

BRAND NAME



DRAGO DUAL



**INSTALLATION,
USE AND MAINTENANCE**

GB

IST 04 C 154 - 01

Thank you for choosing our boilers.

Please read these installation and maintenance instructions with care.

Please note that the boiler must only be installed, repaired and serviced by qualified personnel.

General information for installers, service engineers and users

This INSTRUCTION MANUAL, which is an integral and indispensable part of the product, must be handed over to the user by the installer and must be kept in a safe place for future reference. The manual must accompany the boiler should it be sold or moved.

This boiler must be used for the purpose for which it has been designed. Any other use is considered incorrect and therefore dangerous.

The boiler must be installed in compliance with applicable laws and standards and according to the manufacturer's instructions given in this manual. Incorrect installation may cause injury or damage, for which the manufacturer cannot be held liable.

Damage or injury caused by incorrect installation or use or failure to observe the manufacturer's instructions shall relieve the Manufacturer of all liability whether under a contract or not. Before installing the boiler, check that the specification meets the requirements of the system in which it is to be installed.

Check that the boiler is intact and that it has not been damaged during transport and handling. Do not install equipment which is clearly damaged or faulty.

Do not obstruct the air intake or heat dissipation grates.

Only original accessories must be used for all boilers supplied with optionals or kits (including electrical ones). All the packaging materials can be recycled and should be sent to specific waste management sites.

Keep the packaging out of the reach of children as it constitutes a serious hazard.

In the event of a malfunction, switch off the boiler immediately. Do not attempt to make any repairs and contact a qualified technician.

Original parts must be used for all

repairs to the boiler. Failure to do this may jeopardize the safety of the boiler and create a serious hazard.

To guarantee efficiency and correct operation of the boiler, it is legally binding to service the boilers once a year according to the schedule indicated in the relevant section of this manual.

If the boiler is not used for a certain length of time, switch off the electricity and fuel supply. Place some calcium carbonate inside the combustion chamber to absorb moisture. Should there be a risk of freezing, add anti-freeze. It is not advisable to empty the system as this may result in damage. Use a specific anti-freeze for multi-metal heating systems.

IMPORTANT

If there is a smell of gas, when using a gas-fired boiler, always follow these rules.

- Do not operate any electrical switches or electrical appliances.
- Do not light any flames and do not smoke.
- Close the main gas tap.
- Open all doors and windows wide.
- Contact a Service Centre, a qualified installer or the gas supply company.

Never use a flame to detect a gas leak.

WARNING

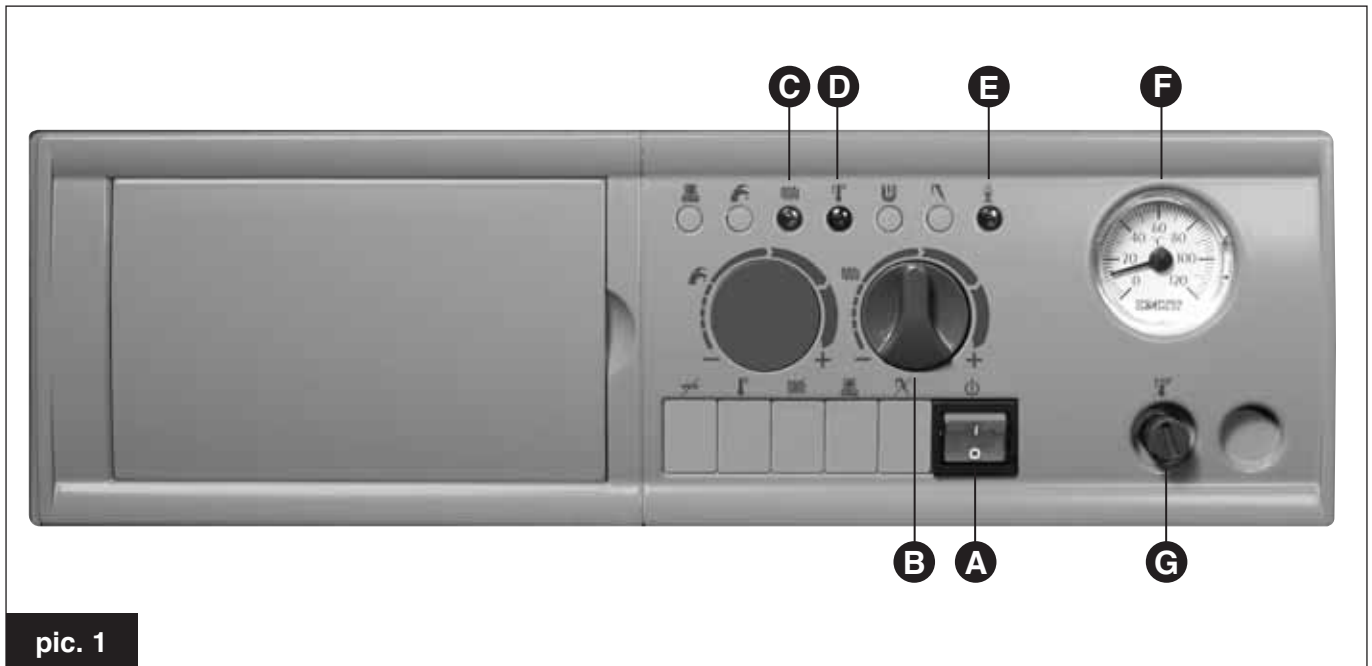
This boiler has been built for installation only in the country indicated on the rating plate. Installation in any other country may cause injury or damage.

