



AMBIRAD

ENERGY EFFICIENT HEATING SYSTEMS

WARM AIR

OIL FIRED UNIT HEATERS

Installation, commissioning
and maintenance manual



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1 General warning

Read these instructions carefully, they include important information on safety of installation, use and maintenance.

Keep this manual safe for any further reference.

In case the unit is sold or transferred to another user, or in case the user should move and leave the units, make sure that this manual stays with the unit, so that it can be consulted by the new user and/or installer.

Any manufacturer's liability (under the contract provisions or otherwise) for damage resulting from wrong installation or misuse, and/or non-compliance with the instructions supplied by the manufacturer shall be expressly excluded.

Combustion air requirements

The combustion air is drawn directly from the building. The unit shall be installed in a suitable room with ventilation openings in compliance with the regulations in force, and sufficient to obtain perfect combustion. All oil-fired appliances require air for the combustion process. If sufficient amounts of combustion air are not available, the heater or other appliance will operate in an inefficient and unsafe manner. Enough air must be provided to meet the needs of all fuel-burning appliances, as well as appliances such as exhaust fans, which force air out of the building. When extract fans are fitted in the building it is essential that sufficient replacement air is supplied, failure to ensure this will result in a negative pressure in the building which can result in down draught, poor combustion and the production of carbon monoxide.

Electrical supply

The electrical installation may only be carried out by suitably qualified persons observing the rules in force. Qualified personnel should check that the electric system is adequate for the rated input shown on the units data plate, making sure in particular that the system wire gauge is suitable for the rated power input of the unit.

The units electrical safety is only achieved when the burner is properly connected to a safe earthing system, installed as provided according to the safety regulations in force.

This essential safety requirement should be carefully verified. In case of doubt, ask qualified personnel to accurately inspect the installation.

The manufacturer shall not be held liable for damages resulting from failure to earth the unit.

No adaptors multiple sockets and/or extensions shall be used to connect the unit to mains. A multi-pole switch shall be provided to connect the units to mains, in compliance with the safety regulations in force.

The use of any component operating with electric power implies that some basic rules are observed such as the following:

- never touch the unit with wet or damp parts of the body
- do not remove electric cables;
- do not leave the unit exposed to adverse weather conditions (rain, sunshine etc) unless the unit has been expressly designed to be so exposed;
- do not allow inexperienced people to use the unit.

The unit supply cable shall not be replaced by the user. In case the cable becomes damaged, switch off the unit and refer to qualified personnel only.

If the unit is idle for some time, the electric switch supplying all power-operated system components (such as fan, burner etc) shall be disconnected.

Packing

Remove the packing material and make sure that the contents have suffered no damage. In case of doubt, do not use the unit and contact the supplier.

Warm air heaters

The unit shall be used in the applications for which it is expressly intended. Any other use is to be regarded as improper, and therefore a potential source of danger.

Factory accessory equipment only shall be used for all units with options or kits.

Avoid contact with hot heater surfaces. Such surfaces, usually located near the flame become hot during operations and remain so for some time after the burner has been extinguished. When use of the unit is to be discontinued, any

potential source of hazard shall be made inoperative.

When the unit is to be finally decommissioned, ask professionally qualified personnel to do the following:

- a) Disconnect the unit from mains by removing the master switch supply cable
- b) Cut off the fuel supply by turning the manual fuel cut-off valve. Remove the control wheels from their seats.

Setting & commissioning of burner

Units shall be commissioned by professionally qualified personnel, following the manufacturer's instructions in compliance with the regulations in force.

Make sure that the burner has been safely secured to the warm air heater, so that the flame is generated inside the heater combustion chamber.

Before igniting the burner, the commissioning engineer should;

- Set the burner fuel flow rate based on the firing rate required by the warm air heater.
- Adjust the combustion air flow rate to obtain a combustion efficiency at least equal to the lowest value required by current regulations.
- Check that fuel combustion is correct to prevent the generation of any harmful or polluting unburnt gases beyond the limits permitted by the current regulations.
- Check that safety and control devices are working properly.
- Check that the flue system is in sound working condition.
- On completing all adjustment and setting operations, check that all adjusting device mechanical locks have been properly tightened.

In case the burner repeatedly shuts down, do not attempt to manually reset the unit. Contact professionally qualified personnel to correct the malfunction.

Please refer to the table on page 12 for details of burner set up.

2 Product selection

All heaters have been tested and approved to allow heater selection to be dependant upon the output and the efficiency needed.

Technical data

The air heaters have been designed to offer a solution for a wide choice of commercial and industrial projects. Outputs range from 32 kW to 100 kW.

Heaters are supplied with a combustion chamber manufactured from high quality heat resisting stainless steel AISI 430. The combustion chamber has been designed for maximum surface area and volume to give high efficiency.

The special stainless steel heat exchanger enables high efficiency. It has also been designed to have minimal resistance to air flow through the unit. The units are constructed from galvanised steel panels. Standard finish is white epoxy painted.

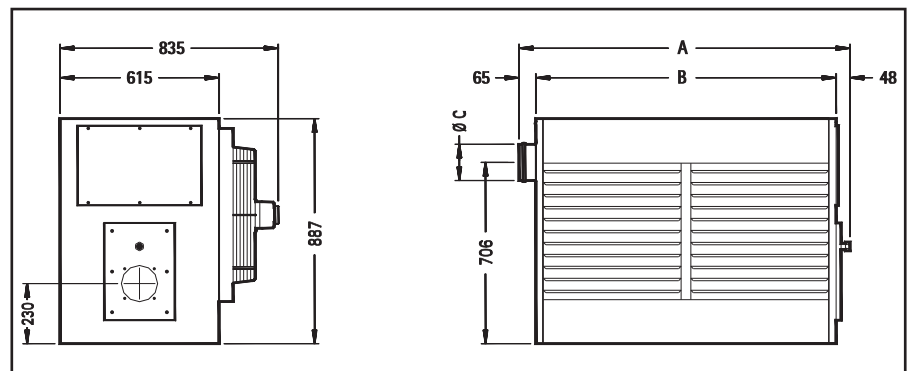
Air flow system

It is possible to reverse the air flow modifying the position of the adjustable warm air discharge louvre and the axial fan. OFSU70/100 models can work with crossed air flow. (100kW model has three fans).

