



FCX 22
FCX 30
USA/CA

**T
E
C
H
N
I
C
A
L

I
N
S
T
R
U
C
T
I
O
N
S**



TABLE OF CONTENTS

I - SAFETY PRECAUTIONS	4
1 - SYMBOLS.....	4
2 - SAFETY PRECAUTIONS.....	4
2.1 - Smell of flue gas	4
2.2 - Explosive or inflammable materials	4
2.3 - Fitting, commissioning	4
2.4 - Servicing	4
2.5 - Combustion air/Ambient air	4
2.6 - Danger due to failing to consider your own safety in an emergency such as a fire	5
2.7 - User information from the installer	5
II - PRESENTATION	6
1 - DESCRIPTION	6
2 - RANGE	6
III - TECHNICAL SPECIFICATIONS	7
1 - CHARACTERISTICS.....	7
2 - DIAMETERS OF PIPE CONNECTIONS	8
3 - DIMENSIONS	9
4 - DESIGNATION OF COMPONENTS	10
5 - CIRCULATING PUMP CHARACTERISTICS	11
6 - MIXING VALVE CHARACTERISTICS.....	11
7 - CHARACTERISTICS OF THE EXPANSION VESSEL.....	11
IV - OPERATION	12
1 - DESCRIPTION	12
V - INSTALLATION	13
1 - GENERAL.....	13
1.1 - Notes on installation and operation	13
2 - VENTILATION	13
2.1 - Type conventional flue outlet	13
2.2 - Balanced flue outlet	13
3 - OPENING THE UNIT.....	14
4 - ASSEMBLING OF THE BURNER	14
5 - COMBUSTION PRODUCT FLUEING	15
5.1 - Boiler placement according to the combustion products outlet system and to the hydraulic connection	15
5.2 - Evacuation by chimney flue	16
5.3 - Balanced flue outlet	19
6 - CONDENSATE DRAINAGE	24
7 - ASSEMBLY OF ACCESSORIES DELIVERED WITH THE BOILER.....	25
7.1 - Bleed + bend	25
7.2 - 1" - Ø 22 bends + seal	25
8 - HYDRAULIC CONNECTION	25
8.1 - Recommendations	25
8.2 - Accessories to connect, install or adjust	26
8.3 - Various typical water circuits are illustrated below	27
9 - OIL CONNECTION.....	28

10 - ELECTRICAL CONNECTIONS	28
10.1 - Wiring and connection diagram	30
VI - COMMISSIONING	31
1 - FILLING THE SYSTEM WITH WATER	31
2 - OIL INLET	31
3 - PRE-COMMISSIONING CHECK.....	31
4 - USER INFORMATION.....	31
5 - COMMISSIONING	32
5.1 - Commissioning procedure - without regulator	32
5.2 - Commissioning procedure - with regulator	33
5.3 - Commissioning the oil burner	34
6 - CHECKING THE SAFETY DEVICES.....	34
VII - MAINTENANCE	35
1 - CLEANING THE BOILER SHELL.....	35
2 - CLEANING THE CONDENSOR	36
3 - BURNER MAINTENANCE.....	37
4 - CHECKING ACCESSORIES.....	37
5 - EXPANSION VESSEL PRE-INFLATION PRESSURE CHECK	37
6 - COMBUSTION PRODUCT FLUES	37
7 - OIL FILTER.....	38
8 - CHANGING A THERMOSTAT OR A THERMOMETER	38
8.1 - Bulbs positioned in the boiler shell pocket	38
8.2 - Bulb positioned on the heating output tube	38
8.3 - Bulb positioned in the pocket of the condensor	38
8.4 - Changing thermostats or thermometer	38
8.5 - Bulbs in the boiler shell	38
9 - DRAINING	39
VIII - OPERATING FAULTS	40
1 - BURNER SHUTDOWN.....	40
2 - SHUTDOWN BY OVERHEATING THERMOSTAT CUT-OUT.....	40
2.1 - Water overheating safety thermostat	40
2.2 - Combustion product overheating safety thermostat	40
IX - PARTS LIST	41

I - SAFETY PRECAUTIONS

1 - SYMBOLS

In this document:



Safety recommendations, warnings and recommendations are by a warning-triangle symbol accompanied by bold text.

2 - SAFETY PRECAUTIONS

2.1 - Smell of flue gas

- Switch off the appliance.
- Open doors and windows.
- Immediately contact your installer or your after-sales service.

2.2 - Explosive or inflammable materials

- Do not store or use any inflammables materials (paper, thinners, paints, etc.) within vicinity of the appliance.
- Respect the minimum distances regard to inflammable materials and fire-proof materials (16 inches (40.6 cm) from the appliance).

2.3 - Fitting, commissioning

- The installation, electrical connection and the first start-up must be carried out by a qualified professional and authorised in accordance with the applicable regulations and rules of good practice.
Respect the electrical connection plan.
- **Danger from electrical shock :**
 - Before installation: make sure the appliance is turned-off at all points. Secure against involuntary re-triggering.
- The appliance must not operate without water.
- Carry out the checks listed in Section 3 - page 31 - chapter VI - COMMISSIONING before the first start-up of the system.
- Only use approved fuels indicated on the data plate.
- Flue system (air inlets, conduits, gaskets etc.) must not be modified in any way and not damaged.
- Connect only one boiler to each venting system or chimney flue.
- The venting system piping must not feed into another air extraction duct.
- Do not route the venting system piping through or inside another duct used for exhaust air or other flue gases.

- Chimney type system B₂₃/B_{23p}:

- Ventilation openings in doors, windows and walls must not be sealed or restricted.

Intoxication Risk: An insufficient air intake can cause the evacuation of dangerous smokes.

- Ensure that no mechanical air-extraction equipment draws air from the boiler room, e.g. kitchen vent hood, clothes dryer, central vacuum system, etc.
- If draught-proof windows are installed, measures must be taken to ensure there is an adequate supply of air to the appliance for combustion.

- Flue type system (C₁₃/C₃₃):

- The flue type system (sealed) can be installed in premises with or without a window or ventilation.
- Room sealed installation in a small room or cupboard, make sure required clearances for service are fulfilled.

2.4 - Servicing

- Recommendations for the user:
 - take out an inspection/maintenance contract with an competent and qualified engineer.
 - have the appliance serviced at regular intervals (annually).
- Respect the safety recommendations of chapter VII - MAINTENANCE - page 35.
- Only use original spare parts.

2.5 - Combustion air/Ambient air

- To avoid any corrosion, the combustion/ambient air must be free of corrosive substances (e.g. halogenated hydrocarbons containing chlorines or fluorines compounds).
- Do not install the appliance in a polluted atmosphere.

2.6 - Danger due to failing to consider your own safety in an emergency such as a fire

- Never put yourself at risk of fatal injury. Your own safety must always take the highest priority.

2.7 - User information from the installer

- Inform the user on the operating modes of the appliance and show him how to use the controls.
- Inform the user that he must never undertake any modifications or repairs of the appliance.
- Inform the user of the various possible operating faults and dangers.
- Give the user instructions to the user.
- This appliance must only be operated by a responsible adult who has been instructed in, understands, and is aware of the appliance's operating conditions and effects.
- Children should be supervised to ensure they do not play with the appliance.

II - PRESENTATION

1 - DESCRIPTION

Standardised description: type C sealed circuit combustion boiler, heating only, 22.3 kW (76000 Btu/hr) or 30,5 kW (104000 Btu/hr).

Model FCX is approved for installation with zero clearance to combustible materials by Intertek Testing Services to the UL Standard for Oil Fired Storage Tank Water Heaters (UL 732).

The FCX boiler is delivered pre-assembled (cover, boiler shell and control panel). It includes the following equipment:

- an enamelled steel cover,
- a thick steel boiler shell comprising:
 - a combustion chamber and a heat exchanger with a system of removable baffles,
- a stainless steel condenser (904 L),
- a control panel comprising:
 - an On/Off switch,
 - a Summer/Winter switch,
 - a thermostat controlling boiler temperature,
 - a heating flow temperature thermometer (circuit 1),
- a water overheating safety thermostat,
- a combustion product overheating safety thermostat,
- a boiler shut-down light,
- pre-wiring for electronic regulation.
- an oil burner (supplied separately),
- an air inlet duct to the burner,
- a circulating pump,
- a manual mixing valve (can be motorised),
- a 30 Psi safety valve,
- an expansion vessel,
- a drain cock,
- a siphon,
- welds for the connection of two independent heating circuits,
- an automatic bleed,
- a reduced bend used to assemble the 3/8" air bleed,
- 4 1" - Ø 22 bends used for easier outlet/return connection to the system,
- thick insulation,
- a socket.

2 - RANGE

Models	Function	Combustion product connection
FCX 22 C FCX 30 C	Heating only	Flue with tubing ((B ₂₃ /B _{23p})) Horizontal balanced flue (C ₁₃) Vertical balanced flue (C ₃₃)

III - TECHNICAL SPECIFICATIONS

1 - CHARACTERISTICS

Model			FCX 22 C	FCX 30 C
Certification following efficiency directive 92/42/CEE			CE1312AS036R	
Connection			B ₂₃ /C ₁₃ /C ₃₃	
Power output	maxi	kW Btu/h	22,3 76000	30,5 104000
Heat flow	maxi	kW Btu/h	23,8 81250	31,5 107500
Efficiency (in B ₂₃)*	60/80 °C 140/176 °F	%	96,3	96,7
Part load efficiency (30 %) (B ₂₃)*		%	99,0	99,8
Combustion product temperature (B ₂₃)	maxi	°C °F	105 221	95,5 204
Flow rate of combustion products (0 °C, 1013 mbar)		g/s Lb/s	11 0.02	15 0.03
Permitted back pressure	maxi	Pa Inches H ₂ O	30 0.12	30 0.12
Air flow required for combustion (0°C, 1013 mbar)		m ³ /h ft ³ /h	29,1 1027.5	39,4 1391.5
Combustion chamber length		mm inches	228 8.98	239 9.41
Ø Combustion chamber		mm inches	294 11.57	350 13.78
Combustion chamber volume		dm ³ Cu. Inches	15 915	23 1403.5
Volume of combustion products circuit		dm ³ Cu. Inches	50 3051	52,5 3203,5
ΔP flue		Pa Inches H ₂ O	25 0.10	
Heating service pressure	maxi	bar Psi	3 43.5	
Heating circuit water temperature	mini/maxi	°C °F	50/70 122/158	
Boiler temperature	maxi	°C °F	80 176	
Water overheating safety thermostat		°C °F	110 230	
Flue overheating safety thermostat		°C °F	110 230	
Boiler water capacity		litre gallon	16 4.23	25 6.6
Primary water flow	60/80 °C 140/176 °F	m ³ /h gal/h	0,96 254	1,3 343
ΔP water (at nominal flow)		mCE	1,0	1,8
Heatlosses ΔT 30 K ΔT 50 K		W / HP W / HP	137 / 0.18 260 / 0.35	144 / 0.19 273 / 0.37
Service consumption coefficient (ΔT 50 K)		%	1,3	
Total capacity of expansion vessel		litre gallon	8 2.1	12 3.2

Model		FCX 22 C	FCX 30 C
Useful capacity (for static height of 5m (197 inch))	litre gallon	5 1.3	7,5 2
Power consumption (Continuous working with heating circulating pump at maximum speed)	W HP	235 0.32	235 0.32
Power consumption with heating circulating pump			
Speed 1	W/HP	45/0.06	
Speed 2	W/HP	65/0.09	
Speed 3	W/HP	85/0.11	
Power absorbed (with burner, without circulator)	W HP	150 0.2	150 0.2
Power supply / Protection index		120 V - 60 Hz / IP x 0D	
Class of electrical insulation		1	
Absorbed intensity	maxi	A	1,9
Weight without packaging	kg Lb	132,4 292	157,3 347
Weight with packaging	kg Lb	146 322	167,5 369

* A 3m (9.8 ft) horizontal or vertical concentric flue connection increases in efficiency by about 2 %.

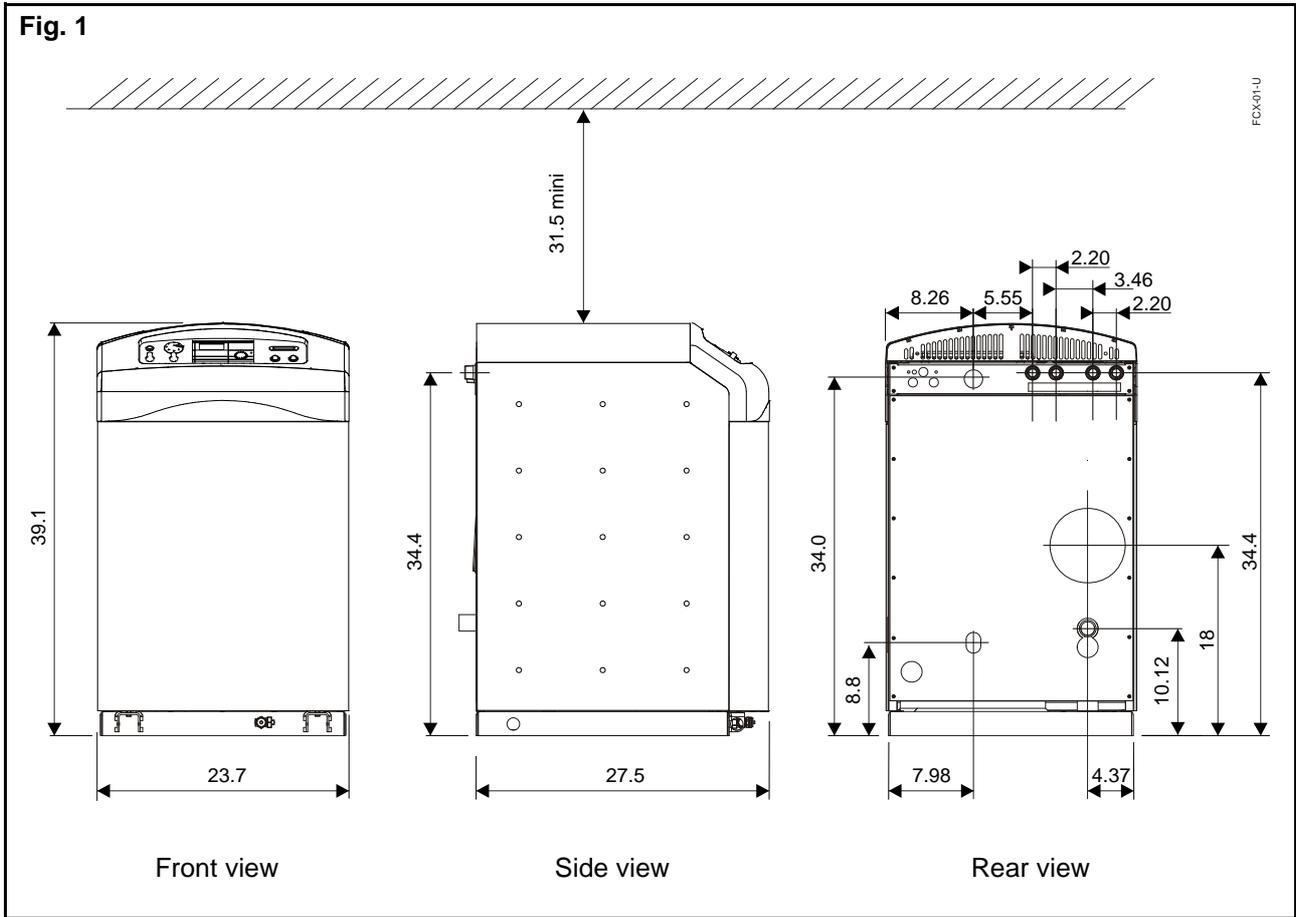
2 - DIAMETERS OF PIPE CONNECTIONS

Model		FCX
Ø Combustion products	mm inch	80/125 3.15/4.92
Ø Heating flow/return	Inch	1
Ø Domestic hot water production system or 2 nd heating circuit connection	Inch	1
Ø Condensate drain	mm Inch	40 1-1/2
Ø Heating water drain	Inch	1/2
Ø Air bleed	Inch	3/4

* Note:

- The F3/4"-F3/8" reduced bend supplied with the boiler makes it possible to assemble the 3/8" bleed supplied (refer to section 7 - page 25 - chapter V - INSTALLATION).

