions. For service and repair purposes use only original Strebel Ltd spare parts.

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2 SAFETY GUIDELINES

Carefully read all the instructions before commencing installation.

Keep these instructions near the boiler for quick reference.

The appliance should be installed by a skilled installer such as GAS SAFE registered person, electrical work carried out by a qualified person, all according to national and regional standards.

Failure to comply with these regulations could deem the warranty invalid.

This appliance must be installed in accordance with the rules that apply and only be used in an adequately ventilated space conforming to standards in place.

Without written approval of the manufacturer the internals of the boiler may not be changed. When changes are executed without approval, the boiler certification becomes invalid.

Commissioning, maintenance and repair must be done by a skilled installer/engineer, according to all applicable standards and regulations.

“WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure to hazardous materials) * or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this water heater.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.”
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.”
- C. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.”



What to do if you smell gas:

- Do not use any electrical equipment.
- Do not press any switches.
- Close the gas supply.
- Ventilate the room (open the windows and/or outdoor water heater room doors).
- Immediately warn the installer.

	The manufacturer/supplier is not liable for any damage caused by inaccurately following of these mounting instructions. Only original parts may be used when carrying out any repair or service works.
	This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

These instructions are written for the installer of Strebel products and contain all necessary information on the installation and adjustment of S-FX ranges of boilers. Please read these instructions fully before installation to ensure that all work is carried out correctly.

We suggest that you keep a copy of these instructions near the boiler.

These instructions together with those in any supplemental instruction booklet cover the basic principles to ensure the satisfactory installation of the boiler, although detail may need slight modification to suit particular local site conditions.

It is the law that all gas appliances and fittings are installed by a competent person (such as a Gas Safe registered installer) and in accordance with The Gas Safety (installation and Use) Regulations.

The relevant British standards for installation, codes of practice or rules in force and in accordance with the Manufacturers' instructions.

The installation must be carried out in accordance with the following regulations plus relevant codes & standards:

- Due consideration must be given to current Health & Safety Legislation while this product is being installed.
- Key Approved Documents to the Building Regulations, in the region of the United Kingdom that this product is being installed.
- The Local Building Regulations and Local water by-laws, the gas services area and the Local Authority recommendations.
- The appropriate British & European Standards for the type of installation and fuel used, including but not exclusively the following standards: -
 - o BS 5440: Part 2 (Flues and Ventilation).
 - o BS 6644: Installation of gas-fired hot water boilers of rated inputs between 70kW & 1.8MW
- The clean air act as defined by the local authority.
- The appropriate documents as produced by the Institution of Gas Engineers and Managers Documents (IGEM) for the type of installation and fuel used, including but not exclusively the following documents: -
 - o IGE/UP/1.
 - o IGE/UP/2.
 - o IGE/UP/4.
 - o IGEM/UP/10 Edition 4.
- If the product is being fuelled with LPG then the appropriate UKLPG Codes of Practice (CoP) should be referred to.
- Wiring to the appliance must be in accordance with the IEE (BS 7671) Wiring Regulations the Health and Safety Document No 635 "The Electricity at Work Regulations 1989" and any local regulations that apply.
- CP 342: Part 2, 1994. Code of practice for centralised hot water supply – buildings other than individual dwellings.
- CIBSE, Guides A, B and C.

Adhere to all regulations that are in force at the time of installation or service.

3 TECHNICAL DATA FOR S-FX BOILERS

3.1 Functional introduction

The S-FX boilers is a high efficiency, low emissions premix condensing heat generator for heating, running on natural gas or LPG and equipped with a microprocessor control system.

The boiler body consists of a patented stainless-steel helical tube heat exchanger and a premix burner in stainless steel, equipped with electronic ignition with ionisation flame control, modulating fan and modulating gas valve.

The S-FX is a heat generator arranged to operate alone or in cascade.

The S-FX boiler is standard set for Natural Gas (G20).

Boiler control includes:

- Cascade control for up to six boilers.
- Remote operation and heat demand indication from each boiler.
- Weather compensation control.
- Calorifier control.

Connections for:

- | | |
|---|---|
| ▪ On/Off thermostat. | ▪ System pump. |
| ▪ 0-10 VDC remote flow temperature (set point) control. | ▪ External flow switch or external safety device. |
| ▪ 0-10 VDC remote burner input control. | ▪ External system sensor. |
| ▪ Outdoor temperature sensor. | ▪ DHW indirect sensor or DHW control thermostat. |
| ▪ External calorifier pump or diverter valve. | |
| ▪ Boiler pump. | |

Cascade control

When using the integrated cascade control, a maximum of six boilers can be controlled in a cascade configuration. Using an appropriate external control, this number may be increased at will.

0-10 VDC connection available

The boiler flow temperature or power input can be controlled by an external 0-10 VDC signal. When a number of boilers are cascaded, and controlled by the integrated cascade control, the signal should be directed to the master boiler only. If an alternative control is used, more than one boiler may be controlled by a 0-10 VDC signal.

Time program

For both central heating and hot water function of the boiler, time programs with six programmable periods per day are available. These time programs are set and activated by entering the desired settings directly at the boiler control panel.

3.1.1 TECHNICAL SPECIFICATIONS DATASHEET

GENERAL						
Product identification number:			CE 0085CL0441			
Gas Appliance Type			B23			
Boiler Model			S-FX 70	S-FX 125	S-FX 220	S-FX 320
Classification			II2H3P	II2H3P	II2H3P	II2H3P
Water Content		litre	166	265	386	530
Weight (empty)		kg	180	280	400	500
Flow Connection		inch / F	R 1 ¼"	R 1 ¼"	R 2"	DN65 PN16
Return Connections		inch / F	R 1 ¼"	R 1 ¼"	R 2"	DN65 PN16
Gas Connection		inch	R ¾"	R 1"	R 1"	R 1"
Flue Exhaust Connection		mm	80	100	160	200
HEATING						
Values min-max:						
Nominal Input (net)		kW	14.0 - 65.5	23.0 - 116.0	41.0 - 207.0	62.0 - 299.0
Nominal Input (gross)		kW	15.5 - 72.7	25.5 - 128.7	45.5 - 229.7	68.8 - 331.8
Nominal Output 80/60 °C		kW	13.7 - 64.4	22.5 - 114.0	40.2 - 204.0	60.8 - 294.5
Nominal Output 50/30 °C		kW	15.0 - 69.9	24.8 - 125.0	44.2 - 220.0	66.8 - 320.0
BOILER EFFICIENCY						
Efficiency – Full Load 100% NCV		%	98.20	97.80	98.30	98.40
Efficiency – Full Load 30% NCV		%	109.5	109.6	109.4	109.6
Seasonal Efficiency (Part L) GV		%	96.76	96.77	96.70	96.88
GAS CONSUMPTION						
Values min-max:						
Natural gas (G20)		m³/h	1.48 - 6.93	2.43 - 12.28	4.34 - 21.9	6.56 - 31.64
Propane (G31) ¹		kg/h	1.09 - 5.09	1.79 - 9.01	3.19 - 16.06	4.82 - 23.23
Gas supply pressure nominal ²	G20	mbar	20			
	G31	mbar	37			
EMISSION						
Values min-max:						
CO ₂ flue gas ³	G20	%	8.8 - 9.3	8.7 - 9.3	8.7 - 9.3	8.5 - 9.0
	G31	%	9.8 - 10.3	9.5 - 10.5	9.5 - 10.5	9.5 - 10.5
NOx class		-	6	6	6	6
Flue gas temperature at combustion air temperature = 20 °C		°C	68	66	67	67
Mass flow flue gas (min/max)		g/s	7.0 - 30.0	11.0 - 53.0	20.0 - 94.0	30.0 - 140.0
Available pressure for the flue system ⁴		Pa	200			
INSTALLATION						
Resistance boiler	ΔT = 11 K	kPa	2.3	5.0	2.3	3.2
	ΔT = 20 K	kPa	1.2	2.3	1.4	1.4
Pressure boiler min-max.		bar	0.5 – 6.0			
Max. flow temperature		°C	95			
ELECTRIC						
Maximum power consumption ⁵		W	105	200	260	330
Power supply		V/Hz	230 / 50			
Protection class		-	IPX0D			

NOTES

¹ Using propane (LPG), LPG conversion kit to be fitted and parameter change required

² Min. and max. gas supply pressures.

	p nominal [mbar]	p min [mbar]	p max [mbar]
G20	20	18	25
G31	37	25	45

³ The CO₂ requirement of the unit – 0.1% tolerance either way

⁴ Maximum allowed combined resistance of flue gas piping at high fire

⁵ Power consumption is measured without circulation pump

3.2 ErP Specifications Datasheet

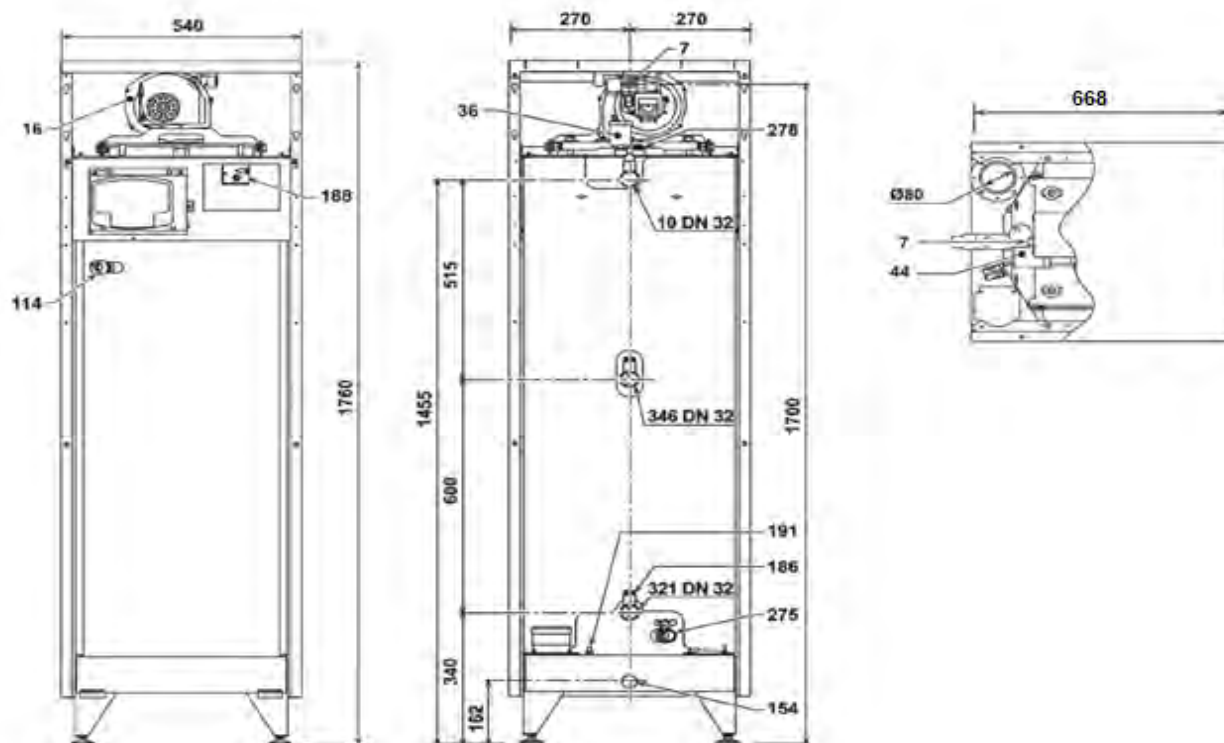
Technical parameters according to the European ERP (Energy Related Products) legislation:

Boiler Model:		S-FX 70	S-FX 125	S-FX 220	S-FX 320
Condensing boiler:		Yes	Yes	Yes	Yes
Low temperature boiler:		No	No	No	No
B11 boiler:		No	No	No	No
Cogeneration space heater:		No	No	No	No
Combination heater:		No	No	No	No
	Unit:	Value	Value	Value	Value
Rated heat output	kW	64	114	204	295
P-rated (P4) at 60-80 °C	kW	64.4	114.0	204.0	294.5
Heat output (P1) 30% at 30-37 °C	kW	12.8	24.2	41.6	60.6
Seasonal space heating energy efficiency (η_s).	%	94.0	94.0	94.0	94.0
Energy efficiency (η ₄) at 60-80 °C	%	88.5	88.1	88.6	88.7
Energy efficiency (η ₁) at 30-37 °C	%	98.7	98.8	98.6	98.8
Auxiliary electricity consumption					
At full load (elmax).	kW	0.105	0.200	0.260	0.330
At part load (elmin)	kW	0.019	0.025	0.037	0.043
In standby mode (Psb)	kW	0.003	0.003	0.003	0.003
Other					
Standby heat loss (Pstby)	kW	0.190	0.300	0.350	0.400
Ignition burner power consumption (P _{ign})	kW	0.000	0.000	0.000	0.000
Emissions (NO _x) of nitrogen oxides (EN15502-1:2012+A1:2015) ¹	mg/kWh	18.0	17.0	22.0	20.0
Sound power level, indoors (EN 15036-1:2006)	dB	58.0	62.0	72.0	76.0

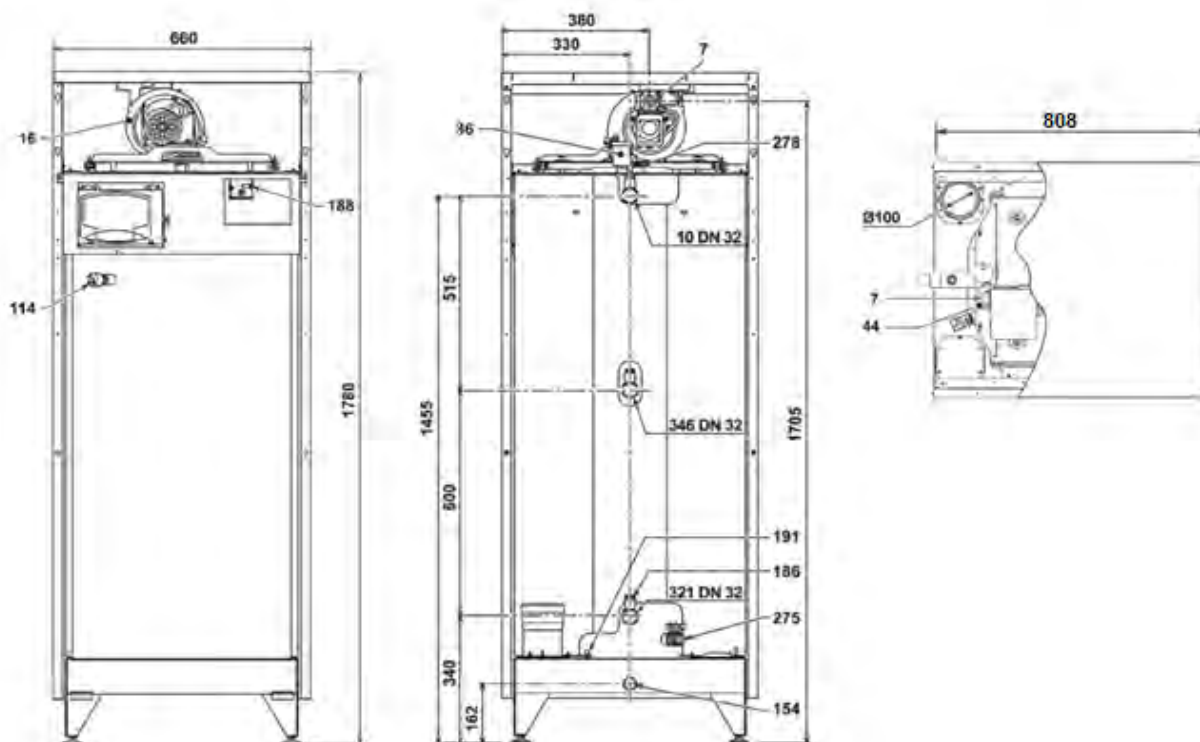
¹ These numbers are used to assign credits according to the BREEAM standards

4 BOILER DIMENSIONS

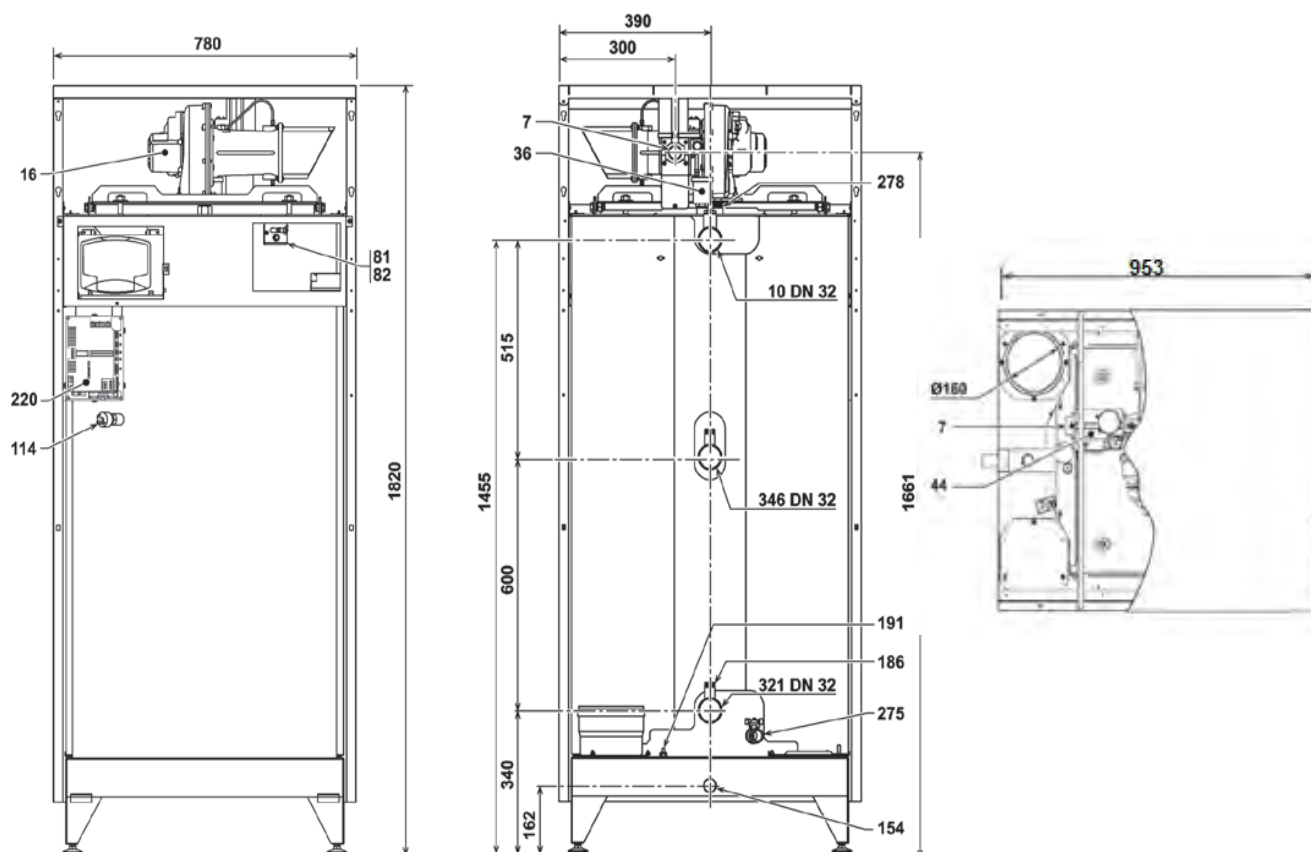
4.1 S-FX 70



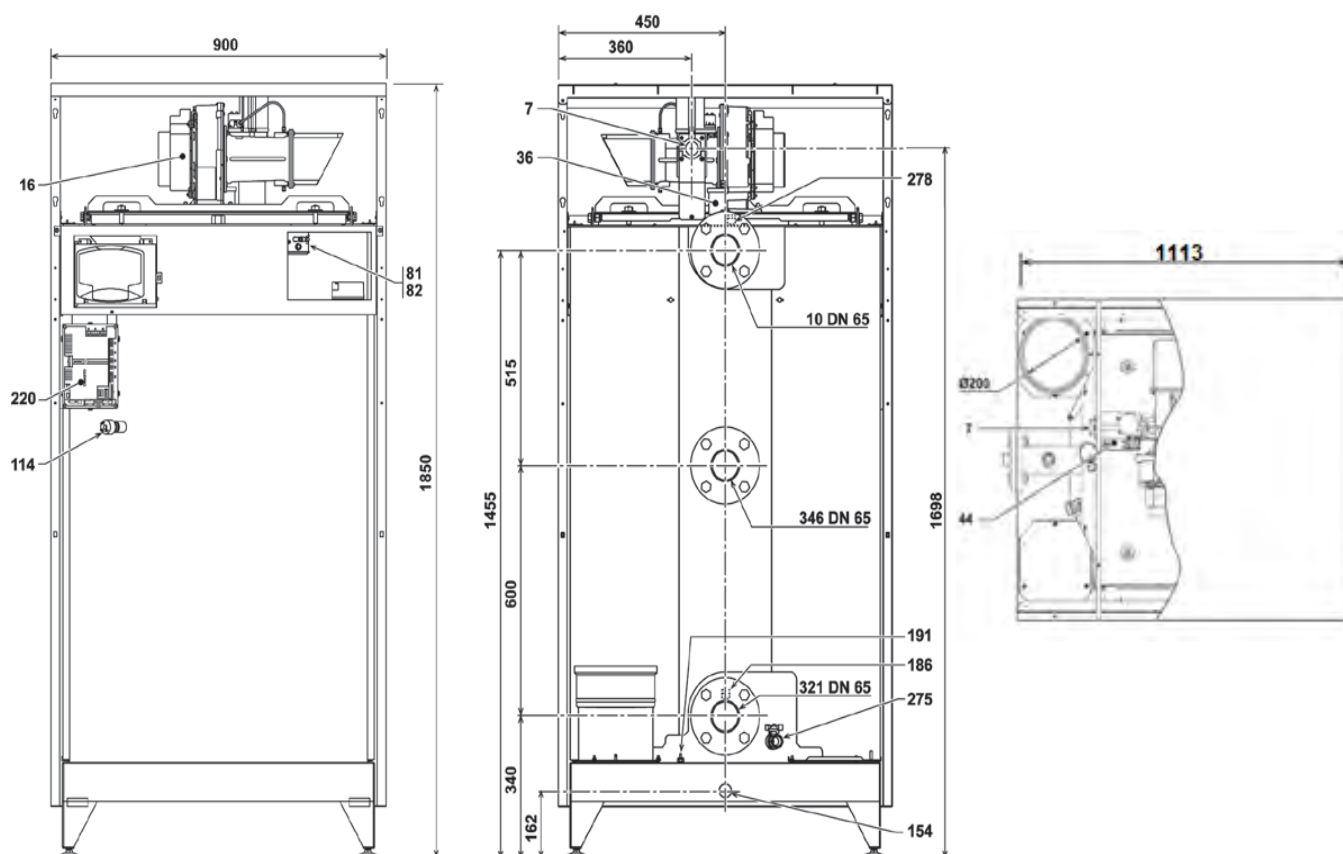
4.2 S-FX 125



4.3 S-FX 220



4.4 S-FX 320



5 INSTALLATION OF THE S-FX BOILERS

5.1 General Notes

The S-FX boiler is mounted on a pallet with a wooden “support” frame around it. The boiler is wrapped in shrink wrap before the wooden support frame is mounted. After the frame is placed the whole pallet, boiler and frame package is shrink wrapped again.

Only remove this packaging when the boiler has been positioned at the place where it will be installed. After removing the wrapping and the frame, the boiler can be taken off the pallet using a forklift or another suitable lifting device.

Positioning

The boiler will now be positioned on the four adjustment bolts.

Ensure the boiler levels in both directions are horizontal by using these four bolts.

5.2 Boiler Room

5.2.1 GENERAL

The S-FX range must be installed in a suitable room with ventilation openings direct to outside air in conformity with the current regulations. If there are several other heat generators that can work together in the same room, the ventilation openings must be sized to allow all heat generators to operate simultaneously.

The place of installation must be free of flammable materials or objects, corrosive gases, powders or volatile substances. The installation room must be dry and not exposed to rain, snow or frost.

5.2.2 BOILER ROOM

For the installation of the boiler(s) the following demands regarding the boiler room should be considered:

1. The radiation losses of the unit are low.
2. The boiler has a built-in fan that will generate noise, depending on the heat demand. The sound emissions are quite low from the boiler but be aware that some noise is produced.
3. You need a power supply of at least 230V-50 Hz with an earth connection and may need a supply of 400V-50Hz depending on the pump. We advise to install a separate “safe working switch on which all poles are switched” externally so one can work on the boiler while having all the wiring free of supply voltage.
4. The air supply of the boiler will be drawn in from the boiler room.

Other considerations related to the boiler location.