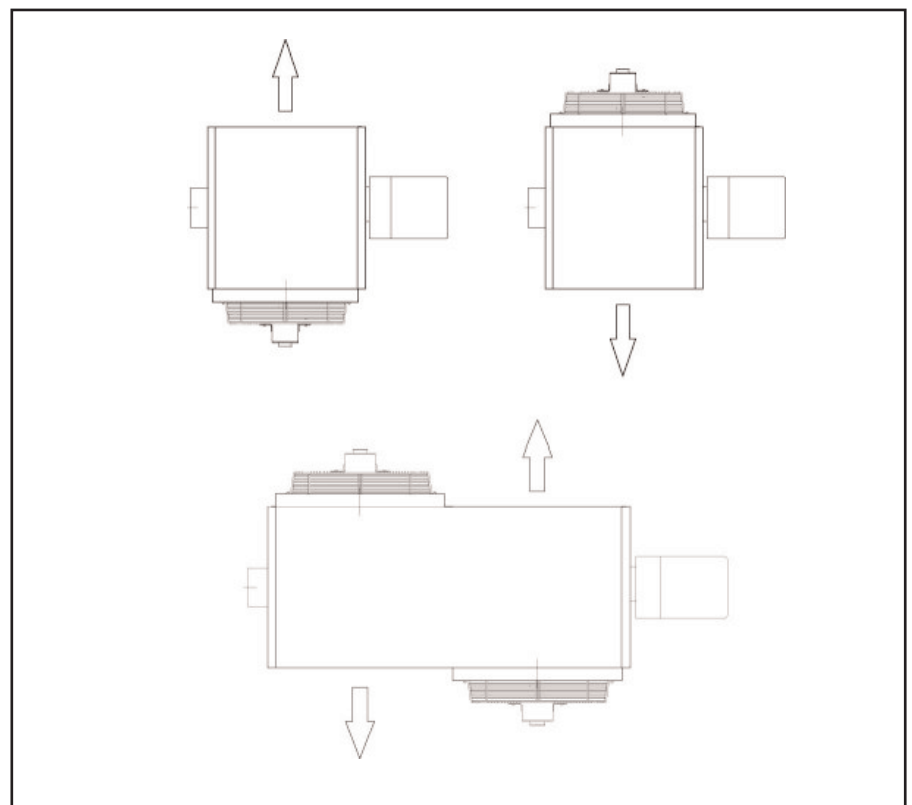
In this condition the air flow is reduced by approximately 5%. This solution is ideal when the heater is to be installed in the middle of the space to be heated and allows the warm air to discharge to the front and to the rear of the unit heater.

U.M	OFSU32		OFSU40		OFSU70		OFSU100		
	Min	Max	Min	Max	Min	Max	Min	Max	
Nominal power	kW	30.0	34.5	32.5	44.0	60.0	77.7	80.0	110.0
Nominal capacity	kW	27.9	31.6	30.4	39.7	55.9	70.2	74.5	99
Efficiency	%	93.0	91.6	93.5	90.2	93.2	90.3	93.1	90.3
Flue gas pressure drop	Pa	10	15	11	22	20	25	21	32
Air flow 15°C	m ³ /h	3100		3500		6200		9500	
Temperature rise	°C	25.0	28.3	24.1	31.5	25.0	31.4	21.8	29
Air throw	m	12		15		18		22	
Electrical supply	V	230/1~/50		230/1~/50		230/1~/50		230/1~/50	
Absorbed electrical power in kW and number of motors		1 x 0.33		1 x 0.70		2 x 0.33		2 x 0.33 1 x 0.70	

Dimensional data and weight



Type	OFSU32	OFSU40	OFSU70	OFSU100
A	723	723	1303	1883
B	610	610	1190	1770
C	120	120	150	180
Gross Weight (Inc burner)	85kg	91kg	137kg	177kg



3 Installation

Suspended Installation

The heater units can be suspended from the ceiling by means of 4 eye hooks (not supplied) please see diagram opposite, droprods, using steel chains or cable.

Oil type and supply

Oil supply connection RC 1/4 (1/4 BSP ext thread). Heaters are supplied as single pipe units for operating on 35 sec gas oil (visc 1.5E @ 20°C) although 28 seconds, Kerosene is available on request. Oil supply lines should be sized to ensure that the required flow rate at the burner is achieved at all times. Insulate external pipework and use winter grade fuel to reduce the potential of freezing.

If a ring main is used, the pressure must be below 0.45bar to avoid aeration and possible air locks. Use pressure regulating valves as appropriate. Where the tank is sited below the height of the heater it is advisable to fit a de-aerater. It is recommended that isolation valves are provided to facilitate servicing.

Oil storage tanks must be installed outside the building in accordance with regulations in force.

The flexible oil line must be used for the final connection to the burner to allow for any expansion or movement of the heater.

A fire valve (operating temperature 70°C) must be utilised to protect each heater. The shut off valve should be sited externally to the building. (BS5410-1 and BS5410 Part 2).

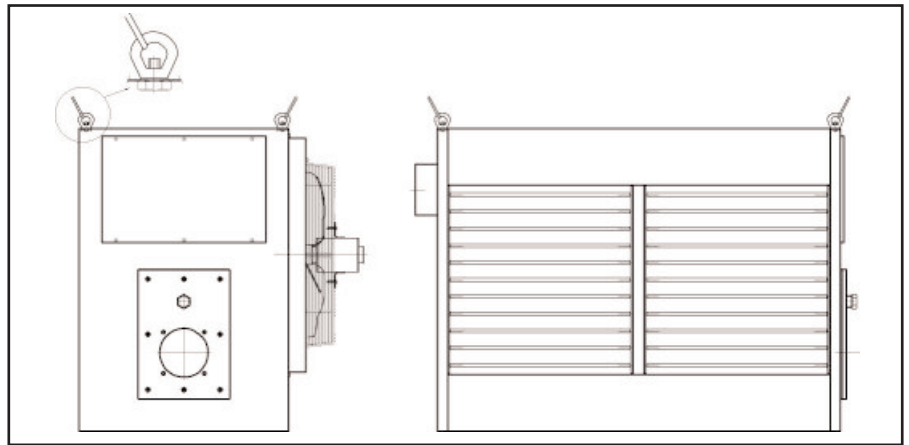
Note The heater is supplied for single-pipe operation, Two-pipe systems require a modification to the pump. For information on this, please refer to the burner manual.

Oil supply lines

There are three methods of connecting the oil supply

- Gravity fed/Siphon systems
- Burner lift systems
- Additional oil pump or oil lifter

With any Single Pipe installations using a Gravity fed/Siphon system, care must be taken not to undersize or oversize the pipework which may lead to incorrect



pressure at the pump. Refer to your supplier for guidance on pipe diameters.

A maximum of 0.45bar vacuum can be obtained at the pump. Refer to burner manual for test point location.

On single-pipe lift systems, a maximum height of 1.5m between the foot valve and the pump is recommended based on the following chart. Do not exceed the stated diameter.

H (m)	Copper pipe length (m)		
	Ø4mm	Ø 5mm	Ø 6mm
0	26	63	100
0.5	23	56	100
1	20	48	100
1.5	17	41	84

As there will always be a separation of air/gas in the system when insufficient pressure occurs, we recommended the use of a de-aerater (eg. Tigerloop) to allow these gasses to escape.

On Two-Pipe systems, it is recommended not to exceed 3.5m between the foot valve and the pump. The maximum allowable pipe length vs. internal pipe diameter can be calculated from the tables shown in Figures 1, 2 and 3 on pages 5 and 6. Do not exceed the stated diameter(s).

On installations where the lift is greater than 3.5m, or pipe runs are longer than shown overleaf, or there are more than one heater on the same system, an oil pump system or an oil lifter system may be required. For examples of these systems, please refer to Fig 3-6 shown on pages 6 and 7.