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1 Instructions for the user

1.1 Control panel



pic. 1

- | | |
|--|--|
| A - Main switch with power light (green) | D - Overheating shutdown light (red) |
| B - CH temperature control | E - Burner light (yellow) |
| C - Heating pump operating light (yellow) | F - Thermometer |
| | G - Safety thermostat with manual reset |

Main switch with power light (green) (A)

When the switch is turned to position **0**, the boiler is off and the green power light is off.

When the switch is in position **I**, the boiler is powered on and the light on the switch is on.

CH temperature control (B)

With this knob you can set the temperature of the heating water, range 49°C to 82°C.

Heating pump operating light (yellow) (C)

When this light is on, it means that the system is in heating mode.

Overheating shutdown light (red) (D)

When this light is on, it means the safety thermostat has cut in due to overheating and needs to be reset manually.

Burner light (yellow) (E)

This light indicates that the burner is in operation.

Thermometer (F)

The thermometer displays the temperature of the water.

Safety thermostat with manual reset (G)

The safety thermostat switches the boiler off when there is a malfunction. Remove the cap and press the reset button.

1.2 Boiler operation (pic. 1)

1.2.1 Switching on

- * Open the fuel tap.
- * Turn the boiler main switch **A** to the ON position (the light comes on).
- * Turn the heating water temperature control knob **B** to the required setting.
- * Set the room temperature value on the room thermostat (if there is one).
- * Light **C** is on when the heating system is in operation.
- * Light **E** is on when the burner is in operation.

Warning: When starting gas boilers after a long period of inactivity, especially LPG-fired boilers, there may be air bubbles in the pipes.

So, before switching the boiler on, turn on another gas appliance such as a cooker ring.

Even so, the boiler may not switch on once or twice. It is therefore necessary to press the reset button (see paragraph below).

1.2.2 Burner shutdown

If the boiler does not function correctly, the burner cuts out automatically and the relevant light comes on. It is necessary to proceed as follows:

- * Check the fuel supply. For gas burners make sure the gas tap is open and gas is being supplied, for example by lighting a gas ring.
- * Press the burner reset button. If the boiler does not start up after two attempts, contact an authorised Service Centre or a qualified technician.

If the burner cuts out frequently, this means there is a recurring malfunction, so contact a qualified technician or an authorised Service Centre.

1.2.3 Shutdown due to overheating

If red light **D** comes on due to overheating, it means the safety thermostat has cut in due to a

recurrent malfunction. Contact an authorised Service Centre or a qualified technician.