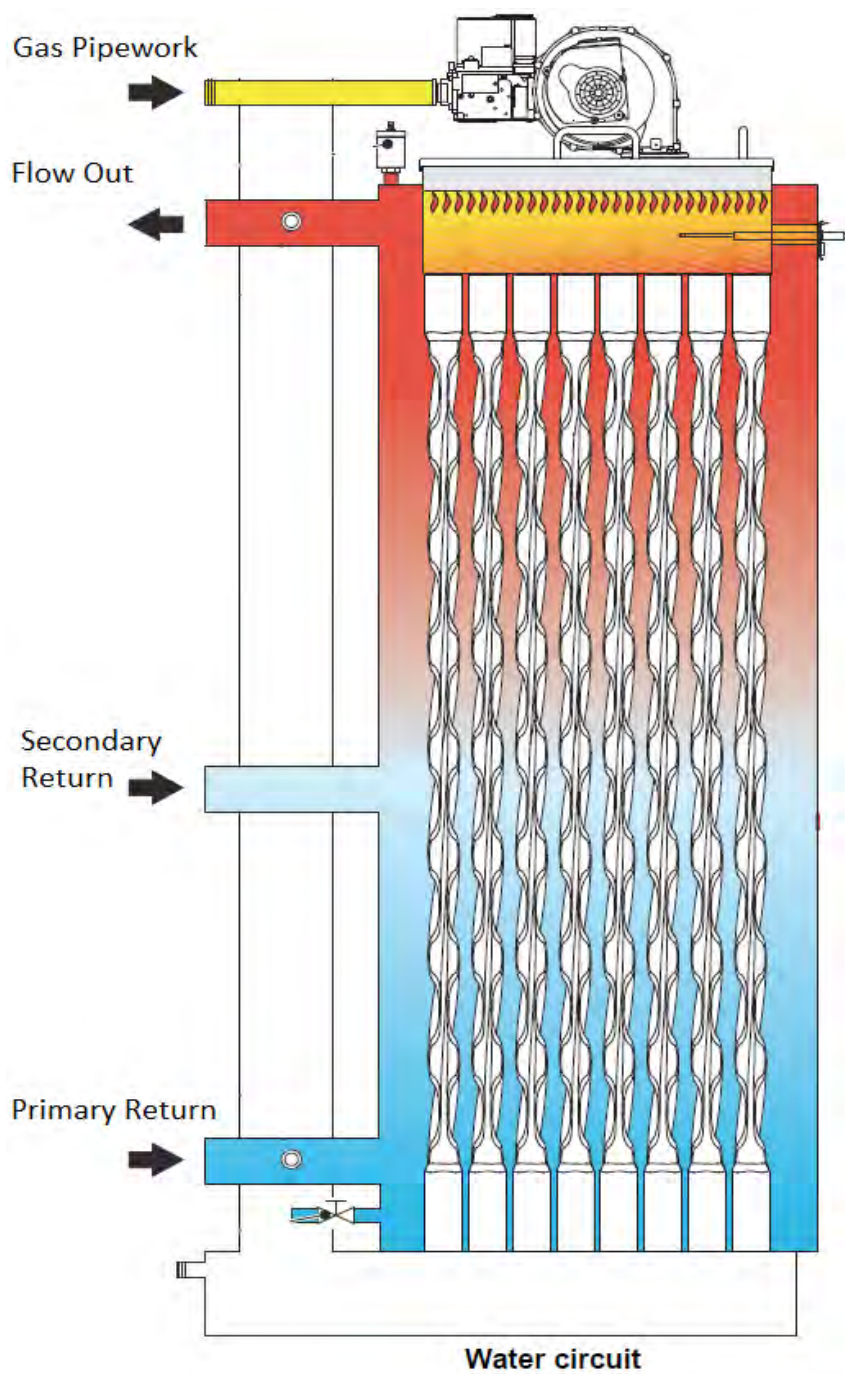
- The ventilation of the boiler room must meet all applicable standards and regulations, regardless of the selected supply of fresh air to the boiler location.
- The flue gas tube must be connected to an outside wall or roof duct. The air supply is required to come from outside into the plant room via correctly sized vents / ducts.
- The installation area must be dry and frost-free.
- There must be sufficient lighting available in the boiler room to work safely on the boiler.
- Mind the positioning of electrical components in relation to the temperature sensitivity.
- Make sure there is an open connection with the sewer to drain the condensate. This connection should be lower than the condensate drain level of the boiler.
- Ensure that the correct space is provided when positioning the boiler for maintenance and replacement of parts. The recommended minimum clearance is:
 - Side clearance: 50 mm
 - Front clearance: 500 mm
 - Rear clearance: 500 mm
 - Above clearance 200 mm
- Make sure that the floor on which the boiler is placed can hold the weight of the boiler.



The S-FX range is strictly prohibited to be installed outdoors, unless adequately protected against atmospheric agents.

6 CONNECTIONS

6.1 Boiler connections



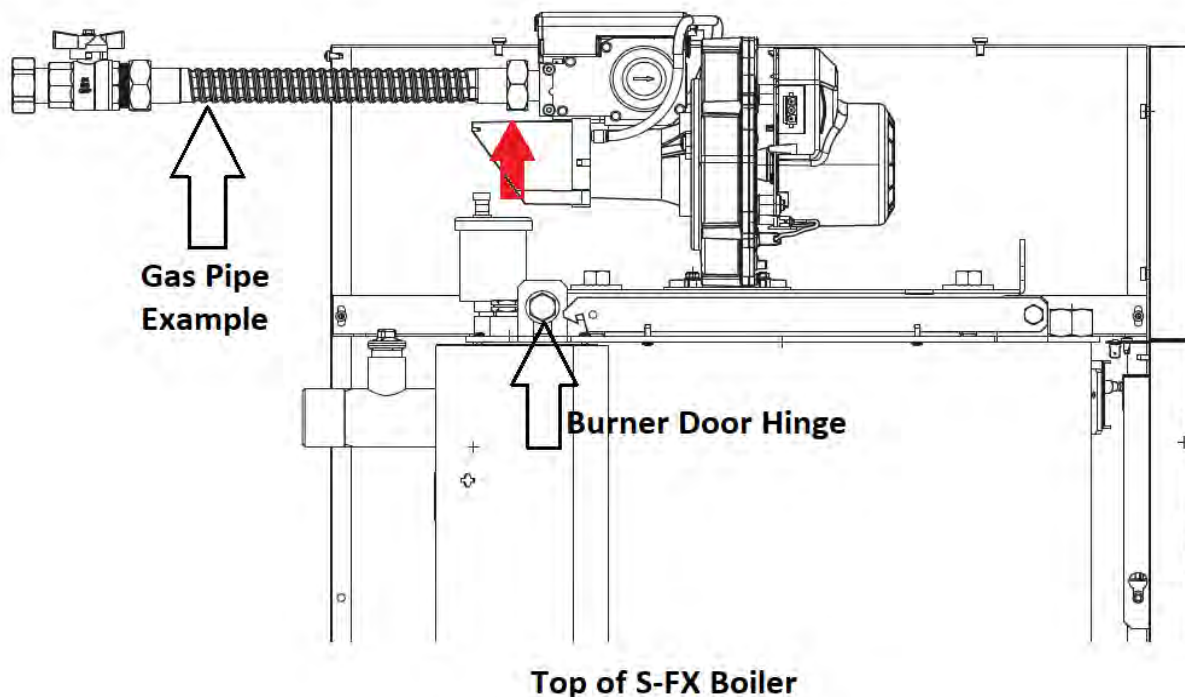
	S-FX			
	S-FX 70	S-FX 125	S-FX 220	S-FX 320
Flow Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16
Primary Return Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16
Secondary Return Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16
Gas Connection	3/4"	1"	1"	1"

6.2 Gas Connection



Before making the connection, make sure the S-FX appliance can operate with the type of fuel available. Clean all the pipes of the gas system to remove any residues that could affect correct functioning of the boiler.

Connection of the S-FX appliance to the fuel supply must comply with current installation standards.



To allow easy opening of the burner door during annual service / maintenance, the last section of the gas pipe must be considered. See chapter 15.2 which shows how the burner door is opened and closed.

As per the above picture, the **red arrow** shows where the gas connection to the boiler is located. The burner door hinge is located directly below thus the gas connection on the S-FX boiler is attached to the fan which is attached to the burner door that is a moveable part. For the burner door to be opened, the gas pipe connecting into the gas connection on the boiler will need to be removed. Therefore it is suggested that either:

- The last section is a stainless steel hose with an isolation valve fitted – gas pipe example above.
- The last section of gas pipe work has breakable unions with an isolation valve fitted.

	S-FX				
	S-FX 70	S-FX 125	S-FX 220	S-FX 320	
Gas Supply Connection Size	3/4"	1"	1"	1"	Ø

Make sure that all gas connections are tight. The capacity of the gas meter must be sufficient for the simultaneous use of all units connected to it. The diameter of the gas pipe leaving the boiler is not decisive for choosing the diameter of the pipe between the S-FX unit and the gas meter. It must be chosen according to its length and pressure drop, in conformity with the current regulations.



Do not use the gas pipes to earth electrical appliances.
In case of connection in cascade, make sure to install a fuel shut off valve externally with respect to the modules.

6.3 Flow & Return Connections

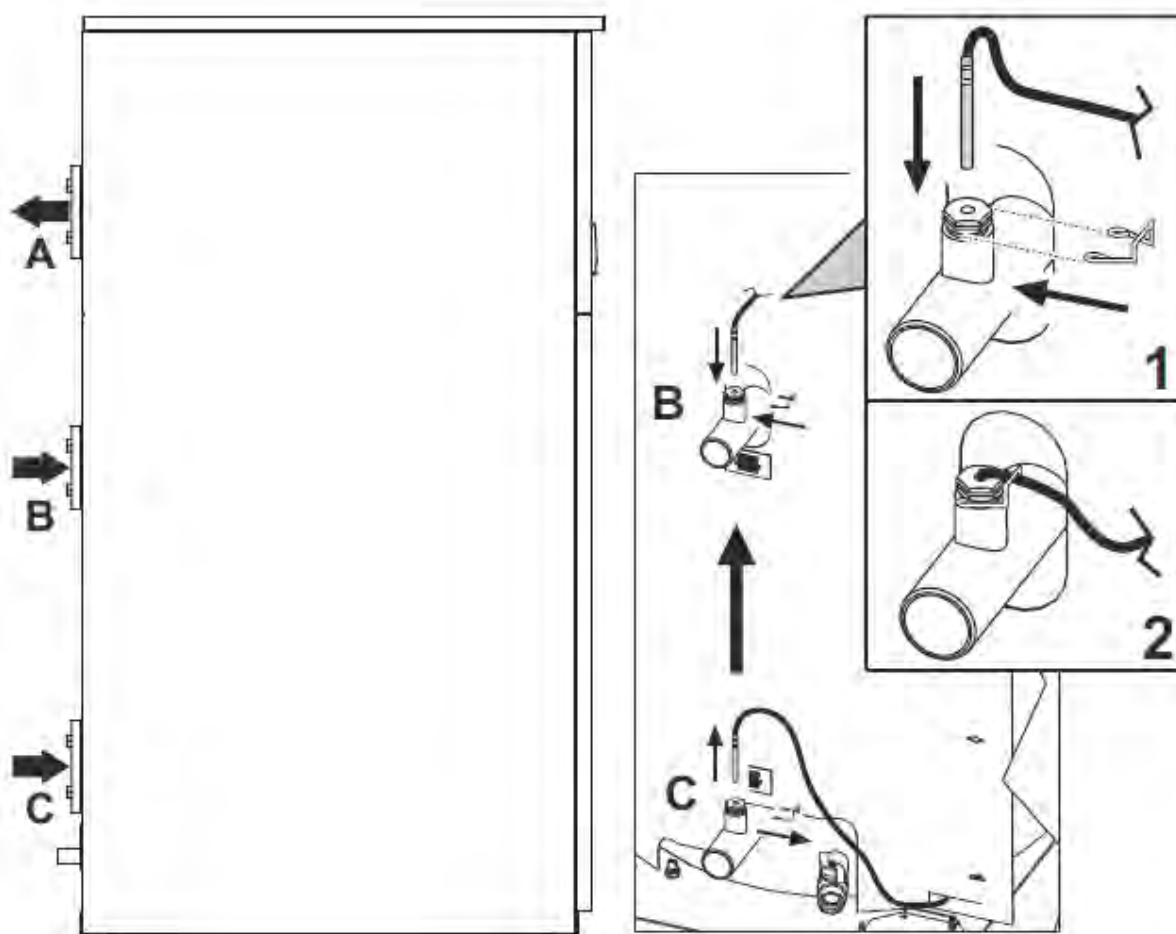


Before making the connection, carefully flush all the pipes of the system to remove residues or impurities that could affect the operation of the unit. See “water quality” and “chemical water treatment” chapters.

	S-FX			
	S-FX 70	S-FX 125	S-FX 220	S-FX 320
Flow Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16
Primary Return Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16
Secondary Return Connection Size	1 1/4" Threaded	1 1/4" Threaded	2" Threaded	DN65 Flanged PN16



If the secondary return connection is NOT used then this must be blanked off by the installation before filling the S-FX appliance.



The hydraulic connections are:

- Connection A = Supply / Flow Connection.
- Connection B = High Temperature Secondary Return Connection.
- Connection C = Low Temperature Primary Main Return Connection.

Each return hydraulic connection has a premade pocket for the flow & return sensors to be inserted into as shown in the above diagram labelled 1 & 2.



Ensure if the primary return connection is only used then insert the return into connection C not B.
Ensure if the secondary return connection is only used then insert the return into connection B not C.

6.4 Water quality

The system water must be checked periodically (at least twice a year during the seasons of use, as required by UNI8065) and possibly have a clear appearance and must be within the following parameters:

- Water PH: From 7 to 8.5.
- Copper Cu (mg/l): < 0.5 mg/l.
- Iron Fe (mg/l): < 0.5 mg/l.
- Chlorides (mg/l): < 50 mg/l.
- Conductivity (µS/cm): < 200µS/cm.

6.5 Chemical water treatment

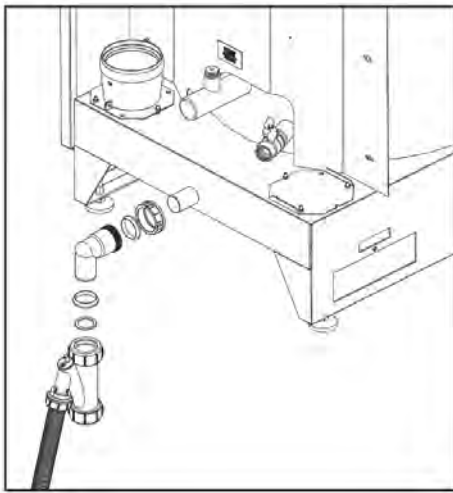
The chemical compatibility of several products for treatment of the central heating equipment has been tested on the heat exchangers and the boilers. See below for the list with the corrosion inhibitors in preventative and curative treatment for gas fired central heating boilers. If water treatment is required when filling the system or preforming maintenance an inhibitor should be used. Follow the instructions provided by the inhibitor manufacturer when adding it to the system.

The following is a list of approved chemical treatments.

Corrosion-/ Scale inhibitors and recommended suppliers		
Product Types	Fernox	Sentinel
Inhibitors	Protector F1 / Alphi 11	X100, X500
Noise reducer		X200
Universal cleaner	Restorer	X300
Sludge remover	Protector F1, Cleaner F3	X400
Antifreeze	Alphi 11	X500
Tightness		Leaker Sealer F4

6.6 Condensate Drain

The condensate drain is supplied loose within the S-FX boiler casing on delivery, please connect before operating the boiler.



The condensate drain is placed at the centre and at the bottom of the boiler and has a hose discharge. Connect this flexible hose to the sewer system.

Use only plastic parts with the condensate drain. Metal lines are not allowed.

Blockage of this drain might damage the boiler. The drain connection is correct when the condensate can be seen flowing away, e.g. using a funnel. Any damage that might occur, when the drain is not installed correctly, is not covered by the warranty of the boiler.

There should be an open connection of the condensate hose into the sewage system. A possible vacuum in the sewage system must never give the opportunity to suck on the boiler's condensate drain hose.

Maximum condensate flow per S-FX model:

S-FX 70	S-FX 125	S-FX 220	S-FX 320
8.3 litres per hour	14.9 litres per hour	26.7 litres per hour	39 litres per hour



When mounting the bottom part of the condensate trap, before commissioning the boiler and/or after maintenance, the condensate trap must **ALWAYS** be completely filled with water.

This is a safety measure: the water in the condensate trap keeps the flue gases from leaking out of the heat exchanger via the condensate drain.

6.7 Expansion Vessel

The capacity of the expansion vessel must be selected and based on the capacity of the central heating system and the static pressure. Suggested is to fit the expansion vessel in the return pipe of the central heating system.

6.8 Pressure relief valve

The S-FX boiler has no internal pressure relief valve, it is required to be installed as close to the boiler on the flow pipe of the heating system. When having cascaded boilers, each boiler requires to have its own pressure relief valve. It is recommended to install isolation valves on the flow and return pipework, so the boiler can be isolated from the heating system, when needed. Make sure that the pressure relief valve is mounted between the boiler and the isolation valves.

Alternatively, there is a connection on the S-FX boilers flow pipe just before it connects to the system which is plugged off. This is primarily used for any BMS temperature sensor require but can be used to connect a safety valve. But due to the size of the connection, NABIC FIG 500 high lift valves will be required:

- S-FX 70 & 125 = ½" FBSP Connection.
- S-FX 220 = ¾" FBSP Connection.
- S-FX 320 = 1" FBSP Connection.

The specifications and size of the relief valve should be determined by the installer and must comply with all applicable regulations and boiler capacity.

6.9 NON-Return Valves.

All S-FX boilers have a non-return valve installed on the air pipe just before the internal combustion fan. These valves are certified to give protection of up to **30 pascals** when installed on a pressurised flue system.

6.10 Bypass

The boiler has no internal bypass. When many thermostatic valves are being used, the system should have a bypass to allow an adequate flow when all thermostatic valves are closed.

Instead of a bypass also a low-loss header or a SMH Boiler Guard can be used for this function.

The boiler flow will also be influenced when a pipe of the heating system is frozen / blocked. Make sure all heating pipes are free from the risk of frost. If there is the risk of freezing of the heating system, all the pipe section must be insulated and/or protected with the help of a tracing.

6.11 Frost protection

The boiler has a built-in frost protection that is automatically activating the S-FX boiler and connected heating pumps when the boiler supply / flow (water) temperature drops below 6 °C.

This frost protection function will not fire up the boiler if the power supply or gas supply has been turned off. If necessary, for system protection use a suitable antifreeze liquid as listed within chapter 6.5.

NOTICE: A boiler damaged by frost is not covered under warranty.

6.12 Automatic Filling System / Pressurisation Units.

When using an automatic water refill system some precautions should be taken (fresh water is bringing fresh oxygen into the system), like installing a water meter to measure and evaluate the total water volume that is added to the system. This to detect and eliminate any water leakage as soon as possible. When an automatic water refill system is used, some form of logging should take place to prevent continuously filling of the system with large amounts of oxygenated fresh water. This can happen when a leak in the system is not detected and the total added water amount is not being logged.

6.13 Water pressure

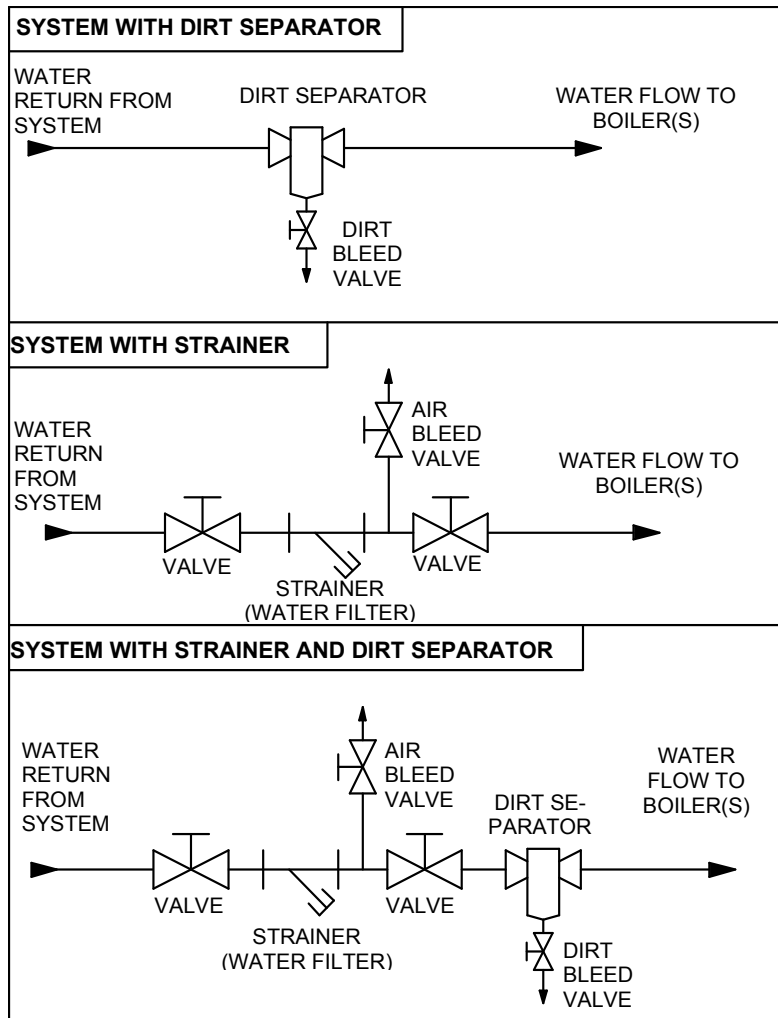
The installation should be designed and built to conform to all applicable regulations and standards, including the right safety valves. **IMPORTANT:** Always keep the pressure in the boiler lower than the value at which its safety relief valve opens.

Switch

A water pressure switch has been built into the boiler. With this switch, the minimum water pressure in the boiler is 0.5 bar. The normal water pressure is supposed to be between 1.5 and 2.0 bar.

The pressure sensor will stop the boiler from firing when the water pressure drops below 0.5 bar, and start the boiler firing again when the water pressure reaches above 1.0 bar.

6.14 Installing a strainer and/or dirt separator



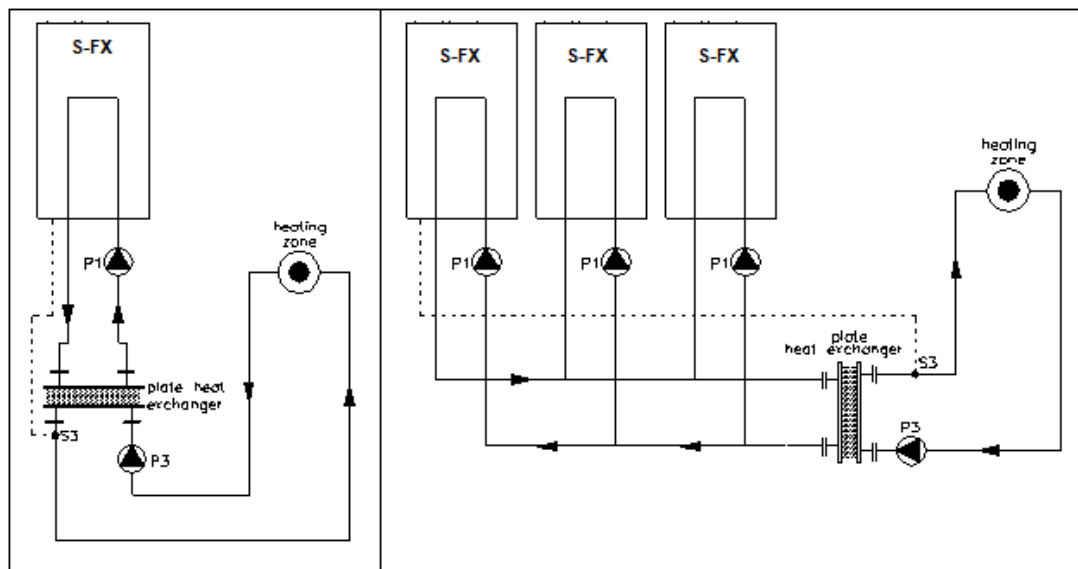
Always install a strainer (water filter) and/or a dirt separator in the return pipe of the boiler; in such a way that the water going to the boiler is free of any debris/particles.

When using a water filter always check a week after installation to determine the strainer cleaning interval. Advice is to mount valves before and after the strainer, including an air bleed valve, so the strainer can be isolated from the heating circuit for service operations.

Clean water is very important, blocked and/or polluted heat exchangers, including failures and/or damages caused by this blockage are not covered by the warranty.