Note Lengths stated within the tables shown in this manual, take into account resistance values for all isolating and

fire valves, external filters and up to four 90° elbows. If additional bends are required use swept bends and not a tight elbows, this will help to reduce the resistance in the system. Refer to manufactures/suppliers data for resistance values for additional components.

Maximum pressure at the pump is 2bar (30psi).

Note These notes are for guidance only and it is the contractors responsibility to ensure any pipework and/or ancillary components that are used are adequate for the installation.

Typical installation diagrams are shown on pages 5, 6, and 7. These are for guidance only and reference should be made to BS5410-1 and BS5410 Part 2 for further information.

Maximum lengths of suction lines for two pipe systems

Fig 1 Two-pipe lift system

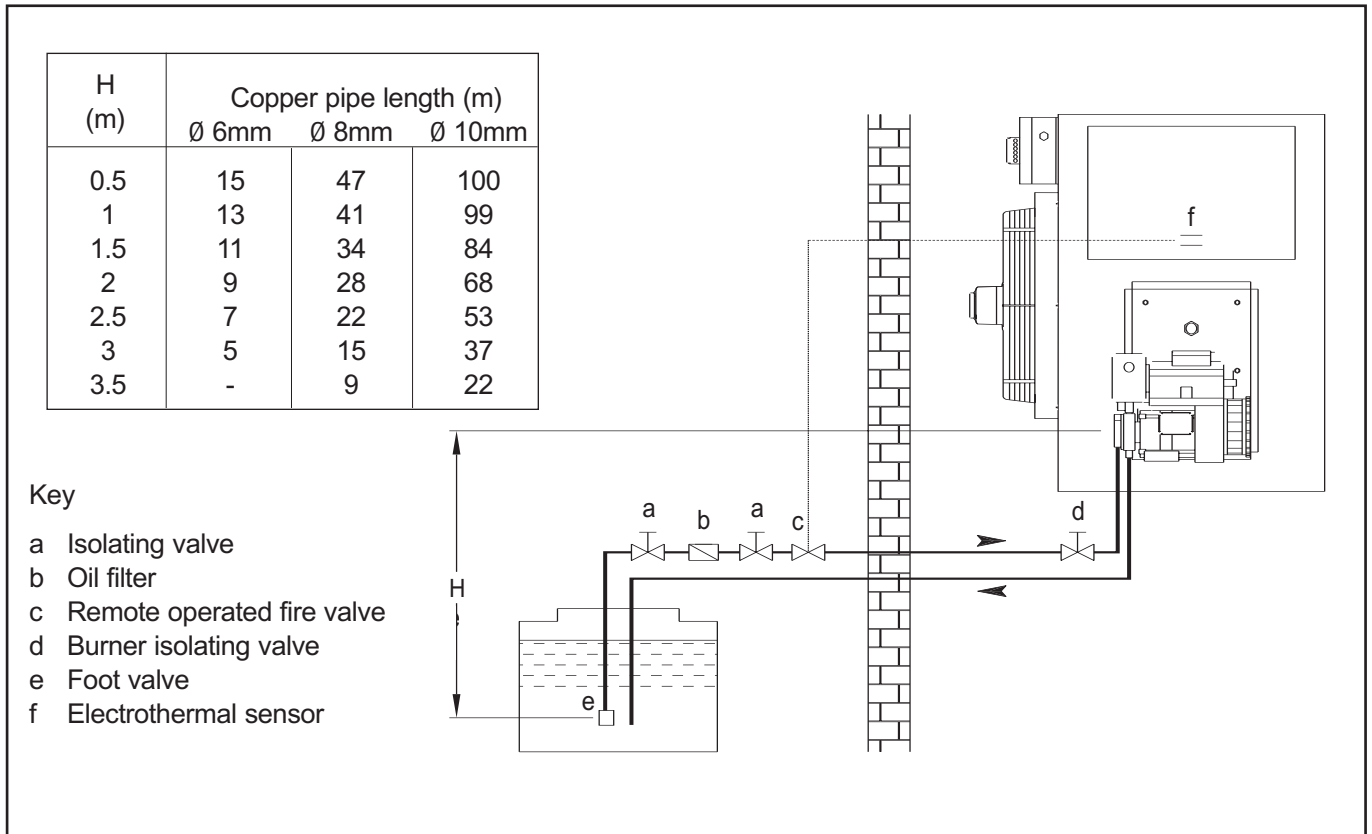
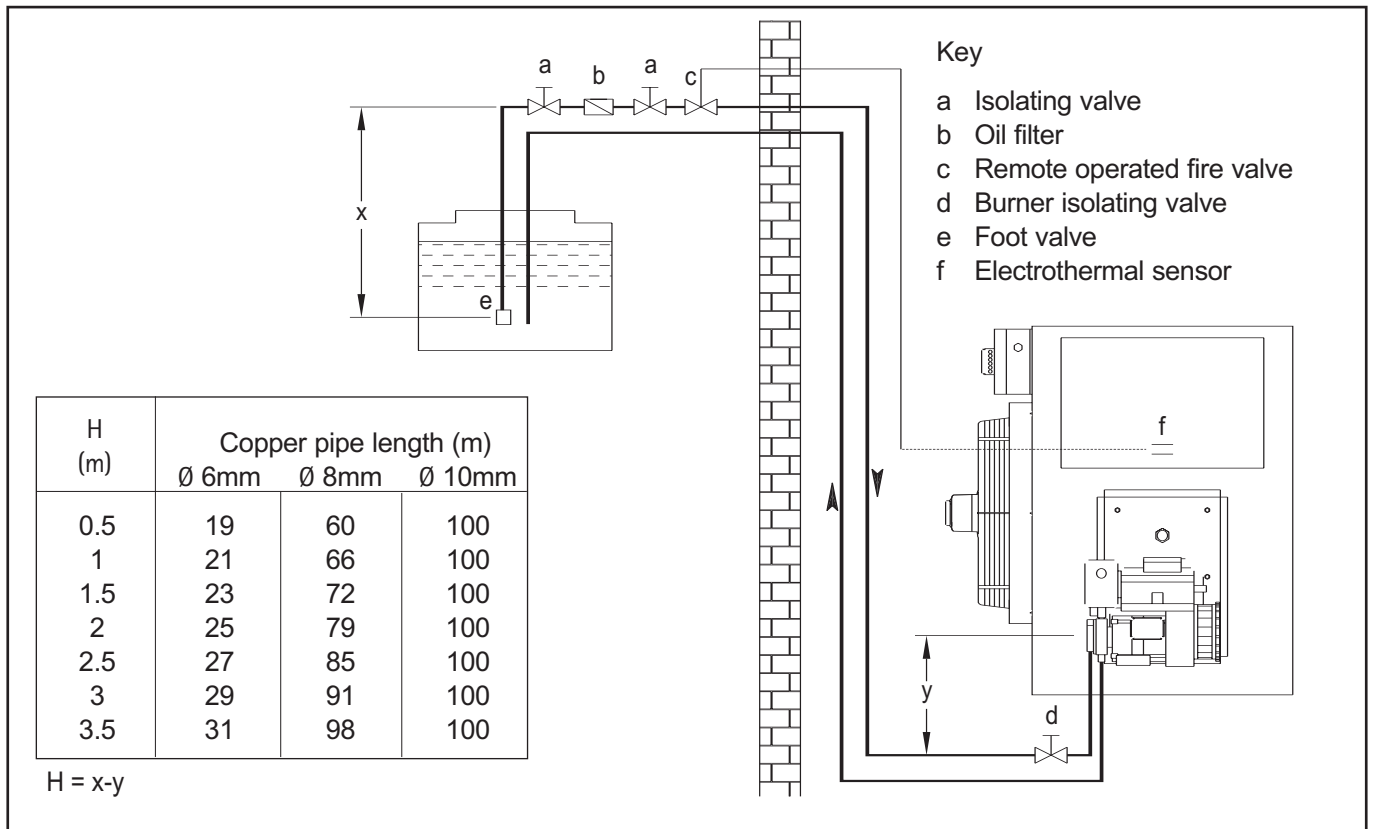