1.3 Maintenance

It is a legal requirement to have the boiler and the burner serviced once a year.

If the boiler is serviced regularly, it will optimise efficiency, safeguard the environment and not cause damage or injury. The boiler must be serviced by qualified personnel.

The user may only clean the exterior casing of the boiler, using a suitable cleaning product.

Do not use water!

1.4 Information for the user

The user only has access to parts of the boiler which can be reached without the need for specific tools. The user must never remove the outer casing of the boiler or tamper with the parts inside.

NO ONE IS AUTHORISED TO MODIFY THE BOILER IN ANY WAY, NOT EVEN QUALIFIED TECHNICIANS.

Qualified technicians are authorised to install specific original kit on the boiler.

The Manufacturer declines all liability for injury or damage resulting from attempts to tamper with the boiler or incorrect operation.

The heating system can be protected against freezing by using a specific anti-freeze for multi-metal systems. **Do not use car engine anti-freeze products. Check the level and quality of the anti-freeze regularly.**

The boiler has a thermometer displaying the water temperature.

2 Technical features and dimensions

2.1 Technical features

This is a floor-standing gas or oil boiler with a cast iron heat exchanger with 3 smoke passes, working with oil or gas free-standing blown-air burners. The following models are available:

23 with 24 kW heat output
33 with 33 kW heat output
43 with 43 kW heat output
53 with 53 kW heat output
63 with 63 kW heat output
73 with 73 kW heat output

The boilers comply with the basic requirements of the following EEC directives:

- Gas Directive 90/396/EEC of 29 June 1990
- Thermal Efficiency Directive 92/42 EEC of 21 May 1992
- EMC Directive 89/336/EEC of 3 May 1989 amended by Directive 92/31/EEC of 28 April 1992
- European Community's Low Voltage Directive 73/23/EEC of 19 February 1973 amended by Directive 93/68/EEC of 22 July 1993

and are fitted with all the safety features required by the applicable laws.

The main technical features of the boilers are listed below.

- * High-efficiency cast iron heat exchanger with 3 smoke passes
- * Extra thick glass wool insulation (50 mm) with aluminium craft
- * Epoxy-coated zinc-plated metal casing
- * Main switch with light
- * Lights indicating power on, heating pump on, burner on, and overheating shutdown
- * Heating temperature control (49/82°C).
- * Safety thermostat (110°C)
- * Wiring system with printed circuit
- * Designed for electrical connection to a heating pump
- * Designed for electrical connection to a low water pressure switch

* Designed for connection to a remote D.H.W. storage tank control board (optional kit)