6.15 Plastic piping in the heating system

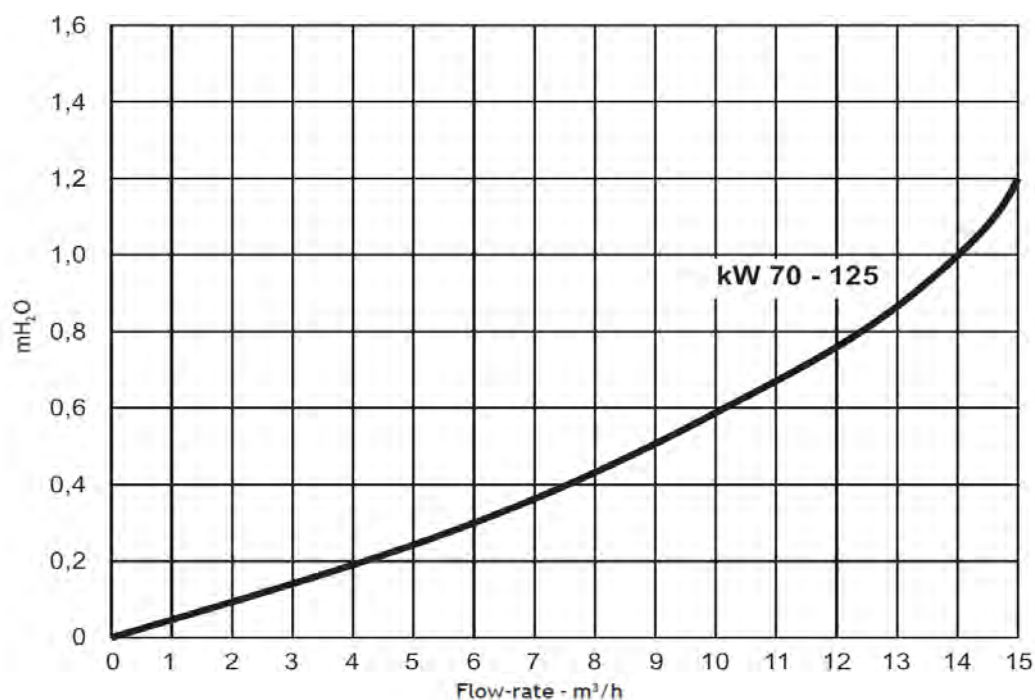
When plastic pipes with no oxygen barrier e.g. under-floor heating system, are used in the central heating system, these should be separated from the boiler system by using a plate heat exchanger. Diffusion (through the plastic) can cause air to enter the heating system. This could damage the boiler, pumps and other components in the system. Be aware that plastic piping is often used in under floor heating systems. When no measures have been taken to prevent the entrance of air into the boiler system, the warranty of the boiler and any boiler part may be deemed invalid.



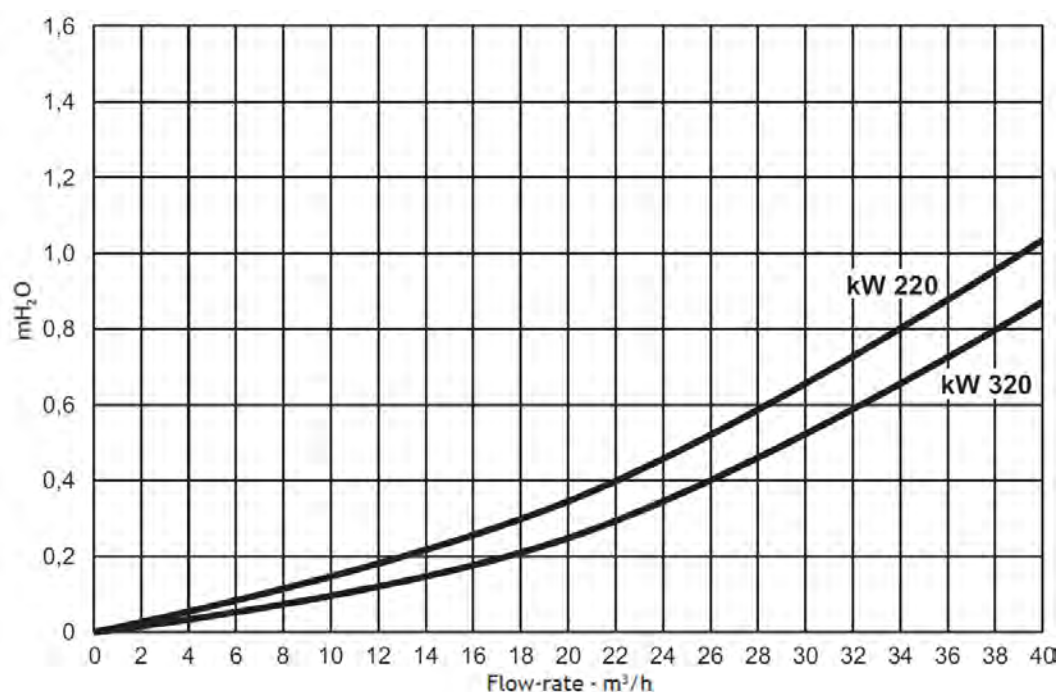
7 BOILER SHUNT PUMP

The S-FX boilers do not have an internal shunt pump therefore using the following graphs, select a pump that is compatible with the hydraulic resistance of the boiler and the system against the required flow rate.

7.1 S-FX 70 & 125 Hydraulic graph



7.2 S-FX 220 & 320 Hydraulic graph



It is recommended to observe the water flow rates in the table and as specified below.

DESCRIPTION					
	S-FX 70	S-FX 125	S-FX 220	S-FX 320	
Water flow rate ΔT 10	5.52	9.77	17.49	25.29	m ³ /h
Water flow rate ΔT 20	2.76	4.89	8.74	12.64	m ³ /h
Water flow rate ΔT 40	1.38	2.44	4.37	6.32	m ³ /h

8 FLUE GAS AND AIR SUPPLY SYSTEM

8.1 General

The S-FX boiler range is a B23 type with combustion air drawn from the place of installation, and exhaust fumes discharged by means of a combustion fan (operation with flue pressurised) direct to outside air via a flue system.

Description	S-FX Boiler Range				
	70	125	220	320	
Flue Pressure the Fan can Overcome	200	200	200	200	Pa

Notice:

- Install all horizontal flue components with an angle of 3° downwards in the direction of the boiler (roughly equal to five centimetres for every linear meter). When not installed accordingly, it may result in condensate building-up in the flue gas tube, eventually causing component failure.
- When using a wall terminal, there is the possible risk of ice building-up on surrounding parts/structures, because the condensate will freeze. This risk should be taken into account during the design phase of the heating installation.
- In line flue condensate drains **must** be used with flue runs longer than 4 meters with the condensate drainpipe going to a sewage system.
- Because the flue gases can have a low temperature, the boiler needs to have a high efficiency approved stainless steel or plastic flue system. These materials, including the gaskets, should be usable for positive pressure flue gas systems and have a temperature class of **T120**. **Meaning: the parts must be certified for use at temperatures of minimal 120 °C** (See also warnings below).

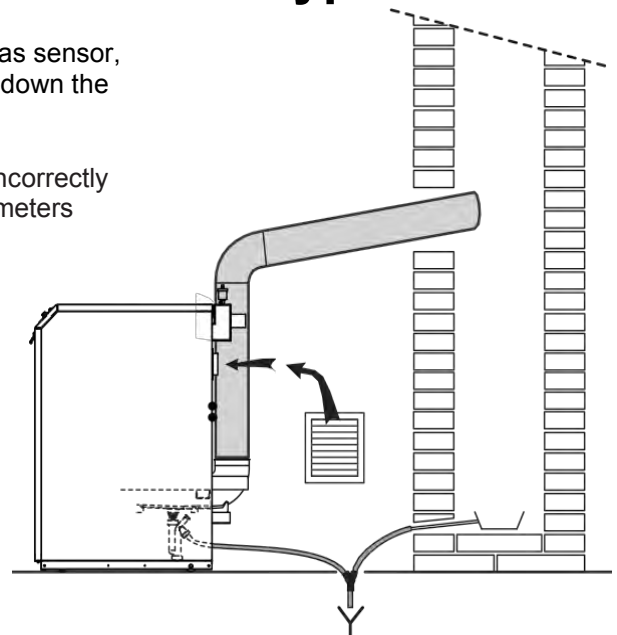
Note:

In general, gas heaters are certified with their own flue gas material. The gas heater must be provided with high efficiency SS or PP flue gas components available. The parts have to be qualified for an overpressure class P1 or H1 and a temperature class of T120 minimum.

	Never use aluminium flue with the S-FX boilers
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B23 Type

- S-FX appliances are equipped with an exhaust flue gas sensor, which in the event of irregular temperatures will close down the operation of the boiler.
- The flue duct must be correctly sized. Inadequate or incorrectly sized flues will cause problems with combustion parameters and excessive noise.
- For the flue duct, the use of stainless steel piping is recommended, in compliance with standards EN1856-1 and EN1856-2.
- Ensure any horizontal flue runs have a 3 degree fall back.
- Inline flue condensate drainage points must be installed connected directly traps with flue runs over **4 metres**.



A few examples of flue gas material suitable for the S-FX boilers:

CE String for Plastic PPs: EN14471 T120 P1 W 2 O(30) I C/E L

CE String for Stainless Steel: EN1856-1 T250 P1 W V2-L50040 O (50)

When selecting flue gas systems, be aware that the minimum requirements are met. So only select flue gas materials having the same or better properties than this table.



Never use aluminium flue with the S-FX boilers

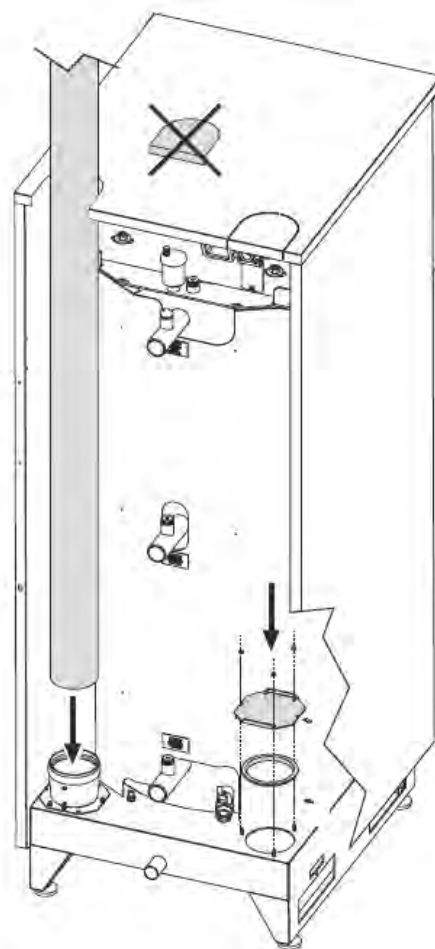
8.2 S-FX Exhaust Flue Connection

Description	S-FX Boiler Range				
	70	125	220	320	
Flue Spigot Diameter	80	100	160	200	mm

Manifold, ducts and flues must be suitably sized, designed and made in compliance with the current regulations. They must be made of suitable materials, i.e. resistant to heat and corrosion, smooth on the inside and tight.

In particular, the internal flue gaskets must be condensate proof.

Before proceeding with the flue installation, check and carefully comply with the local regulations and provisions.



Every unit has two flue connections in order to offer greater flexibility for installation. Only use one of the outlets and make sure the other connection is properly plugged up.

8.3 Plantroom Combustion Air

Being a type B23 type, combustion air is brought into the S-FX boiler from the installation room. The following conditions and considerations must be followed.

- The equipment room MUST be provided with properly sized openings to assure adequate combustion air in accordance with the BS / IGEM standards. These vents must be open and not be closed or blocked.
- There will be a noticeable increase in the noise level during normal operation from the inlet air opening.
- Vent system and terminations must comply with the standard venting instructions set forth in this manual.

8.3.1 AIR CONTAMINATION

Pool and laundry products and common household and hobby products often contain fluorine or chlorine compounds. When these chemicals pass through the boiler, they can form strong acids. The acid can eat through the boiler wall, causing serious damage and presenting a possible threat of flue gas spillage or boiler water leakage into the building.

Please read the information given in the list below, with contaminants and areas likely to contain them. If contaminating chemicals will be present near the location of the boiler combustion air inlet, have your installer pipe the boiler combustion air and vent to another location, per this manual.

	The boiler may never be located in a laundry room or pool facility, for example, these areas will always contain hazardous contaminants.
	To prevent the potential of severe personal injury or death, check for areas and products listed in the list below, with contaminants before installing the boiler or air inlet piping.
	If contaminants are found, you MUST: - remove contaminants permanently. or - relocate air inlet and vent terminations to other areas.
	The installation room has to have sufficient air supply vents. These vents must be open and may not be closed or blocked. Requirements in accordance with national and local standards.

Corrosive Contaminants and Sources

Products to avoid:	Spray cans containing chloral/fluorocarbons
	Permanent wave solutions
	Chlorinated waxes/cleaners
	Chlorine-based swimming pool chemicals
	Calcium chloride used for thawing
	Sodium chloride used for water softening
	Refrigerant leaks
	Paint or varnish removers
	Hydrochloric acid/muriatic acid
	Cements and glues
	Antistatic fabric softeners used in clothes dryers
	Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
	Adhesives used to fasten building products and other similar products

Areas likely to have contaminants:	Dry cleaning/laundry areas and establishments
	Swimming pools
	Metal fabrication plants
	Beauty shops
	Refrigeration repair shops
	Photo processing plants
	Auto body shops
	Plastic manufacturing plants
	Furniture refinishing areas and establishments
	New building construction
	Remodelling areas
	Garages with workshops.

8.4 Boiler categories - types of flue gas systems.

CE string flue gas material	European standard	Temperature class	Pressure class	Resistance to condensate	Corrosion resistance class	Metal: liner specifications	Soot fire resistance class	Distance to combustible material	Plastics: location	Plastics: fire behaviour	Plastics: enclosure
min. req. PP	EN 14471	T120	P1	W	1		O	30	I of E	C/E	L
min. req. SS	EN 1856-1	T120	P1	W	1	L20040	O	40			

8.5 Flue Terminal & Common Flues / Ducts



Never use aluminum containing flue gas materials for this boiler range

The flue terminal duct can be made of:

- Stainless steel in combination with **T120** gaskets.
- PP temperature class **T120**.

8.5.1 HORIZONTAL FLUE TERMINAL POSITIONING

Please refer to the relevant British Standards:

- BS 5440-2 – Flueing and Ventilation for Gas Appliances of Rated Input not Exceeding 70kW = (S-FX70).
- BS 6644 – Installation of gas fired hot water boilers of rated inputs between 70kW – 1.8MW.

Please refer to the Institution of Gas Engineers and Manager Documents (IGEM):

- IGEM/UP/10 Edition 4 – Installation of gas fired hot water boilers of rated inputs between 70kW – 20MW.

***** Appendix 9 – Risk Assessment for Positioning of Horizontal Flues Terminations.**

8.5.2 VERTICAL FLUE TERMINAL POSITIONING

Please refer to the relevant British Standards:

- BS 5440-2 – Flueing and Ventilation for Gas Appliances of Rated Input not Exceeding 70kW = (S-FX70).
- BS 6644 – Installation of gas fired hot water boilers of rated inputs between 70kW – 1.8MW.

Please refer to the Institution of Gas Engineers and Manager Documents (IGEM):

- IGEM/UP/10 Edition 4 – Installation of gas fired hot water boilers of rated inputs between 70kW – 20MW.

8.5.3 COMMON FLUE / DUCTS

Multiple boilers can be connected to a common duct. These flue gas systems for multiple boiler installations should be engineered preferably as zero or negative pressure systems with all but one boilers firing in high fire; this to prevent the risk of recirculation of the flue gases.

Where they are on site flue restrictions that prevent a common flue system being sized to a zero or negative draught, as per chapter 6.9 all S-FX boilers have a flue gas non return valve which is built in. The non return valve is certified up to 30 pa therefore a common flue system can be sized to a positive pressure up to 30pa with all but one boiler firing at high fire.

8.6 Horizontal Flue Terminal Risk Assessment

Using the below risk assessment as per IGEM/UP/10 appendix 9 to work out if the horizontal flue terminal position is suitable or not.

Appliances with net heat input exceeding 70kW and not exceeding 333kW low level flue discharge risk assessment (including net heat input for groups of appliances)			
No	Flue Position	Yes	No
1	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.1 titled figure 12 line G of a road, path, track, thoroughfare, walkway, property boundary or an area which is used for general public access other than for maintenance purposes?		
2	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.1 titled figure 12 line G to a playground, school yard, seating area where there may be public gathering?		
3	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.1 titled figure 12 line G of a surface or building that may be affected by corrosion or deterioration from plume condensate?		
4	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.1 titled figure 12 line G to an area where vehicles could be parked?		
5	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.1 titled figure 12 line G of any trees, branches or shrubs?		
6	Is the suggested flue terminal location within the distance of the formula shown in chapter 8.4.2 titled figure 7 line Y to a wall when enclosed by two or more vertical walls		
7	Is the suggested flue terminal location within a light well?		
8	Are the products of combustion from the suggested flue terminal location likely to build up under certain conditions, due to poor cross flow or air caused by enclosures or adjacent structures that is likely to cause nuisance?		
9	Is the suggested flue terminal location likely to cause a nuisance to adjoining properties?		
Clean Air Act		Yes	No
10	Is the total net input of individual or group of flue terminals greater than 333kW net input?		
Building Regulations Part J		Yes	No
11	Is the suggested flue terminal position less than 300mm from the boundary of the property, as measured from the side of the terminal to the boundary?		

All above answers are NO	Flue Position is Suitable	Any above answers YES	Flue Position is Unsuitable
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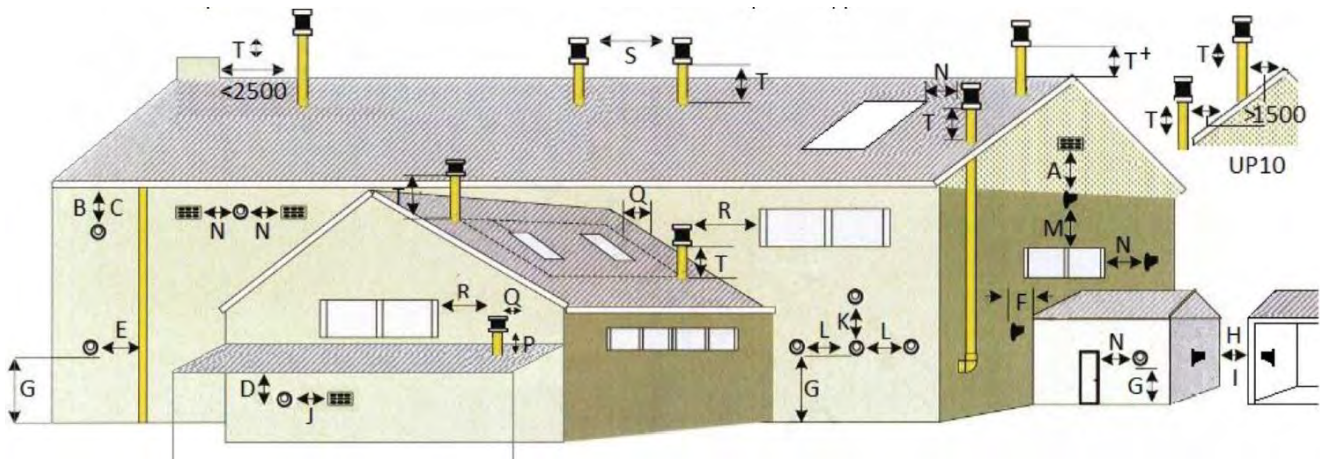
8.6.1 FIGURE 12 – LINE G

$$19.32 \times (\text{net heat input kW}) + 647.59 = \text{mm}$$

8.6.2 FIGURE 7 – LINE Y

$$7.232 \times (\text{net heat input kW}) + 93.708 = \text{mm}$$

8.7 Other Flue Terminal Minimum Distances



All measurements are in mm

Terminal Location		Boiler Manufacturers & IGEN-UP-10 Boilers Rated >70kW <333kW Net Input (Fan Draught)
A	Directly below an opening into the building	2500
B	Below gutter soil pipes etc.	200
C	Below Eaves	200
D	Below balconies or car port roof	Not Recommended **
E	From vertical drain or soil pipe etc.	150
F	From internal or external corners	If < 2500 - use plume kit & plume kit extensions
G	Above ground or balcony level	3000
H	From a surface facing the terminal	$23.126 \times (\text{kW net input}) + 618.84$
I	From a terminal facing the terminal *	$19.32 \times (\text{kW net input}) + 647.59$
J	From opening in a carport into a dwelling	Not Recommended **
K	Vertically from a terminal on the same wall	2500mm
L	Horizontally from a terminal on the same wall	Exhaust Only – No Minimum Distance
M	Above an opening into the building	$7.232 \times (\text{kW net input}) + 93.708$
N	Horizontally to an opening into the building	$7.232 \times (\text{kW net input}) + 93.708$
P	Above a flat roof (Obstacle > 2500mm)	$7.232 \times (\text{kW net input}) + 93.708$
P+	Above a flat roof (Obstacle < 2500mm)	$4.5675 \times (\text{kW net input}) + 19.723$
Q	From an adjacent wall (Edge of terminal)	$4.5675 \times (\text{kW net input}) + 19.723$
R	To an opening into the building	$7.232 \times (\text{kW net input}) + 93.708$
S	From any other terminal	Exhaust Only – No Minimum Distance
T	Above a >20 Deg Pitched Roof (BOT)	$4.5675 \times (\text{kW net input}) + 19.723$
T+	Above a >20 Deg Pitched Roof (BOT) - Valley	$4.5675 \times (\text{kW net input}) + 19.723$

*Positions not recommended **Risk assessment required (Chapter 9.11) BOT = Base of Terminal

9 ELECTRICAL INSTALLATION

9.1 General

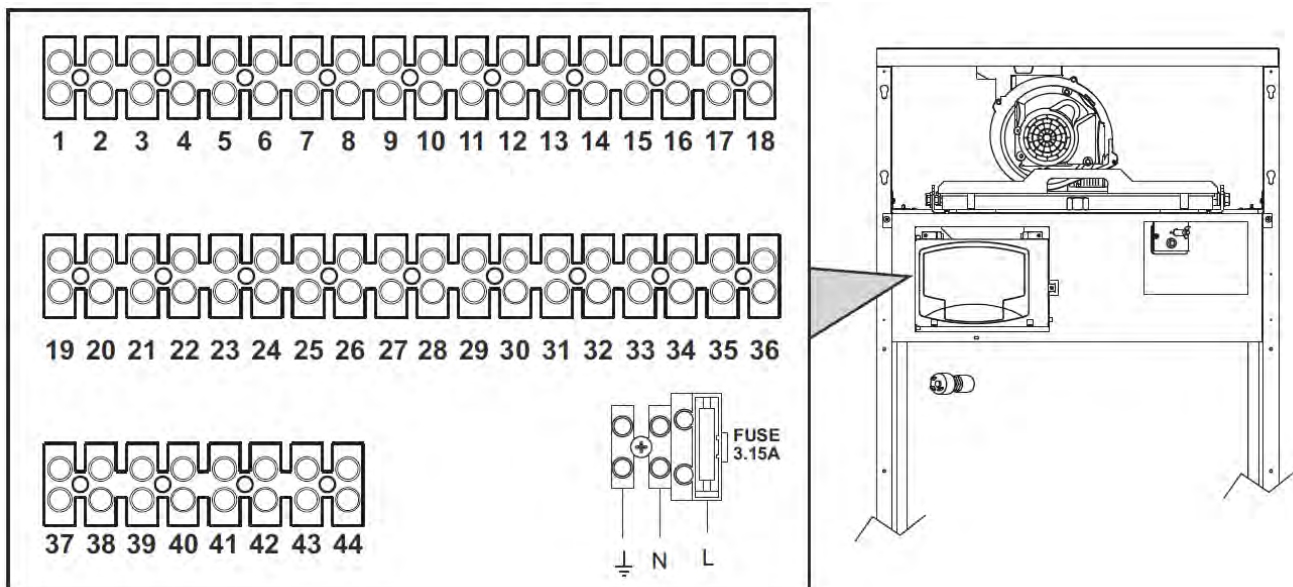
- For operation, the boiler needs a power supply of 230 VAC 50Hz.
- The boiler main supply connection is phase/neutral sensitive.
- The wiring for the connections can be entered at the bottom of the boiler through the cable glands.
- NOTICE: Before starting to work on the boiler, it must be switched off and the power supply to the boiler must be disconnected.
- Electrical wiring should be installed according to all applicable standards and regulations.
- Working on the boiler should only be done by a qualified service engineer that is skilled in working on electrical installations and according to all applicable standards.

9.2 Connection mains supply

- It is advised to use a flexible cable between the cabinet entry (at the bottom) and the connection terminal.
- The earth wire has to be longer than the phase and neutral wire.
- The power supply cable must be secured by tightening the cable gland at the bottom of the boiler casing.
- In case of a flexible cable: use crimp ferrules on each wire end for the terminal connections.
- The minimum cross section of the wires in the power supply cable is $3 \times 1.0 \text{ mm}^2$.
- As it is a stationary appliance without means for disconnection from the supply a contact separation in all poles that provide full disconnection under voltage category III must be provided.