Fig 2 Two-pipe Siphon system



Examples of other typical installations

Fig 3 Two-pipe Lift system - 2 heaters shown

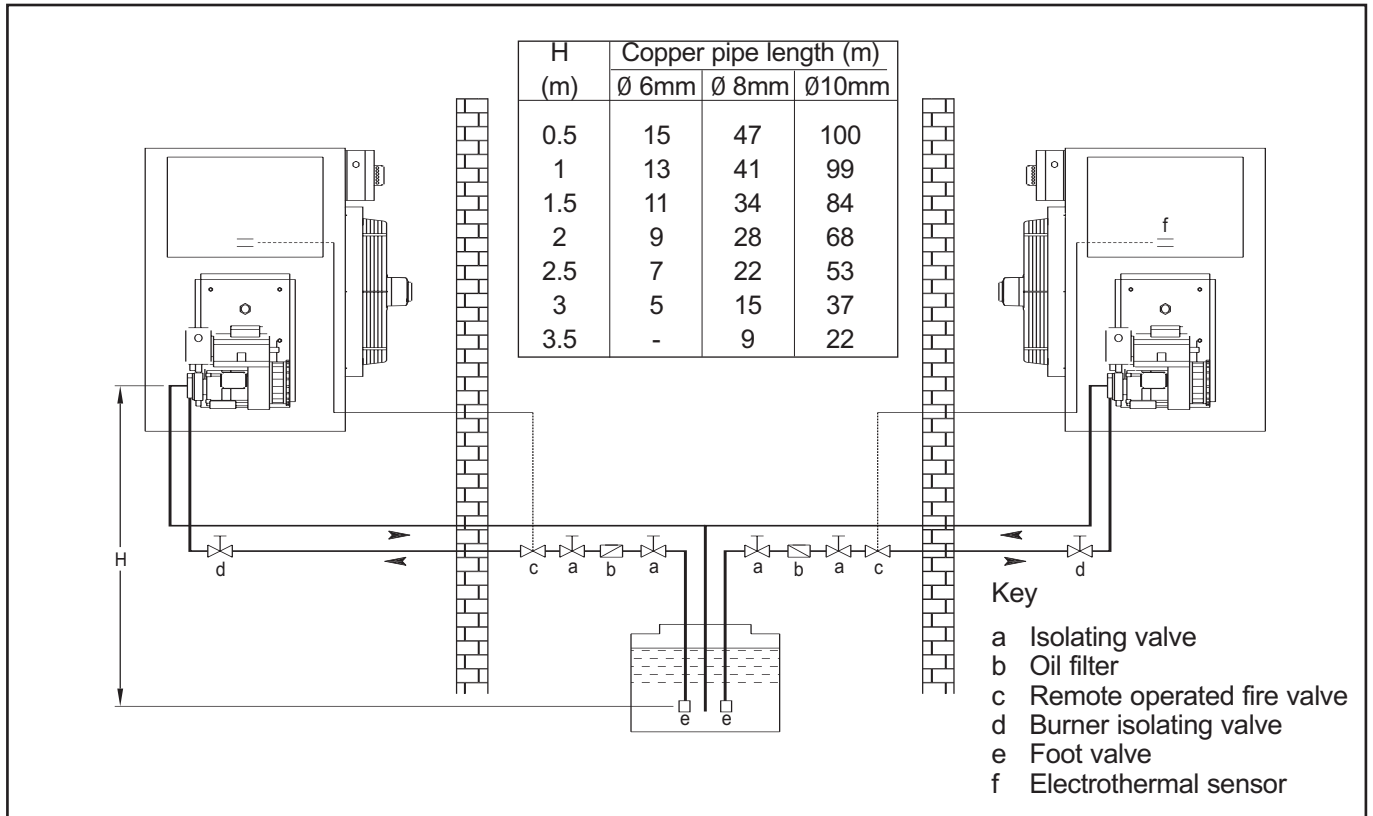


Fig 4 Multiple heater installation with oil transfer pump (two-pipe system shown)