3 - DIMENSIONS

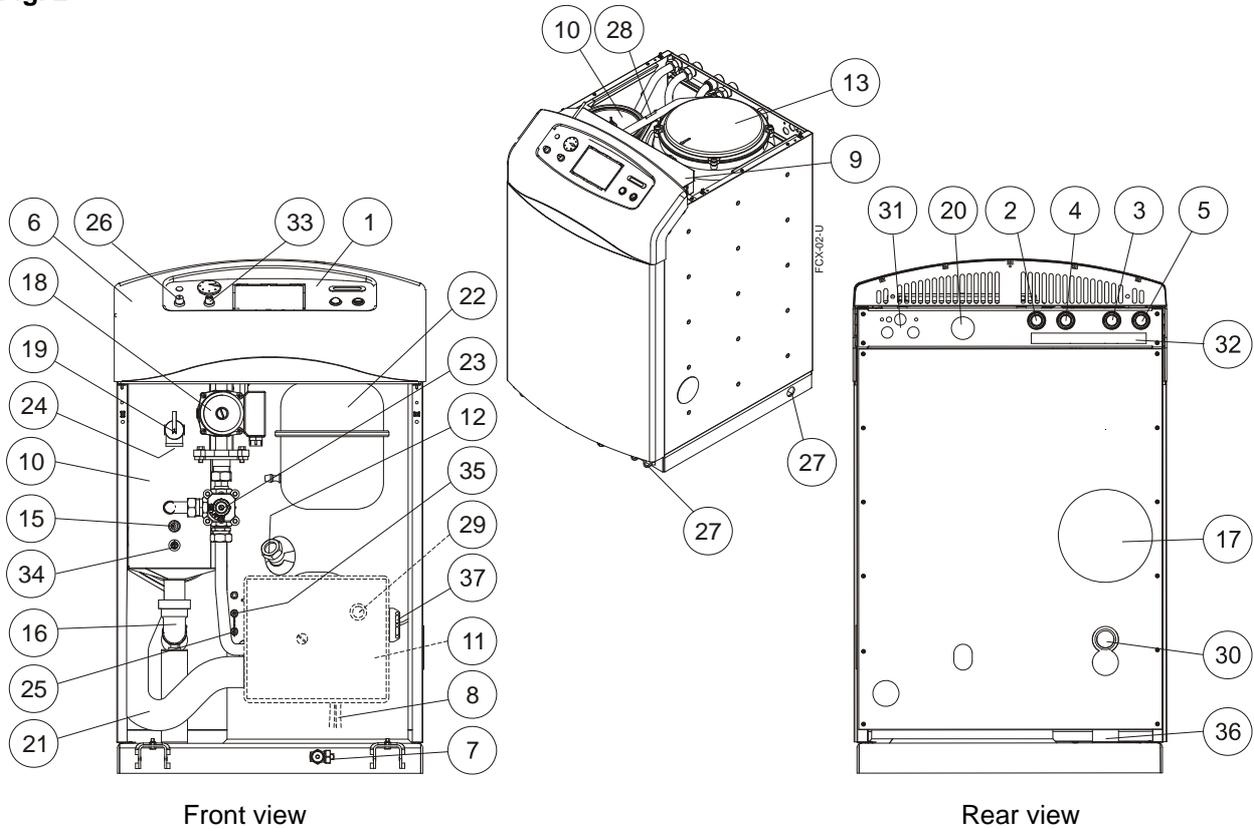


Note:

- Be sure to leave a sufficient gap behind the boiler for access to the combustion product evacuation trap.

4 - DESIGNATION OF COMPONENTS

Fig. 2

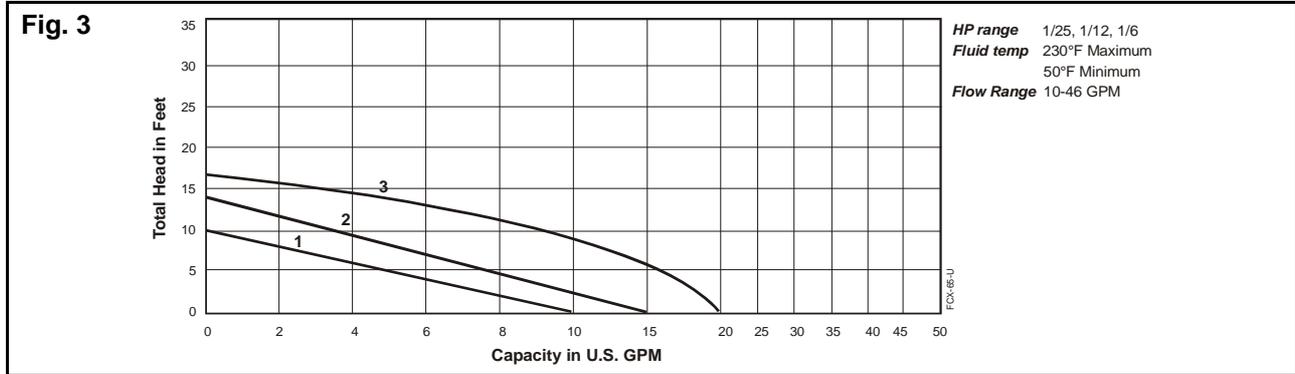


- | | |
|---|--|
| <ul style="list-style-type: none"> 1) Control panel 2) 1st circuit heating flow 3) 1st circuit heating return 4) 2nd circuit heating flow / Primary flow - (outlet of the boiler to the domestic hot water preparation) (optional) 5) 2nd circuit heating return / Primary return - (return from domestic hot water preparation to the boiler) (optional) 6) Plastic cover 7) Drain cock 8) Oil supply 9) Terminal box protection plate 10) Condenser 11) Oil burner (supplied separately) 12) Sight glass 13) Boiler shell 14) / 15) Combustion test point 16) Siphon 17) Combustion product outlet 18) Heating circulating pump 19) Safety valve 20) Weld for air bleed connection (bend + air bleed delivered with the boiler) 21) Air inlet duct to the burner | <ul style="list-style-type: none"> 22) Expansion vessel
[8 L (2.1 gal) = FCX 22 / 12 L (3.2 gal) = FCX 30] 23) Manual mixing valve 24) Safety valve outlet 25) Pocket for boiler temperature control thermostat bulb 26) Water overheating safety thermostat 27) Opening for passage of handling bars 28) Temperature thermometer bulb, heating outlet 1st circuit 29) Burner safety reset button 30) Condensate drain 31) Opening for passage of 230 V cables 32) Opening for passage of sensor cables 33) Combustion product overheating safety thermostat 34) Pocket for combustion product overheating safety thermostat bulb 35) Pocket for water overheating safety thermostat bulb 36) Hole for oil hose raceway and outlet of the safety valve 37) Burner electrical supply |
|---|--|

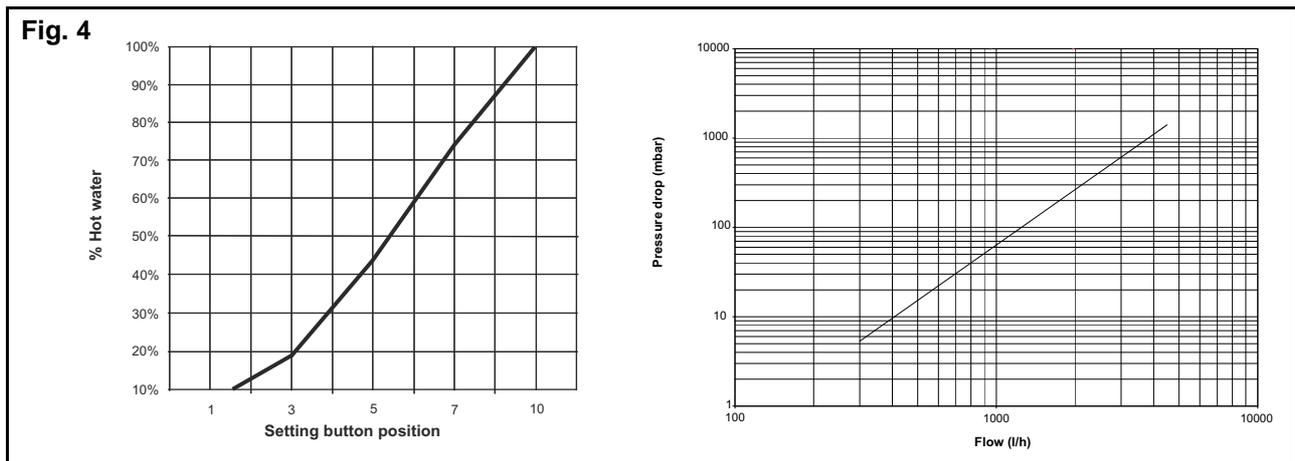
5 - CIRCULATING PUMP CHARACTERISTICS

The circulating pump is equipped with a 3-speed motor with a 85 W (0.11 HP) maximum power input.

The heating pump's power consumption can be significantly optimised by adapting its speed to the requirements of the installation and by using the control devices that are offered as options



6 - MIXING VALVE CHARACTERISTICS



7 - CHARACTERISTICS OF THE EXPANSION VESSEL

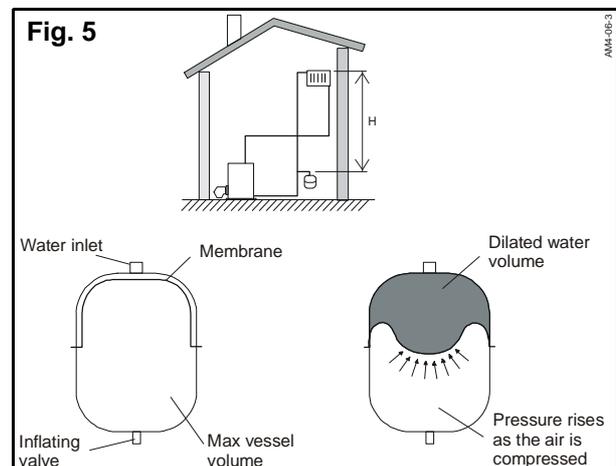
FCX boilers are pre-equipped with an expansion vessel for an installation water capacity of approximately 62 liters (16 gal) .(section 8.2 - page 26 - chapter V - INSTALLATION)

The expansion vessel absorbs the increase in the water volume in the installation produced by the increase in temperature. The pre-inflation of the vessel sends the internal membrane to the side of the connection and the water dilation pushes on this membrane. Optimum efficiency is obtained when the inflation pressure is equal to the water pressure.

Note:

- The minimum water pressure necessary for the correct working of the installation is defined by the difference in levels between the boiler and the

highest point in the installation [ex : 8 m = 0,8 bar (26ft=11.6 Psi)].



1 - DESCRIPTION

The FCX boiler is a sealed exhaust circuit condensation boiler.

Air is sucked in by the burner's fan from outside the appliance through the hose connected to the air inlet and combustion product evacuation concentric tube.

The boiler shell equipped with a system of removable baffles, is linked to a stainless steel condenser located directly on the heating return.

This unit is extremely efficient (thanks to condensation) and produces a very low level of sound.

Two independent heating circuits can be connected to the appliance:

- the 1st circuit (radiators): passes through a three way mixing valve incorporated into the boiler. This valve can either be driven by a regulator (option) or driven manually (factory setting),
- the 2nd circuit can supply an under floor heating circuit (VM2 mixing valve to be used in this case), a hot water production system or both section 8.3 - page 27 - chapter V - INSTALLATION).

V - INSTALLATION

1 - GENERAL



DANGER: Risk of fatal injury from toxic flue gases!

Never connect more than one boiler to a flue system – regardless of whether the flue is vertical or horizontal.

Common venting systems can cause damage to property and personal injury.

Do not route the flue system through another flue system that is in use, e.g. a masonry chimney connected to a wood stove.

Follow the instructions of the flue pipe manufacturer.

The boiler must be installed by a trained and certified installer in accordance with all requirements of NFPA-31, "Installation of Oil-Burning Equipment". Installation must comply with all local and national codes applicable to the installation of oil-fired condensing boilers.

In Canada, the requirements of CSA/CGAB139 Installation Code apply.

1.1 - Notes on installation and operation

When installing and operating the heating system observe the following:

- The local building codes regarding the installation
- The local building codes regarding combustion air supply and venting systems, and the chimney connection
- Regulations governing power connection to the power supply
- The regulations and standards relating to the safety systems for the water heating system

Other important information:

- Only operate the boiler with the combined combustion air/flue venting system specifically designed and approved for it.
- Follow the local code when connecting the condensate outlet to the public sewer system.

2 - VENTILATION

2.1 - Type conventional flue outlet

- All combustion appliances consume a quantity of air proportional to their power.
 - A ventilation space of at least 100 cm² (0.11 ft²) must be provided at least 1.8 m (5.9 ft) above the ground, as well as an air input, below, of 100 cm² (0.11 ft²).
- To avoid corrosion, the combustion air must not contain any harmful agents. Halogenated hydrocarbons, containing combinations of chlorine or fluorine that are found in solvents, paints, glues, propellants, household cleaning products, etc. are considered to greatly encourage corrosion.

2.2 - Balanced flue outlet

When the FCX boiler is installed with the horizontal or vertical balanced flue kits provided as an option, the combustion circuit is sealed tight in relation to the local installation.

The boiler does not require any special ventilation, but when the room is very small, you must take every measure to ensure that the ambient temperature of the installation premises does not exceed 45°C (113°F) (ventilation).

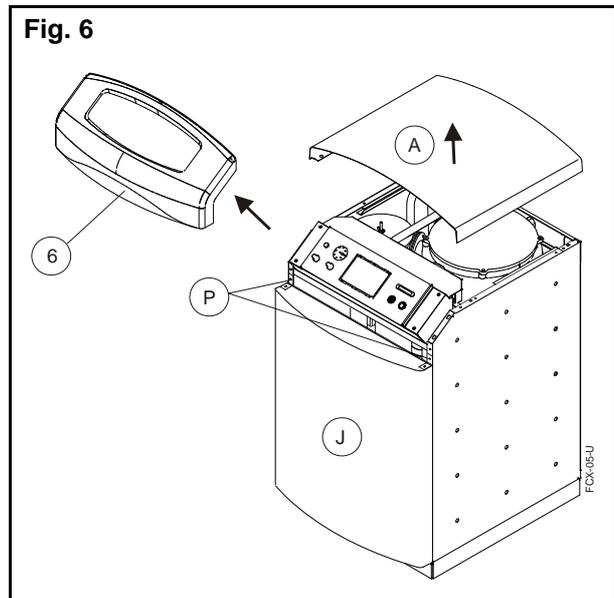


The installation premises may require ventilation to be fitted according to its features or use.

3 - OPENING THE UNIT

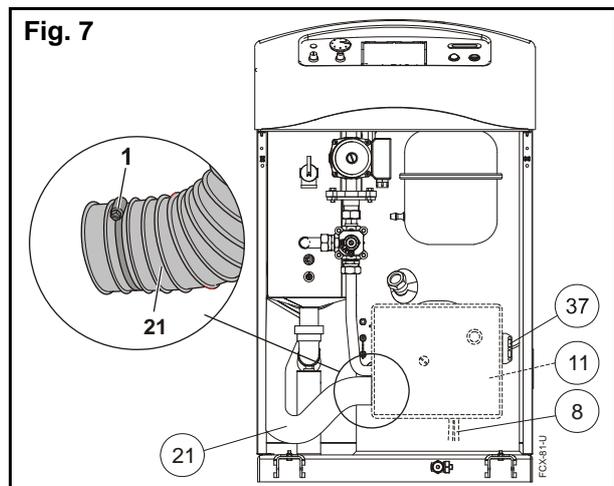
To open Model FCX to access for installation, and/or service, follow these steps :

- Remove the control panel escutcheon molding (6) by grasping it on both sides and pulling it outward towards you and up. The escutcheon will come free of the attachment clips leaving the control panel exposed.
- Remove the top cover of the unit (A) by lifting the cover at the front and rear to free the attachment clips, and then simply lift the cover straight up and off.
- Remove the front panel attachment screws (P), then pull the front panel (J) outward towards you at the top to free it from the attachment clips. Lift the panel up to free it from the lower attachment pins, and simply lift the panel off.



4 - ASSEMBLING OF THE BURNER

- Remove the front panel attachment screws (P, fig. 6), then pull the front panel (J, fig. 6) outward towards you at the top to free it from the attachment clips. Lift the panel up to free it from the lower attachment pins, and simply lift the panel off.
- Make the assembly of the burner on the boiler - refer to the burner's technical instructions.
- After the assembly of the burner :
 - connect the air inlet pipe (21, fig. 7) to the burner (11, fig. 7) and **fix it with the fastening collar (1, fig. 7) supplied to avoid any risks of disconnection (A disconnection of the burner air inlet pipe could generate a dysfunction of the burner),**
 - carry out the power supply connection to the burner with the connector (37, fig. 7) located in the boiler



- remount the front panel (J, fig. 4) with the 2 screws (P, fig. 4), after starting-up the boiler and after checking the combustion settings

5 - COMBUSTION PRODUCT FLUEING



The installer or client must ensure that the flue system chosen complies with local installation regulations.

For the installation of the combustion product evacuation system, accessories or an authorized combustion product system must be used and adapt to the oil fired condensing boiler with a sealed combustion system.



Whatever the type of connection :

To prevent any accidental leakage:

- Check that the air inlet and combustion product extraction outlet tube and bend joints are properly sealed after mounting.
- ensure that tight sealing joints are used.
- use the fastening collars or flanged components to attach the piping securely to the wall with a least 1 collar per female adapter of each section of piping.
- exclude imperatively any use of oil or grease.



To make assembly easier, apply liquid soap over 5 cm (0.03 ft) of the section of the tube to be fitted.

The tubing connections are arranged so that no condensate is retained and to ensure that they are transferred up to evacuation (descending slop of 3% between the base of the flue and the boiler).

5.1 - Boiler placement according to the combustion products outlet system and to the hydraulic connection

When the boiler must be placed as close as possible to the rear wall, several configurations can be envisaged depending on the hydraulic connection - refer to some examples below.

5.1.1 - Installation example



5.2 - Evacuation by chimney flue



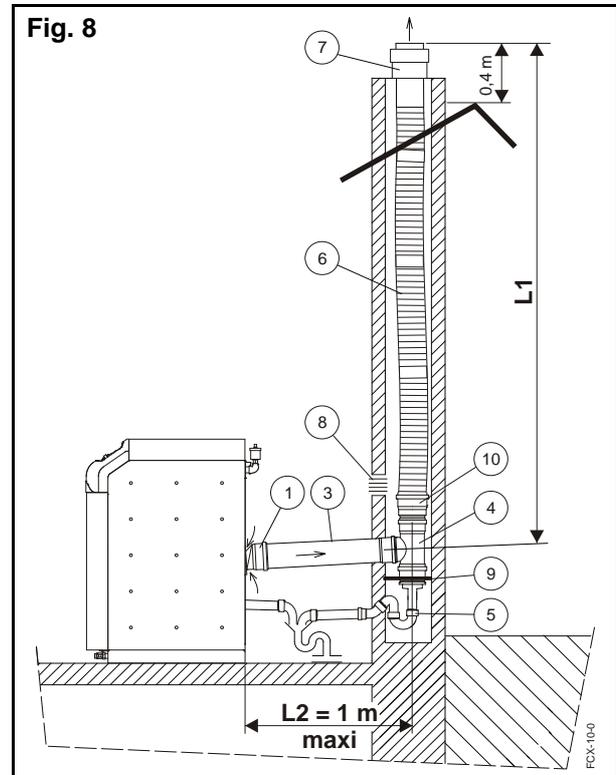
An existing chimney flue can be used provided that it is cleaned before the lining is fitted.