9.3 Electrical connections

The electrical terminal block is located in the rear of the control panel.



The S-FX boiler is prewired and provided with a Y-cable and plug for connection to the electrical supply. The connection to the mains power supply must be made with a permanent connection and equipped with a bipolar switch whose contacts have a minimum opening of at least 3mm, interposing fuses of max 3A between the boiler and the mains supply panel.

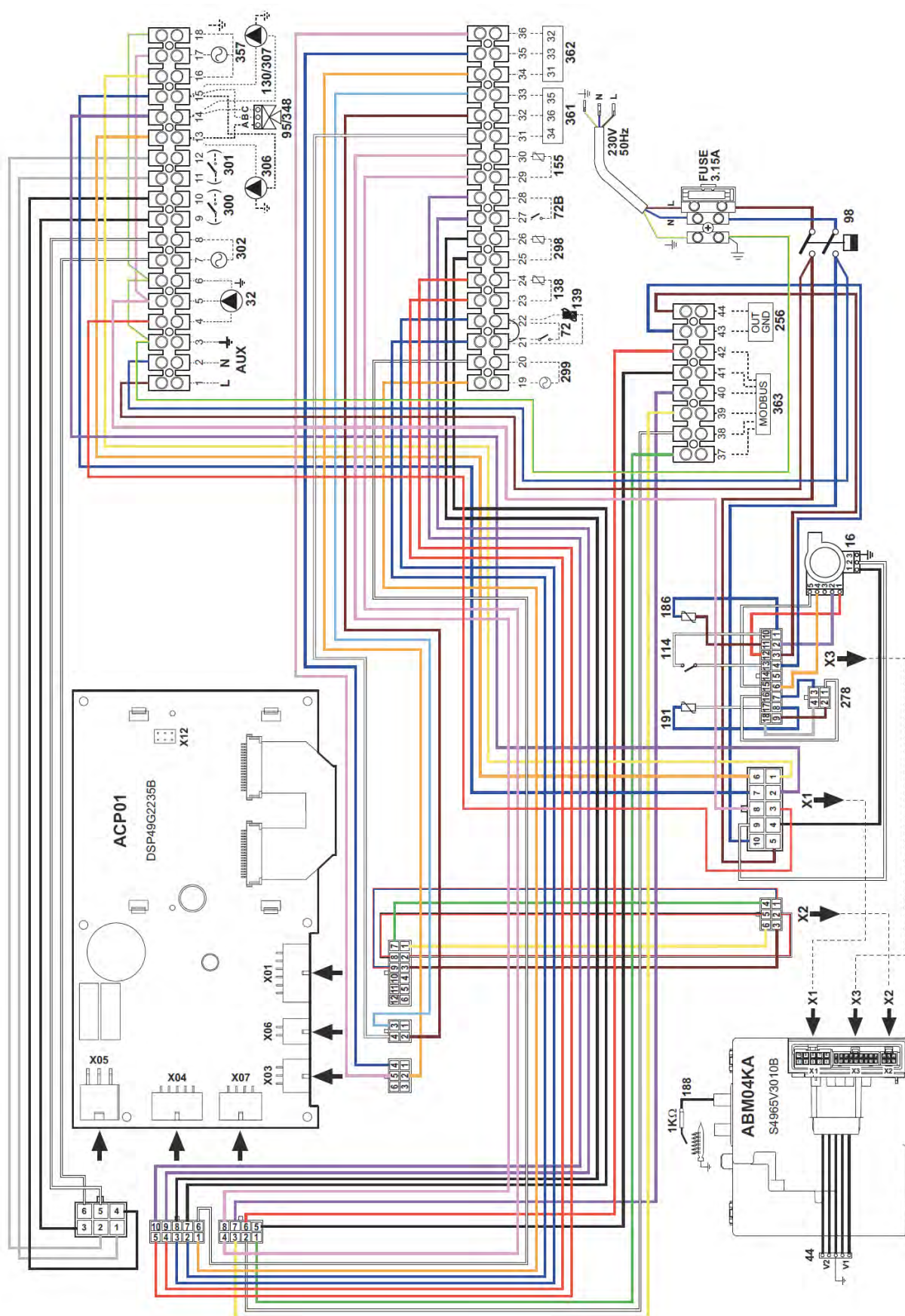
It is important to respect the polarities:

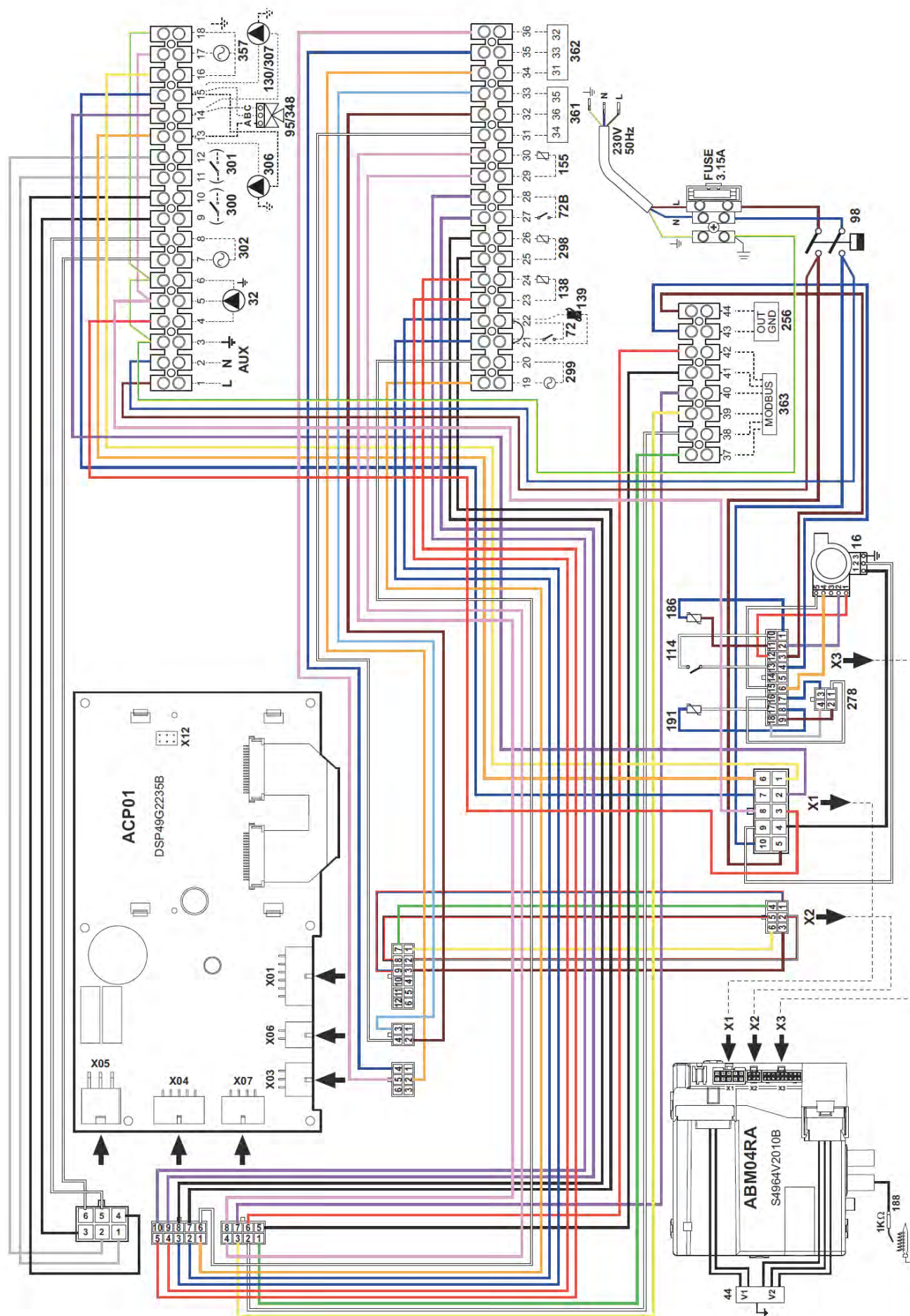
- Power Live Supply = Brown.
- Neutral = Blue.
- Earth = Yellow & Green.

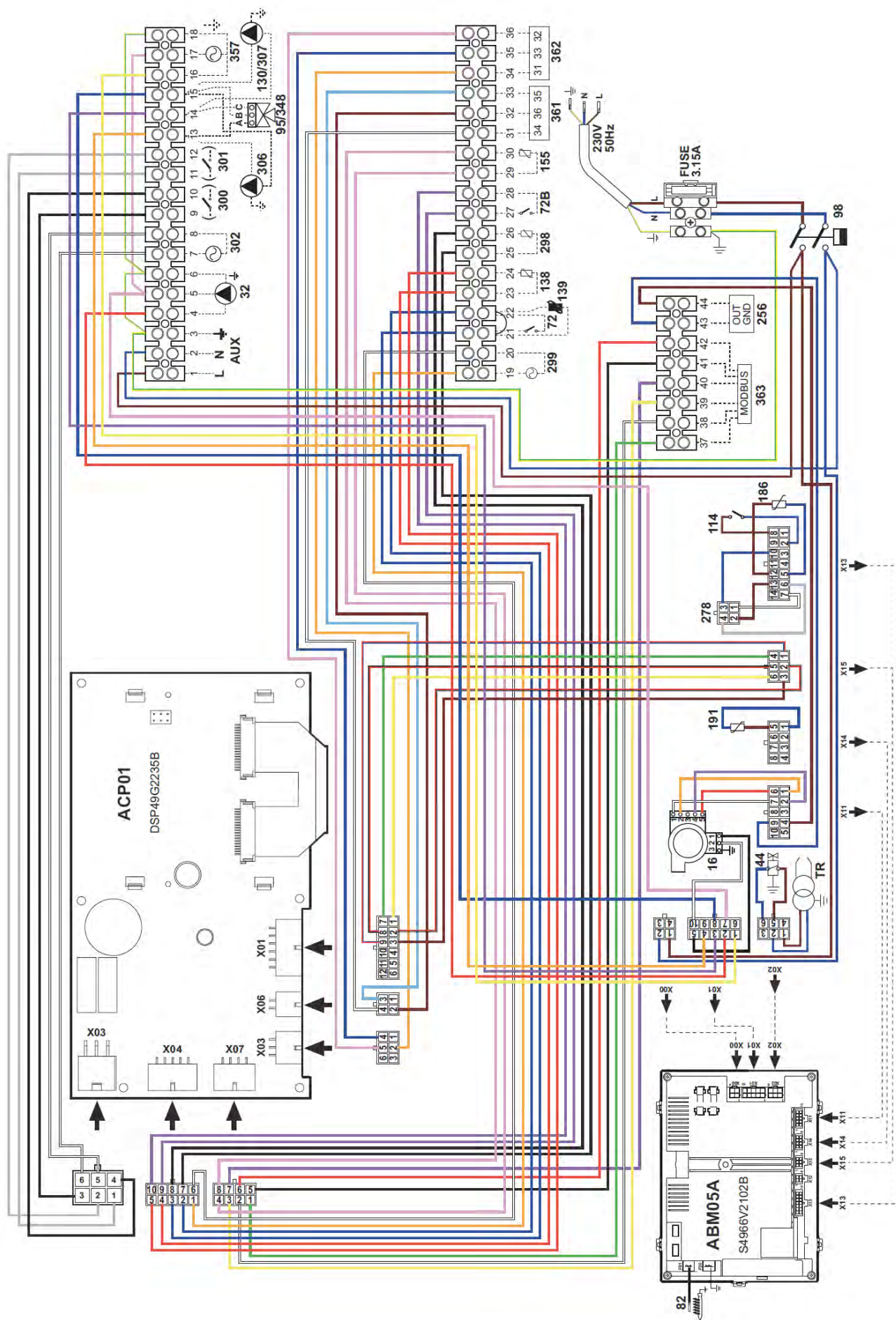
During installation or when changing the power cable, the earth wire must be left 2cm longer than the others.

9.4 Electrical Schematics

S-FX 70







9.5 Drawing Number Legend

Drawing Number	Part Description
16	Combustion Fan
32	Boiler Central Heating Shunt Pump
44	Gas Valve
72	Room Thermostat 1 st Zone
72b	Room Thermostat 2 nd Zone
81	Ignition Electrode
82	Detection Electrode
98	On / Off Switch
114	Water Pressure Switch
130	DHW Primary Circulating Pump
138	Outside Sensor
139	Remote Control 1 st Zone
155	DHW Tank Probe
186	Return Sensor
188	Ignition & Ionisation Electrode
191	Flue Gas Temperature Sensor
278	Double Sensor (Safety & Heating)
298	Cascade Flow Temperature Sensor
299	0-10v DC Control
300	Burner Burning Indication (Volt Free Output)
301	Fault Indication (Volt Free Output)
302	Remote Reset Input (230v)
306	Heating Circulating Pump 1 st Zone
307	Heating Circulating Pump 2 nd Zone
348	3 Way Valve
357	Fault Indication (230v)
361	Cascade Connection - Emitter
362	Cascade Connection - Receiver

Room Thermostat Connections (72 & 72b)

The room thermostat connectors are **volt free connections**. Connecting 230v to these terminals will damage the main PCB boards:

- 72 – Room Thermostat = Terminals 21 & 22.
- 72b – Second Room Thermostat = Terminals 27 & 28.

Advisory: When connecting a remote timer control or a timer switch, do not take the power supply for these devices from their cut out contacts. Their power supply must be taken with a direct connection from the mains or batteries.

Outdoor Sensor (138)

Connect the outdoor sensor to terminals 23 & 24 - The maximum length of cable is 50 metres, a common two wire core cable can be used.

The outdoor sensor should be connected to a north wall of the building, not near windows, doors, vents, flues or any other heat sources that could affect an accurate reading.

DHW Tank Probe (155)

Connect the outdoor sensor to terminals 29 & 30 - The maximum length of cable is 50 metres, a common two wire core cable can be used.

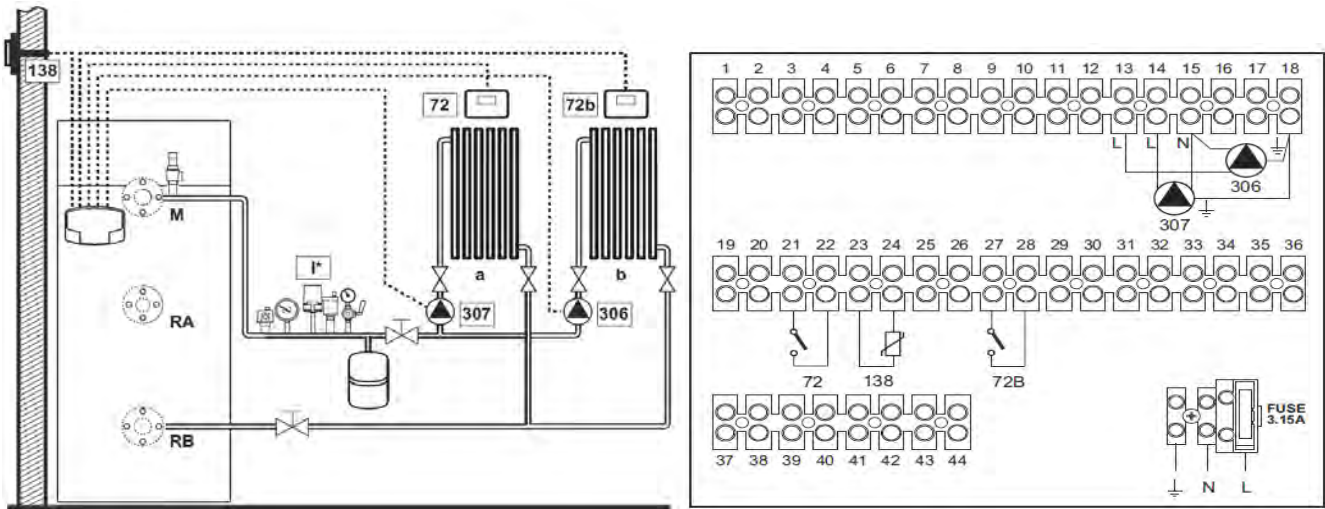
0-10 Volt Controller (299)

Connect the controller to terminals 19 & 20, with terminal 19 being the + supply.

Note: A parameter change is required on P.01 (See chapter 10.4.5) and both room thermostats terminals 72 & 72b (above) must be linked out.

9.6 Schematic & Wiring Examples

9.6.1 2 X DIRECT HEATING CIRCUITS



Legend

72 – Room Thermostat 1 st Zone	72b – Room Thermostat 2 nd Zone	138 – Outside Sensor
307 – Heating Pump 1 st Zone	306 – Heating Pump 2 nd Zone	I – ISPEL Safety Devices

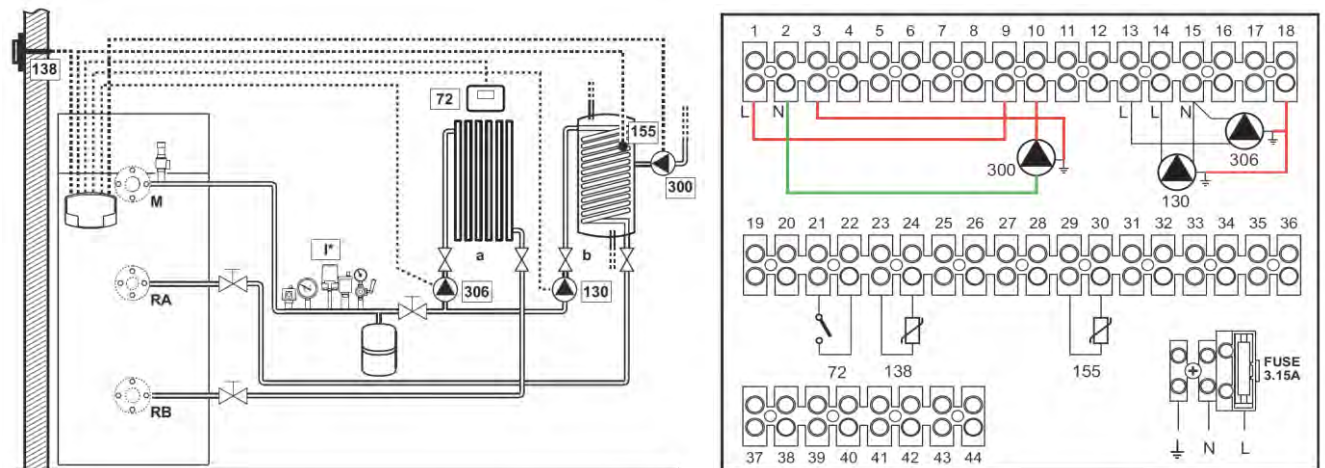
Required Parameter Changes

Every system requires different parameter settings, for the above system change the following parameters.

System Type:

- Parameter **P.01**: Set to 4.
- Parameter **P.09**: Set to 1.

9.6.2 1 X DIRECT HEATING CIRCUIT & 1 X DHW PRIMARY CIRCUIT WITH PUMP



Legend

72 – Room Thermostat	138 – Outside Sensor	155 – DHW Tank Sensor
130 – DHW Primary Pump	300 – DHW Secondary Pump	306 – Heating Pump

Required Parameter Changes

Every system requires different parameter settings, for the above system change the following parameters.

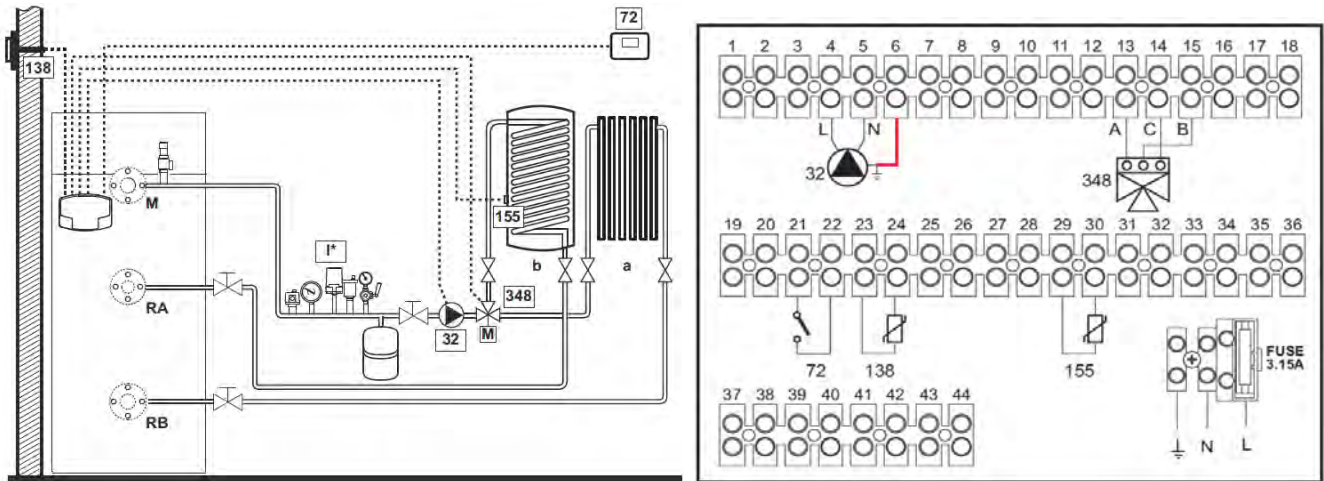
Configuration Type:

- Parameter **B02** : Set to 8 for 70, 125 & 320 models ; Set to 5 for 220 model.
- Parameter **B08** : Set to 1.

System Type:

- Parameter **P.09**: Set to 1.

9.6.3 1 X DIRECT HEATING CIRCUIT & 1 X DHW PRIMARY CIRCUIT WITH THREE WAY VALVE



Legend

32 – Common Heating Pump	72 – Room Thermostat	138 – Outside Sensor
155 – DHW Tank Sensor	348 – 3 Way Valve	I – ISPEL Safety Devices

Required Parameter Changes

Every system requires different parameter settings, for the above system change the following parameters.

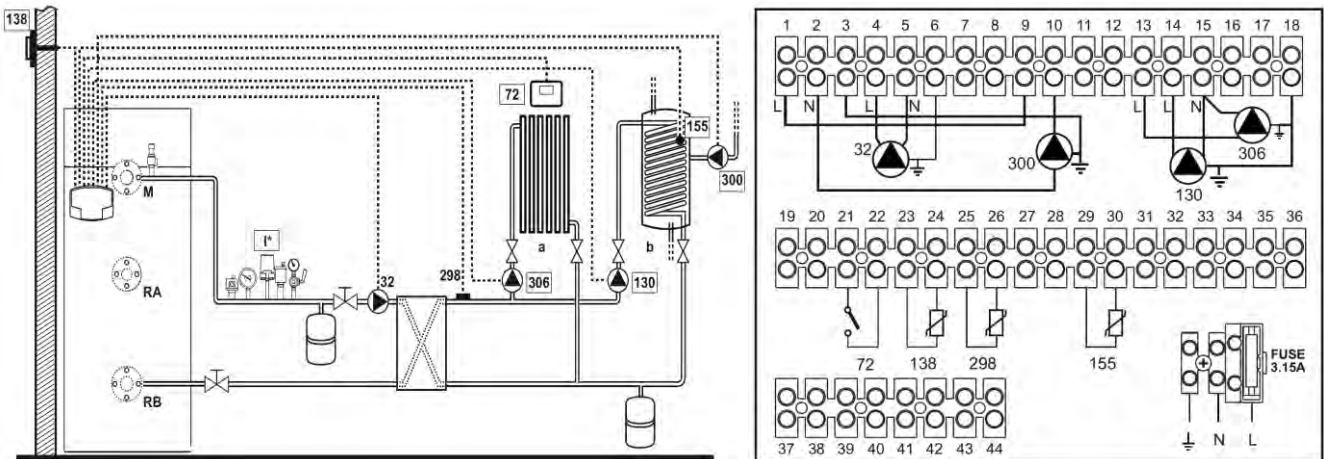
Configuration Type:

- Parameter **B02** : Set to 9 for 70, 125 & 320 models ; Set to 6 for 220 model.

System Type:

- Parameter **P.09**: Set to 1.
- Parameter **P.11**: Set to 1.

9.6.4 1 X DIRECT HEATING CIRCUIT & 1 X DHW PRIMARY CIRCUIT WITH PUMP (WITH PHE)



Legend

32 – Primary Boiler Shunt Pump	72 – Room Thermostat	138 – Outside Sensor
155 – DHW Tank Sensor	298 – Cascade Flow Temp Sensor	130 – DHW Primary Pump
300 – DHW Secondary Pump	306 – CH Heating Pump	I – ISPEL Safety Devices

Required Parameter Changes

Every system requires different parameter settings, for the above system change the following parameters.