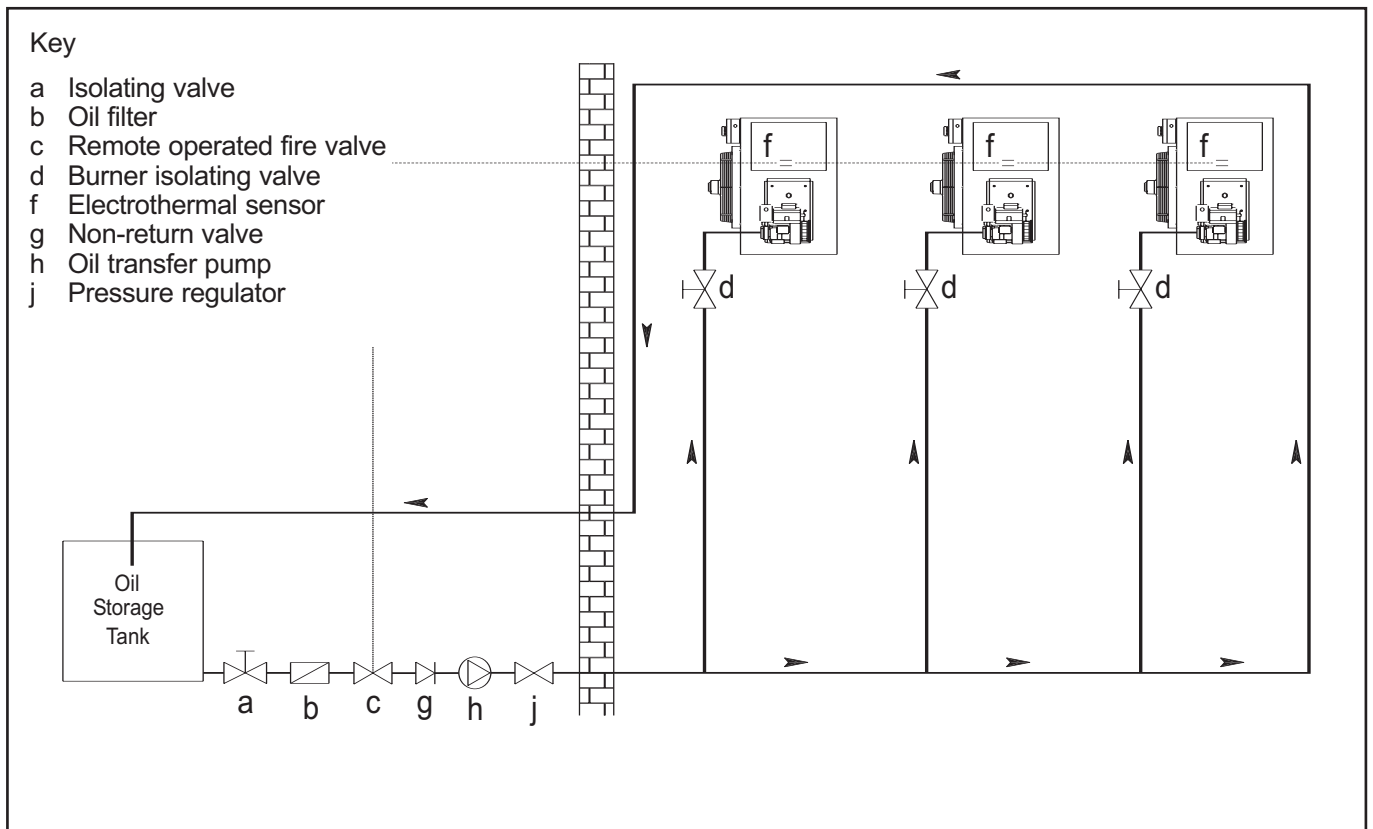


Fig 5 Single heater installation with oil lifter

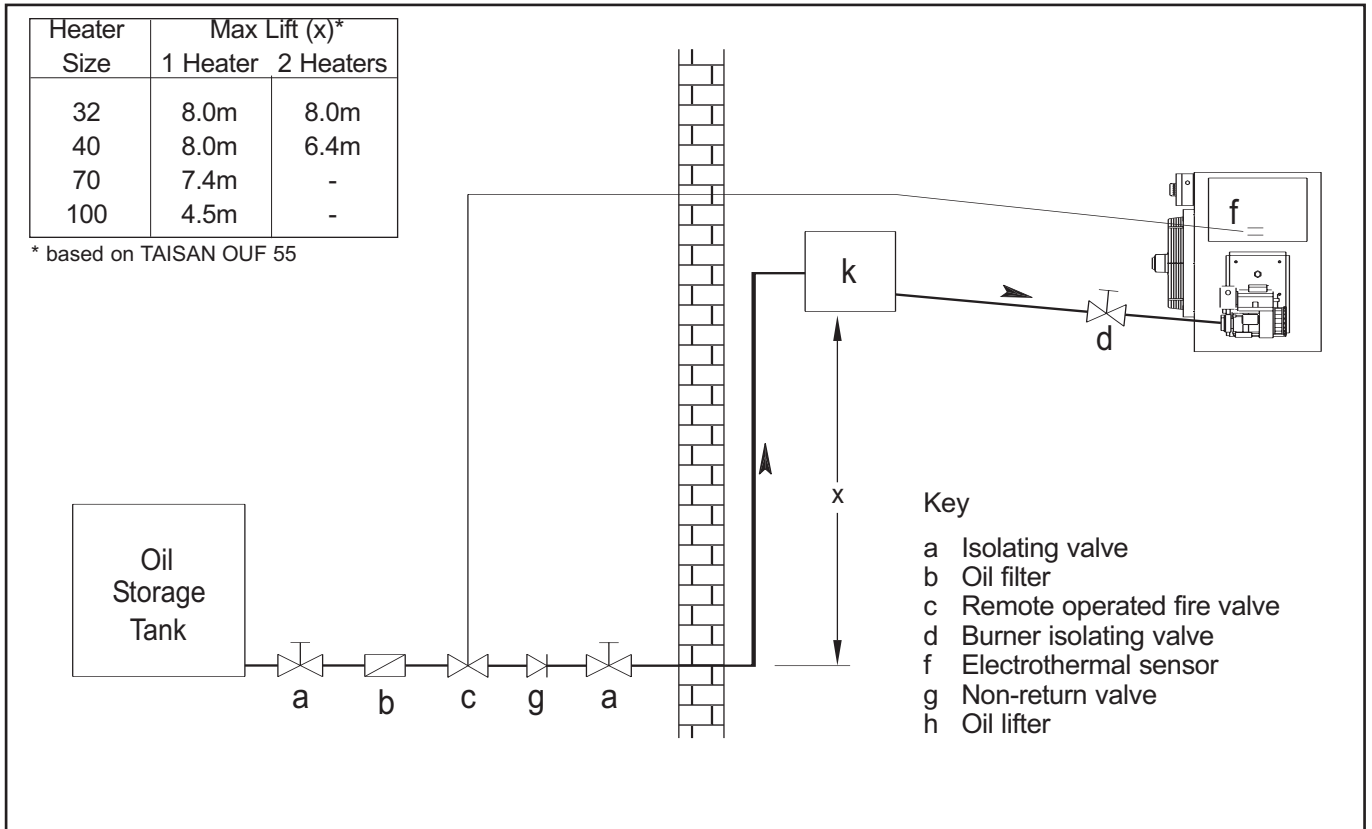
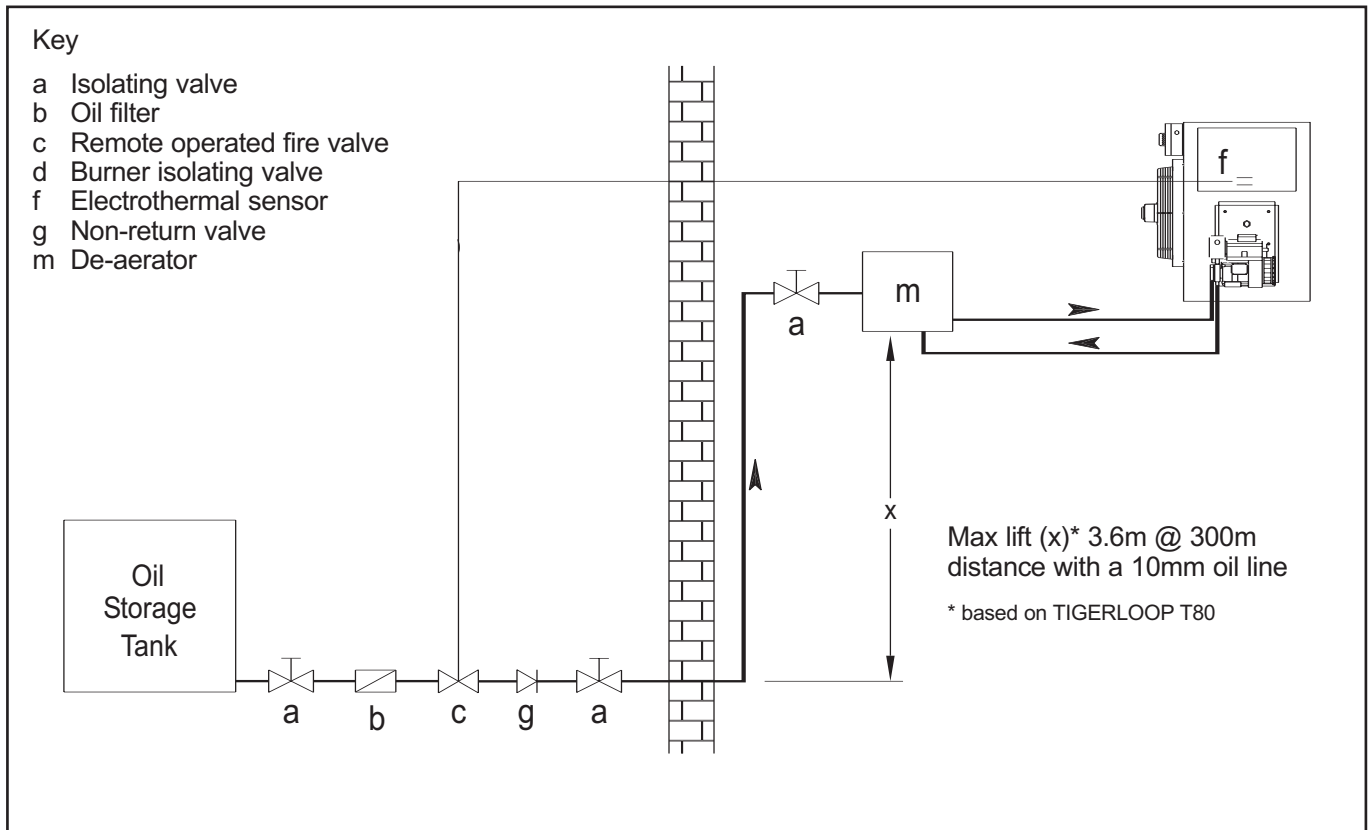