5.2.1 - Standard natural draft configuration (flue operating at negative pressure)

Definition: Lining of an existing chimney flue by a sealed **STAINLESS STEEL** corrugated flue of Ø 125 (4.92 inch).

- The termination is specific to this configuration and the outlet must be **above** the roof (comply with the local intructions régulations),
- **Do not use the hose for a horizontal assembly: condensate may be retained.**
- Use the authorized accessories for the stainless steel conduit connection to the boiler,
- Fit a siphon (5) with a minimum 80 mm (3.15 inch) seal between the bleed T-bracket and the waste water pipe,
- **Ventilation for the flue (8) and the heating system (section 2 - chapter V - INSTALLATION) must be provided.**
- If the boiler is installed in premises that have mechanical air extraction, ensure that this does not cause negative pressure.
- The premises must never be fitted with other appliances using natural draft to operate.
- The air is sucked in by the burner directly from the room in which the boiler is fitted.
- The burner air-inlet is equipped with a flap door valve that reduces losses caused by the accumulation of soot.

5.2.1.1 - Installation example (B₂₃)



Accessories :

- 1) PPTl off-centre reduction Ø 80/110(3.15/4.33 inch),
- 2) /
- 3) PPTl tube Ø 110 (4.33 inch) L = 1 m (3.28 ft) (cut to the length required),
- 4) Bleed T-bracket Ø 110 (4.33 inch),
- 5) Siphon,
- 6) STAINLESS STEEL corrugated flue of grade 904 L Ø 125 (4.92 inch),
- 7) Termination (above the roof) ,
- 8) Lining ventilation
- 9) Bleed T-bracket support
- 10)Adaptator Ø 110/125 (4.33/4.92 inch),

L1max ≤ 20 m (65.6 ft)

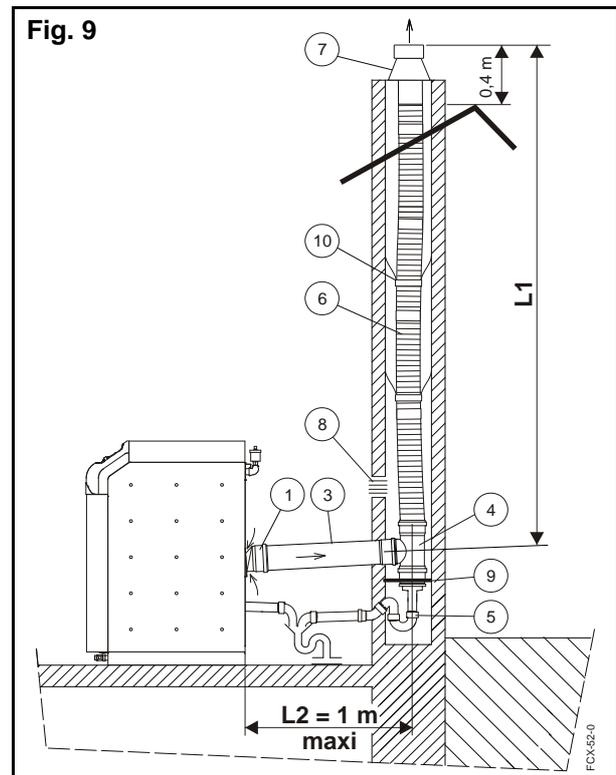
- Each 45° elbow added reduces the total length allowed by 0.5 m (1.6 ft).

5.2.2 - Configuration with pressurized lining (B_{23p})

Definition : Lining of an existing chimney flue by a corrugated PP flue conduit of $\varnothing 110$ (4.33 inch) according to the height.

- The termination must have its outlet **above** the roof (comply with the local instructions regulations),
- **Do not use the hose for a horizontal assembly: condensate may be retained.**
- Fit a siphon (5) with a minimum 80 mm (3.15 inch) seal between the bleed T-bracket and the waste water pipe,
- The bleed T-bracket at the foot of the flue is optional when the vertical flue is short ($L1 < 5$ m),
- **Ventilation for the flue (rep. 8) and the heating system (section 2 - chapter V - INSTALLATION) must be provided.**
- If the boiler is installed in premises that have mechanical air extraction, ensure that this does not cause negative pressure.
- The premises must never be fitted with other appliances using natural draft to operate.
- The air is sucked in by the burner directly from the room in which the boiler is fitted.
- The burner air-inlet is equipped with a flap door valve that reduces losses caused by the accumulation of soot.

5.2.2.1 - Installation example



Accessories :

- 1) PPTl off-centre reduction $\varnothing 80/110$ (3.15/4.33 inch),
- 2) /
- 3) PPTl tube $\varnothing 110$ (4.33 inch) $L = 1$ m (3.28 ft) (cut to the length required),
- 4) Bleed T-bracket $\varnothing 110$ (4.33 inch)
- 5) Siphon,
- 6) PP corrugated flue $\varnothing 110$ (4.33 inch),
- 7) Termination (above the roof)
- 8) Lining ventilation
- 9) Bleed T-bracket support
- 10) Chimney spacers

Models	Maximum permitted length L1 with bleed T-bracket with horizontal connection 1 m (3.28 ft) at conduit diameter
	Conduit $\varnothing 110$ (4.33 inch)
FCX 22 C	20 m (66 inch)
FCX 30 C	15 m (49 inch)

Note:

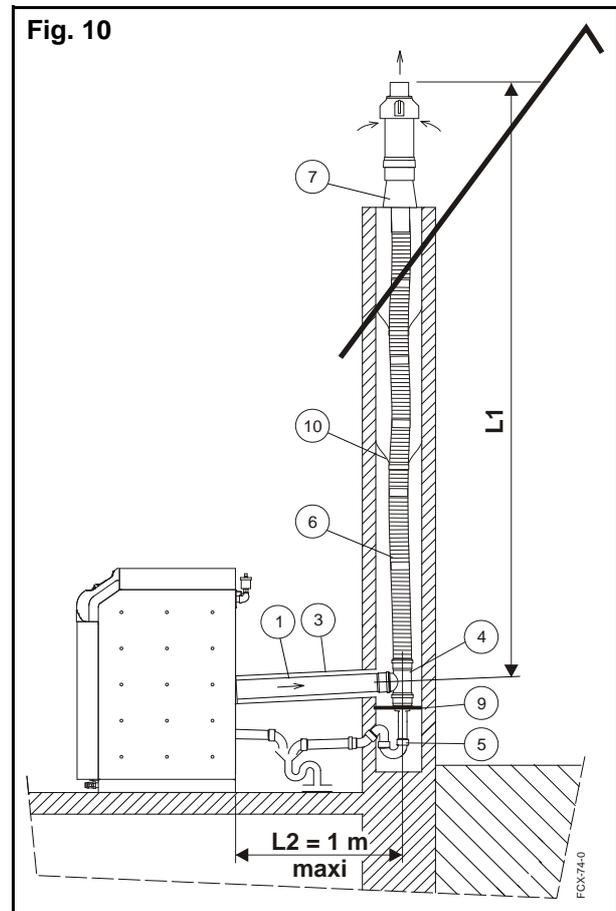
- Calculation of the diameters for the conduits to be made according to the local instructions regulations.
- Each 45° elbow added reduces the total length allowed by 0.5 m.

5.2.3 - Sealed configuration by chimney flue

Definition: Lining of an existing chimney flue, sealed with respect to the installation room by a PP corrugated flue of Ø 80 (3.15 inch) or Ø 110 (4.33 inch) (in this case the air inlet is obtained by the chimney flue around the combustion product outlet) - (no ventilation constraints for the boiler).

- The roof termination specific to this configuration can have an outlet **below** the roof,
- **Do not use the hose for a horizontal assembly: condensate may be retained.**
- Fit a siphon (5) with a minimum 80 mm (3.15 inch) seal between the bleed T-bracket and the waste water pipe,
- The bleed T-bracket at the foot of the flue is optional when the vertical flue is short,
- The air is sucked in by the burner from outside the room through the concentric terminal.
- **Refer to the CSTB technical notice for installing flues.**

5.2.3.1 - Installation example



Accessories :

- 3) PPTl tube Ø 80 (3.15 inch) L = 1 m (3.28 ft) (cut to the length required),
- 3) PVC tube Ø 125 (4.92 inch)L = 1 m (3.28 ft) (cut to the length required),
- or 1+3 = concentric extension Ø 80/125 (3.15/4.92 inch)
- 4) Bleed T-bracket (PPTl Ø 80 (3.15 inch) for FCX 22) - (PPTl Ø 110 (4.33 inch) with at input, an offset reducing coupling of Ø 80/110 (3.15/4.33 inch) for the FCX 30) (preferred option), or Ø 80 (3.15 inch) or Ø 110 with a 90° elbow,
- 5) Siphon,
- 6) PP corrugated flue (Ø 80 (3.15 inch) for FCX 22) - (Ø 110 (4.33 inch) for FCX 30)
- 7) Termination (outlet possible below the roof)
- 9) Bleed T-bracket support
- 10) Chimney spacers

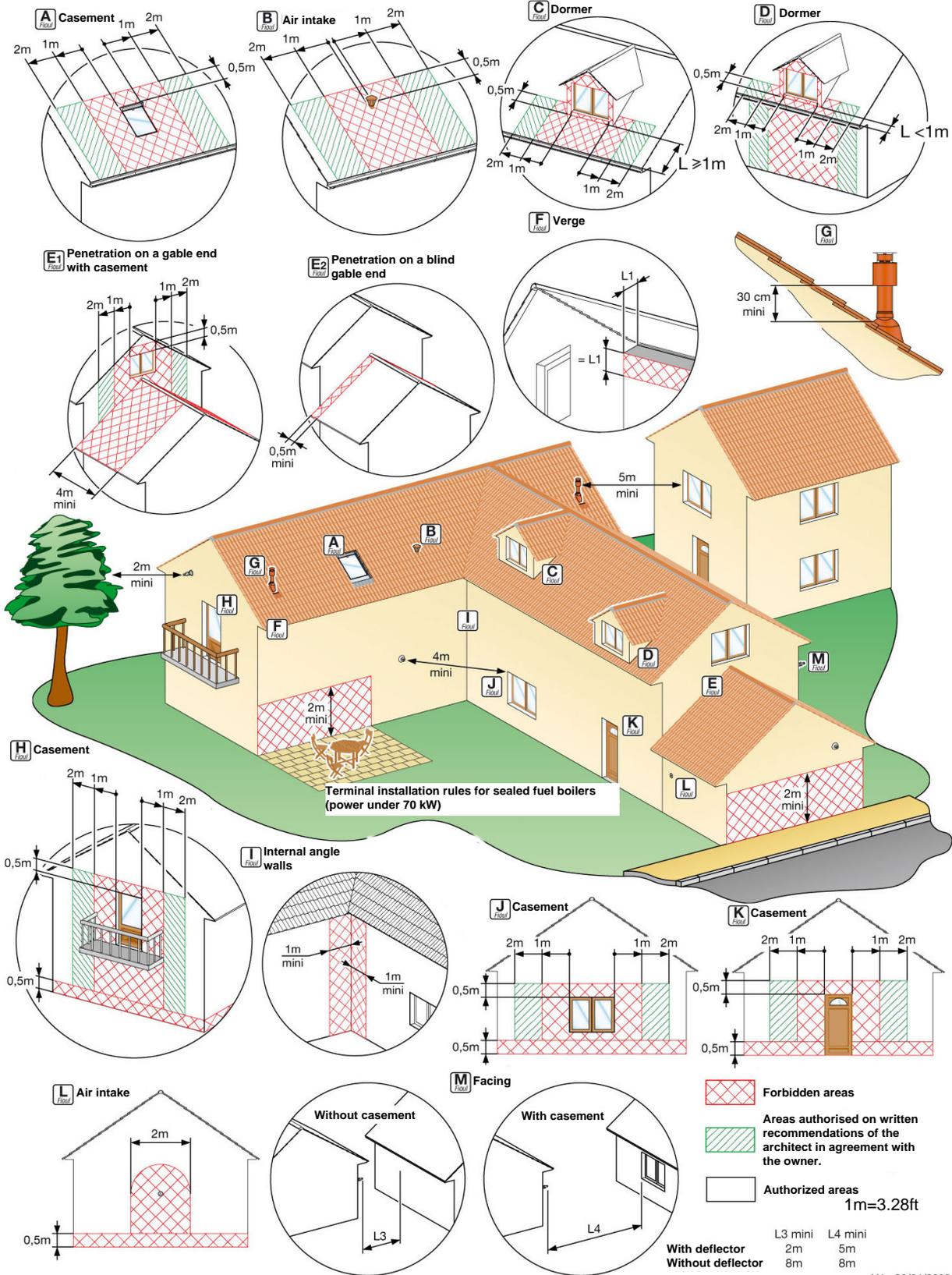
Maximum length allowed: :
 $L_{max} \leq L1 + L2 + 1\text{ m (3.28ft)} \leq 9\text{ m (29.5 ft)}$

- T-bracket added reduces the total length allowed by 1 m (3.28 ft).

5.3 - Balanced flue outlet

5.3.1 - Installation regulations for balanced flues - Comply with the National and Local Standards

Fig. 11



Drainage by balanced flue offers the advantage of making the boiler airtight in relation to the ventilation conditions in the premises on which it is installed. Drainage is possible through the wall next to the boiler or through the roof.

5.3.2 - Horizontal balanced flue

Recommendations



It is possible to install the boiler with a balanced flue outlet when the wall next to the boiler is an outside wall opening on to a well-ventilated area.

Ensure that the level of sound produced by the boiler, around the balanced flue terminal, will not be a nuisance.

Do not place the flue terminal:

- at less than 2 m (6.6 ft) from a ventilation hole or an opening,
- in front of the building or in a passageway (risk of obstruction, smell of combustion products, varying amounts of steam depending on the weather conditions).
- at less than 2 m (6.6 ft) from the ground or in an area that can be accessed by a young child (risk of obstruction - not supplied).

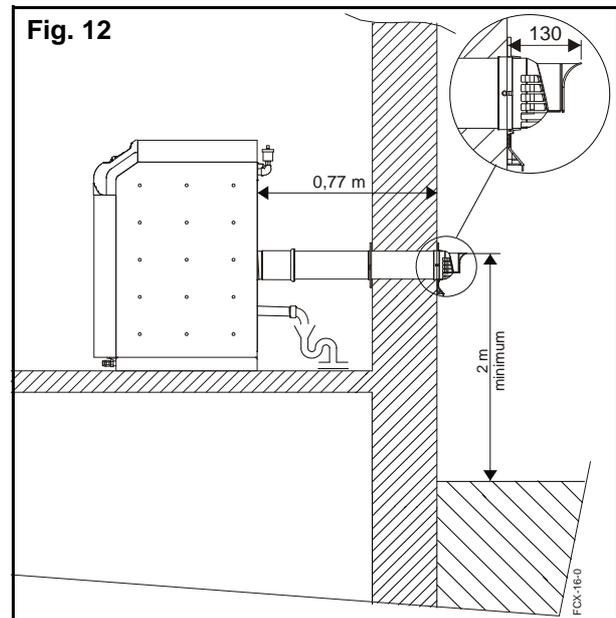
Maximum linear length of the horizontal flue :
Lmax = 5 m (16.4 ft)

Note:

- It is possible to raise the terminal using the flue with elbow option.
- Each 45° elbow added reduces the total authorized length by 0.5 m (1.6 ft) .
- Each 90° angle added reduces the total authorized length by 1 m (3.28 ft).

5.3.2.1 - Installation examples

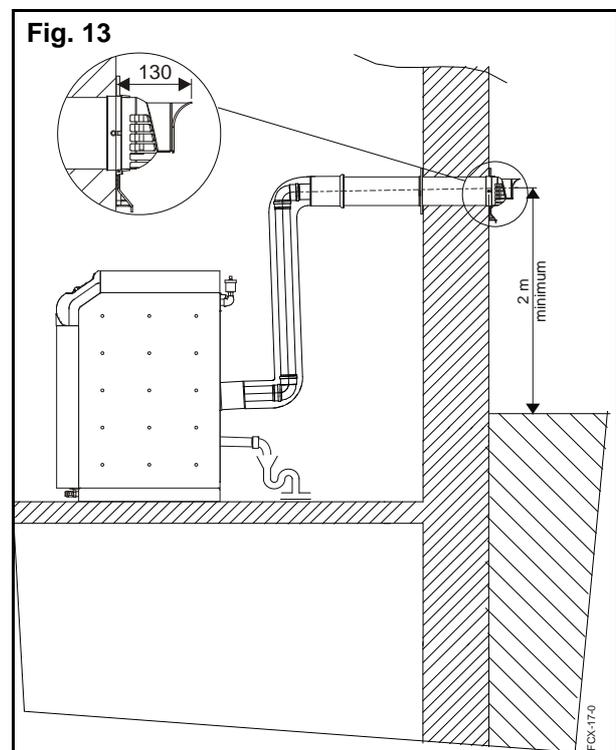
5.3.2.1.1 - Straight balanced flue



Accessory:

- 1 straight horizontal balanced flue kit - **l = 0,95 m (3.12 ft)**.