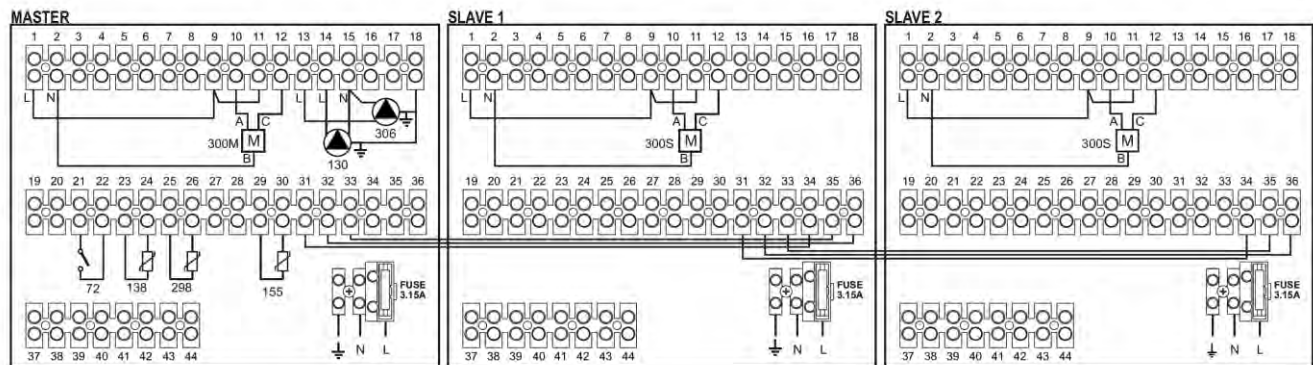
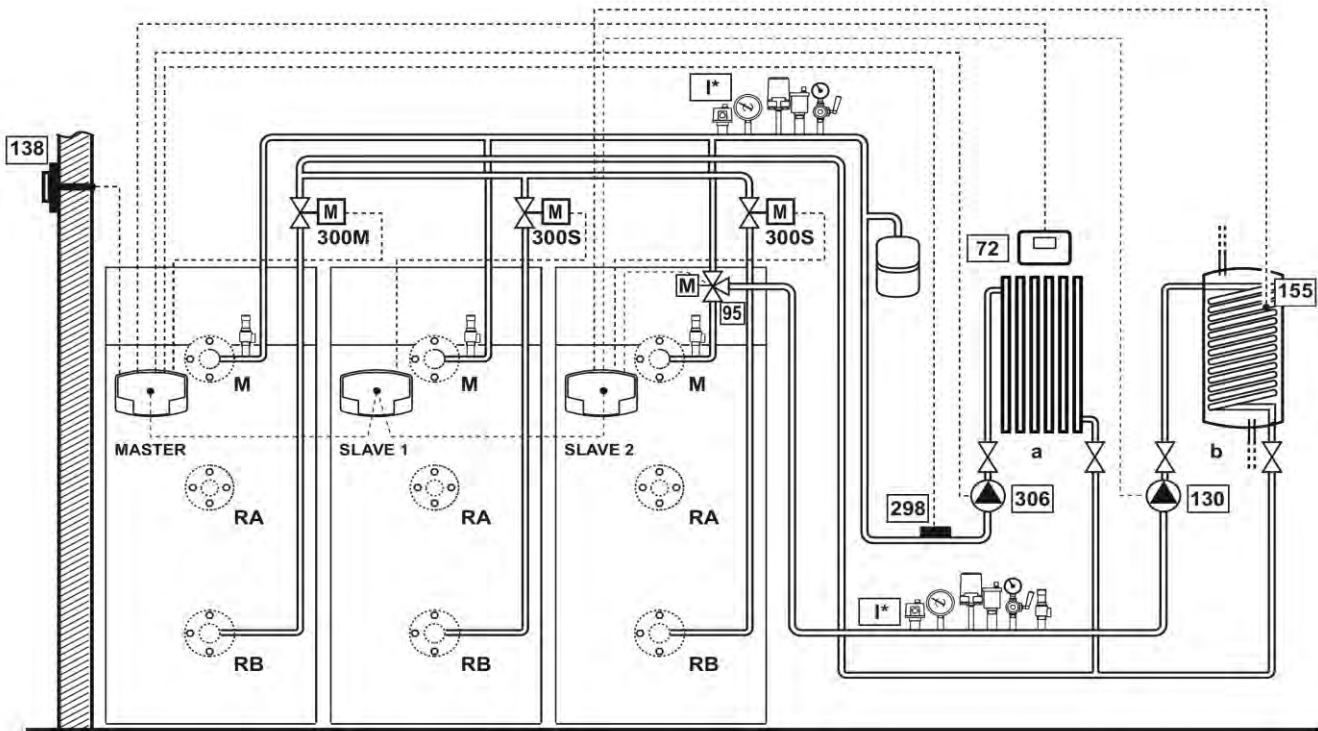
Configuration Type:

- Parameter **B02** : Set to 8 for 70, 125 & 320 models ; Set to 5 for 220 model.
- Parameter **B08** : Set to 1.

System Type:

- Parameter **P.02**: Set to 1.
- Parameter **P.09**: Set to 1

9.6.5 3 X S-FX IN CASCADE: 1 X DIRECT HEATING CIRCUIT & 1 X DHW PRIMARY CIRCUIT WITH PUMP



Legend

72 – Room Thermostat	138 – Outside Sensor	155 – DHW Tank Sensor
298 – Cascade Flow Temp Sensor	130 – DHW Primary Pump	306 – CH Heating Pump
300M – Master Butterfly Valve	300S – Slave Butterfly Valve	I – ISPEL Safety Devices

Required Parameter Changes

Every system requires different parameter settings, for the above system change the following parameters.

Master Boiler & Slave Boilers

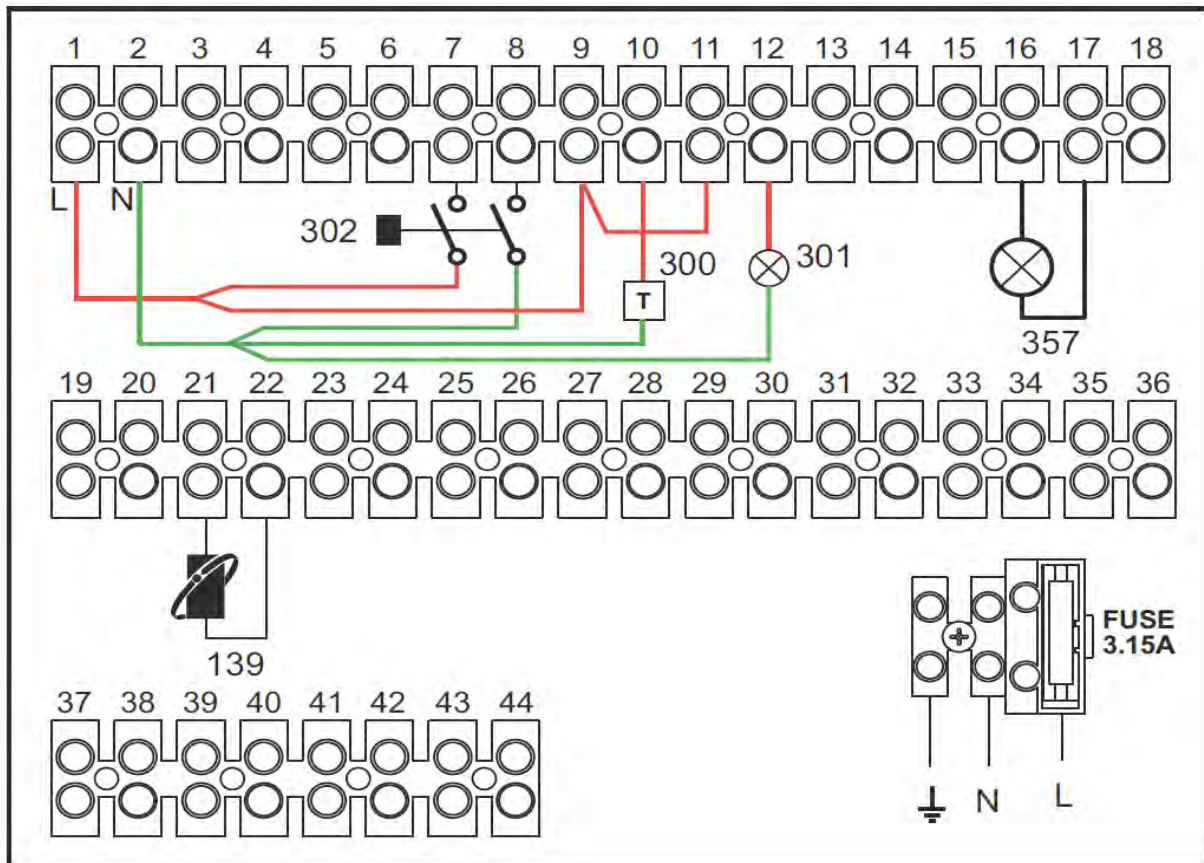
Configuration Type:

- Parameter **B02**: Set to 8 for 70, 125 & 320 models; Set to 5 for 220 model.
- Parameter **B08**: Set to 3.

System Type:

- Parameter **P.02**: Set to 1.
- Parameter **P.09**: Set to 1

9.6.6 REMOTE ON / OFF CONTROL, REMOTE RESET & BMS OUTPUTS PER S-FX BOILER

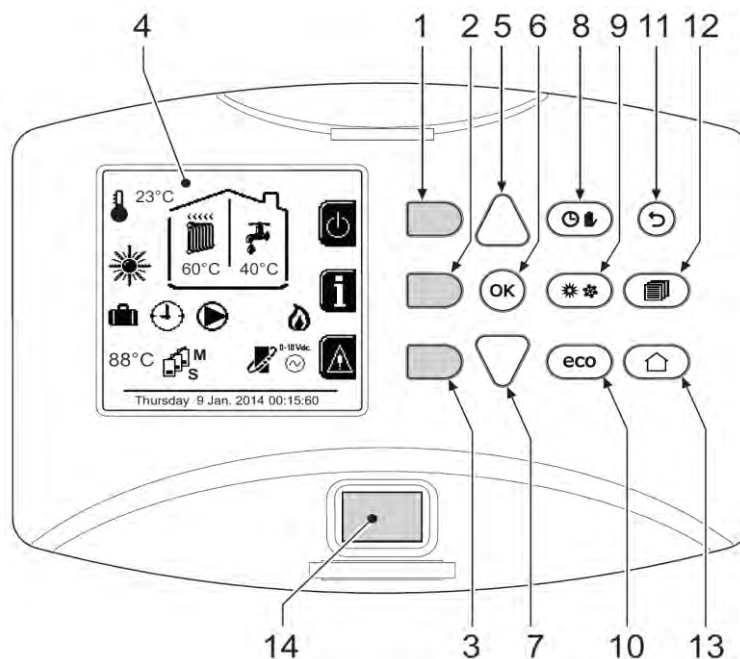


Legend

Drawing Number	Description
139	Remote Control: It can be installed in place of the room thermostat (72).
300	Burner On Indication: Volt Free Contact – The example shows a 230v connection.
301	Fault Indication: Volt Free Contact – The example shows a 230v connection.
302	Remote Reset Option: The example shows a double pole switch at 230v.
357	Fault indication: 230v Output on Terminal 16.

10 BURNER CONTROLLER AND DISPLAY.

10.1 Display and buttons



Legend

Drawing Number	Description
1	Contextual Button 1
2	Contextual Button 2
3	Contextual Button 3
4	LCD Display
5	Menu Navigation Button – Up
6	Confirm / Menu Access Button
7	Menu Navigation Button – Down
8	Automatic / Manual Operation of CH & DHW
9	Summer / Winter Selection Mode
10	Economy / Comfort Mode Selection Mode
11	Menu Exit Button
12	Main Menu Button
13	Home Button (Back to Main Screen)
14	On / Off Main Switch

10.1.1 DISPLAY ICONS

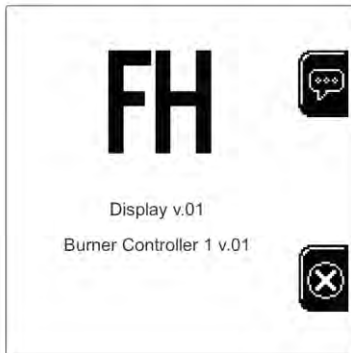
The following table gives a short description of the icons that can be visible on the main screen during operating:

	Winter Operation Mode Selected - Heating		Summer Operation Mode Selected – DHW Only
	Holiday Mode Activated		Automatic Operation Selected
	Heat Demand Active – Pump Running		Burner Burning
	Outside Temperature Fitted – Currently Reading 23c Outside		Boiler Controlled by a 0-10v Controller for Heating
	Cascade Software Activated (Master & Slave Setup)		CH Flow Temperature Setpoint

10.2 Powering Up & Down

10.2.1 TURNING ON THE S-FX BOILER FOR THE FIRST TIME

Once all the electrical wiring has been completed, the S-FX boiler is turned on by pressing the on / off button as per drawing number 14 shown in chapter 10.1.



The screen will load as shown to the left. The “FH” is the boilers de-aeration cycle, this last for 300 seconds.

Whilst going through this cycle, by pressing the contextual button 1 (next to the speech bubble) the language can be selected.

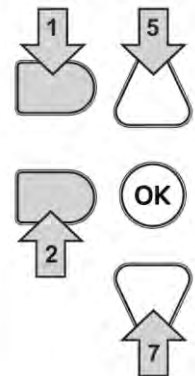
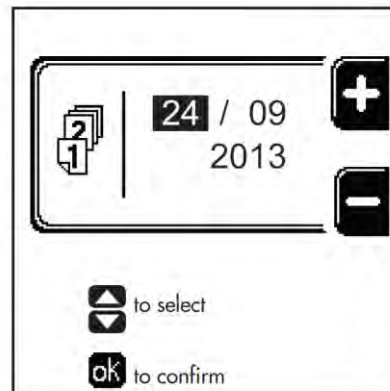
Once the “FH” has disappeared from the display, the boiler de-aeration has completed and will show the standard home display.

10.2.2 CHANGING THE CONTRAST

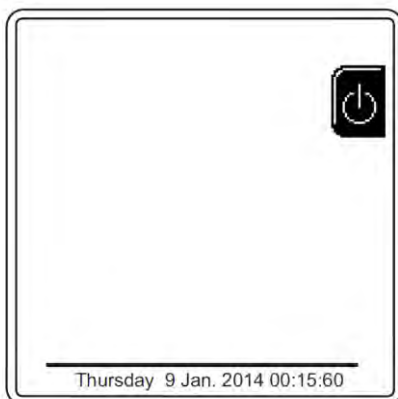
On the first start up, we would advise checking the contrast of the display and change if required.

To adjust the contrast, press and hold together contextual button number 2 and OK. To increase to contrast, press the UP arrow (number 5) and to decrease the contrast press the down arrow (number 7).

Once this is satisfactory, press the OK button to confirm the change.



10.2.3 TURNING OFF THE BOILER DISPLAY



From the home display, press the contextual button number 1 and confirm the shutdown by pressing the OK button.

When this shutdown, the PCB is still powered but the CH & DHW mode are disabled.

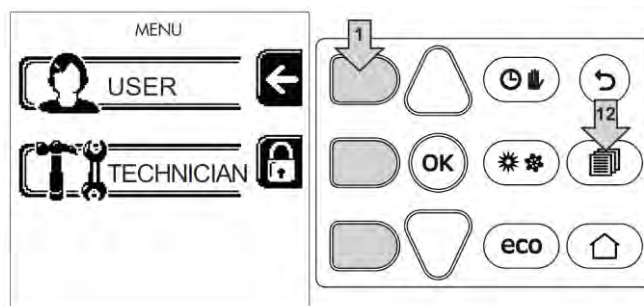
The boilers frost protection will still be active.

10.2.4 POWERING DOWN THE COMPLETE BOILER

To power down the complete boiler, press the on / off button as per drawing number 14 shown in chapter 10.1. The boilers frost protection will be deactivated with the power completely powered down.

10.3 User Menu Structure

To access the User Menu Structure, from the home screen press the main menu button (number 12) and then the contextual button 1 as shown in the below diagram.

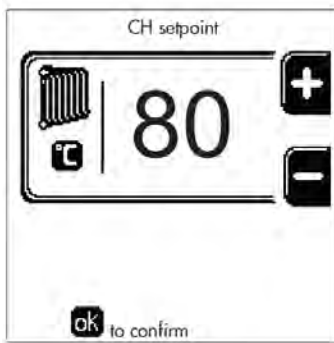


HEATING		
	Adjustment Temp	
	Reduction Adjustment Temp	
	Sliding Temperature	Curve1
		Offset1
		Outside Temp Heat Off
		Curve2
		Offset2
	Time Program	
DOMESTIC HOT WATER		
	Adjustment Temp	
	Reduction Adjustment Temp	
	Legionella	
	Time Program	
HOLIDAY FUNCTION		
MAINTENANCE		
	Test mode	Test mode
		Gas Type Selection
		Cascade Test Mode
	Service Information	
	Service Intervention Date	
SETTINGS		
	Language	
	Unit of Measure	
	Set Date	
	Set Time	

The following chapters will explain each of the above settings.

10.3.1 HEATING PARAMETER

Adjustment Temperature



This parameter can be accessed by “USER MENU” > “HEATING” > “AJUSTMENT TEMPERATURE.”

Using the contextual buttons 1 and 2, the maximum CH setpoint and the minimum setpoint can be set.

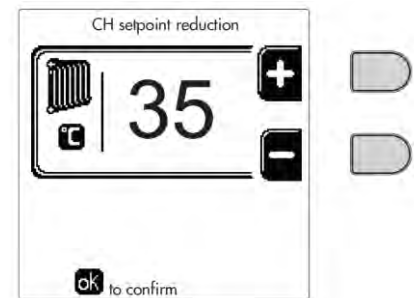
Once both settings have been set, press OK to confirm.

Reduction Adjustment Temperature

This parameter can be accessed by “USER MENU” > “HEATING” > “REDUCTION ADJUSTMENT TEMPERATURE.”

Using the contextual buttons 1 and 2, the reduction adjustment temperature can be changed. This ranges from 0c to 50c.

Once the setting has been set, press OK to confirm.

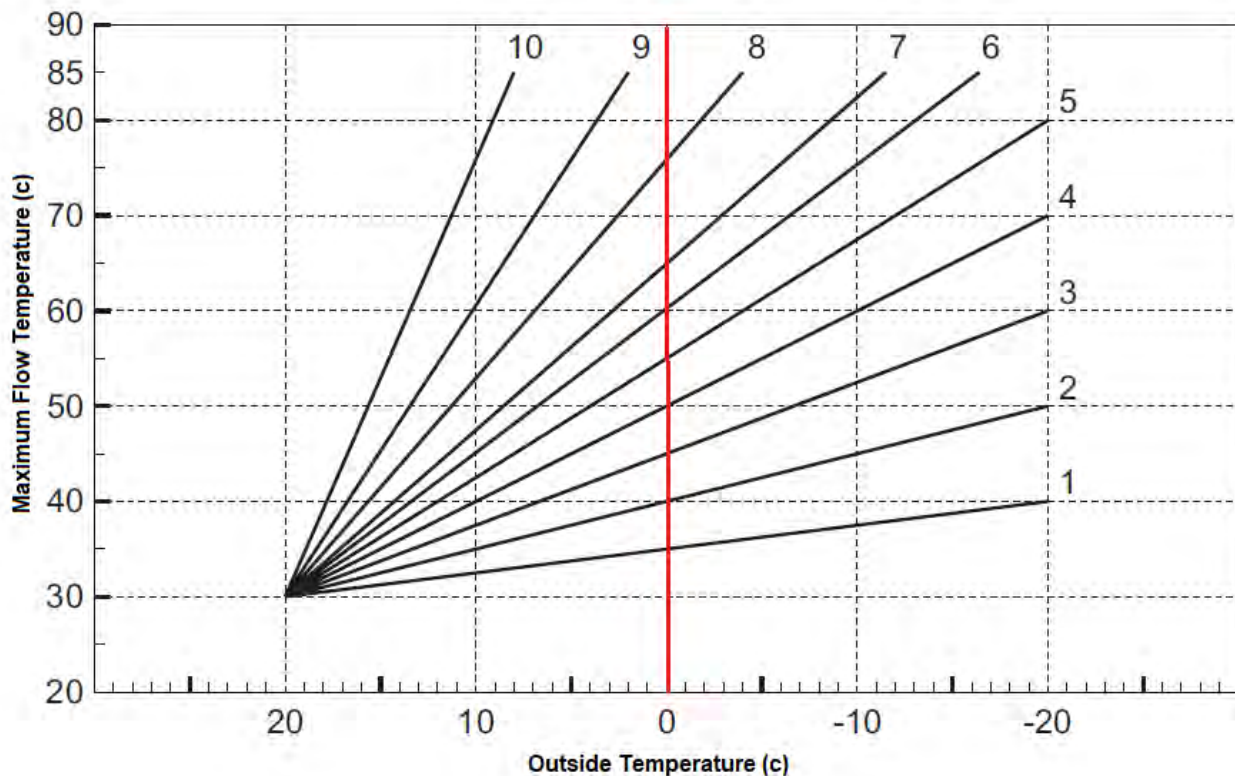


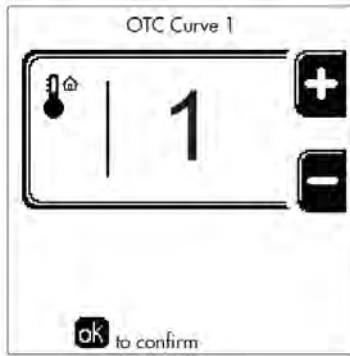
Sliding Temperature

This parameter is active once an outside temperature sensor has been installed to the S-FX boiler. With this sensor installed the flow temperature of the heating system is adjusted according to the outside temperature. This ensures a high level of comfort and energy saving throughout the year.

Standard Compensation Curve:

Outside Temperature Graph is as per below





This parameter can be accessed by “USER MENU” > “HEATING” > “SLIDING TEMPERATURE” > “CURVE 1”

Using the contextual buttons 1 and 2, the OTC curve can be set. This ranges from 1 to 10 and corresponds with curve numbers as shown on the “outside temperature graph” on the previous page.

By setting the curve to 0, this will disable the sliding temperature.

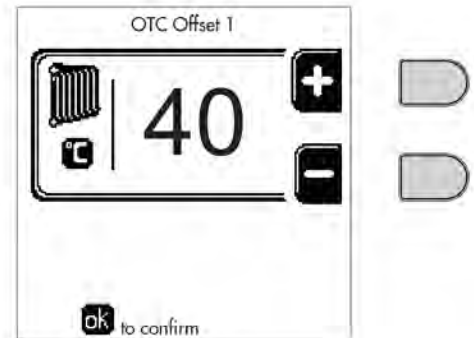
Once the setting has been set, press OK to confirm.

Offset of Standard Compensation Curve

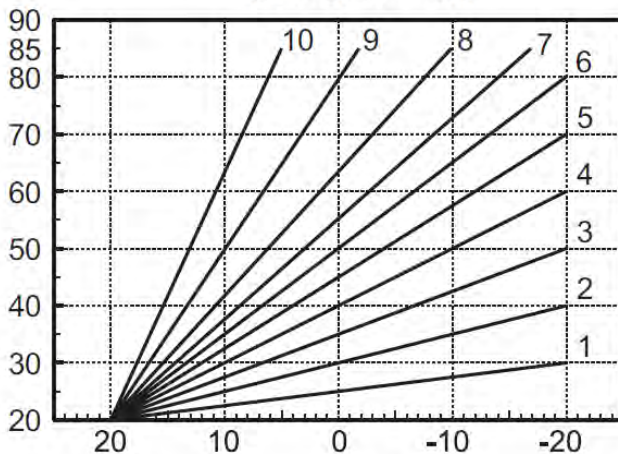
This parameter can be accessed by “USER MENU” > “HEATING” > “SLIDING TEMPERATURE” > “OFFSET 1”

Using the contextual buttons 1 and 2, the offset of the OTC curve can be set. This ranges from 20 to 60 and corresponds with curve the two below examples showing an offset of 20 and an offset of 60c.

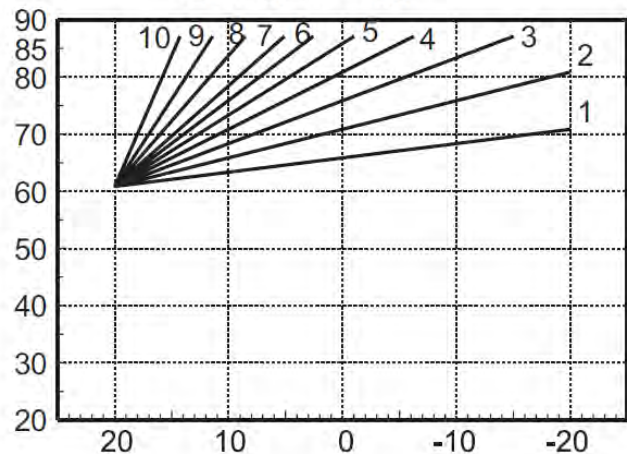
Once the setting has been set, press OK to confirm.