Fig 6 Single heater installation using De-Aerator



Electrical wiring

The electrical supply to the heater must be 230V/50Hz fused at 5A. The absorbed power of each model is specified on the electrical wiring label. For cable sizing information refer to the information detailed in the table below.

Absorbed electrical power

Type		OFSU32	OFSU40	OFSU70	OFSU100
Absorbed power	W	330	700	660	1360
Absorbed current	A	1.7	1.9	3.4	5.3
Oil burner	W	300	300	400	500

Heater protection	IP20
Electric board protect	IP44
Fuse	10 Amp

Flue connection

The OFSU warm air heater has a conventional flue system and therefore any flue pipe **MUST** rise vertically and ideally should not change direction. If this is not possible or practical, there should be no more than **FOUR** bends and **NO** horizontal runs in the entire flue route.

Once the gases have left the system they should disperse without causing nuisance. Flue outlets should not be placed near a window, or where higher parts of the building will affect the pull on the flue.

The flue diameters are shown in the table below and should be a minimum length of 3 metres.

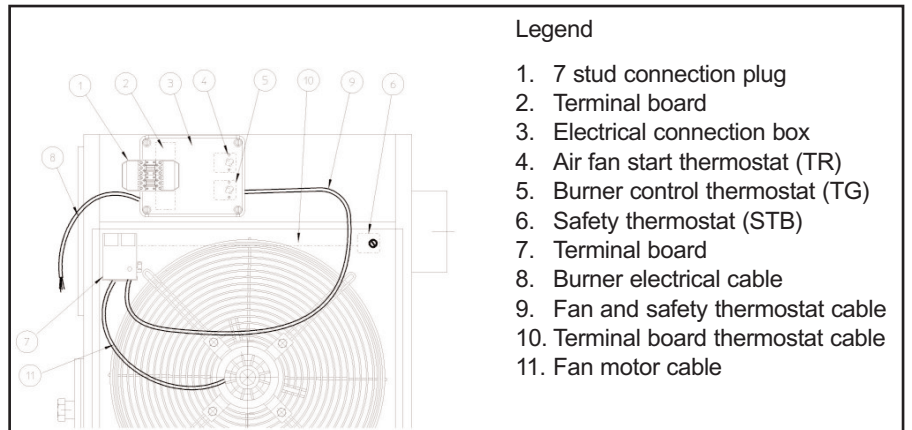
OFSU Size		32	40	70	100
Flue Diameter	mm	125	125	150	175
	in	5	5	6	7