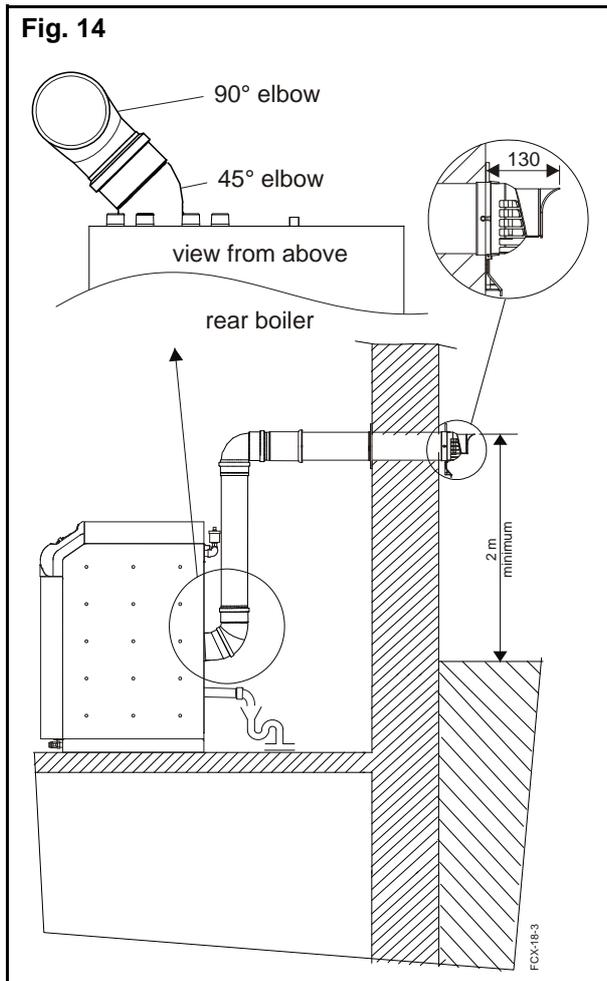
5.3.2.1.2 - Angled balanced flue with hose



Accessory:

- 1 angled horizontal balanced flue kit - **l = 3 m (9.8 ft)**.

5.3.2.1.3 - Rigid flue with elbow



Accessory:

- 1 angled horizontal balanced flue kit - **l = 3 m (9.8 ft)**,

Note :

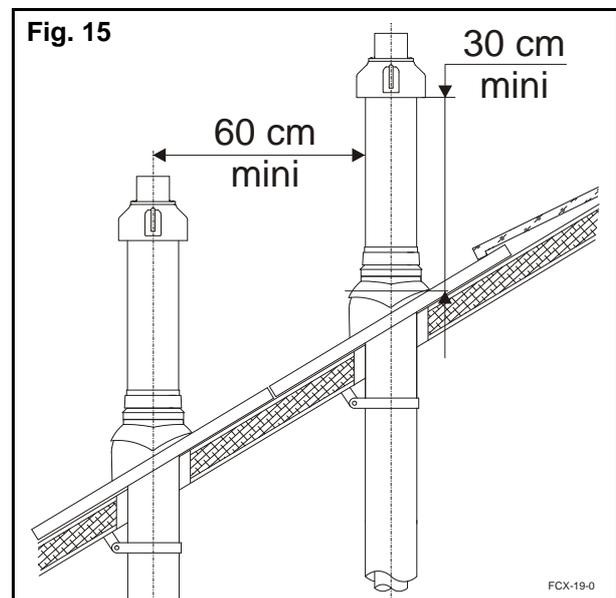
- Use either the 45° bend or the 1 m (3.28 ft) extension at boiler outlet according to the system design.

5.3.3 - Drainage by vertical balanced flue

In addition to the flue installation guide-lines mentioned above, the vertical flue terminal must leave a minimal 30 cm (0.98 ft) gap between the roof level (sloping or flat) and the air intake zone.

The distance between two terminals is also regulated: it is advised to position two adjacent terminals in the same horizontal plane. If this is not applicable, the axis of the lower terminal must be at least 0.60 m (1.97 ft) clear of the closest point of the air inlet of the higher terminal

Maximum length of the vertical conduit = **9 m (29.5 ft)**



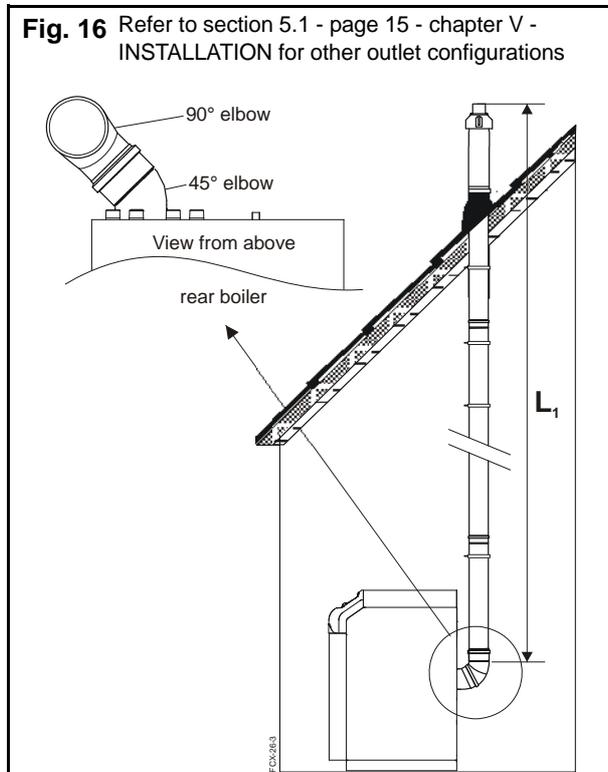
GEMINOX recommendations



It is advised to use 45° elbows rather than 90° elbows.

5.3.3.1 - Examples of installations with a 45° bend and a 90° bend at the boiler outlet

5.3.3.1.1 - Straight configuration



Accessories :

- 1 45° concentric elbow Ø 80/125 (3.15/4.92 inch)
- 1 90° concentric elbow Ø 80/125 (3.15/4.92 inch),
- concentric extensions Ø 80/125 (3.15/4.92 inch),
- 1 concentric vertical terminal Ø 80/125 (3.15/4.92 inch),
- 1 vertical terminal fastening collar (supplied with the vertical terminal),
- 1 sleeve tile adaptable according to the type of roof covering and the roof slope,
- 1 roof plate,
- 3 Ø 125 (4.92 inch) fastening collars,

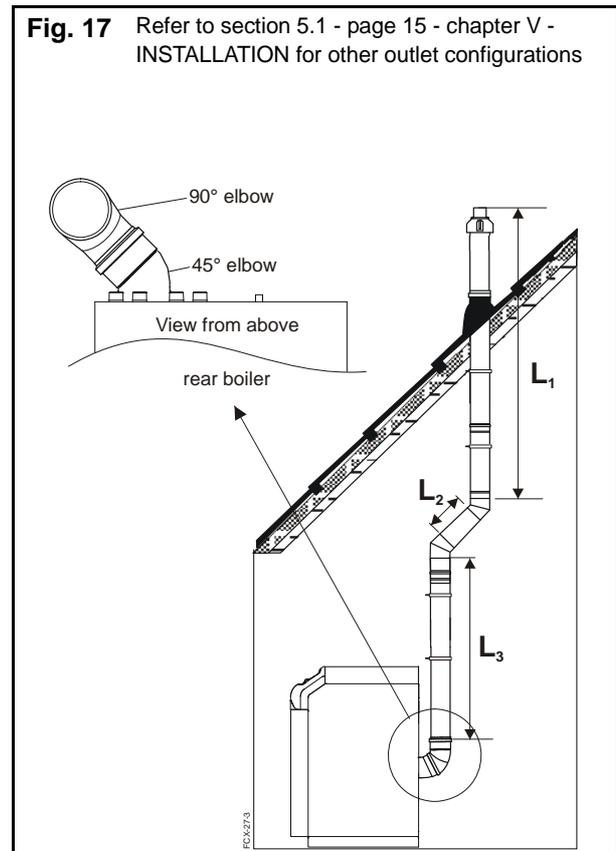
$$L_{max} = L1 + 1 \text{ m} + 0,5 \leq 9 \text{ m}$$

$$L_{max} = L1 + 3.28\text{ft} + 1.6\text{ft} \leq 29.5 \text{ ft}$$

Note:

- Each 45° elbow added reduces the maximum authorised length by 0.5 m. (1.6 ft)
- Each 90° elbow added reduces the maximum authorised length by 1m (3.28 ft).

5.3.3.1.2 - Straight configuration



Accessoires :

- 1 45° concentric elbow Ø 80/125 (3.15/4.92 inch)
- 1 90° concentric elbow Ø 80/125 (3.15/4.92 inch),
- 3 concentric extensions Ø 80/125 (3.15/4.92 inch),
- 2 45° concentric elbow Ø 80/125 (3.15/4.92 inch),
- 1 concentric vertical terminal Ø 80/125 (3.15/4.92 inch),
- 1 vertical terminal fastening collar (supplied with the vertical terminal),
- 1 sleeve tile adaptable according to the type of roof covering and the roof slope,
- 1 roof plate,
- 3 Ø 125 (4.92 inch) fastening collars

$$L_{max} = L1 + 0,5 \text{ m} + L2 + 0,5 \text{ m} + L3 + 1 \text{ m} + 0,5 \leq 9 \text{ m}$$

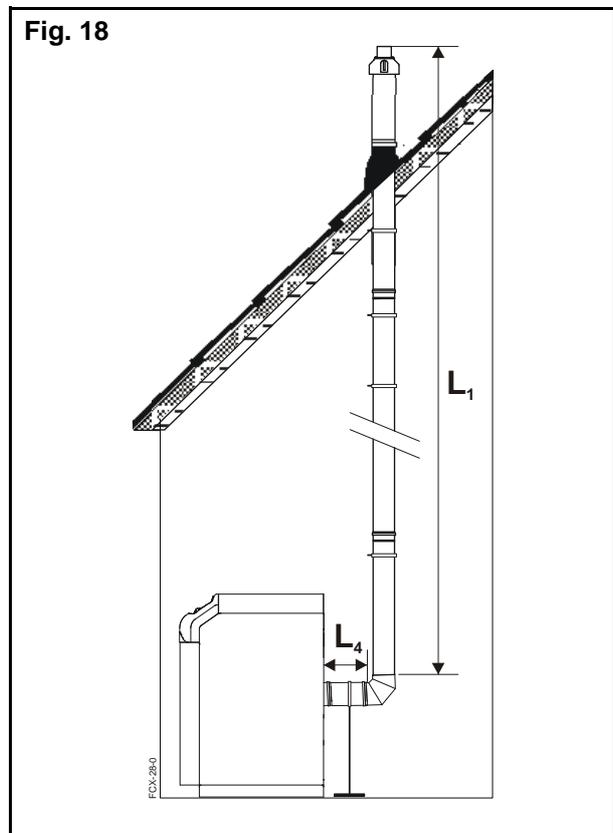
$$L_{max} = L1 + 1.6\text{ft} + L2 + 1.6\text{ft} + L3 + 3.28\text{ft} + 1.6\text{ft} \leq 29.5\text{ft}$$

Note:

- Each 45° elbow added reduces the maximum authorised length by 0.5 m (1.6 ft).
- Each 90° elbow added reduces the maximum authorised length by 1m (3.28 ft).

5.3.3.2 - Examples of installation with a boiler outlet extension

5.3.3.2.1 - Straight configuration



Accessories:

- 1 90° concentric elbow Ø 80/125 (3.15/4.92 inch)
- concentric extensions Ø 80/125 (3.15/4.92 inch),
- 1 concentric vertical terminal Ø 80/125 (3.15/4.92 inch),
- 1 vertical terminal fastening collar (supplied with the vertical terminal),
- 1 sleeve tile adaptable according to the type of roof covering and the roof slope,
- 1 roof plate,
- 3 Ø 125 (4.92 inch) fastening collars,
- 1 adjustable support,

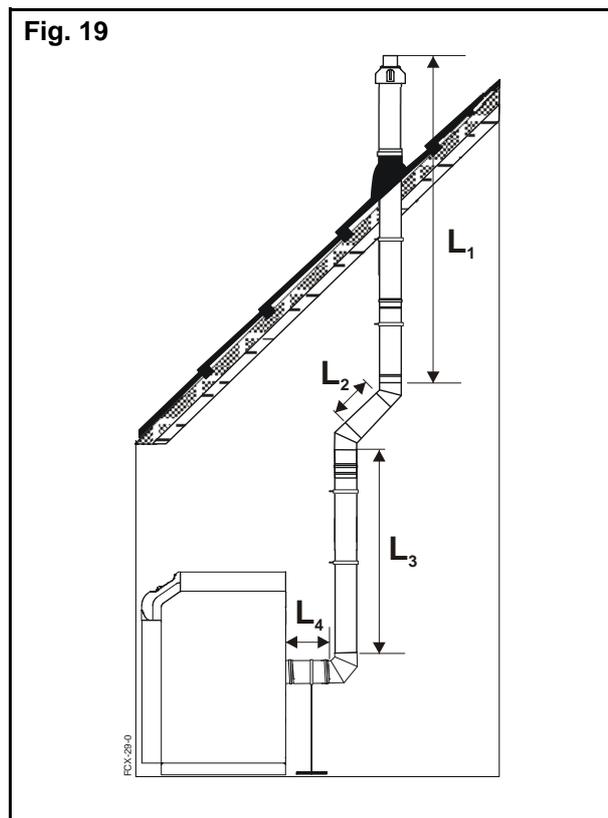
$$L_{max} = L_1 + 1 \text{ m} + L_4 \leq 9 \text{ m}$$

$$L_{max} = L_1 + 3.28\text{ft} + L_4 \leq 29.5 \text{ ft}$$

Note:

- Each 45° elbow added reduces the maximum authorised length by 0.5 m. (1.6 ft)
- Each 90° elbow added reduces the maximum authorised length by 1m (3.28 ft).

5.3.3.2.2 - Configuration with elbows



Accessories:

- 1 90° concentric elbow Ø 80/125 (3.15/4.92 inch),
- 3 concentric extensions Ø 80/125 (3.15/4.92 inch),
- 2 45° concentric elbows Ø 80/125 (3.15/4.92 inch),
- 1 concentric vertical terminal Ø 80/125 (3.15/4.92 inch),
- 1 vertical terminal fastening collar (supplied with the vertical terminal),
- 1 sleeve tile adaptable according to roof covering type and slope,
- 1 roof plate,
- 3 Ø 125 (4.92 inch) fastening collars,
- 1 adjustable support

$$L_{max} = L_1 + 0,5 \text{ m} + L_2 + 0,5 \text{ m} + L_3 + 1 \text{ m} + L_4 \leq 9 \text{ m}$$

$$L_{max} = L_1 + 1.6\text{ft} + L_2 + 1.6\text{ft} + L_3 + 3.28\text{ft} + L_4 \leq 29.5 \text{ ft}$$

Note:

- Each 45° elbow added reduces the maximum authorised length by 0.5 m. (1.6 ft)
- Each 90° elbow added reduces the maximum authorised length by 1m (3.28 ft).

6 - CONDENSATE DRAINAGE

When connecting the condensate drain to the waste water drain, it is essential:

- to follow all applicable codes and regulations covering the disposal of condensate originating from combustion appliances.
- to maintain a downwards slope towards the drain,



The condensate drainage tubes must either be buried or pass through a heated area to avoid any obstructions caused by freezing.

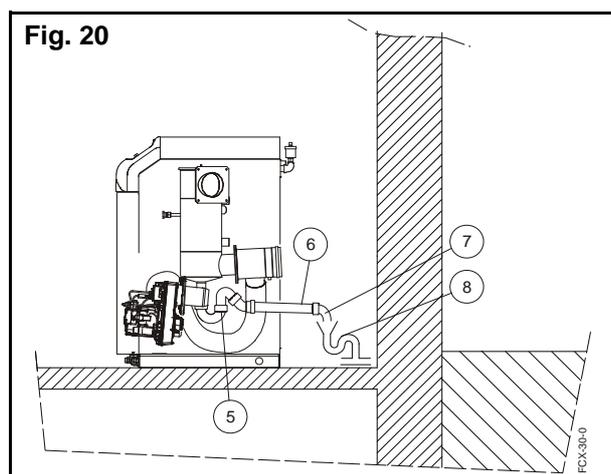
The condensate drainage siphon should be checked regularly.



Before activating the boiler for the first time, remove the condenser cover and fill the siphon (rep 10) (fig. 2 - page 10 - chapter III - TECHNICAL SPECIFICATIONS).

Note:

- The maximum production of condensates is 1.5 l/h (with underfloor heating low temperature load 100 % load) which amounts to an average daily production of 10 litres of condensates for a 15 kW installation - This low flow rate does not require any specific treatment (extensive dilution in the waste water). Nevertheless, if local regulations require waste to have a neutral pH, a condensate treatment tank must be installed between the siphon and the waste water drain.



Accessories:

- Siphon (5)
- Tube \varnothing 40 (1"-1/2) (6)
- Elbow \varnothing 40 (1"-1/2) (7)
- Waste water drain (8)

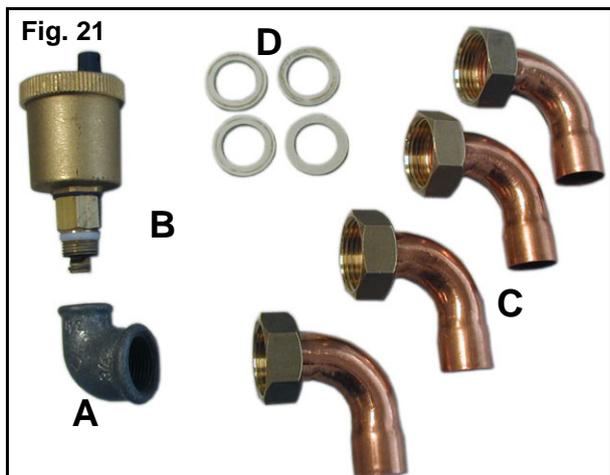


DANGER: Risk to life from flue gas poisoning!

A dry siphon or leaky condensate connections can release flue gases into the building.

Check the siphon fluid level regularly and fill with water if needed.