OFFSET = 20



OFFSET = 60



As an example, using an offset of 20 with the OTC curve set to 9 will give a maximum flow temperature of 80c with the outdoor sensor reading 0c temperature.

Outdoor Temperature Off

This parameter will prevent the S-FX boiler from firing if the temperature measured by the outdoor sensor is a higher value.

This parameter can be accessed by “USER MENU” > “HEATING” > “SLIDING TEMPERATURE” > “OUTDOOR TEMP HEAT OFF”

Using the contextual buttons 1 and 2, this temperature setting ranges from 7c to 30c. Once the parameter has been set, press OK to confirm.

10.3.2 DHW PARAMETER

Adjustment Temperature



This parameter can be accessed by "USER MENU" > "DHW" > "ADJUSTMENT TEMPERATURE."

Using the contextual buttons 1 and 2, the DHW setpoint can be set.

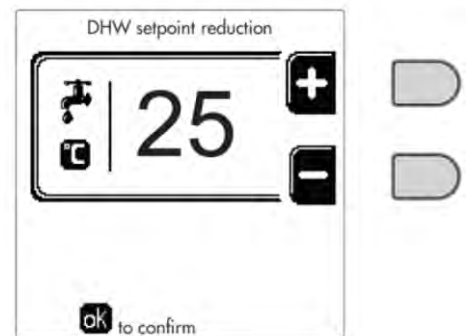
Once set, press OK to confirm.

Reduction Adjustment Temperature

This parameter can be accessed by "USER MENU" > "DHW" > "REDUCTION ADJUSTMENT TEMPERATURE."

Using the contextual buttons 1 and 2, the reduction adjustment temperature can be changed. This ranges from 0c to 50c.

Once set, press OK to confirm.



Legionella Programming

This parameter can be accessed by "USER MENU" > "DHW" > "LEGIONELLA."

Using the contextual button 1,2 and the OK button, set the following four parameters:

- Anti-legionella Day: Select the day of the week for this programme to run.
- Time of Anti-legionella: Select the time for this program to run.
- Anti-Legionella Duration: Select the duration in minutes this program runs for.
- Anti-Legionella Temperature: Select the DHW temperature this program runs to.

Once all settings are set, press the OK button to confirm.

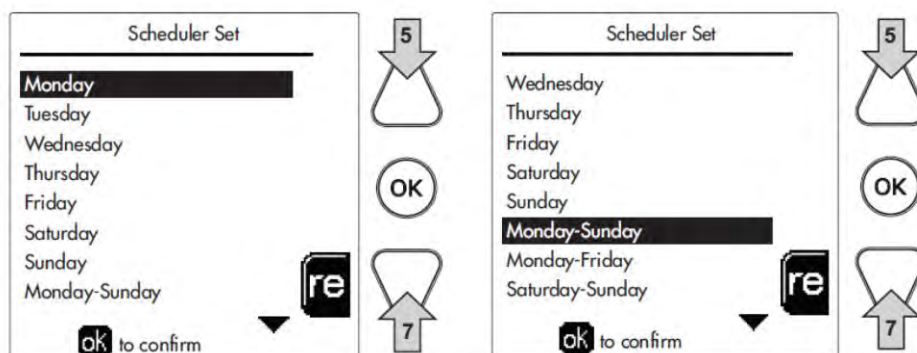
10.3.3 TIME PROGRAMMING

This is to be set within the S-FX boilers if there are no external controls / thermostats to bring the boiler on and off. During the "on" period, the burner will operate to the CH and DHW setpoint. In the "off" period the burner will not operate.

Programming the time is done the same way both for central heating and DHW; the two programs are independent.

To access the parameter for central heating - "USER MENU" > "HEATING" > "TIME PROGRAM"

To access the parameter for DHW - "USER MENU" > DOMESTIC HOT WATER" > "TIME PROGRAM"



The time program can be set using the up and down navigational buttons as:

- Individual day program.
- 5 day / 2 day program.
- 7 day program.

Once you have selected the appropriate program, press the OK button. There are 6 independent time bands for each day of the week. See below step by step procedure:



Set the time using the contextual buttons 1 & 2.

To move to the end time, press the down navigation button.



Set the time using the contextual buttons 1 & 2.

To move to the end time, press the down navigation button.



Press the down navigational button to go to the next time period.

Continue the same way until the required time periods are setup.



Press the down navigational button to go to the next time period.

Continue the same way until the required time periods are setup.

When the day has been programmed, press the OK button. This will automatically highlight the “save & exit” option. From here you can either:

- Make adjustments to the current day.
- Save & exit this day and move onto the next day.
- To program the next day with the same time periods, using the navigational up & down arrows and the OK button. Select “copy to next day.”

10.3.4 HOLIDAY FUNCTION

This parameter can be accessed by “USER MENU” > “HOLIDAY FUNCTION.”

Using the contextual buttons 1, 2 and the OK button, set the following two parameters:

- Holiday Start Date.
- Holiday End Date.

	Holiday function programmed but not yet active.		Holiday function in progress.
---	---	---	-------------------------------

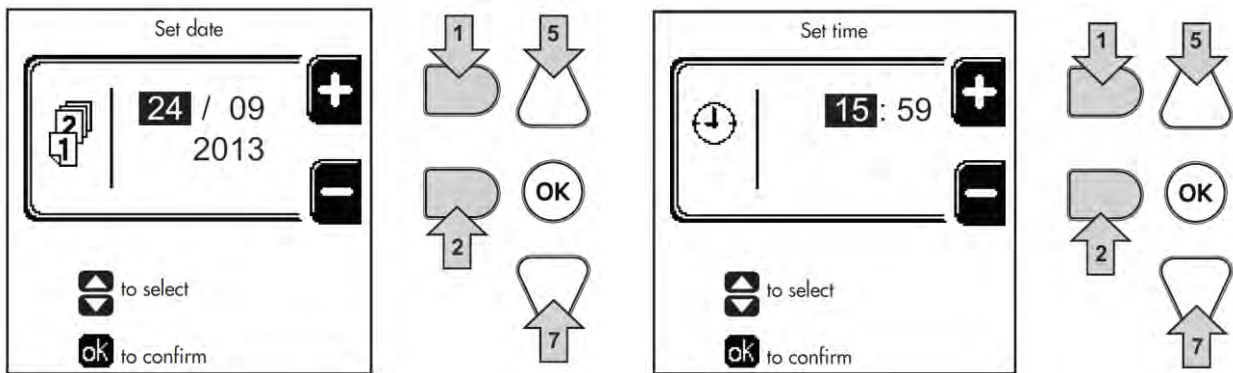
Whilst in holiday mode, the S-FX boiler will act in Summer mode therefore will not operate the heating. The frost protection and legionella program remain active.

10.3.5 SETTING DATE & TIME

To access the parameter for central heating - “USER MENU” > “SETTINGS” > “SET DATE”

To access the parameter for DHW – “USER MENU” > “SETTINGS” > “SET TIME”

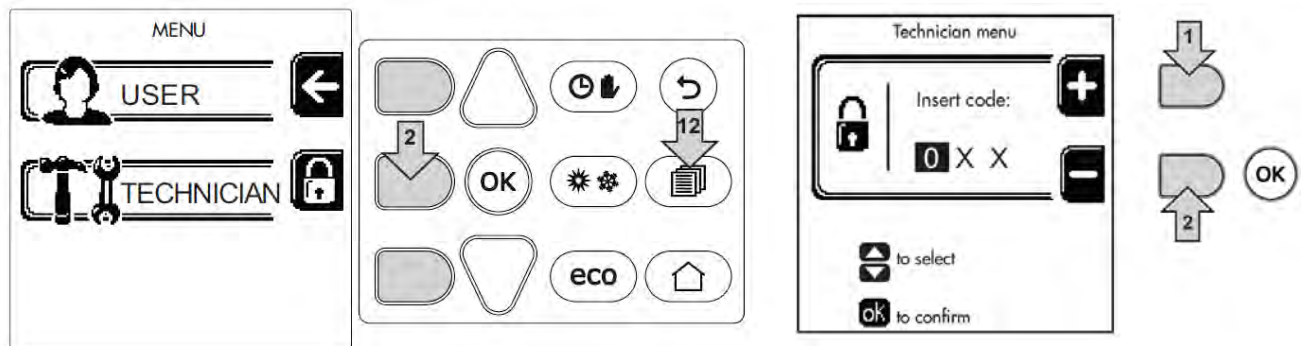
Using the contextual buttons 1, 2, the navigational up & down buttons, set the date and time.



Once set, press OK to confirm.

10.4 Technical Menu Structure

To access the Technical Menu Structure, from the home screen press the main menu button (number 12) and then the contextual button 2 as shown in the below diagram.

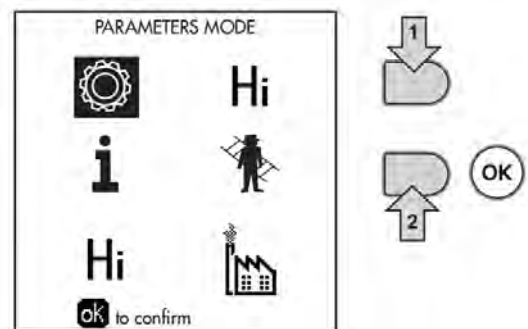


The code required to enter the technical menu is "4 1 8" – Enter the code using the contextual buttons 1 & 2 one by one and press the OK button to confirm each number.

10.4.1 TO ACCESS THE PARAMETERS

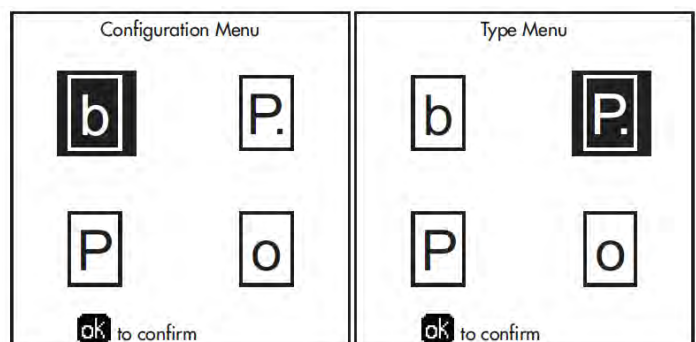
After entering the technical pass code and pressing OK, you will be able to enter the boiler parameters to set up the S-FX boiler based on the design of the system.

Using the contextual buttons 1, 2 and the OK button, highlight the top left-hand icon and press the OK button.



10.4.2 TO ACCESS THE CONFIGURATION, TRANSPARENT & SYSTEM PARAMETERS

Using the contextual buttons 1, 2 and the OK button, highlight the required parameter and press the OK button.



10.4.3 CONFIGURATION PARAMETER - B

There is a total of 16 parameters within the configuration parameter.

Each parameter is listed in the below table along with what they are set to as standard.

Index	Description	Range	S-FX 70	S-FX 125	S-FX 220	S-FX 320
b01	Type of Gas	0 = Natural Gas 1 = LPG	0	0	0	0
b02	S-FX Boiler Model	1 to 3 = Not Used 4 = S-FX 220 (Solo) 5 = S-FX 220 with dhw pump 6 = S-FX 220 with 3 way valve & dhw storage pump 7 = S-FX 70,125 & 320 Solo 8 = S-FX 70,125 & 320 with dhw pump 9 = S-FX 70,125 & 320 with 3 way valve & dhw pump	7	7	4	7
b03	Water Pressure Protection	0 = Water Pressure Switch 1 – 5 = Not Used	0	0	0	0
b04	Max Fan Freq in DHW mode	With b02 set to 4 With b02 set to 7	210 Hz	200 Hz	180 Hz	190 Hz
b05	Max Fan Freq in CH mode	With b02 set to 4 With b02 set to 7	210 Hz	200 Hz	180 Hz	190 Hz
b06	Min Fan Freq in CH/DHW mode	With b02 set to 4 With b02 set to 7	50 Hz	50 Hz	50 Hz	50 Hz
b07	Min Fan Freq offset	With b02 set to 4 With b02 set to 7	40 Hz	40 Hz	40 Hz	40 Hz
b08	Function of Variable Output Relay	0 = Burner On 1 = Legionella Pump 2 = Boiler Room Ventilation 3 = Motor Drive O/O Valve	0	0	0	0
b09	Post Ventilation	0 – 120 Seconds	30	30	30	30
b10	Boiler Room Pre-Ventilation	1 – 15 Minutes	1	1	1	1
b11	Boiler Room Post-Ventilation	1 – 15 Minutes	1	1	1	1
b12	Flue Sensor	0 = Deactivated 1 = Enabled	1	1	1	1
b13	H/Ex 2 Protection	Not Used	-	-	-	-
b14	Max Flue Gas Temperature	With b02 set to 4 With b02 set to 7	110c	110c	110c	110c
b15	Type of Fan	With b02 set to 4 With b02 set to 7	0	0	0	3
b16	Pump anti-locking operating time	0 – 20 seconds	5	5	5	5

10.4.4 TRANSPARENT PARAMETER – P

There is a total of 31 parameters within the transparent parameter.

Each parameter is listed in the below table along with what they are set to as standard.

Index	Description	Range	S-FX 70	S-FX 125	S-FX 220	S-FX 320
P01	Start Up Heat Output	0 – 100%	30%	30%	30%	30%
P02	Heating Ramp	1-10c / minute	1-10c/min	1-10c/min	1-10c/min	1-10c/min
P03	Min Set Point Temperature	20c – 80c	20c	20c	20c	20c
P04	Heating Delay Time	0 – 10 Minute	4 min	4 min	4 min	4 min
P05	CH Pump Over Run	0 – 255 Minutes	3 min	3 min	3 min	3 min
P06	Pump Operation	0 – 3	0	0	0	0
P07	Min Modulating Pump Speed	0 – 100%	30%	30%	30%	30%
P08	Modulating Pump Start-Up Speed	0 – 100%	75%	75%	75%	75%
P09	Maximum Pump Modulating Speed	0 – 100%	100%	100%	100%	100%
P10	Pump Shut Down Temp in Overrun	0 – 100c	35c	35c	35c	35c
P11	Pump Start Up Temp Hysteresis	0 – 100c	5c	5c	5c	5c
P12	Minimum Heating Set Point	20 – 90c	20c	20c	20c	20c
P13	Maximum Heating Set Point	20 – 90c	80c	80c	80c	80c
P14	Maximum Output in CH Mode	0 – 100%	80%	80%	80%	80%
P15	DHW Ramp	1-10c / minute	5c / min	5c / min	5c / min	5c / min
P16	DHW Delay Time	0 – 255 Seconds	120	120	120	120
P17	DHW Pump Overrun	0 – 255 Seconds	30	30	30	30
P18	Min DHW Setpoint	With b02 set to 1, 4 or 7 With b02 set to 2,3,5,6,8 & 9	Not Used 10c	Not Used 10c	Not Used 10c	Not Used 10c
P19	Max DHW Setpoint	With b02 set to 1, 4 or 7 With b02 set to 2,3,5,6,8 & 9	Not Used 65c	Not Used 65c	Not Used 65c	Not Used 65c
P20	Max Output in DHW Mode	0-100%	80%	80%	80%	80%
P21	Storage Cylinder Hysteresis	With b02 set to 1, 4 or 7 With b02 set to 2,3,5,6,8 & 9	Not Used 2c	Not Used 2c	Not Used 2c	Not Used 2c
P22	DHW Primary Flow Temp	With b02 set to 1, 4 or 7 With b02 set to 2,3,5,6,8 & 9	Not Used 80c	Not Used 80c	Not Used 80c	Not Used 80c
P23	Legionella Protection	With b02 set to 2,3,5,6,8 & 9 0 = Disabled ; 1 = Active	0	0	0	0
P24	Fan Freq in Standby	0 – 255 Hz	0 Hz	0 Hz	0 Hz	0 Hz
P25	Modulating Pump Control Temp	0 – 60c	35c	35c	35c	35c
P26	Primary Heat Exchanger Dt Protection	0 – 60c	35c	35c	35c	35c
P27	Min System PRV	Not Used	-	-	-	-
P28	Rated Sys PRV	Not Used	-	-	-	-
P29	Heat Exchanger Protection Activation	0 = No F43 1 = 1 – 15c / second	0	0	0	0
P30	Hysteresis in CH mode start up	6 – 30c	10c	10c	10c	10c
P31	Hysteresis Timer in CH mode start	60 – 180 Seconds	60 sec	60 sec	60 sec	60 sec

10.4.5 SYSTEM PARAMETER – P.

There is a total of 23 parameters within the system parameter.

Each parameter is listed in the below table along with what they are set to as standard.

Index	Description	Range	S-FX 70	S-FX 125	S-FX 220	S-FX 320
P.01	Heat Demand Selection	0 = Either room thermostats can be used to operate boiler. 1 = Both room thermostats need to be closed to operate boiler. 2 = 0-10v on Temperature 3 = 0-10v on Power 4 = Both room thermostats are used on 2 separate zones. 5 = Both room thermostats are used on 2 separate zones with outside sensor.	0	0	0	0
P.02	Select Cascade Sensor	0 = Disabled 1 or 2 = Enabled	0	0	0	0
P.03	No Function	-	-	-	-	-
P.04	3 Way Valve Time	0 – 255 Seconds	0	0	0	0
P.05	Activation Timer*	0 – 255 Seconds	1	1	1	1
P.06	Deactivation Time*	0 – 255 Seconds	5	5	5	5
P.07	Activation Heat Output*	0 – 100%	70%	70%	70%	70%
P.08	Deactivation Heat Output*	0 – 95%	5%	5%	5%	5%
P.09	Low Loss Header Function	0 = Disabled 1 = Enabled	0	0	0	0
P.10	Fill System Function	0 = Disabled 1 = Enabled	0	0	0	0
P.11	Select 3 Way Valve	0 = 2 or 3 Wire 1 = 3 Wire	0	0	0	0
P.12	0-10v On Temp Off Voltage**	0-10v	2.5v	2.5v	2.5v	2.5v
P.13	0-10v On Temp On Voltage**	0-10v	3.0v	3.0v	3.0v	3.0v
P.14	0-10v On Temp Max Voltage **	0-10v	10.0v	10.0v	10.0v	10.0v
P.15	0-10v On Temp Min Temp**	0-100c	20c	20c	20c	20c
P.16	0-10v On Temp Max Temp**	0-100c	90c	90c	90c	90c
P.17	0-10v On Power Off Voltage**	0-10v	2.5v	2.5v	2.5v	2.5v
P.18	0-10v On Power On Voltage**	0-10v	3.0v	3.0v	3.0v	3.0v
P.19	0-10v On Power Max Voltage **	0-10v	10.0v	10.0v	10.0v	10.0v
P.20	0-10v On Power Min Power**	0 – 100%	0%	0%	0%	0%
P.21	0-10v On Power Max Power**	0 – 100%	100%	100%	100%	100%
P.22	Enable Slave Boiler DHW (Auto Cascade)	0 = Disabled 1 = Enabled	0	0	0	0
P.23	Slave Boiler Cont. Comfort	0 = Disabled 1 = Enabled	0	0	0	0

Notes:

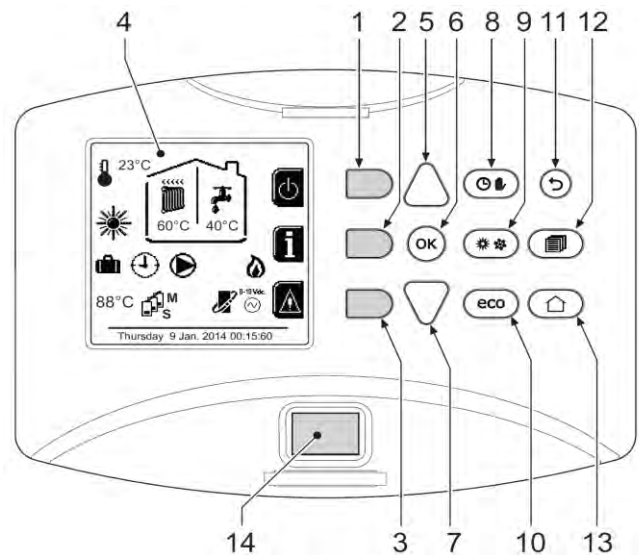
*These Parameters are only active when two control units are connected to the same ACP01 display.

**These parameters are only active when the system works with a 0 – 10 volt controller.

10.4.6 S-FX INFORMATION MENU

To enter the information menu, press the contextual button number 2 from the home screen.

Then using the navigational buttons (number 5 & 7), you can scroll through each parameter.



This menu consists of the following information.

Heating Demand	OT - means Open Therm control demand. TA - means Room Thermostat demand. 0-10Vdc - means 0-10v Signal demand. TA2 - means second Room Thermostat demand.
Heating Circulating Pump	ON / OFF
Heating 3 Way Valve	ON / OFF
DHW 3 Way Valve	ON / OFF
Standby Time	ON / OFF
T Delta Protection	ON / OFF
Flame Supervisor	ON / OFF
Heating Sensor 1	°C
Heating Sensor 2	°C
Return Sensor	°C
DHW Sensor	°C
External Probe / Outside Temperature	°C
Fume Sensor / Flue Gas Sensor	°C
Cascade Heating Sensor	°C
Fan Frequency	Hz
Burner Load	%
System Water Pressure	1.4 bar = ON ; 0.0 bar = OFF
Modulating Circulating Pump	%
Cascade Modulating Circulating Pump	%
Ionisation Current	uA
Input 0-10Vdc	Vdc
Heating Adjustment Temperature	Setpoint °C
Power Leavel Adjustments 0-10Vdc	Setpoint %

To return back to the “Home Menu” from this chapter, press button number 13.

11 S-FX CASCADING

11.1 System setup

The S-FX boiler controller can control manage up to 6 boilers in a cascade (1 x master & 5 x slaves) setup. An additional system temperature sensor is necessary to measure the cascade system supply temperature.

Make all electrical connections (terminal 1 to 30) on the master boiler such as any sensors, system pumps, heat demand control. On the slave boilers, only connect the power supply and if required the relevant run / fault BMS outputs:

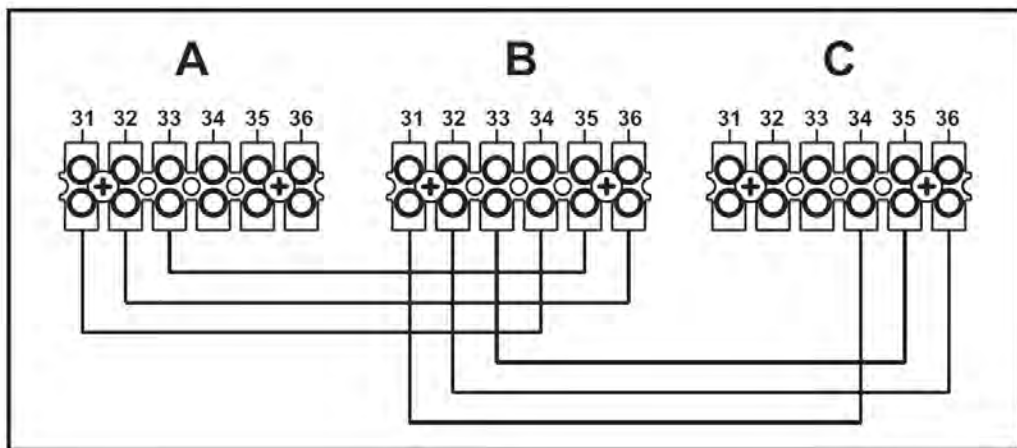
- Burner Running – 300.
- Burner Fault – 301.
- Remote Reset Input – 302.

11.2 Boiler cascade communication setup.

In order for the system to work for cascade, the communication must be wired up between all boilers into the relevant terminals – 31 to 36.

Below example is of three S-FX boilers linked together:

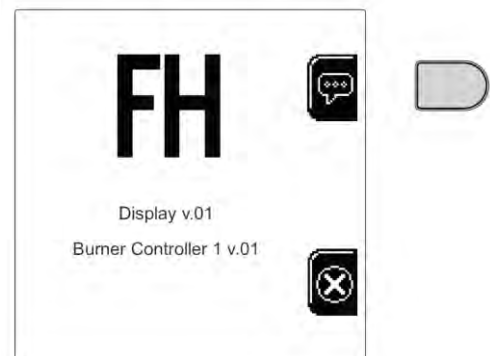
- Boiler A is the Master Boiler.
- Boiler B is the Slave 1 Boiler.
- Boiler C is the Slave 2 Boiler.



Once all the electrical wiring has taken place, turn on the electrical supply to all S-FX boilers and allow them to go through there de-aeration cycle.

Once this cycle is completed, the cascade communication setup will be completed. Check the display of the boiler as it should show:

- Boiler 1 – Master Icon.
- Boiler 2 – Slave Icon.
- Boiler 3 – Slave Icon.



If this does not occur or either a F70 / F71 fault code is displayed, then the above wiring must be checked.