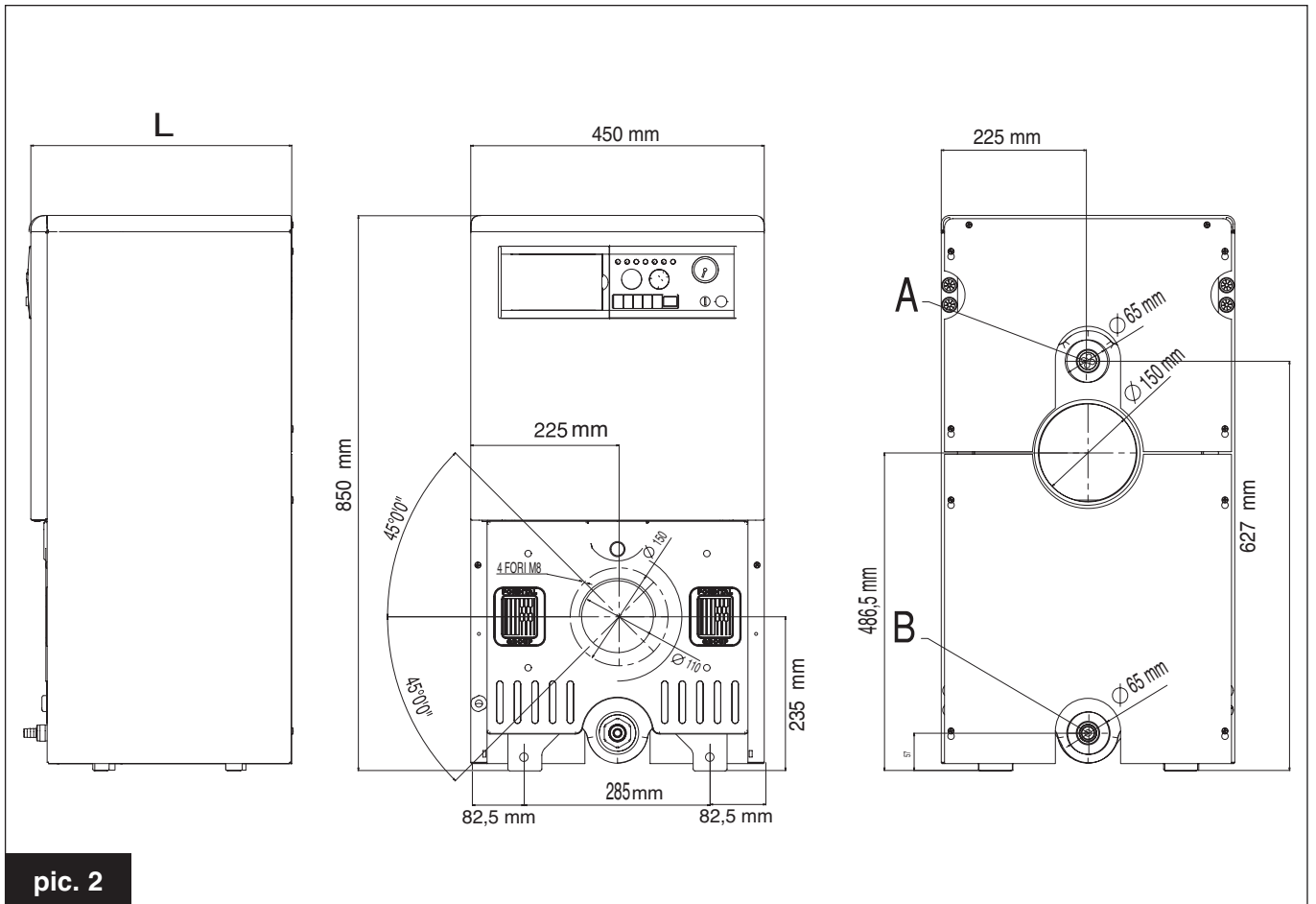
* Designed for connection to a climate control unit (optional kit)

* Designed for connection to a control board for managing up to three heating areas (optional kit)

* Thermometer

* Drain cock

2.2 Dimensions



MODEL	L	Flow A	Return B
23	400	1" 1/4	1"
33	525	1" 1/4	1"
43	625	1" 1/4	1"
53	700	1" 1/4	1"
63	800	1" 1/4	1"
73	900	1" 1/4	1"

2.3 Technical characteristics

		MODELS					
		23	33	43	53	63	73
EC efficiency rating		☆☆	☆☆	☆☆	☆☆	☆☆	☆☆
Max. heat output	kW	24	33	43	53	63	73
Heat input	kW	26.6	36.3	47.2	57.9	68.5	79.3
Efficiency at nominal load	%	90	91	91	91.5	92	92
Efficiency at reduced load (30%)	%	89.7	90.7	90.7	91.1	91.6	91.6
No. of elements of the heat exchanger		3	4	5	6	7	8
Net weight	Kg	125	151	177	203	229	255
Water content	l	15.5	19.5	23.5	27.5	31.5	35.5
Min. flow rate	l/h	680	950	1230	1520	1800	2150
Combustion chamber length	mm	208	308	408	508	608	708
Flue gas temperature	°C	210	190	188	202	181	175
Flue gas flow rate	Kg/h	40	53.2	69.3	8.1	97.7	114.5
Working pressure	bar	4	4	4	4	4	4
Load loss on flue side at max. heat input	Pa	13	25	40	40	50	65
Load loss on water side 10° ΔT	Pa	4800	5600	6000	7100	10000	11200
Load loss at ΔT = 50°	%	0.3	0.3	0.3	0.3	0.3	0.3
Max. burner hole Ø	mm	110	110	110	110	110	110
Flue Ø	mm	150	150	150	150	150	150
Working temperature range	°C	49 - 82	49 - 82	49 - 82	49 - 82	49 - 82	49 - 82
Voltage/frequency	V-Hz	230/50	230/50	230/50	230/50	230/50	230/50
Fuse on mains	A	4	4	4	4	4	4