7 - ASSEMBLY OF ACCESSORIES DELIVERED WITH THE BOILER



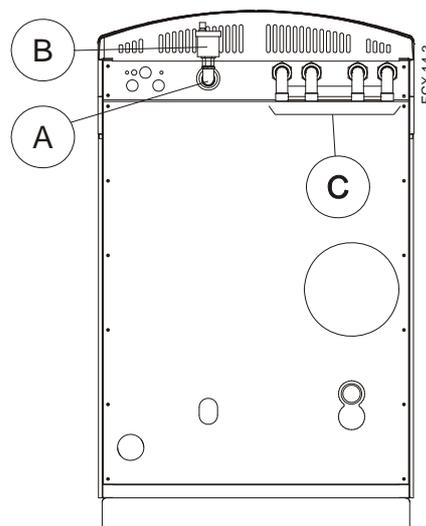
7.1 - Bleed + bend

- Install the bend (A) on the weld for bleed connection - 3/4" section, boiler side,
- Install the bleed (B) on the 3/8" section of the bend (A).

7.2 - 1" - Ø 22 bends + seal

- Fit the 4 bends (C) and the related seals (D) on the boiler outlet/return tubes.

Fig. 22



8 - HYDRAULIC CONNECTION

Water circuit connections are made in the back of the unit on the four 1" branch connections - use the four bends provided (refer to section 7 - page 25). Model FCX can be connected to various comfort heating water systems as well as to a domestic hot water heating system if desired.

8.1 - Recommendations



When the boiler is assembled on an old installation make sure the installation is rinsed with fresh water, so as to clear any sediment stagnating in areas where the flow is slow.

To prevent circulation noises in an installation featuring temperature controls, the following is recommended:

- Do not fit all the radiators with temperature controls,
- Fit a differential valve,



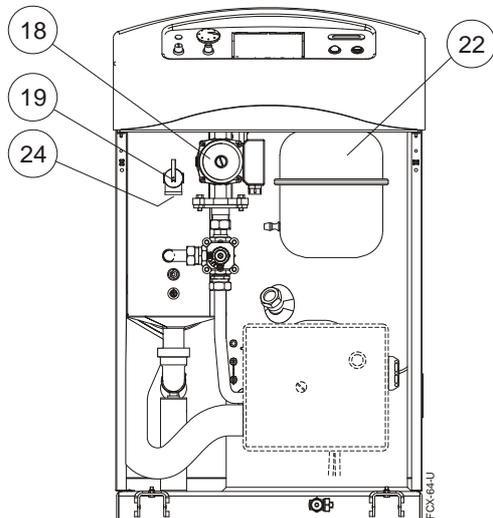
In accordance with the installation standards, a filling system must be fitted on the installation.

Never place an isolation valve between the safety control box and the hot water tank (FCX + domestic hot water tank) and never between the boiler shell and the expansion vessel.

The boiler should be positioned so that the connection of the combustion products outlet system is possible with respect to the heating outlet/return pipes (section 5.1 - page 15 - chapter V - INSTALLATION).

8.2 - Accessories to connect, install or adjust

Fig. 23



- 1 Expansion vessel (22),
- 1 Circulating pump (18),
- 1 Safety pressure relief valve (19),
- 1 Safety valve outlet (24)

- Isolating valve :

It is advised to place isolation valves on the installation's flow-returns so as to allow possible servicing on the boiler without draining the installation. **Never place an isolation valve between the safety control box and the hot water tank**

- For the FCX boiler + domestic hot water production system - See the tank technical instructions.

- Circulating pump :

Water circulating pumps provided in the various circuits must be large enough for each circuit including the pressure drop of the boiler/condenser in the unit.

Set the pump to the speed that is appropriate to the installation's flow rate and load loss (limitation of circulation noises, optimisation of power consumption).

- Water pressure gauge (not supplied):

This has to be fitted outside the unit.

- Safety valve:

This must be connected to the used water drain via a siphon funnel.

- Expansion vessel:

If the installation capacity is over 62 litres (16 gal), an extra expansion vessel to the boiler expansion vessel will be added.

The correct operation of the boiler requires an installation pressure of at least 1 bar.

If the installation is a renovation and uses an open vessel, this must be removed and replaced with a closed vessel (the boiler can be equipped with one originally) to seal the circuit.

The vessel should be able to support an expansion of 6% of the total water capacity of the heating circuits. But it is important to note, in order to guarantee this expansion, that the useful capacity of a vessel does not equal its actual capacity.

Example :

- Installation : 100 litres (26.4 gal)
- Domestic hot water tank : 5 litres (4.3 gal)
- Boiler : 16 litres (4.2 gal)
- Total water capacity : 121 litres (32 gal)

Conditions : Using a vessel pre-loaded to 1 bar (14.5 Psi) (under floor boiler = ground floor heating + 1 floor), heating safety valve calibrated at 3 bars (43.5 Psi), installation filled cold at 1 bar.

• Vessel efficiency calculation (R):

$$R = \frac{(\text{Safety Pressure} - \text{Filling pressure})}{\text{Safety Pressure}}$$

$$R = \frac{(3 + 1) - (1 + 1)}{(3 + 1)} = 0,5$$

+ 1) = the transformation of relative pressures into absolute pressures

• Calculation of the useful capacity of the vessel (Cu) :

$$Cu = \text{total volume} \times \text{expansion}$$

$$Cu = 121 \times 0,06 = 7,26 \text{ dm}^3$$

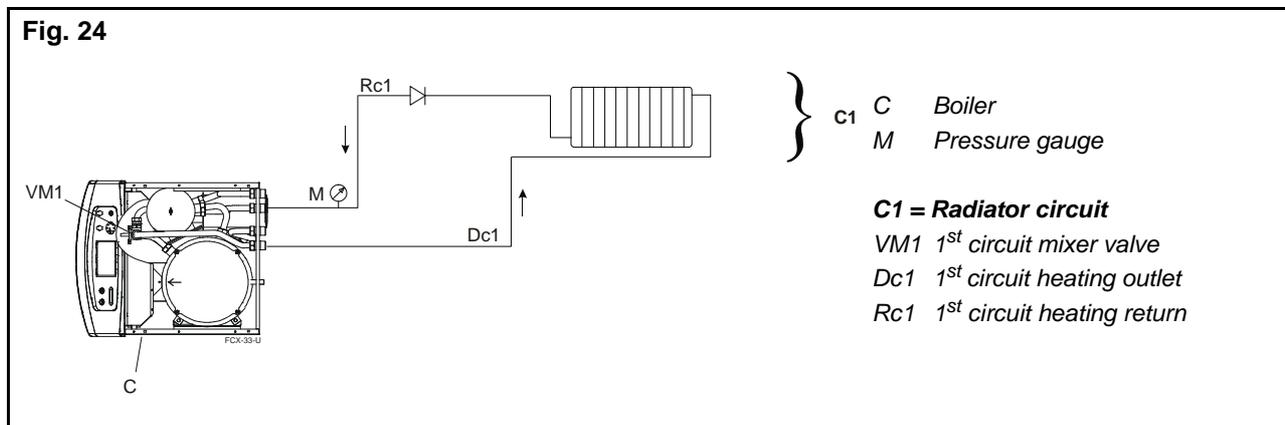
• Calculation of the real capacity of the vessel (Cr) :

$$Cr = \frac{Cu}{R}$$

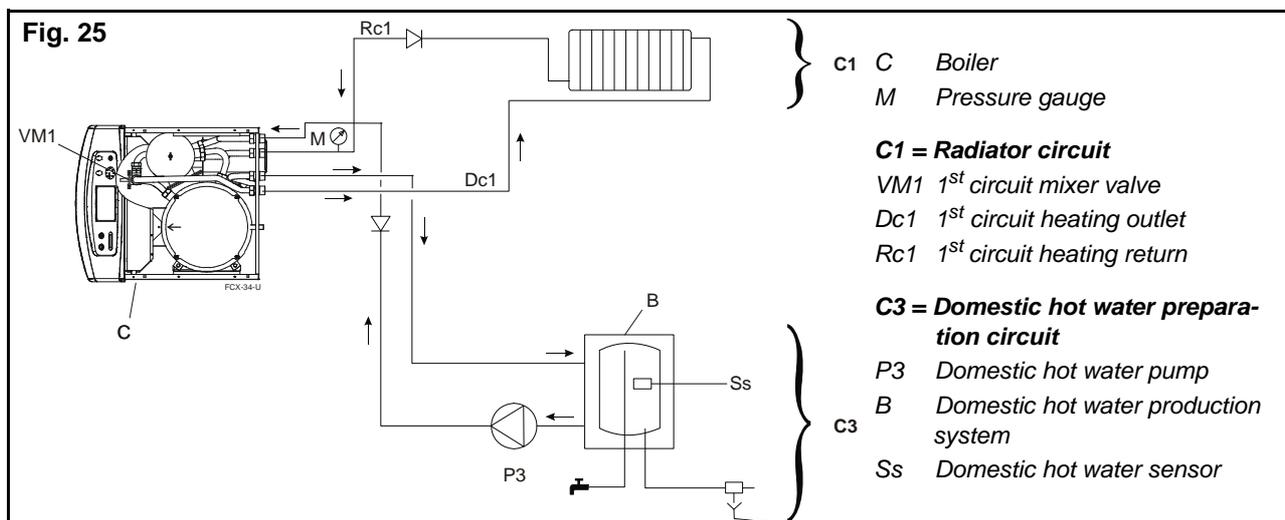
$$Cr = \frac{7,26}{0,5} = 14,5 \text{ (litres (3.83 gal))}$$

8.3 - Various typical water circuits are illustrated below

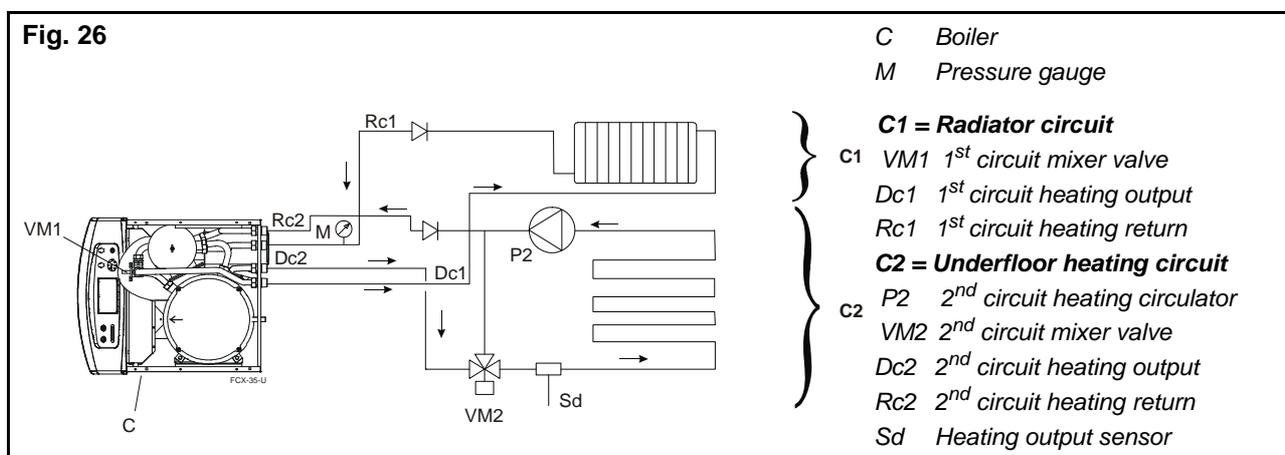
8.3.1 - Connection to a single heating circuit



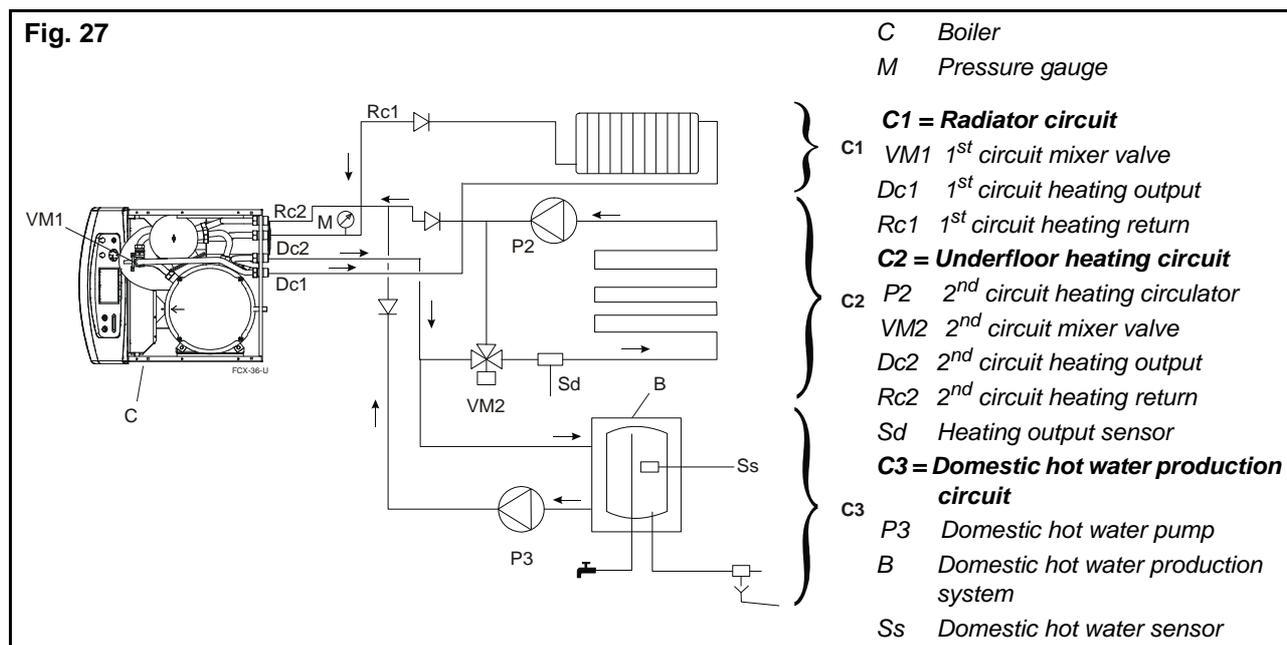
8.3.2 - Connection to a heating circuit with a domestic hot water production system



8.3.3 - Connection to a double heating circuit



8.3.4 - Connection to a double heating circuit with a domestic hot water production system



9 - OIL CONNECTION

The fuel connection is to realize to the burner. (Burner supplied separately).

Please refer to the technical instructions supplied with the burner.

Note :

- Fitting an oil filter to the burner oil inlet is recommended.

10- ELECTRICAL CONNECTIONS

WARNING - ELECTRICAL SHOCK HAZARD!

DISCONNECT THE POWER SUPPLY BEFORE ATTEMPTING ELECTRICAL INSTALLATION OF THE UNIT.

The electrical connection and all the equipment used to make this connection must be in accordance with the locally applicable regulations,

The premises must be suitable in terms of the boiler protection (IP X 0D),



WARNING: Fire hazard from hot boiler components!

Hot boiler components may damage electrical cables

- Make sure that all cables are routed through the conduits provided or on the outside of the boiler's thermal insulation.

- Make sure the boiler is electrically grounded to NEC or CEC requirements.

Electrical power and control connections are made to pigtail leads that exit through holes (2 et 4, fig. 28) in the right rear of the unit (facing the front of the unit).

The power connections must be made in a Listed junction box that is not provided with the unit. All wiring should conform to the National Electrical Code and any applicable local codes and standards. To minimize the likelihood of a heating system shutdown caused by an unrelated electrical circuit fault, the unit and any related electrical components should be connected to a separate branch circuit specifically dedicated for that purpose.

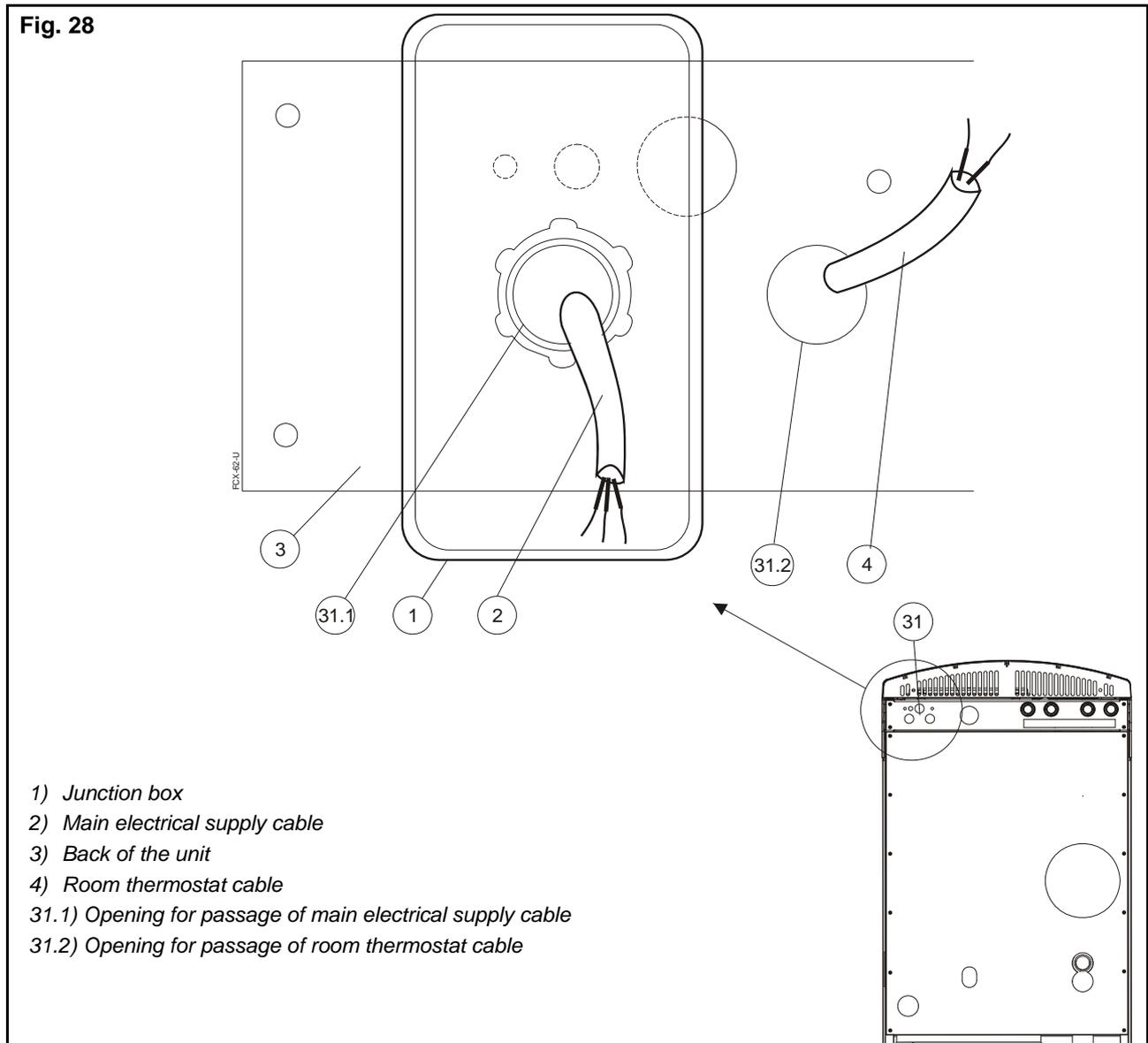
The control circuit connections can be in-air splices made to pigtail leads provided. Control circuit connections must be NEC Class 2, intended for connection to a typical room thermostat.