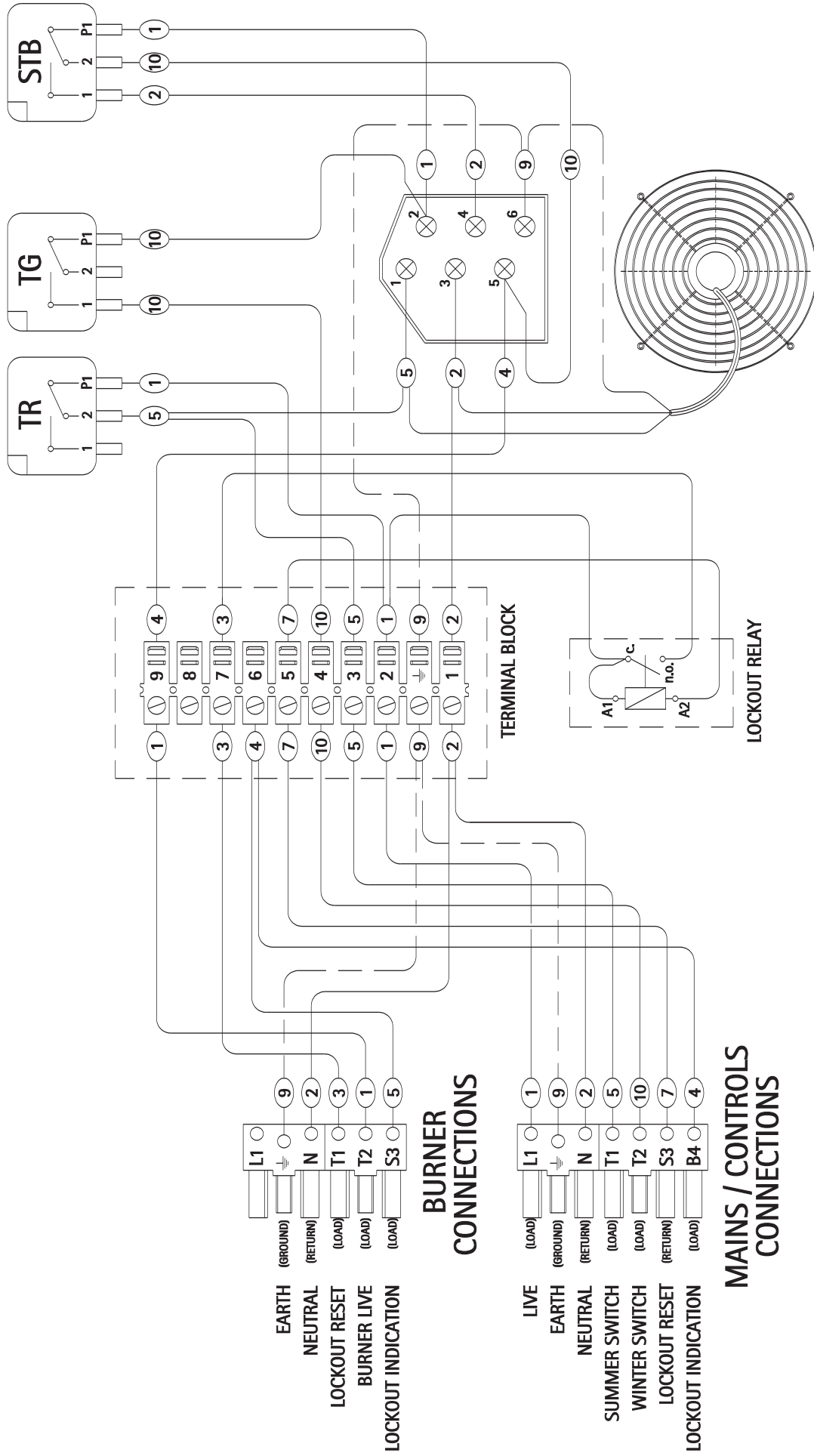
Electrical diagram

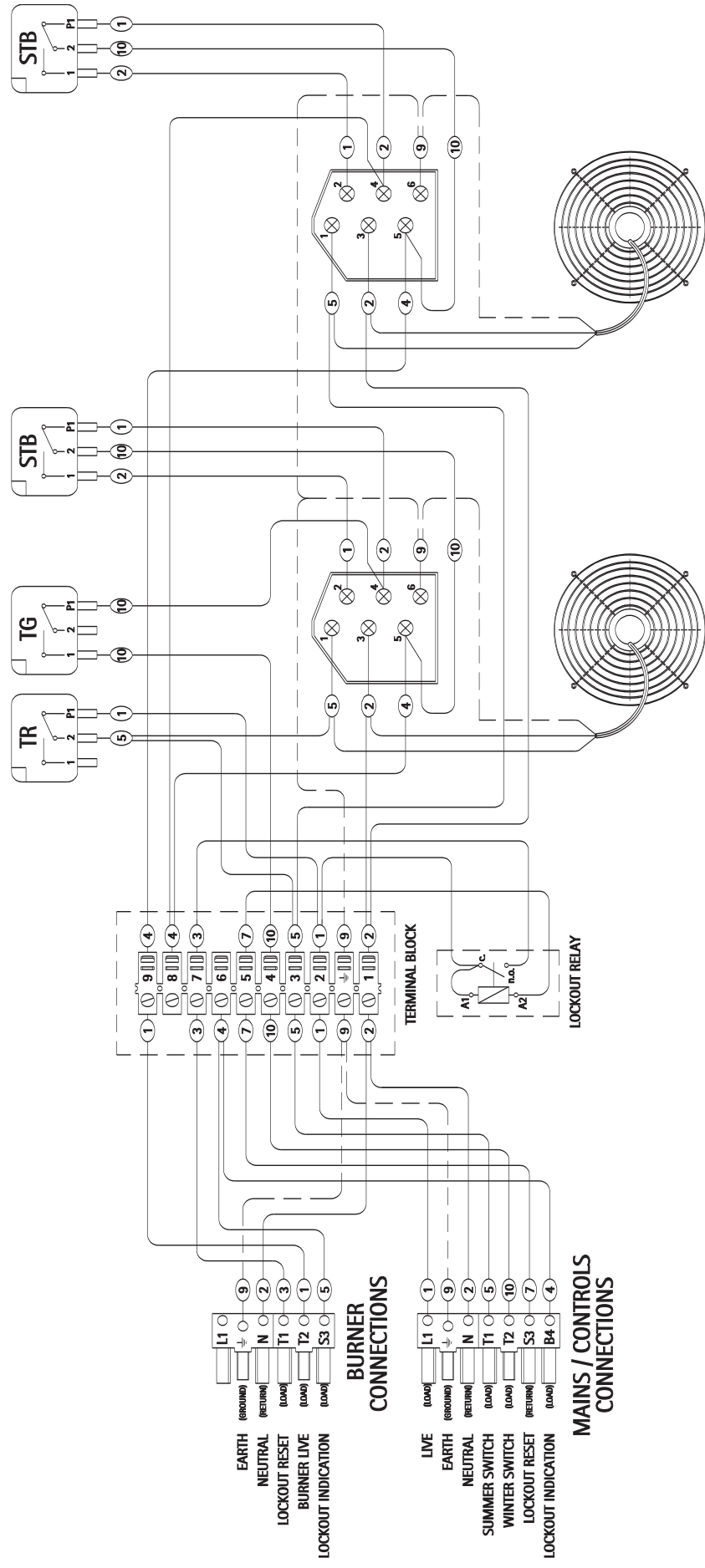
The heater is supplied with:

- TG Burner Control Thermostat
- TR Air Fan Start Thermostat
- STB Safety Thermostat (Manual Reset)
- 10 Stud Terminal Board
- 7 Stud Connection Plug

Before any cleaning or service operation, disconnect the unit from mains by pulling out the 7 stud connection plug.