Recommended nozzles for blown-air oil burners

Manufacturer		Delavan W - Steinen Q - Danfoss S					
Flow rate	Usgal/h	0.65	0.85	1.00	1.10	1.35	1.65
Angle/cone		60° W			60° B		

Note

The installation of blown-air burners, according to the standards in force (EC marking as per Directives: CEE/73/23 – CEE/89/336; EN267 regulation), must be done respecting the burner manufacturer instructions and making a burner adjusting which permits to obtain CO₂ values as indicated below.

Fuel		CO ₂
natural gas	G20	9 ÷ 9.7
natural gas	G25	8.8 ÷ 9.5
butane gas	G30	10.7 ÷ 11.6
propane gas	G31	10.5 ÷ 11.4
oil		12.5 ÷ 13

3 Instructions for the installer

3.1 Installation standards

The boiler must be installed in compliance with current laws and standards **which are considered an integral part of this handbook**.

3.2 Installation

3.2.1 Packaging

The boiler comes packed in a sturdy cardboard box on a wooden pallet. Take the boiler out of the box and check that it is intact. All the packaging materials can be recycled and should be sent to specific waste management sites. **Keep the packaging out of the reach of children as it is a source of hazard.**

The Manufacturer declines all liability for damage or injury resulting from failure to follow this rule.

Inside the box is a bag containing the handbook for the installation, use and maintenance.

3.2.2 Choosing where to install the boiler

Rules to bear in mind when choosing the place:

- It is advisable to leave at least 50 cm on either side of the boiler for easy access for maintenance.
- Do not install the boiler in wet or dusty areas.
- The boiler must not be accessible to animals, children or anyone else.

3.2.3 Installing the boiler

Before connecting the boiler to the tap water and heating system pipes, carefully clean the pipes to remove all traces of metal resulting from processing and welding operations as well as any oil and grease which could damage the boiler or jeopardize its operation.

N.B. Do not use solvents which could damage the components.

The Manufacturer declines all liability for damage or injury resulting from failure to follow the above rules.

Proceed as follows to install the boiler:

- Unscrew the four screws securing the brackets of the boiler to the pallet (pic. 3).



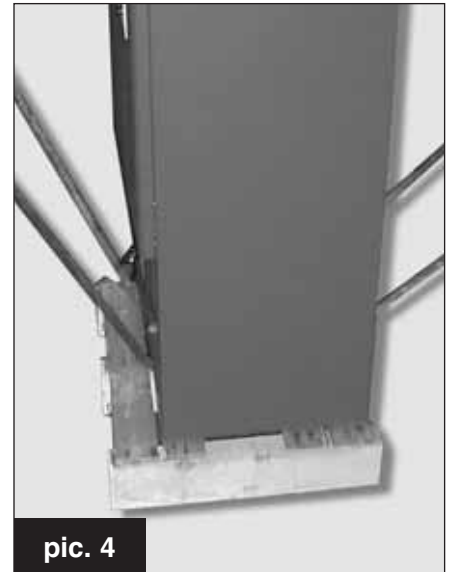
- Pass belts or cables underneath the boiler and around the legs, lift it off the pallet and place it in position on the ground. **Attention: when lifting the boiler from the pallet, hold it to prevent it from turning over** (pic. 4).