There are three 7/8" holes in the right rear of the

unit. Mount a Listed 2 x 4 inch, "HandiBox" type junction box (1, fig. 28) vertically over the hole (31.1) in such manner that the hole (31.2) is open. When installing the junction box, center the box vertically over the hole (31.1) by using the center knockout in the box. Install a 1/2-inch trade size cable connector or insulating bushing through the hole in the unit and through the knockout in the box. Secure the box with screws as required.

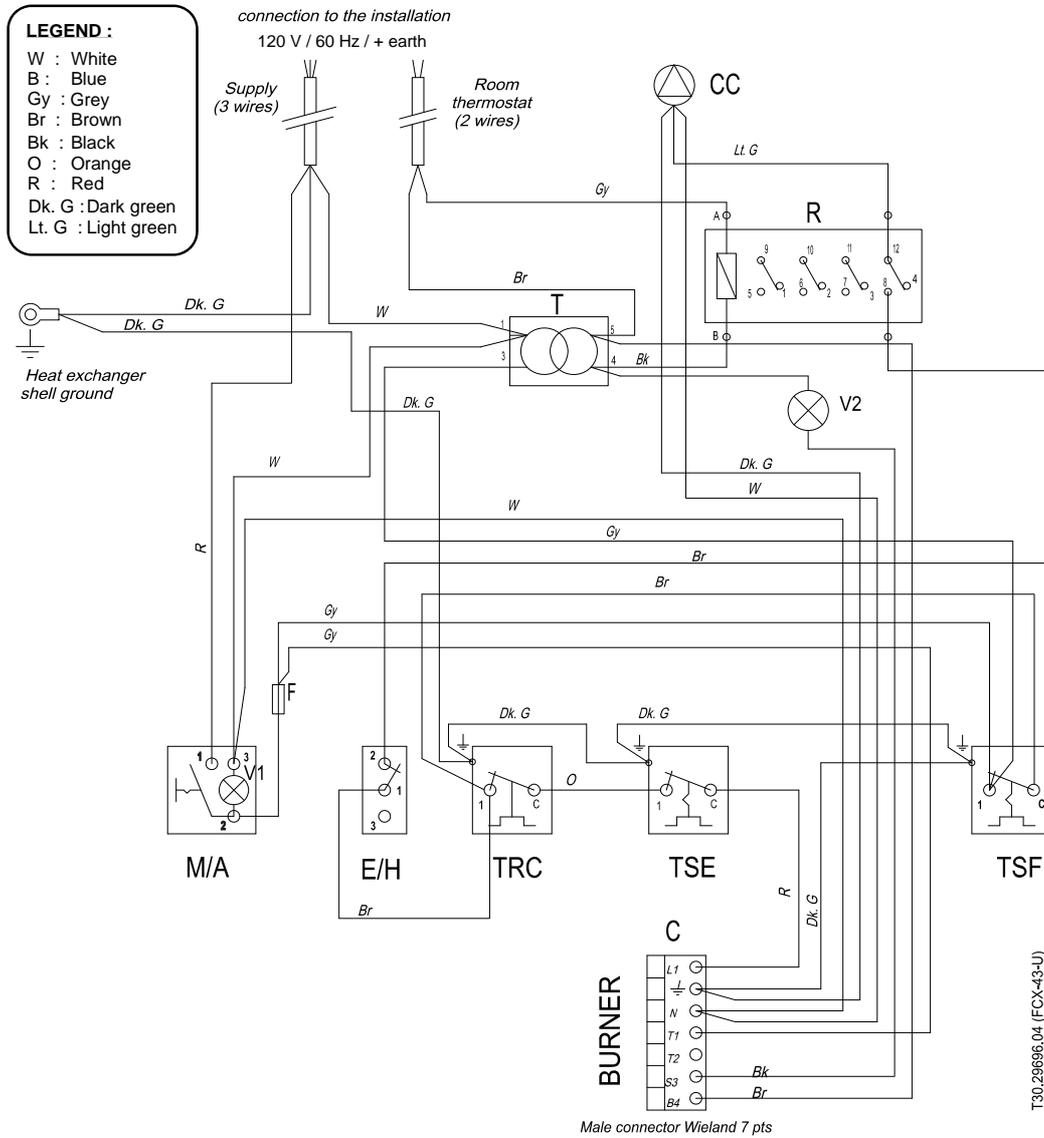
Connect the main electrical supply cable (2, fig. 28) to the connector into the junction box and secure the connector clamp on the wires (Use a listed connector).

Install a second cable or conduit connector in another knockout in the box for the power wiring system as required. Connect the power wires and grounding conductors to the pigtail leads in the box using Listed wire connectors and install a cover.



10.1 - Wiring and connection diagram

Fig. 29



T30.29696.04 (FCX-43-U)

LEGEND :

- | | |
|--|-----------------------------------|
| L : Phase | V1: On light |
| N : Neutral | V2: Burner safety shutdown light |
| M/A: On/Off switch | C : Burner connector |
| E/H: Summer/Winter switch | F : Fuse (6,3 A) |
| TSE: Overheat safety cutout aquastat | R : Relay |
| TRC: Adjustable thermostat | T : Main transformer 120/24 volts |
| TSF: Flue gas safety cutout thermostat | CC : Circulating pump |

Notes :

- Electric power leads factory provided at right rear of unit. Permanently field splice 120-1-60 field provided power circuit leads in NEC junction box.
- Control circuit leads factory provided at right rear of the unit are 24 volt, NEC class 2 for connection to a room thermostat.

VI - COMMISSIONING

1 - FILLING THE SYSTEM WITH WATER



WARNING: Health risk from contaminated domestic water!

Always observe the regulations and standards applicable in your jurisdiction for the prevention of contamination of drinking water (e.g. by water from heating systems).



CAUTION: Risk of damage to system due to material stress caused by temperature differentials!

Only fill the heating system when cold.

- Filling the system:
 - Open the heating output/return valves if necessary,
 - Open the cold water inlet valve,
 - Fill the installation slowly (to aid degassing) using the filling system.
- Close the filling valves again,
- Check that it is watertight,
- Drain the entire installation, including the radiators. Continue to fill until a pressure of 1,5 bar (22 Psi) is obtained.
- To FCX with DHW hot water tank:
 - When the boiler is under pressure and the hot water circulating pump is supplied, the water tank coil will be purged when the circulating pump is started.
 - Filling the tank:
 - . Fill the tank with water using the safety control box of the system, and making sure a hot water tap is open,
 - . When the tank is filled, check that the tank access door is tightened,

2 - OIL INLET



The burner must be off when filling the tank with oil. Only start it up after a minimum time of one hour to prevent any

of the various filters from clogging owing to the suction of deposits disturbed in the tank when it is filled.

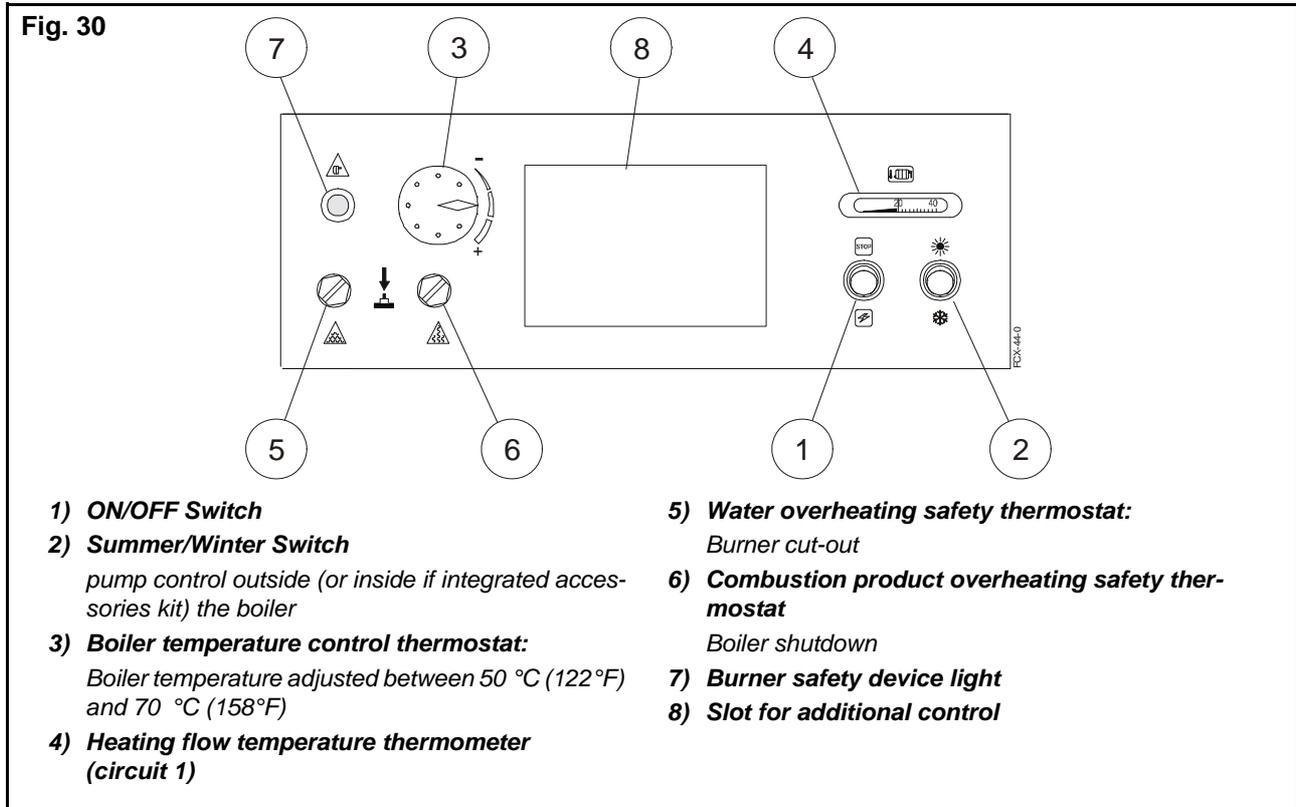
3 - PRE-COMMISSIONING CHECK

- Check that the boiler is filled with water and under pressure (1,5 bar=22 Psi) and that there are no leaks,
- Fill the entire water system with water, treated as desired for the application, including anti-freeze solution if appropriate. Open any shut-off valves in the system.
- Check that the electrical connection of the boiler is correct: 120 V, 60 Hz, connection to earth in conformity, polarities respected,
- Check that the combustion product drainage flue is correctly assembled, airtight and free of all obstructions.
- Check that the ventilation units in the heating system are free from any obstructions and that they conform to the necessary regulations.
- Check that the condensate siphon of the flues is filled with water (filled via the condenser cover),
- Check that the condensate outlet is connected properly and that there are no leaks.
- Leak-check the fuel oil supply system and open any fuel shut-off valves.

4 - USER INFORMATION

It is up to the installer to inform the user as to how to use the appliance. In particular, the user must be informed about the safety devices and their use and about the need for regular maintenance by a qualified professional.

5 - COMMISSIONING

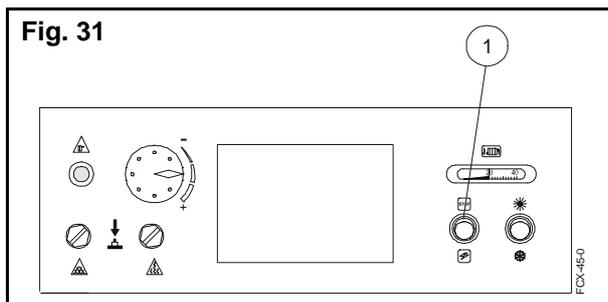
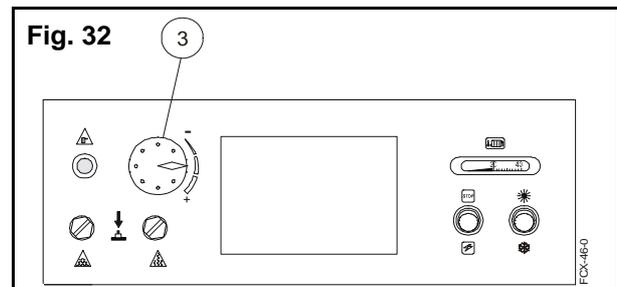


To start the boiler, first make sure the room thermostat is set at a high enough temperature to be closed so that the circulating pump is running.

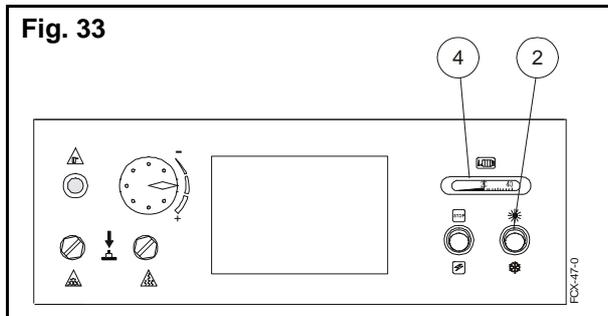
- Set the boiler temperature thermostat (3) - To minimum mid-season and maximum in the winter (adjust in accordance with the installation).

5.1 - Commissioning procedure - without regulator

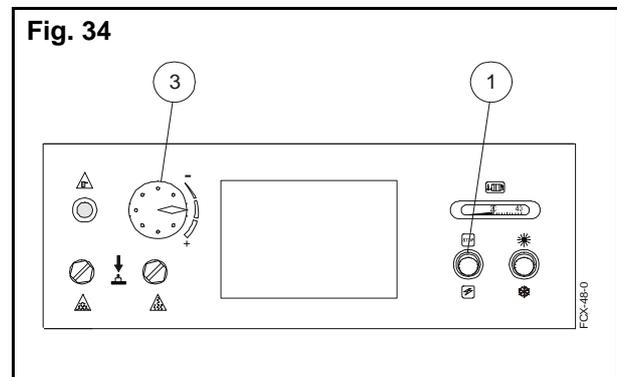
- Open the heating output/return valves and the fuel inlet,
- Activate the electrical circuit-breaker outside the boiler,
- Turn the On/Off switch (1) to On -
 - Nota : When the burner has been commissioned the delay can be from 1 to 2 minutes before starting,



- For commissioning with the winter setting:
 - Press the Summer/Winter switch (2) - Winter position - heating pump started up.
 - adjust the mixing valve (23 , fig. 2 - page 10 - chapter III - TECHNICAL SPECIFICATIONS) so that the desired radiator output temperature is obtained (indication on the thermometer (4)).



- For commissioning with the summer setting:
 - For the FCX models:
 - Stop the boiler using the Stop/Start switch (1),
 - For the FCX + domestic hot water production tank :
 - press the Summer/Winter switch (2) - Summer position,
 - set the tank domestic hot water thermostat to the required temperature,
 - position the boiler temperature thermostat (3) to the minimum,
 - set the mixing valve (23 , fig. 2 - page 10 - chapter III - TECHNICAL SPECIFICATIONS) to position "0".



In the summer it is advisable to operate the heating pump for several minutes to avoid any risks of fouling (see section 4 - page 37 - chapter VII - MAINTENANCE).

(When the boiler is equipped with an electronic regulator, this function is performed automatically).

5.2 - Commissioning procedure - with regulator

See the regulator technical instructions for temperature control.



Set the boiler temperature thermostat (3) to maximum.

5.3 - Commissioning the oil burner

- While the oil burner has been adjusted at the factory, it is recommended that the operating characteristics of the burner be determined at start-up and readjusted if necessary. Run the unit long enough at the burner maximum firing rate to make sure the burner has reached a stable maximum operating temperature. THEN, check the burner as follows:
- When commissioning the oil burner for the first time:
 - check that the smoke spot number does not exceed 0.5 (BACHARACH control),
 - check the CO₂ rate - 11.5 to 12.5 %, CO < 100 ppm (watch out for secondary air inlets),
 - check the temperature of the combustion products (under 230°F - 110 °C).