See chapter 9.6.5, this shows an example of a three boiler cascade installation.

12 NATURAL GAS TO LPG CONVERSION

To convert the S-FX boilers from natural gas (G20) to LPG (G31), there is two parts to this conversion which must be completed before firing the boiler.

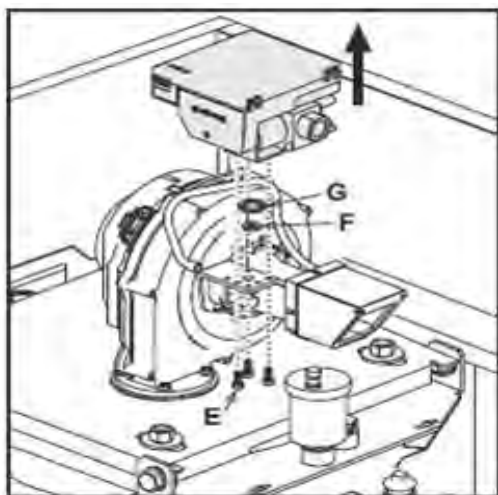
12.1 Part 1 – Fitting the LPG Conversion Kit

Each model has their own LPG conversion kit so please ensure the correct kit is ordered. These kits are an optional extra therefore they will need to be ordered separately.

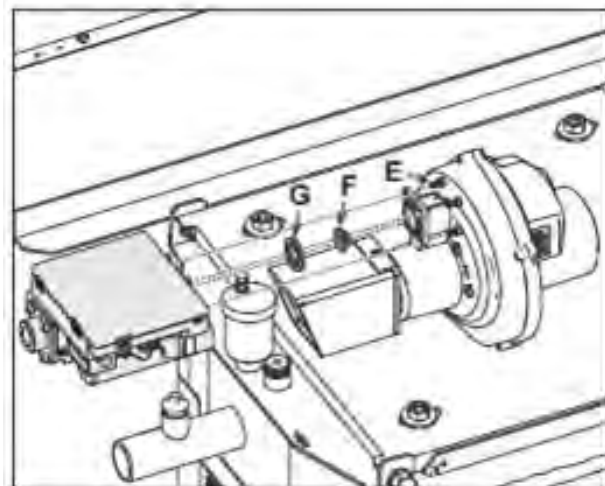
To fit this conversion kit, follow the below steps and use the drawings to assist:

- Disconnect the power supply to the S-FX boiler.
- Remove the top panels which will give full access to the boiler gas valve.
- Detach the electrical connections from the gas valve controller.
- Undo the fixing screws “E” and remove the gas valve.
- Replace the gas nozzle “F” positioning it inside the seal “G” with the one contained in the conversion kit.
- Refit the gas valve and check the tightness.

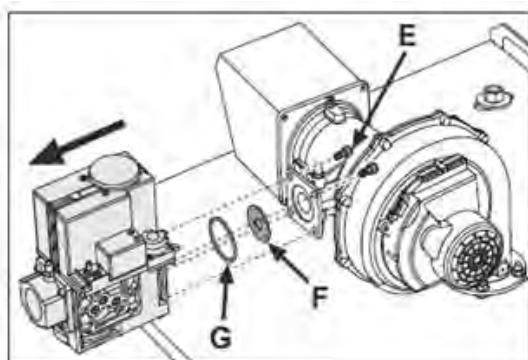
S-FX 70



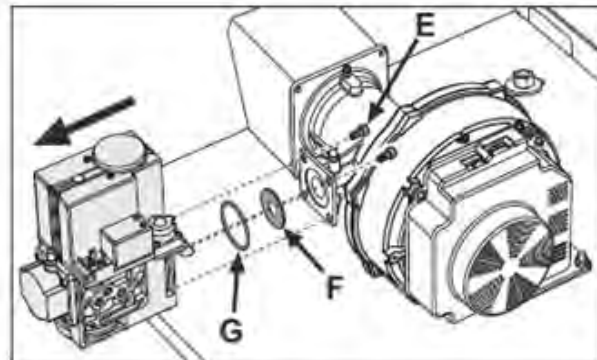
S-FX 125



S-FX 220



S-FX 320

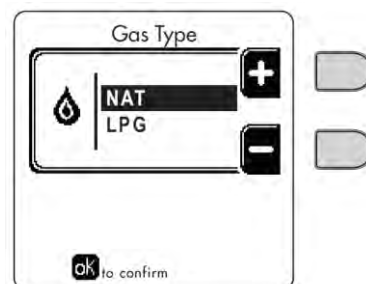


12.2 Part 2 – Software Change

This change can be completed through the user menu using the contextual buttons 1 & 2, the navigational up and down buttons 5 & 7, then the “OK” button to confirm.

To access this parameter: “USER MENU” > “MAINTENANCE” > “TEST MODE” > “GAS TYPE SELECTION”

Select LPG using the contextual buttons 1 & 2 then press OK to confirm.



The LPG boiler label supplied within the S-FX conversion kit must be fitted.

The combustion on high & low fire must be adjusted to the LPG requirements – see the “commissioning the boiler” chapter to obtain the combustion readings

13 COMMISSIONING THE BOILER

13.1 First: Flushing the Boiler with Water

After installation of the boiler the first step, before commissioning, is to flush the boiler and the whole heating installation with fresh water to remove pollution, debris and other materials that might cause a blocking. This must also be done with heating installations, where only the boiler is replaced.

Existing and new heating systems must be cleaned with an approved system cleaner; see chapter 6.15 "Chemical water treatment." System cleaner must be drained and thoroughly flushed with clean water to remove any residual cleaner, prior to installing a new boiler. NEVER leave a system cleaner for longer than recommended by the manufacturer of the cleaner.

13.2 Second: Filling & Venting the Boiler and the System

After flushing the boiler and the installation the system can be filled with fresh water. Fill the boiler and the heating system by using the appropriate filling valve. The water pressure of the system normally lies between 1,5 and 2,0 bar.

NOTICE: Use the following aspects to prevent corrosion of the central heating system:

- Filling water: Do not use any additives for the water of the central heating system, except glycol. The pH value of the water should be more than 5 (If this pH value is less, please contact the supplier).
- Ensure that any used "plastic" pipes are oxygen diffusion-proof in accordance with DIN 4726/4729. If not, make sure that the boiler circuit is separated from the heating circuit by a plate heat exchanger. This way no oxygen that entered the heating system through these pipes can reach the boiler.

Check the total heating system for any leaks. This to prevent oxygen entering the system through these leaks.

The boiler has an automatic air vent situated inside the boiler. This vent is always open, and the venting outlet goes via a plastic tube through the bottom to the outside. Shortly after putting the boiler into operation, check the water pressure and add or remove some water to obtain the required pressure.

During the commissioning, make sure that no water can enter the boiler and make contact with the electrical parts.

13.3 Third: Check the Water Flow

Before starting the boiler ensure the circulating pump(s) installed and operating correctly and that there are no obstructions or closed valves that could prevent water flow through the heat exchanger.

13.4 Mounting Condensate Trap

When mounting the bottom part of the condensate trap, before commissioning the boiler and/or after maintenance, it must **ALWAYS** be completely filled with water.



This is a safety measure: The water in the condensate trap keeps the flue gases from leaking out of the heat exchanger via the condensate drain.

13.5 Checking Gas Pressure

Check the gas pressure available at the gas connection pipe of the boiler. Use the pressure nipple of the gas safety valve for this measurement.

Min. and max. gas supply pressures:

Type of Gas	p nom [mbar]	p min [mbar]	p max [mbar]
G20	20	18	25
G31	37	25	57.5

14 ADJUSTING AND SETTING THE BOILER

Before carrying out any adjusting of the burner, carefully read this complete chapter.



The initial lighting of the appliance must be performed by a licensed Gas Technician. Failure to follow these instructions may result in property damage, serious injury or death.

As soon as the appliance has been fully installed (with regard to hydraulics, filling and de-aeration of installation, gas, flue gas, air intake, wiring etc.) according to the preliminary installation instructions, the boiler may then be wired to an electrically grounded power supply source. The boiler should always be connected to a disconnect or external power shutoff. The boiler must be electrically bonded to the ground in accordance with the requirements of the local authority having jurisdiction.

14.1 Introduction

The boiler must always be adjusted in the next situations:

- A new boiler is installed
- As part of a service/maintenance check, in case the CO₂ values turns out to be incorrect.
- The gas valve has been replaced.
- Gas conversion from natural gas to LPG or LPG to natural gas.
- The venturi has been replaced.
- The fan has been replaced
- The flue gas check valve has been replaced

In any of the cases described, always check the gas/air ratio of the combustion figure (CO₂) at maximum and minimum input.

First set the boiler at maximum load and subsequently at minimum load and repeat if necessary (adjustments at maximum load influence values at minimum load and vice versa).

14.1.1 COMBUSTION TABLE

Table 1: CO₂ values for maximum and minimum load on natural gas.

Gas Type		CO ₂ [%]	
Natural Gas (G20)	Boiler Model	max load	min load
	S-FX 70	9.2 - 9.4	8.7 - 8.9
	S-FX 125	9.2 - 9.4	8.6 - 8.8
	S-FX 220	9.2 - 9.4	8.6 - 8.8
	S-FX 320	8.9 - 9.1	8.4 - 8.6

Table 2: CO₂ values for maximum and minimum load on LPG.

Gas Type		CO ₂ [%]	
LPG (G31)	Boiler Model	max load	min load
	S-FX 70	10.2 - 10.4	9.7 - 9.9
	S-FX 125	10.4 - 10.6	9.6 - 9.8
	S-FX 220	10.4 - 10.6	9.6 - 9.8
	S-FX 320	10.4 - 10.6	9.6 - 9.8

14.1.2 ADJUSTMENT VALUES

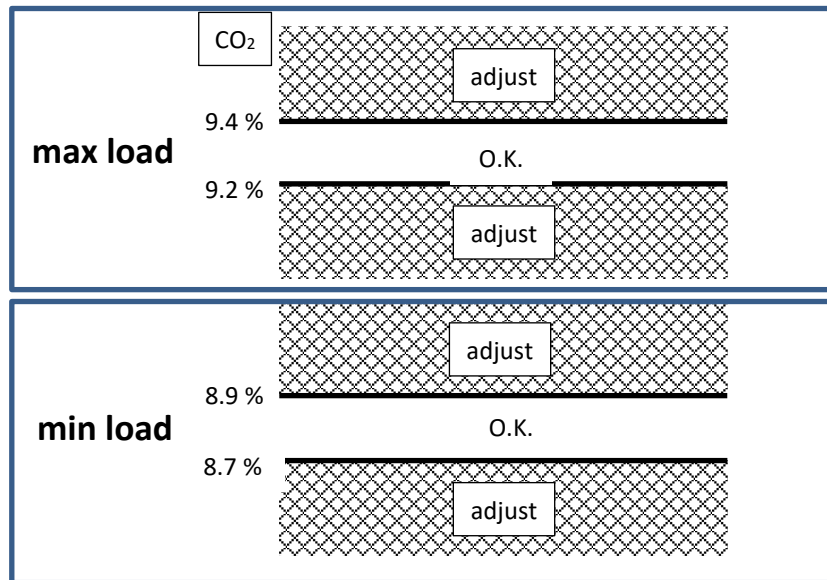
To make adjustments easier, values of table 1 & 2 are presented in the following figures.
The CO₂ values should always be between the values set in this figure.

Nominal values can be found in the Technical specifications datasheet at the beginning of this manual.

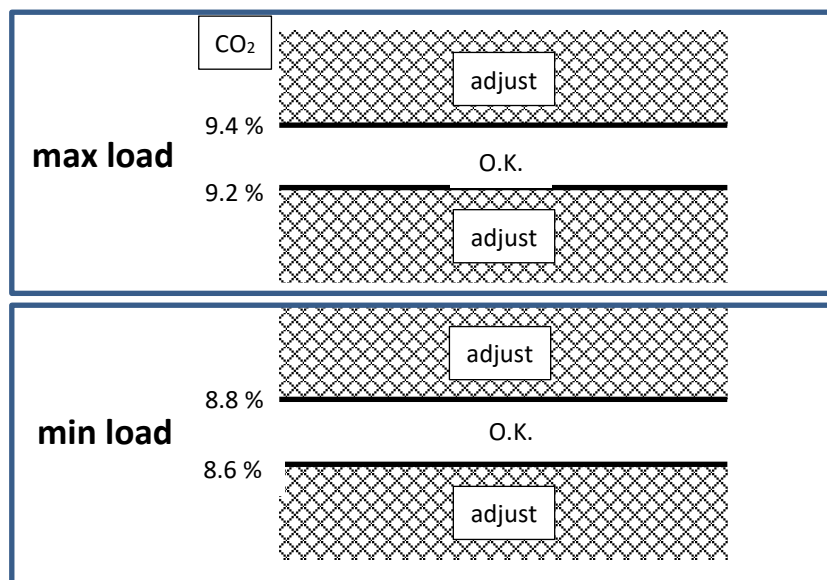
Gas Type G20:

The CO₂ level may never be in the hatched area.

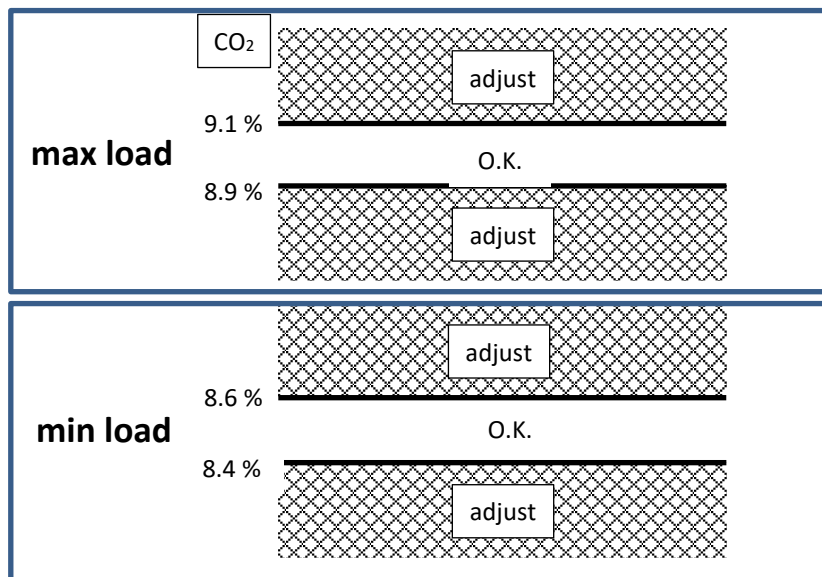
S-FX 70



S-FX 125 & 220



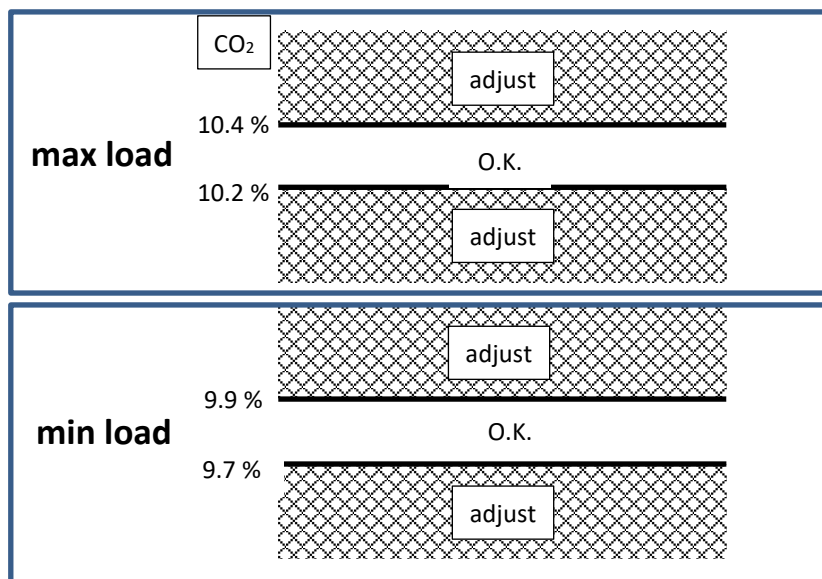
S-FX 320



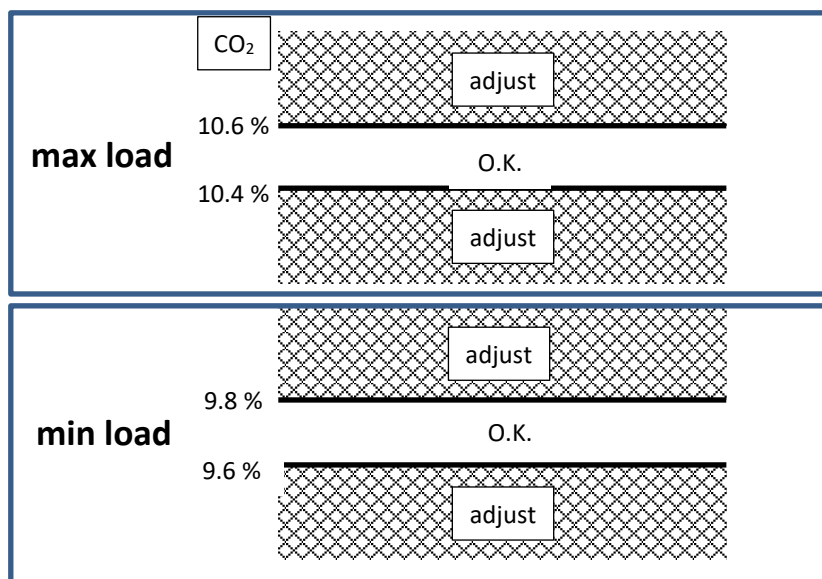
LPG G31:

The CO₂ level may never be in the hatched area.

S-FX 70



S-FX 125, 220 & 320



14.2 Putting the Burner into High & Low Fire

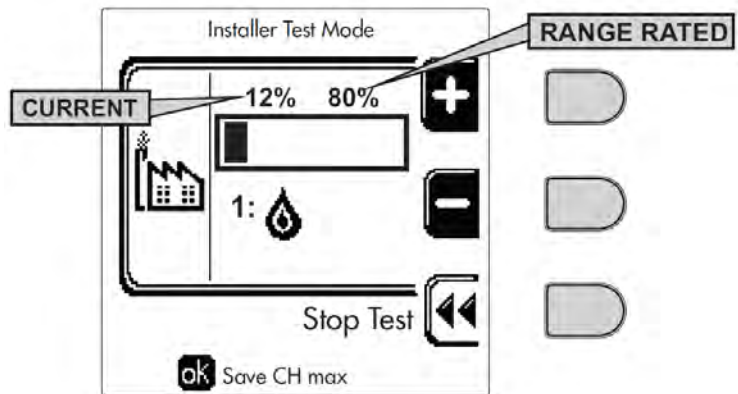
This is done through the user menu under the maintenance chapter under test mode. To enter this mode, navigate through the following path:

“USER MENU” > “MAINTENANCE” > “TEST MODE” > “TEST MODE”

Once in this mode the S-FX boiler will ignite and modulate up to a high fire.

The display will show the current percentage the burner is burning (left) and the maximum heating power (range rated) as shown in the picture to the right. The range rated figure is explained in the next chapter.

Press the contextual buttons 1 & 2 to increase / decrease the burner power. To deactivate this test press contextual button 3 or alternately after 15 minutes the test will automatically finish.



Do not turn off the S-FX boiler electronically during the test.

If this happens, when the power is switched on again the system does not recognise deactivation of the test. Therefore, it will start operating in test mode and not in normal operation.

14.3 High & Low Fire Adjustment

14.3.1 ADJUSTING THE BURNER AT HIGH FIRE

1. From the home screen, go to “User Menu” > “Maintenance” > “Test Mode” > “Test Mode.”
2. Press contextual button 1 until burner power is 100%
The boiler will fire up, after about 10 seconds, the boiler burns at high fire.
3. Measure the CO₂ percentage.
4. Using the “Gas Max” adjustment screw, set the combustion to the require CO₂ valve as shown in the previous chapter.

14.3.2 ADJUSTING THE BURNER AT LOW FIRE

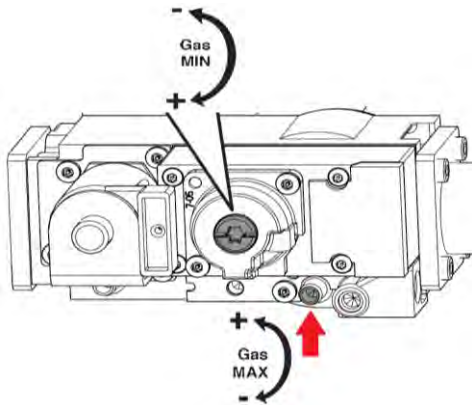
1. From the home screen, go to “User Menu” > “Maintenance” > “Test Mode” > “Test Mode.”
2. Press contextual button 2 until burner power is at its minimum.
The boiler will fire up, after about 10 seconds, the boiler burns at low fire.
3. Measure the CO₂ percentage.
4. Using the “Gas Min” adjustment screw, set the combustion to the require CO₂ valve as shown in the previous chapter.

Repeat the above process to ensure the combustion figures are correct, adjust if required.

The test mode automatically stops after 15 minutes, after this the system continues with normal demand handling. When the system test mode is changed during an active system test, the 10-minute timer is restarted.

14.3.3 LOCATION OF ADJUSTMENT SCREWS

S-FX 70 & 125 Gas Valve

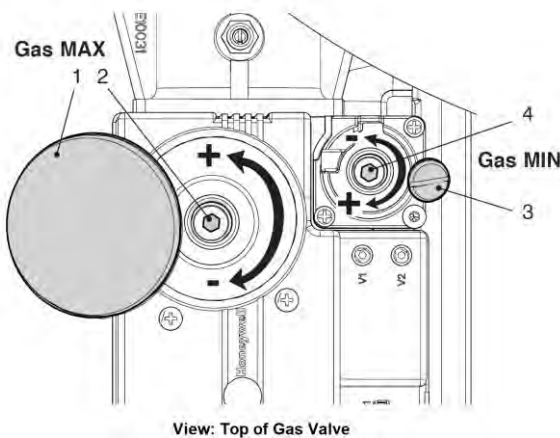


Low Fire Adjustment (Offset) : Located in the middle of the gas valve, turn clockwise to increase CO₂.

High Fire Adjustment (Throttle) : Located at the bottom of the gas valve within a red coloured fitting. Turn anti clockwise to increase CO₂.

S-FX 220 & 320

To give easy access to the top of the gas valve, the top case will need to be removed – see chapter 15.2.



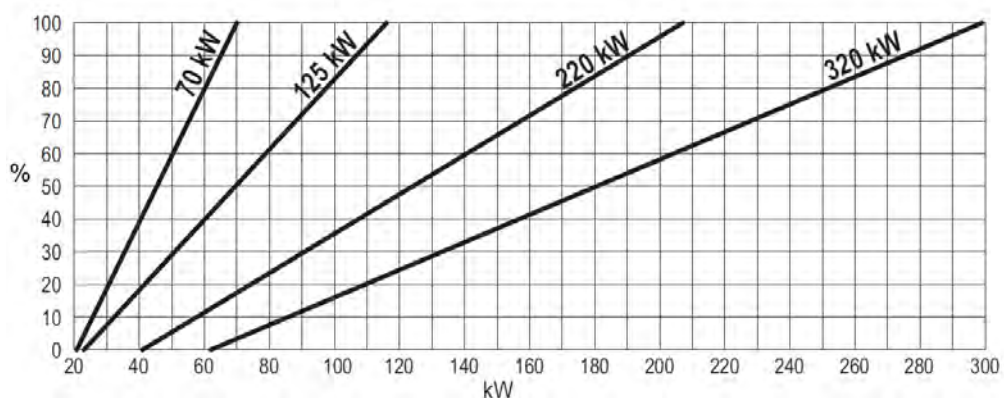
Low Fire Adjustment (Offset) : Located in the top right hand corner of the gas valve, turn clockwise to increase CO₂.

High Fire Adjustment (Throttle) : Located under the black plastic cap in the middle of the gas valve, turn anti clockwise to increase CO₂.

14.4 Heating Capacity Adjustment (Range Rated)

As factory set, all S-FX boilers are range rated to 80% which can be seen within the transparent menu P14.

Heating power Adjustment Diagram:



This is a “Range Rated” boiler (according to EN 483) and can be adjusted to the systems thermal requirement by setting the maximum heating capacity for operation in heating mode:

- Put the S-FX boiler into “Test Mode” as shown in chapter 14.2.
- Press the contextual buttons 1 & 2 to increase / decrease the heating capacity (0 = minimum : 100 = maximum). Use the above “Heating Power Adjustment Diagram.”
- By pressing the “OK” button as shown in the above test mode picture in chapter 14.2 will set the maximum heating capacity.

After setting the desired heating capacity, write the value on the sticker provided and place it on the boiler under the data plate.