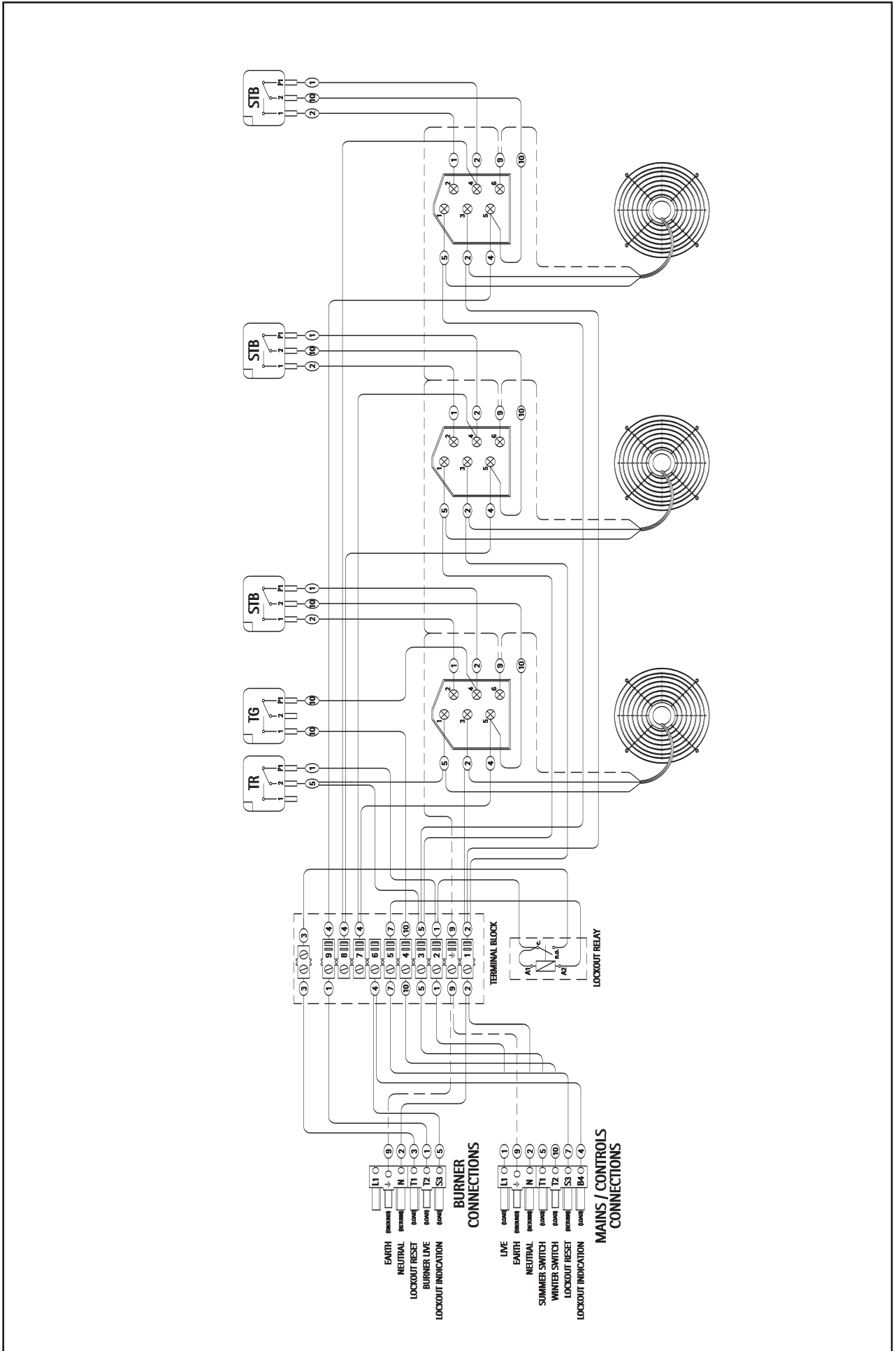




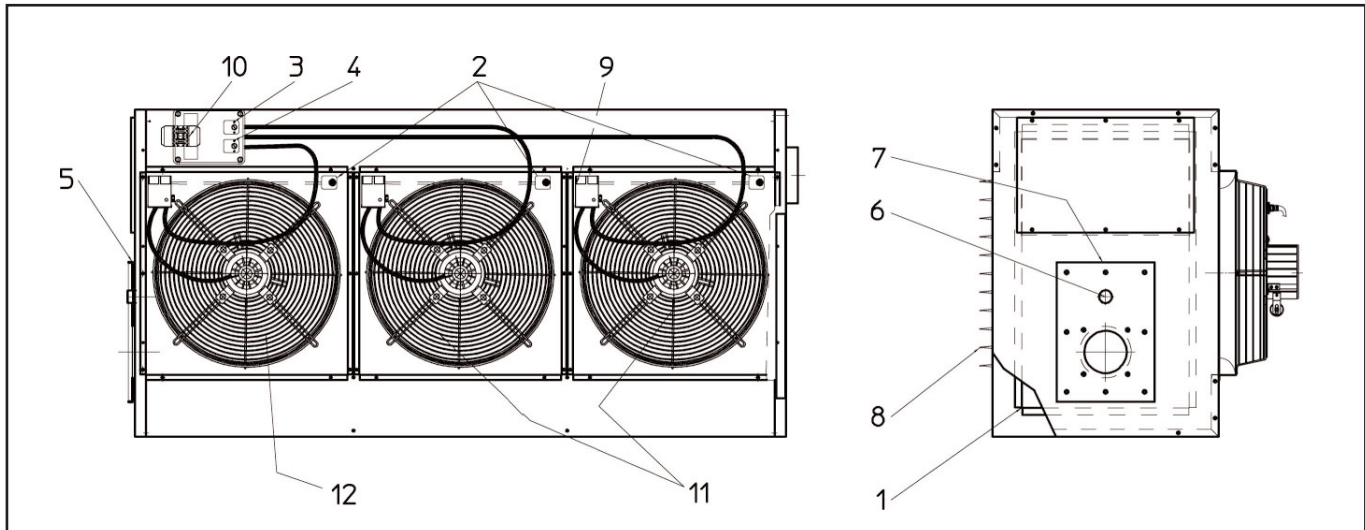


- BURNER CONNECTIONS**
- L1 (LIVE)
 - (GROUND) (EARTH)
 - N (NEUTRAL)
 - T1 (SUMMER SWITCH)
 - T2 (WINTER SWITCH)
 - S3 (LOCKOUT RESET)

- MAINS / CONTROLS CONNECTIONS**
- L1 (LIVE)
 - (GROUND) (EARTH)
 - N (NEUTRAL)
 - T1 (SUMMER SWITCH)
 - T2 (WINTER SWITCH)
 - S3 (LOCKOUT RESET)
 - B4 (LOCKOUT INDICATION)



4 Components drawing



Components list

	OFSU32	OFSU40	OFSU70	OFSU100
1. Exchanger	G10130	G10130	G10140	G10150
2. Safety thermostat STB	G09070	G09070	G09070	G09070
3. Burner thermostat TW	G02750	G02750	G02750	G02750
4. Fan thermostat TR	G02781	G02781	G02781	G02781
5. Burner plate gasket	G01190	G01190	G01190	GF01190
6. Flame glass	G02317	G02317	G02317	G02317
7. Burner plate	G10115	G10115	G10115	G10115
8. Air distribution louvres	G10030	G10030	G10030	G10030
9. Terminal board	G10025	G10025	G10025	G10025
10. 7 poles connector	B02455	B02455	B02455	B02455
11. Fan	Technical data table section 5			
12. Fan	Technical data table section 5			

5 Technical data

Fan features table

Model	No on drwg	Code	Fan No	Motor Power	Fan Dia (mm)	Blades No	Blades Angle
OFSU32	11	G00908	1	150	450	4	23°
OFSU40	12	G11020	1	245	450	4	27°
OFSU70	11	G00908	2	150	450	4	23°
OFSU100	11	G00908	2	150	450	4	23°
OFSU100	12	G11020	1	245	450	4	27°

Burner set up table

Model	Air setting	Pump pressure	CO ₂ %	Smoke	Flue gas (approx)	Nozzle Size
OFSU32	5.0	13.8bar	11.8	0	193°C	0.65 x 60°s
OFSU40	5.4	13.2bar	11.7	0	241°C	0.85 x 60°s
OFSU70	5.0	12.0bar	12.5	0	220°C	1.35 x 60°s
OFSU100	5.0	12.0bar	11.5	0	197°C	2.00 x 45°s

Setting of thermostats

Type	OFSU32	OFSU40	OFSU70	OFSU100
TR Thermostat	30-35°C	30-35°C	30-35°C	30-35°C
TG Thermostat	70-75°C	75-80°C	70-75°C	75-80°C
STB Thermostat	100°C	100°C	100°C	100°C



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Document reference number GB/WA/044/0108



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