Models		FCX 22 C	FCX 30 C
oil burner RIELLO		RDB 2.2 (T1)	RDB 2.2 (T3)
		Réglage à la puissance maxi	Réglage à la puissance maxi
Heat flow	Btu/hr kW	81250 23.8	107500 31.5
Pump pressure	Psi bar	185 13	180 12
Nozzle		0,55 60A	0,7 60A
Position of the air flap (FCX balanced flue outlet)		1,5 B	3,5 C

Remark:

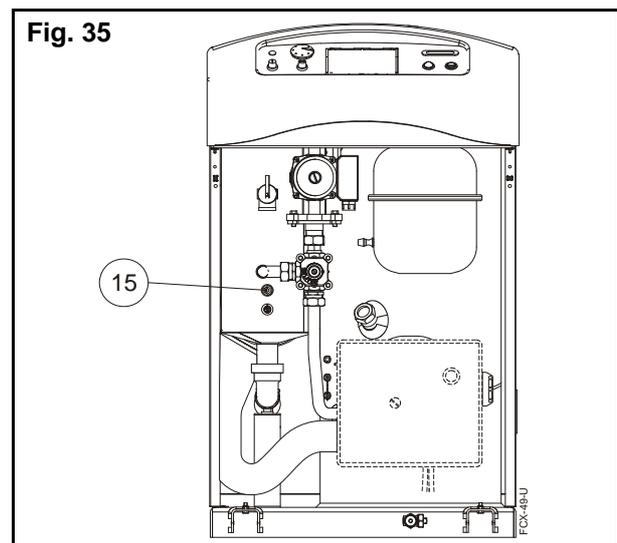
- The air and oil inlet settings must be checked systematically on commissioning and after all maintenance operations on the burner by testing the opaqueness of the flue gasses and of the % CO₂
- See the burner technical instructions.



Ensure that the maximum heat flow is respected.

Combustion inspection must be carried out when the boiler is heated up. The temperature of the air allowed to pass to the burner increases notably when the boiler is installed with a concentric flue.

Combustion control is carried out on the boiler through the opening (15) provided for this purpose after the cap is removed. This opening must be closed again after checking.



6 - CHECKING THE SAFETY DEVICES

At the time of commissioning, check the safety and control devices.

- Thermostats :
 - Check that the thermostat bulbs are correctly positioned in their housing. Burner shut-off through a temperature increase,
- Flame monitoring :
 - Burner shut-down through the deactivation of the flame monitoring device or the interruption of the fuel inlet,
- 30 Psi safety valve (heating circuit),

VII - MAINTENANCE

It is recommended that the boiler and flue/combustion air system be inspected and maintained annually by a qualified technician.

Spare parts must be ordered using the references given in chapter IX - PARTS LIST - page 41, specifying the type and serial number of the device.



Disconnect all electrical circuits before servicing the unit.

Close any isolation valves that may be in the water system.

Shut off the fuel oil supply if servicing the burner



DANGER: Risk of fatal injury from escaping flue gases!

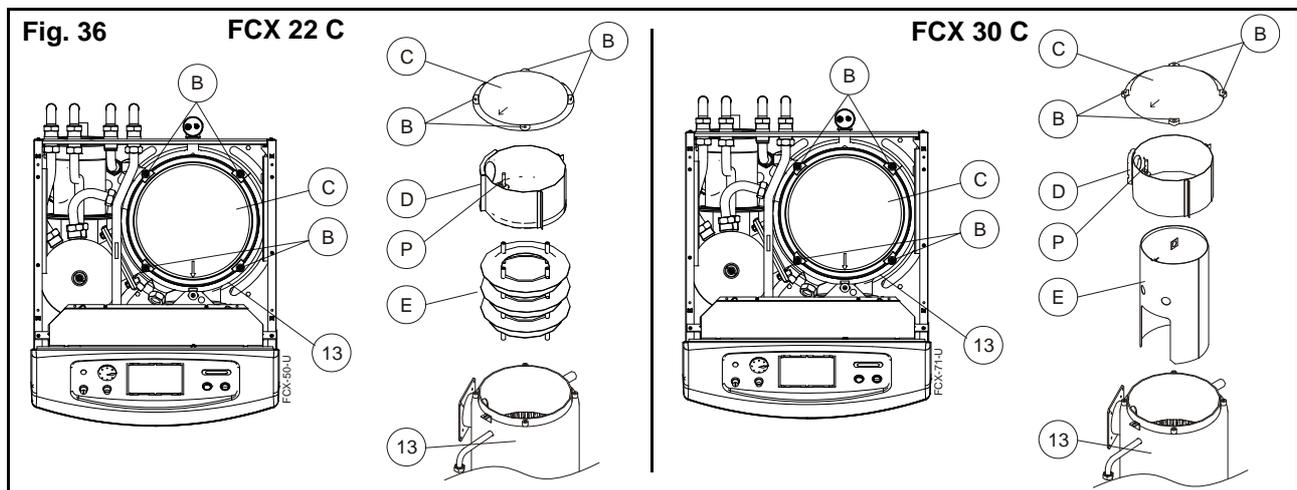
Follow these instructions carefully to ensure safe operation of the system after completing the cleaning.

Open the top of the boiler and the front panel (refer to section 3 - page 14 - chapter V - INSTALLATION).

Drain the unit if necessary (refer to section 9 - page 39 - chapter VII - MAINTENANCE).

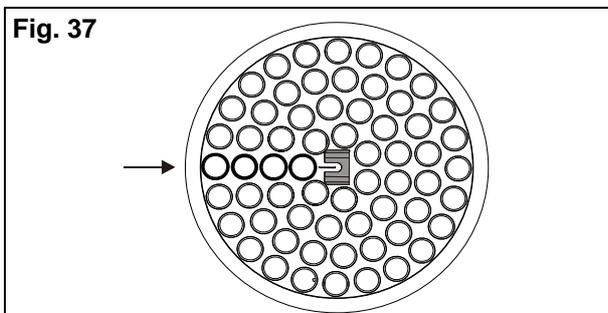
1 - CLEANING THE BOILER SHELL

- Unclip the top of the boiler casing by pulling it upwards (refer to section 3 - page 14 - chapter V - INSTALLATION),
- unscrew the 4 fixing screws (B) from the cast-iron plate (C)
- remove the combustion chamber pipe (D),
- remove the baffles (E - FCX 22) or remove the firebox (E - FCX 30) ,
- clean the walls of the boiler shell (13),
- reassemble all the parts and be sure :
 - not to reverse them,
 - for FCX 30 models :
 - . Position the firebox cover (E) centrally using the 2 internal pins of the boiler shell and the positioning arrow on the top of the cover.
 - to position the combustion chamber pipe (D) with its centering screw (P) towards the front of the boiler,
 - to position the cast-iron plate arrow marker (C) opposite the centering screw (P).

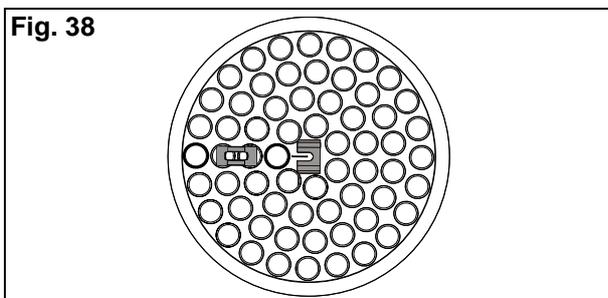


2 - CLEANING THE CONDENSOR

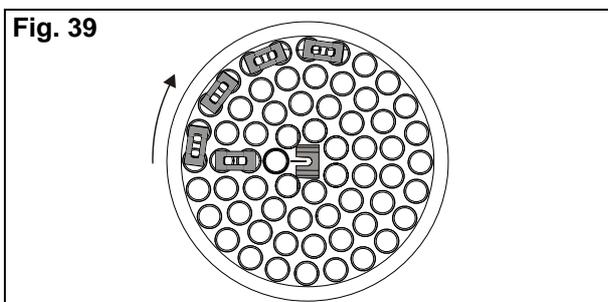
- Unclip the top of the boiler casing by pulling it upwards (section 3 - page 14 - chapter V - INSTALLATION),
- Remove the condenser insulation (S, fig. 41),
- Unscrew the fixing screw (F) from the condenser cover (G),
- Remove the swirlers (N) of the tubes (H) of the condenser (10),
- Clean the condenser tubes (H) using a bottle brush,
- Position the swirlers (N) in the tubes (H) of the condenser (10) ensuring that the following layout is respected:
 - identify the 4 tubes aligned opposite the notch of the jumper used to support the threaded rod (R, fig. 41),



- leave the tube closest to the jumper empty,
- position the first swirler in the following 2 tubes,

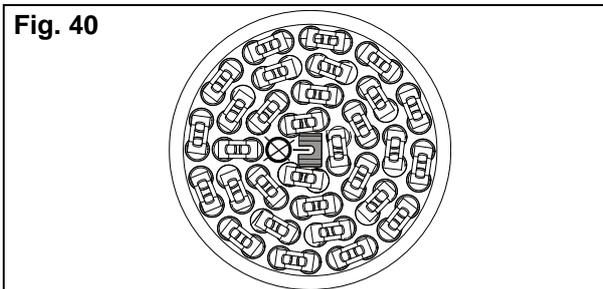


- continue to distribute the swirlers by fitting them in a circular direction.



 **The tube closest to the jumper must remain empty.**

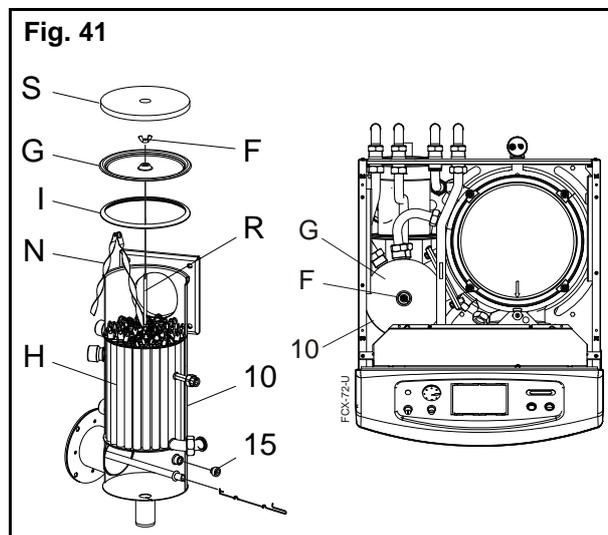
- Final result:



- Check that the combustion products can flow freely :
 - unscrew the plug to check the combustion products (15),
- Check that the sealing joint is properly positioned (I) when replacing the cover (G):

Remarks:

- If after cleaning the temperature of the flue gasses remains excessive ($> 230^{\circ}\text{F} = 110^{\circ}\text{C}$), perform a boiler check.
- Make sure that the sealing joint on the cover (I) are maintained in good condition and replace it if necessary.



3 - BURNER MAINTENANCE



Turn-off and disconnect the boiler

Annual burner maintenance is sufficient if it is properly adjusted.

- cleaning: See *boiler instructions*,
- check that the spray nozzles are in good condition (s. section 5.3 - page 34 - chapter VI - COMMISSIONING,).
- check that there is no fuel leak.

4 - CHECKING ACCESSORIES

- Check annually that the safety and regulation devices (30 Psi safety valve, air bleed, safety control box, etc.) are operating properly.
- Check that the condensate drain siphon is clean (remove it, clean it, replace it and then fill it with water).
- Also check that neither the installation nor the boiler present any water or fuel leaks (leaks may produce a risk for safety and shorten the lifespan).
- When it is frequently necessary to add water to maintain pressure in the installation, even though no leaks have been discovered, perform an expansion vessel check (s. section 5 - page 37 - chapter VII - MAINTENANCE).
- Check the condition of the various seals (burner flange, burner door, flue outlet, etc.).
- To avoid any sludging risk, it is recommended to switch-on the circulator heater and to operate the mixing control valve at least twice during the summer (see the operating instructions).

5 - EXPANSION VESSEL PRE-INFLATION PRESSURE CHECK

- Drop the pressure in the heating installation by opening the drain cock or the safety valve (pressure gauge reading under 7-8 PSI (0.5 bar)).
- Check the pressure in the expansion vessel and if necessary bring it back up to pressure, or replace it if the membrane is punctured (water present in the inflating valve).
- To optimise the efficiency of the vessel:
 - adjust its pre-inflation pressure in line with the installation. It must correspond to the static height of the installation (H) expressed in bars (height between the highest point of the installation and the expansion vessel, with 10 metres (32.8 ft) = 1 bar (14.5 Psi)),
 - adjust the filling pressure of the installation to a value of over 3 PSI (0.2 bar) above the pre-inflation pressure of the vessel (after totally bleeding the air from the installation).

6 - COMBUSTION PRODUCT FLUES

- Have the combustion product outlet checked and cleaned at least once a year (by qualified personnel). (non blocked conduit).

The outlet can be cleaned with running water. The water flow must not be too great so that it can be evacuated through the condensate outlet ($\varnothing 40 = 1,6$ inch).

- Be sure to maintain proper watertightness and the unobstructed flow of the combustion products. Replace any damaged tightness seals if necessary.

Leaks can be detected through the appearance of condensate runoff traces on the outside of the tubes.

Check:

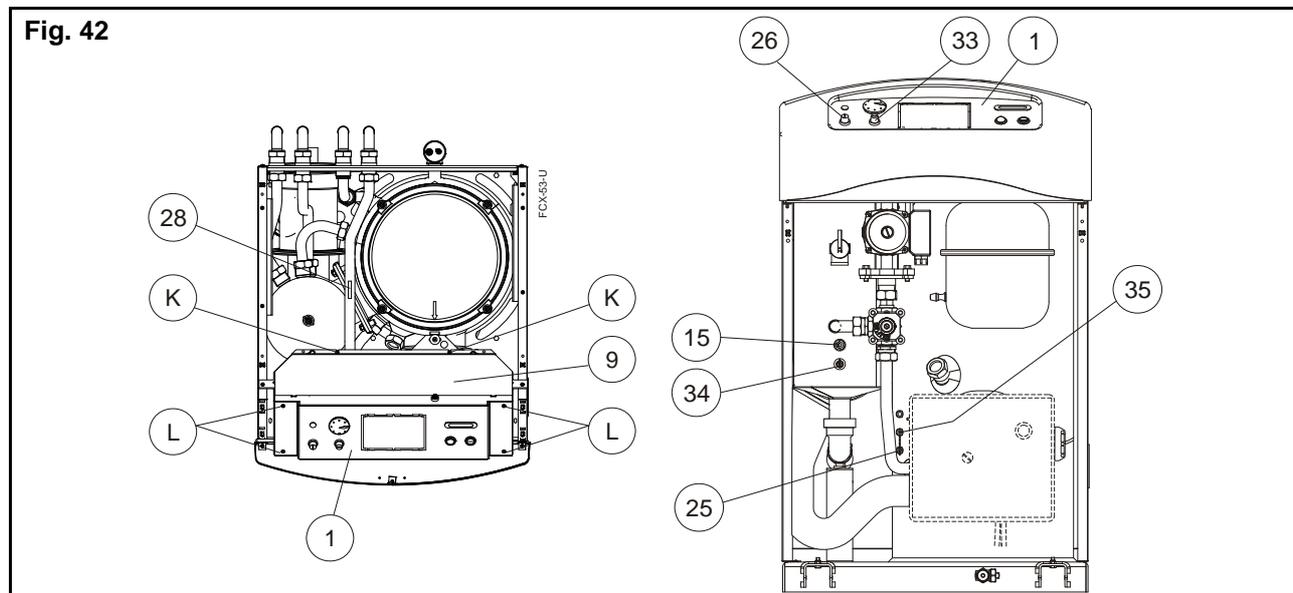
- the inside of the outlet with an electric torch,
- the entrance of the outlet through the combustion test point (fig. 41, 15),
- the end of the outlet through the horizontal or vertical terminal.
- Clean the air suction inlet sheath at the burner.

7 - OIL FILTER

Annually clean the fuel filter or if it becomes damaged (e.g. when filling the tank).

- Close the fuel inlet tap,
- unscrew the bowl

8 - CHANGING A THERMOSTAT OR A THERMOMETER



8.1 - Bulbs positioned in the boiler shell pocket

- Boiler temperature control thermostat.
- Water overheating safety thermostat.

8.2 - Bulb positioned on the heating output tube

- Boiler temperature thermometer.

8.3 - Bulb positioned in the pocket of the condensor

- Combustion product overheating safety thermostat

8.4 - Changing thermostats or thermometer



Safety: After each change, the capillary must be properly secured on the pocket opening so that the thermostat bulb cannot accidentally fall out.

- Remove the boiler front panel (J), the top of the casing (A) and the plastic cover (6), (Refer to section 3 - page 14 - chapter V - INSTALLATION)

8.5 - Bulbs in the boiler shell

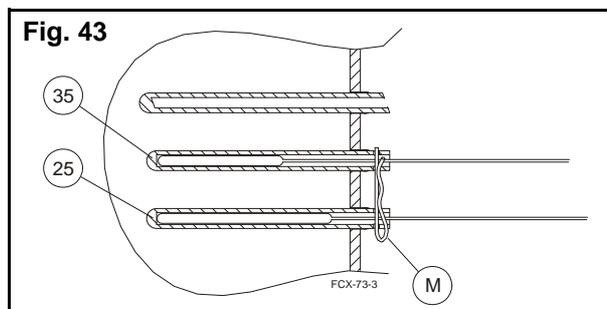
- Extract the bulbs from the pockets (25 and 35) after removing the retaining clip (M, fig. 43),

- unscrew the 2 fixing screws (K) from the protection plate (9),
- remove the protection plate (9),
- unscrew the 4 fixing screws (L) from the control panel (1),
- remove the control panel (1) to gain access to the thermostat,
- remove the faulty appliance and replace it,
- position the bulbs in the pockets (25) and (35). To ensure satisfactory heat contact, insert them as far as possible inside the pocket.

- maintain it using the clip (M),



Do not crush the bulbs with the clip (M, fig. 43) - deterioration of this latter.