14.5 Cascade Test Mode

This test mode allows for all boilers connected in cascade to be activated at the same time operating up to the same power. This will need to be selected through the master boiler which can be identified by the master icon shown on the display = 

To enter this mode, navigate through the following path:

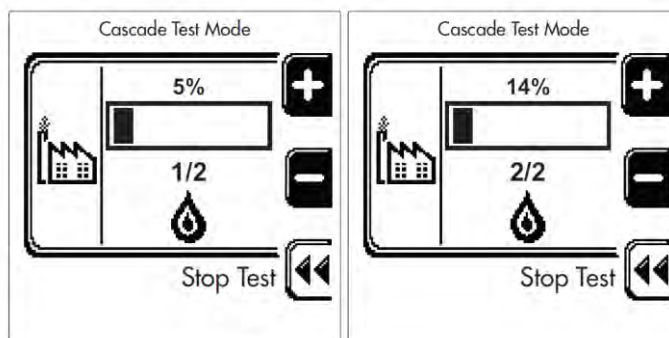
“USER MENU” > “MAINTENANCE” > “TEST MODE” > “CASCADE TEST MODE”

This example shows two S-FX boilers setup in cascade.

Both modules will light and operate up to their maximum heating power.

The display as shown on the right will show the actual heating power:

- 5% = Actual Heating Power.
- 1 / 2 = Module Lit / Modules Connected.



Press the contextual buttons 1 & 2 to increase / decrease the burner power. To deactivate this test press contextual button 3 or alternately after 15 minutes the test will automatically finish.



Do not turn off the S-FX boilers electronically during the test.

If this happens, when the power is switched on again the system does not recognise deactivation of the test. Therefore, it will start operating in test mode and not in normal operation.

14.6 Start Up Checklist

Installation/start-up checklist

Installer Information	
Company	
Engineer name	
Address	
Postal code	
City	
County	
Telephone number	

Site Information	
Site name	
Site contact (End user)	
Address	
Postal code	
City	
County	
Telephone number	

Boiler information	
Model	
Serial number	
Installation date	
Cascade installation (Y/N)	(YES/NO)
Number of boilers	
Type of boilers in cascade	



After filling in form please send a copy by e-mail to: salesoffice@strebel.co.uk.

Exhaust Flue Installation	Information
Diameter	
Total length	
Length horizontal	
Length vertical	
Length sloped at°	
Number elbows 90°	
Number elbows 60°	
Number elbows 45°	
Number elbows 30°	
Distance vertical from roof	
Distance from (closest) wall	
Possibility of dust/chemicals drawn into air intake?	
If YES => of which kind?	
Distance from Flue outlet (top of chimney) vertical	
Distance from Flue outlet (top of chimney) horizontal	
Is there a condensate drain installed to common flue system	
Flue outlet pressure (on bottom of boiler)	

Condensate Drain	
Check the level of the heat exchanger; It must have a slight angle from the rear to ensure that the condensate drains from the heat exchanger.	(YES/NO)
Condensate trap (from package) installed according installation manual?	(YES/NO)
Inside diameter of drain piping	mm/inch
Is there a definite air gap between the condensate trap and the connection to drain pipe?	(YES/NO)
Total drop in height from boiler to drain piping exit point	
Any additional trap points?	(YES/NO)
Perform PH test and register PH value	
Condensate Neutralizer installed	(YES/NO)

Water circulation & temperature regulation (for DHW)	
Piping diameter	
Total length of straight pipe between boiler & tank	
Number of elbows	
Number of tees	
Temperature rise between inlet and outlet after 5 min. cold-start operating max. power	°C / °F
Water temperature setpoint	
Test of Water Flow Switch (DHW)?	(Yes/NO)

Gas supply	
Type of Gas from installation	
Is gas isolation valve installed under boiler according to installation manual?	(YES/NO)
Which diameter gas isolation valve is installed?	
Gas piping (inside) diameter	
Gas piping material (if possible specify mark/type)	
Gas piping flexible (YES/NO)	(YES/NO)
Gas piping inside structure (e.g. smooth/corrugated)	
Measured Gas pressure @Gas valve (Static) **	
Measured Gas pressure @Gas valve (dynamic - all gas appliances in the building should be turned on and running at full load)	
Is there a secondary gas pressure regulator before the boiler?	(YES/NO)
If YES what is the length of the Gas piping in between?	
If YES what is the Brand & Model?	

Combustion settings		unit:
Set for NG (Natural Gas) or LP (Liquid Propane)?	NG or LPG?	
If LPG is the right gas orifice mounted?	(YES/NO)	
Diameter gas orifice for LPG?		mm
CO2 / O2 level at high fire ...%		%
CO2 / O2 level on low fire ...%		%
Flue pressure @ CO2 / O2 measuring point at high fire		Pa
Flue pressure @ CO2 / O2 measuring point at low fire		Pa
If cascaded with common flue system run all appliances at high fire and measure Flue pressure		Pa
If cascaded with a common flue system; run all appliances, measure the flue pressure at low- and at high fire.		Pa

Electronics & Power supply		unit:
Version Burner Controller Hardware (see Chapter 3.2 for location)		
Version Burner Controller Firmware (see Chapter 3.2 for location)		
is ground connected to building grounding system	(YES/NO)	
Voltage incoming (Hot to Neutral)		V
Voltage incoming (Hot to Neutral)		V
Voltage measured between Ground and Neutral		V
Total of amperage switched by the Boiler Control is below 3.5 A or 800 W		A

Additives	
Used chemical additions	
Mixing Ratio	

15 INSPECTION, MAINTENANCE AND SERVICE.

15.1 General

For a good, safe and long-time operation of the boiler and to maintain warranty it is mandatory to carry out inspection, maintenance and service on the boiler at least once a year.

Inspection, maintenance and service of the boiler should also be carried out on the following occasions:

- **When a number of similar error codes and/or lock-outs appear.**
 - **At least every twelve months maintenance must be done to ensure safe and efficient operation.**
- Damage caused by the lack of maintenance will not be covered under warranty**

Service intervals

The normal service frequency for the boiler is once a year. Every year the boiler should be cleaned and checked, according to the maintenance procedures. If there is doubt whether the boiler is operating with the correct water and/or combustion air quality, it is advised that a first check is already executed after six months. This check serves to determine the frequency of the future services. The maximum interval between two services is one year.



WARNING

INSPECTION, MAINTENANCE AND SERVICE MUST BE EXECUTED FOR A SAFE AND EFFICIENT OPERATION OF THE BOILER.

Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after operation servicing.

15.2 Inspection, maintenance and service.

Inspection, maintenance and service including the replacement of boiler parts must only be carried out by a licensed professional, service agency or the gas supplier. Apart from the maintenance proceedings it is required to maintain a service log for each boiler that includes all of the following information:

- Serial number.
- Date and time of maintenance.
- Name of maintenance engineer.
- Which parts were exchanged during maintenance.
- Which settings (software) were changed during maintenance.
- Special remarks / findings.
- Future aspects that need extra attention.
- Additional aspects: measurement reports, complaints by the (end)-user, lock-out codes, etc.
- Static Gas Pressure.
- CO₂ / O₂ % at high fire.
- Gas Pressure at high fire.
- Gas Pressure at low fire.
- pH of the water or water/glycol in the system.
- Name of service company.
- Date of service

During maintenance, the following items in bold listed below of the boiler must be checked and inspected.

NOTICE: Before starting to work on the boiler:

- Switch off the electrical power to the boiler (service switch and/or unplug boiler)
- Close the gas valve to block gas supply to the boiler

Customer comments:

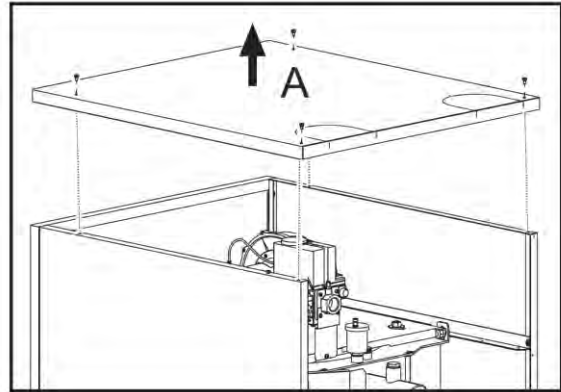
Comments and remarks from the customer should be analysed and used to find possible causes for any occurring problems and complaints.

Removing the Top Casing

Step 1:

Undo the 4 screws shown in the picture on the right.

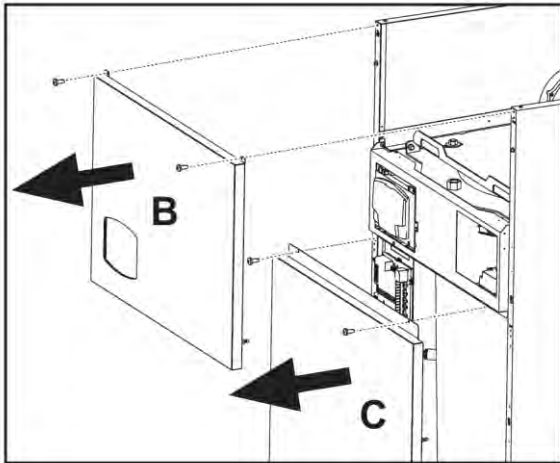
This will allow the top panel A to be removed.



Step 2:

Undo the 6 screws as shown in the picture on the left.

This will both the upper front panel B and the lower front panel C to be removed.



To Open & Close Burner Door

Once the top casing has been removed as detailed above, the burner door can be opened and closed by completing the following steps:

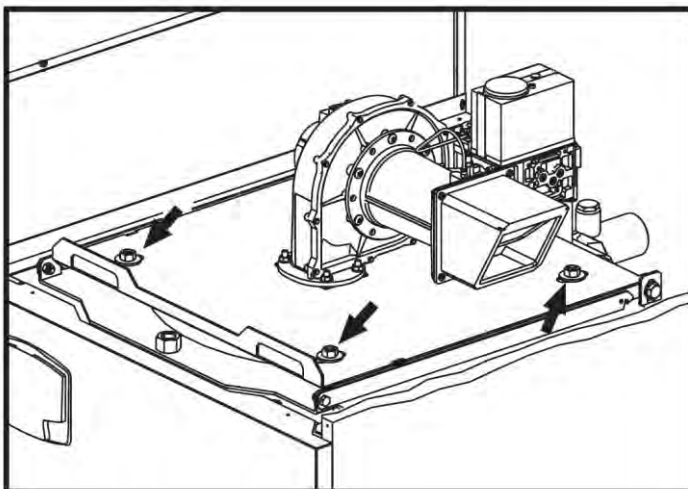
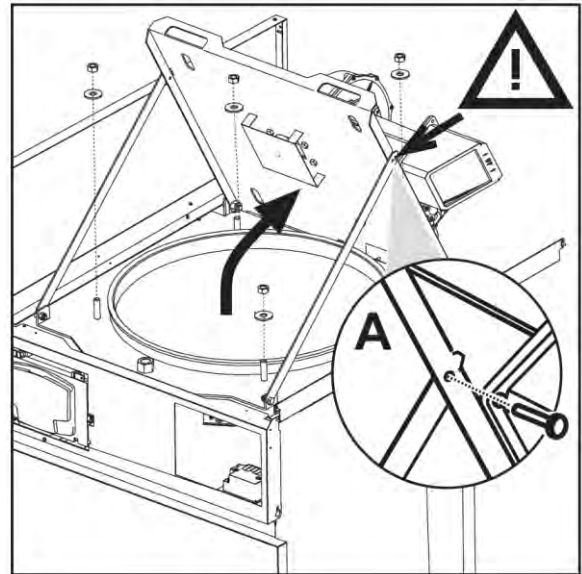
To Open the Door:

Disconnect the gas pipe from the gas valve: see chapter 6.2 - Gas Connection.

Undo and remove the four nuts & washers. These are located in each corner of the square burner door.

Once removed, the burner door can then be lifted from front to back.

Once opened, using the support arms to hold the burner door open and lock it into place by inserting a locking pin as shown in the picture on the right – location A.



To Close the Door:

Complete the above procedure in reverse order.

Tighten down the nuts as shown.

Fit gas pipework back to gas valve.

Complete tightness test.

Gas Supply & Safeties

The gas pipes must be checked for gas tightness. Also check if the mounting of these pipes is correct, safe and not damaged. Any built-in safeties should be checked for a correct functioning. Any gas pipe or fitting that have been opened or adjusted should be checked for leaks.

Heat Exchanger

After the removal of the complete burner unit check if there is any debris and dirt in the heat exchanger. The coils of the heat exchanger can be cleaned by using a **non-metallic** brush. After this the dirt and dust can be removed with a vacuum cleaner and by flushing the burner room with water. Don't forget afterwards to clean the siphon once again.

Burner

Check the burner surface to see if it has damages, signs of rust and/or cracks. When the burner surface is damaged the burner must be replaced. The burner can be cleaned by using a soft (non-metallic) brush. The dust can be removed with a vacuum cleaner or pressurized air.

Burner Door Gasket

If any part of a gasket has discoloured, changed texture, or hardened then, the rubber has cured and/or has damages, these gaskets must be replaced.

Notice: Only use the gaskets that are supplied by the boiler manufacturer.

Ignition / Ionisation Electrode

When the complete burner is removed, it is very easy to check the ignition electrode.

Check the electrode for any tear/crack and signs of rust. When they are damaged in any manner or rusty, replace the electrode. Also replace the electrode when there is a crack in the ceramic insulation of the electrode. When the electrode is replaced, also the gasket must be replaced. The electrode should be replaced annually.

Emory cloth, sandpaper, and any other abrasive material should never be used to clean the electrode.

Fan

When the fan blades are polluted and dirty, carefully clean the blades with a soft brush.

Notice: Do not use too much force on the blades or else the fan might be out of balance and run irregularly, causing noises and fan failures. Check the fan also for any water damages. In doubt always replace the fan of the boiler.

Condensate Trap

Disassemble the condensate trap and clean every part of it. Check the condensate trap connection of the heat exchanger for any blocking or pollution and clean it (if necessary). Check the functioning of the condensate trap by pouring clean tap water in the boiler combustion chamber (when burner door is removed). This water will exit the heat exchanger by the condensate trap.



When mounting the bottom part of the condensate trap, before commissioning the boiler and/or after maintenance, the condensate trap must **ALWAYS** be completely filled with water.

This is a safety measure: the water in the condensate trap keeps the flue gases from leaking out of the heat exchanger via the condensate drain.

Water Leakage

The water pressure of the heating installation should be more than 1.0 bar (21 psi) and at a maximum of 6.0 bar (87 psi) in normal operation. When the water pressure drops below the minimum occasionally, there might be a water leak. Check the boiler and the complete heating installation for any water leakages and have these repaired. higher water pressures are allowed with the use of a different relief valve and a pressure switch kit

Exhaust Flue Gas & Air Supply

The flue gas pipes must be checked for gas tightness. Also check if the mounting of these pipes is correct, safe and not damaged. Check the bottom side of the boiler housing for signs of water leakage and traces of water coming from the exhaust flue pipes. Check to ensure the flow there are no obstructions within the exhaust flue or the intake combustion air venting. Check that the exhaust flue has been properly reassemble and sealed before leaving site.

Checking Non-Return Flap

The non-return flap is installed on the air inlet pipe before the internal combustion fan. Clean the valve and check the valve is fully moveable and shuts when the fan is not in operation.

Gas/air ratio

With every service check and/or maintenance of the boiler always check the gas/air ratio by measuring the CO₂ percentage (flue gas) at the maximum and minimum load of the boiler. If necessary, adjust these values. For the values see chapter 14.1.1.

Circulating Pumps (if wired directly into the S-FX boiler)

Check the electrical wiring inside the boiler for any abnormalities and flow through the boiler is correct.



WARNING

When faults and abnormalities are found by the service technician during service and maintenance and these are not repairable, this information should be reported to the owner/end-user of the installation. Also, the owner/end-user should be advised how to fix these faults and these faults should be reported in the service report / log file of the boiler.

During service and maintenance, the gas, supply air, flue gas and condensate connections are disconnected, checked and replaced. Make sure that all these components are mounted correctly before commissioning the boiler again.

Cleaning the combustion chamber and heat exchanger with acid or alkali products is prohibited.

15.3 Maintenance Checklist



Allowing the boiler to operate with a dirty combustion chamber will hurt operation. Failure to clean the heat exchanger as required by the manual and dictated by the operating location could result in boiler failure, property damage, personal injury, or death.
Such product failures ARE NOT covered under warranty

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the heater. The technician must also inform the owner that the lack of proper care and maintenance of the boiler may result in a hazardous condition.

Maintenance Table

Inspection Activities		Date Last Completed			
		1 st Year	2 nd Year	3 rd Year	4 th Year
Near Boiler Piping	Check system and boiler piping for any sign of leakage. Take off boiler cover and inspect connections in boiler for any leaks or corrosion.				
Vent / Flue	Check condition of all vent / flue pipe and joints.				
	Check to ensure vent termination not blocked or obstructed.				
Gas	Check gas piping, test for leaks and signs of aging. Record gas pressure and note pressure drop upon start-up. Record CO ₂ at high and low fire.				
Visual and Temperature	Do visual inspection of all system components and verify programmed temperature settings.				
Connections	Check wire connections and make sure they are tight.				
Combustion chamber	Check burner tube and combustion chamber coils. Clean with nylon brush and vacuum. Avoid touching white ceramic fibre. Also see maintenance section of manual.				
Spark igniter	Ensure spacing of igniter prongs are aligned properly.				
Condensate trap	Disconnect condensate hose and trap. Ensure no blockage, rinse and clean out. Fill completely again with fresh water and re-install.				
Relief Valve	Check to make sure it is not weeping.				
Pump and Fan	Listen to sound of the pump and fan. If either makes noise during operation, it is recommended to replace the part.				
Low water cut-off	Check the LWC is not leaking and check for right pressure value by draining the water from the boiler and comparing the value with a calibrated meter Equipment.				
Homeowner	Question homeowner before maintenance if they have any issues and after done, confirm activities you performed during maintenance visit.				
Chemical additions	Check the chemical additives and add or renew if the mixing ratio is out of spec.				
Mixing Ratio					

16 FAULT CODES / TROUBLESHOOTING

The S-FX boiler is equipped with an advanced self-diagnosis system. In the case of a boiler fault, the display will light up indicating the fault code and in case of connection in cascade, the number of the boiler module in fault.

There are faults that cause a permanent shutdown (A fault codes) – the S-FX boiler will not attempt to fire up until the boiler is reset. To reset the boiler either:

- Press and hold the “OK” button for 1 second; or
- Reset the boiler via the remote time control (optional) if connected.

If on resetting the boiler, the burner fails to start, and the fault code is shown again – a qualified engineer is required to investigate the fault.

Other faults cause temporary shutdowns (F fault codes) which are automatically reset as soon as the valves returns within the S-FX boilers normal working range.

16.1 List of Fault Codes

16.1.1 LOCK OUT FAULTS – A CODES (REQUIRES RESETTNG)

Fault Code	Fault Description	Possible Causes	Cure
A01	No Burner Ignition	No Gas / Low Incoming Gas Pressure	Check the incoming gas pressure to the boiler.
		Ignition / Detection Electrode Fault	Check the wiring to the probes, correctly positioned and free of any deposits.
		Faulty Gas Valve	Check the gas valve is opening.
		Blocked Condensate Trap	Check the trap and clean if required.
		Faulty Ignition Transformer (Only on 220 & 320 models)	Test and replace if necessary.
A02	Flame Signal with Burner Off	Electrode Fault	Check wiring, replace if required.
		Ignition PCB Board Fault	Check PCB, replace if required.
A03	High Limit Temperature Sensor Tripped	Faulty High Limit Sensor	Check the high limit sensor.
		No Flow Through Boiler	Check the circulating pump.
		Air in the System	Vent the system.
A04	Boiler Flue Gas Sensor Tripped	Fault Code F7 has occurred 3 times in the last 24 hours	See fault code F7.
A05	Fan Fault	Fault F15 has lasted over an hour	See fault code F15.
A06	No Flame After Ignition Stage (6 times in 4 minutes)	Ionisation Electrode Fault	Check the wiring & positioning, replace if at fault.
		Flame Unstable	Check the burner & combustion.
		Gas Valve Offset Fault	Check the offset at low fire.
		Exhaust Flue Obstruction	Inspect flue for blockages.
		Blocked Condensate Trap	Check the trap and clean if required.
A41	Sensor Position	Flow Sensor Disconnected from Pipe	Check the positioning and sensor.
A42	Heating Sensor	Heating Sensor Damaged	Replace the sensor.
A61	Controller Fault	Controller Internal Error	Check earth connection, replace controller.
A62	No Comm between Controller & Gas Valve	Controller not Connected	Check the controller is connected.
		Gas Valve Damaged	Replace gas valve.
A63 A64 A65	Controller Fault	Controller Internal Error	Check earth connection, replace controller.

16.1.2 TEMPORARY FAULTS – F CODES (AUTOMATICALLY RESET)

Fault Code	Fault Description	Possible Causes	Cure
F7	Flue Sensor Tripped on High Temperature	Partially Blocked Exhaust Flue.	Check flue for partial blockages.
		Incorrect Combustion.	Check combustion on high/low fire.
		Flue Gas Sensor Fault.	Check the flue gas sensor.
F10	Flow Sensor 1 Fault	Flow Sensor Damaged.	Check flow sensor & wiring, replace if faulty.
		Flow Sensor Wiring Damaged.	
		Flow Sensor Wiring Disconnected.	
F11	Return Sensor Fault	Return Sensor Damaged.	Check return sensor & wiring, replace if faulty.
		Return Sensor Wiring Damaged.	
		Return Sensor Wiring Disconnected.	
F12	DHW Sensor Fault	DHW Sensor Damaged.	Check DHW sensor & wiring, replace if faulty
		DHW Sensor Wiring Damaged.	
		DHW Sensor Wiring Disconnected.	
F13	Flue Sensor Fault	Flue Sensor Damaged	Check flue sensor & wiring, replace if faulty.
		Flue Sensor Wiring Damaged	
		Flue Sensor Wiring Disconnected	
F14	Flow Sensor 2 Fault	Flue Sensor Damaged	Check flue sensor & wiring, replace if faulty.
		Flue Sensor Wiring Damaged	
		Flue Sensor Wiring Disconnected	
F15	Fan Fault	No 230v Power Supply	Check the 3-pin plug on the fan.
		No Tacho Signal	Check the 5-pin plug on the fan.
		Fan Damaged	Replace fan.
F26	Reset button on Controller on Gas Valve Fault	Reset Button on Controller Fitted on Gas Valve is Blocked or Faulty	Check the reset button and replace the controller on the gas valve if necessary
F34	Supply Voltage Fault	Supply Voltage is Under 170 Volts	Check the mains supply voltage
F35	Supply Frequency Fault	Supply Frequency is Incorrect and not 50Hz	Check the mains supply frequency
F37	Water Pressure Switch Open	Low System Water Pressure	Check water system pressure
F39	Outside Sensor Fault	Sensor or Wiring Fault	Check wiring, replace outside sensor
		No Outside Temperature Reading	Check boiler controller settings
F50	Cascade Temperature Sensor Fault	Sensor Damaged	Check sensor & wiring, replace if faulty
		Wiring Shorted	
		Wiring Disconnected	
F52	Heating Sensor	Heating Sensor Damaged	Replace the sensor
F66	Controller Fault	Controller Internal Error	Check earth connection, replace controller.
F99	No Comm between Controller and Display	Wiring Disconnected	Check the wiring of the 6 wires between controller and display

17 USER INSTRUCTIONS

After installing and commissioning of the boiler, demonstrate the operation of the entire central heating system to the end-user. The user should be made familiar with all safety precautions of the boiler and the installation. The user should be instructed that service and maintenance of the boiler is required every twelve months. Regular service and maintenance are essential for a safe and proper operation of the boiler.

Hand over the documents supplied with the boiler.

18 USER'S PART.

This section is written for the user.

Strebel Ltd is not accountable for any damage caused by incorrect following these instructions. For service and repair purposes use only original Strebel Ltd spare parts.

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18.1 Safety guidelines.

"FOR YOUR SAFETY READ BEFORE OPERATING"

"WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

"A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand."

"B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor."

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- If you cannot reach your gas supplier, call the fire department."
- Immediately call your gas supplier from a neighbour's phone. Follow the gas supplier's instructions.

"C. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water."



Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure to hazardous materials) * or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

18.2 To turn off gas to the appliance

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. The main gas switch is situated underneath the boiler in the gas supply line.
4. Turn the valve clockwise  to "OFF." to close the gas supply. **Do not use excessive force.**

"Should overheating occur or the gas supply fail to shut off, do not turn off or disconnect the electrical supply to the pump. Instead, shut off the gas supply at a location external to the appliance."

18.3 Maintenance and inspection

Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

Maintenance and inspection of the boiler should be carried out at the following occasions:

- When a number of similar error codes and/or lock-outs appear.
- At least every 12 months maintenance must be done to ensure safe and efficient operation.

Damage caused by lack of maintenance will not be covered under warranty

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