8.5.1 - Bulb on the heating output tube

- extract the bulb positioned in the pocket (28, fig. 42) on the heating output tube,
- unscrew the 2 fixing screws (K, fig. 42) from the protection plate (9, fig. 42),
- remove the protection plate (9, fig. 42),
- unscrew the 4 fixing screws (L, fig. 42) from the control panel (1, fig. 42),
- remove the control panel (1, fig. 42) to gain access to the thermometer,
- remove the faulty appliance and replace it,
- insert the bulb in the pocket and clip it on again onto the heating outlet tube.

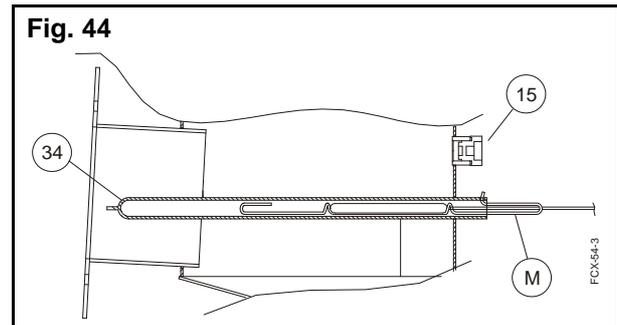
8.5.2 - Bulb in the condenser

- Extract the bulb from the pocket (34, fig. 42) from the condenser after removing the retaining clip (M, fig. 44),
- unscrew the 2 fixing screws (K, fig. 42) from the protection plate (9, fig. 42),
- remove the protection plate (9, fig. 42),

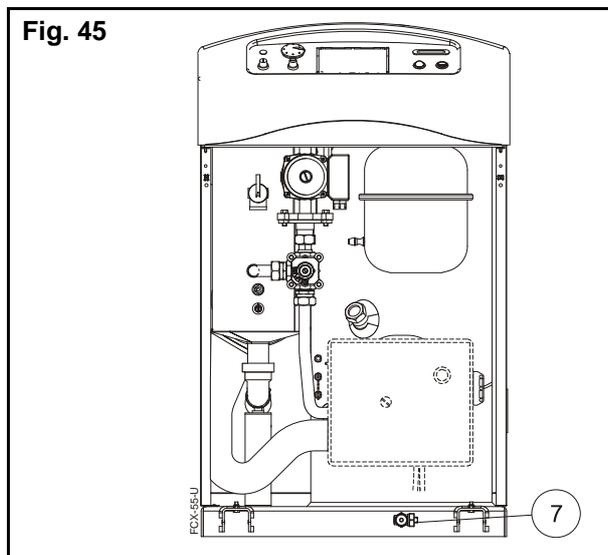
- unscrew the 4 fixing screws (L, fig. 42) from the control panel (1, fig. 42),
- remove the control panel (1, fig. 42) to gain access to the thermostat,
- remove the faulty appliance and replace it,



Reposition the bulb in the entrance of the pocket (34, fig. 44), as shown in fig. 44 using the retaining clip (M, fig. 44) thus preventing the accidental removal of the bulb



9 - DRAINING



- Cut off the power supply,
- Close the fuel inlet valve,
- Close the heating output/return valves (if they exist),
- Connect a hose pipe to the drain cock (7) after removing the plug,
- Open the drain cock with the plug tip provided for this purpose.



Make sure that the bleed is open as soon as the pressure gauge indicates zero pressure to allow air to enter the boiler shell.

When bleeding the installation, provide an air inlet at a high point (radiator bleed).



CAUTION: Risk of system faults from excessive flue gas temperature!

The drain valve connection (7) must never be used for any other purpose than to drain the boiler shell.

VIII - OPERATING FAULTS

1 - BURNER SHUTDOWN

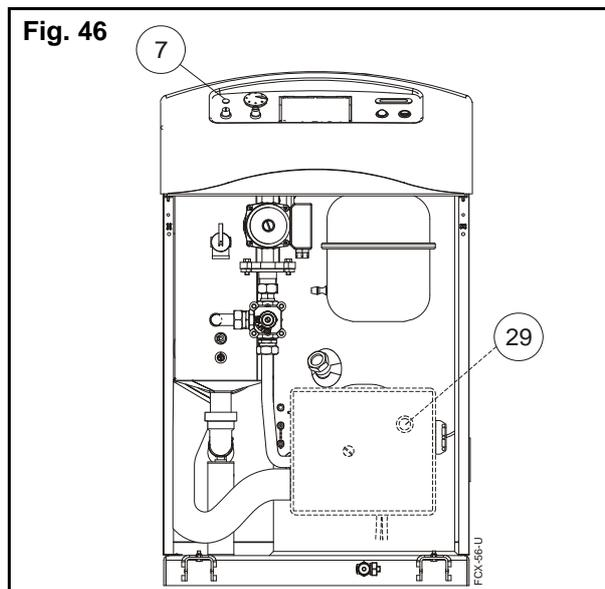
The burner shuts down (RED LED (7) on) :

- There is not enough fuel (valve closed or oil filter clogged)
- The burner is clogged,
- the spray nozzle is faulty,
- The flame monitoring cell is clogged or faulty.

To restart the burner:

- Open the lower front door of the casing,
- Manually reset the safety button (29) located on the front of the burner. (refer to the technical instructions of the burner).

If the fault persists, call in a qualified professional and see the technical instructions supplied with the burner.



2 - SHUTDOWN BY OVERHEATING THERMOSTAT CUT-OUT

2.1 - Water overheating safety thermostat

The activation of the safety device for the overheating thermostat leads to the heating and domestic hot water production system (FCX + domestic hot water production system) being stopped by burner shutdown.

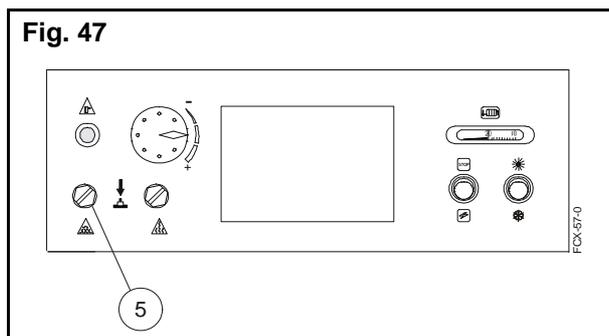
The thermostat (5) can be accessed through the boiler control panel.

It is triggered if:

- the temperature of the boiler shell water exceeds 230°F (110 °C), in which case check the control thermostat (s. section 8 - page 38 - chapter VII - MAINTENANCE,).

The thermostat is reset manually (5) after removing its cap.

If the fault persists, call in a qualified professional.



2.2 - Combustion product overheating safety thermostat

Activation of the safety device for the overheating thermostat leads to the boiler shutting down.

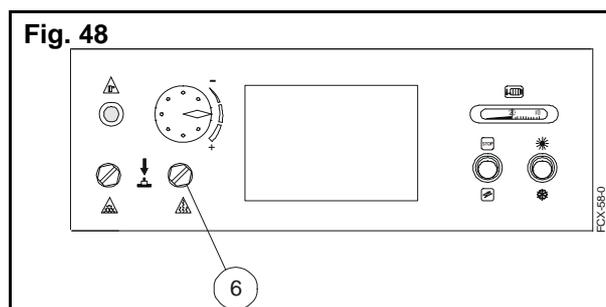
The thermostat (6) can be accessed through the boiler control panel.

It is triggered if:

- the temperature of the combustion products exceeds 230°F (110°C), in which case :
 - the boiler setting (spray nozzle and heat flow) should be checked,
 - Check the position of the bulb in the pocket (s. section 8.5.2 - page 39 chapter VII - MAINTENANCE),
 - the boiler shell and condenser cleaned (s. section 1 - and section 2 - chapter VII - MAINTENANCE,).

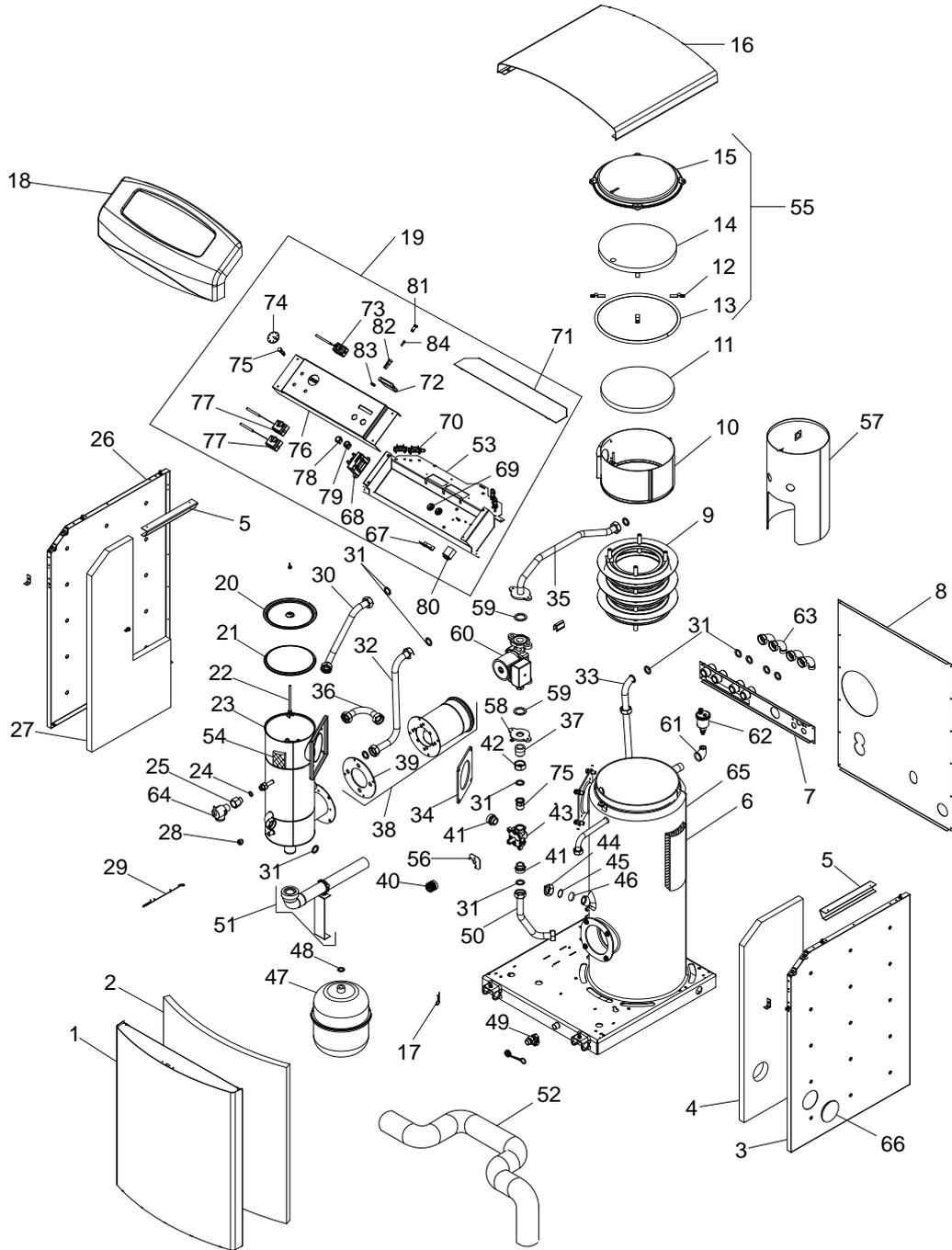
The thermostat is reset manually (6) after removing its cap.

If the fault persists, call in a qualified professional.



IX - PARTS LIST

FCX 22/30 C



CFC0U003-030-01

Rep.	Reference	Description
1	Y72.26518	FRONT PANEL EQUIPED
2	V72.26643	FRONT PANEL INSULATION
3	Y72.26664	RIGHT HAND SIDE PANEL EQUIPED
4	V72.26624	INSULATION RIGHT HAND SIDE
5	Y72.26512	FOLDED NECK
6	V72.38386	BOILER SHELL INSULATION
7	V72.26679	PAINTED CONNECTING FLANGE
8	Y72.26677	PAINTED BACK PANEL
9	V72.35234	SWIRLERS (FOR FCX22 ONLY)
10	V72.08531	PUT FOR COMBUSTION CHAMBER
11	F30.11048	MINERAL WOOL 90 KG DISK DIAMETER 262X20
12	V72.28378	FASTENING ANGLE
13	V70.09239	GLASS FIBER INSULATION LG 950- CAST PLATE
14	F20.28379	FIBER INSULATION D.280X20 (300°C)
15	H00.28364	BOILER SHELL COVER- CAST IRON
16	Y72.26519	TOP COVER EQUIPPED
17	B60.34727	SIMPLE SPRING'S PIN D.2 DIN 915
18	H20.26489	ABS PROTECTION
19	W72.30227	ELECTR. CONTROL BOX + CABLE
20	V72.36340	CONDENSER TOP
21	E20.36342	TIGHTNESS O'RING CONDENSER TOP
22	V72.26826	FASTENING FLANGE FOR CONDENSER COVER
23	V72.42528	CONDENSER FCX
24	E20.06892	SEAL AFM34 D. 18,6 X 12 2 MM THICKNESS
25	I20.30758	BRASS CONNECTION M1/2 - F3/4 NPT
26	Y72.26665	LEFT HAND SIDE PANEL EQUIPED
27	V72.26638	INSULATION LEFT HAND SIDE
28	A00.28827	PLASTIC CAP MALE 1/4
29	T40.38317	KLIXON FIXATION WIRE
30	U72.26516	HEATING RETURN 2. CIRCUIT
31	E20.03889	SEALING AFM34D 30X21X3
32	U72.26515	HEATING RETURN 1. CIRCUIT
33	U72.26517	HEATING FLOW 2. CIRCUIT
34	E20.26827	SEALING ON CONDENSER FLANGE
35	U72.30771	HEATING FLOW
36	U72.26786	BOILER SHELL RETURN
37	K20.12116	MALE CONNECTION 3/4
38	V90.37055	FLUE ADAPTATOR 80/125 + SEAL
39	E20.38753	EPDM PEROXYDE SEAL Ø 162X79X4
40	A10.17552	BLACK HANDLE (FOR H3MG VALVE)
41	K20.03021	REDUCED MESSING NIPPLE M1-M3/4
42	K20.04136	NUT
43	L85.40043	VALVE BRASS MUT 3-WAY
44	K20.03004	NUT FOR FLANGE 1" (FOR PIPE D.22,5)
45	B59.00692	STAINLESS STEEL WASHER 30,4X25,5X0,3
46	T20.00582	SIGHTGLASS PYREX D.30X5
47	L90.03520	EXPANSION CYLIND, VESSEL 8L MALE 3/4
47	L90.03639	EXPANSION VESSEL 12L 3/4 CYL
48	E20.03890	SEALING AFM34 D 24X17X3
49	K50.00584	DRAIN COCK WITHOUT THE CAP F1/2-M1/2
50	U72.26513	HEATING FLOW BEFORE 1. CIRCUIT
51	V72.26687	CONDENSATE DISCHARGE
52	U65.29493	AIR HOSE D.80 LG1500
53	Y72.26694	PAINTED CONTROL BOX
54	V72.38351	CONDENSER INSULATION

Rep.	Reference	Description
55	V72.28389	BOILER SHELL COVER EQUIPPED FOR FCX
56	V72.28409	VALVE STOP
57	V72.38350	POT FOR COMBUSTION CHAMBER LOW (FOR FCX 30 ONLY)
58	U72.30772	FLANGE
59	E20.01008	SALMSON SEALING 1 1/2 DIA 44 X 32 X 3
60	L30.15074	CIRCULATING PUMP GRUNDFOSS 115 UPS15.42 F-9H
61	K10.13600	BEND 90° F3/4-F3/8
62	L90.19347	AUTOMATIC DRAIN 3/8 WITH ISOLATING VALVE
63	K20.37049	ELBOW COPPER NUT 1" - Ø22
64	L90.30759	SAFETY VALVE 30 PSIG MAL/FEM. 3/4 NPT
65	V72.38465	EQUIPPED BOILER SHELL FCX 22
65	V72.38486	EQUIPPED BOILER SHELL FCX 30
66	A00.19467	GREY PLASTIC CAP MALE 75
67	V72.30220	UPPER FASTENER FOR THE RELAY
68	C60.15500	OMRON RELAY
69	C91.03071	WIRE CARRIER
70	C91.12561	WIRE ROPE CLAMP PA 6,6
71	Y72.26696	PAINTED CASING / CONTROL BOX
72	L60.01135	THERMOSTAT RECT HORIZ 69X14 LG CAPIL.1500 MM
73	L71.34468	THERMOSTAT 50/70° SINGLE CONTACT
74	H20.18800	AQUASTAT KNOB
75	C90.03244	RED LIGHT 230V - 120) FLAT HEAD
76	W72.26691	CONTROL PANEL + STICKER
77	L71.42394	SAFETY THERMOSTAT 110° CAP 2M
78	C20.24904	UNIPOLAR SWITCH D. 23 / GREEN LIGHT
79	C20.24903	UNIPOLAR REVERSIBLE SWITCH D. 23 BLACK
80	C90.15411	TRANSFORMER 120V / 24V
81	C30.07167	FUSE 6.3AMP 5X20
82	C30.40760	FUSE HOLDER
83	C30.40759	FUSE HOLDER NUT
84	C30.40761	FUSE HOLDER BUTTOM
*	C30.12702	FUSE HOLDER WICKMANN REF 19820+19835
*	T25.26940	BOLT (PVC)
*	T25.26941	CLIP FIXATION
*	T40.36749	HOOK GLASS WOOL
*	V70.05733	BAFFLE PLATE F400-F E/FEA-FCX (250X200X1,5)
*	V90.33425	DISK FOR INSULATION (INSULFRAX)
*	W72.30226	WIRING FOR FCX

LUCKY DISTRIBUTING, Inc
8111 N.E. COLUMBIA Blvd
OR 97218 - 4035 PORTLAND
USA