- If the boiler needs to be stabilised, insert shims between the floor and the boiler legs.
- Connect the boiler to the flow and return pipes.
- Remember that the plumbing system must be fitted with all the necessary safety and control systems specified by law (safety valve, water pressure switch, hot water discharge valve, pressure gauge, etc.).
- Connect the boiler to the chimney.
- If there is an ambient thermostat, heating pump or hot water pressure switch, connect to the wiring system.
- Connect to the mains supply.

Important

Leave at least 10 cm between the boiler and the wall behind

it to allow removal of the upper panel.



3.2.4 Room ventilation

These boilers have an open combustion chamber and are designed for connection to a chimney. **The combustion air is taken directly from the room in which the boiler is installed.**

The boiler must be installed in a suitable room pursuant to applicable standards and laws, **which are considered an integral part of this handbook.**

3.2.5 Flue gas system

These boilers have a flue gas discharge pipe designed for connection to a 150 mm Ø duct. As regards flue gas emission into the atmosphere, it is mandatory to comply with the applicable standards and laws, **which are considered an integral part of this handbook.**

The ducts from the boiler must be connected to a chimney in compliance with the applicable standards and laws, **which are considered an integral part of this handbook.**

Below is a list of legal requirements for chimneys and ducts.

* The diameter must not be less than the diameter of the boiler discharge outlet. For square or

rectangular chimneys, the inside cross section must be 10% greater than that of the boiler fitting.

* The material used must be water-proof and resistant to the flue gas temperatures and acid condensate.

* Mandatory features are low thermal conductivity, adequate mechanical resistance, perfect seal and carefully calculated height and cross section.

* The chimney must be as vertical as possible, and have a constant cross section and no throttling.

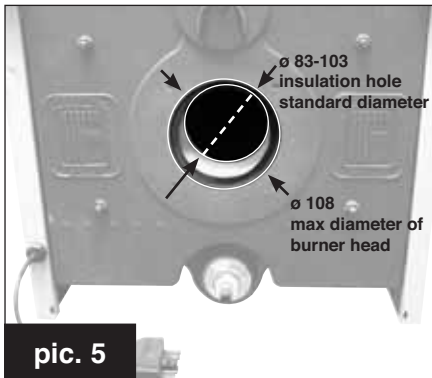
* The final section must allow efficient emission of the flue gas under all atmospheric conditions.

* The final section must protrude at least 50 cm above any adjacent structure within a five-metre radius.

3.2.6 Choosing and installing the burner

When choosing a burner for the boiler, make sure the features are compatible with the rated features of the boiler.

The burner must bear the CE mark.



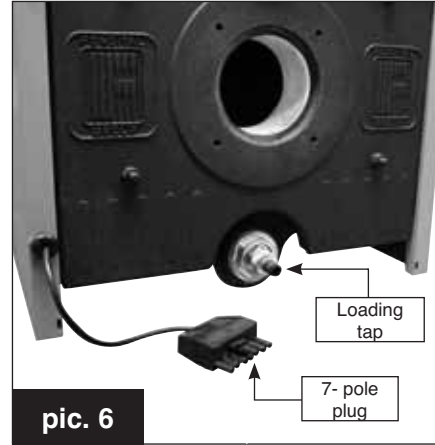
The burner must be fixed into the front panel of the boiler using four screws: the panel comes with four M8 threaded holes on a 150 mm diameter circumference.

If the burner uses a different fixing method, an adapter needs to be used. The maximum diameter of the burner head is 108 mm. The standard insulation hole is 83 mm (for models 22, 33 and 43) and 103 mm (for models 53, 63 and 73). If the burner head has a larger diameter, widen the hole in the insulation. If it is smaller, add extra

insulation to protect the burner from the flame (pic. 5).

WARNING

Insulating material adjustment, when needed, must be made with the utmost care in order not to damage the insulating material itself.



The boiler is equipped with a universal seven-pole plug for the electric connection of the burner (pic. 6).

3.2.7 Measuring combustion efficiency

Proceed as follows to determine combustion efficiency:

* Measure the combustion air temperature.

* Measure the flue gas temperature and percentage of CO₂ through the hole in the flue gas duct.

Take the readings when the boiler is running at a steady state.

3.2.8 Connecting to the gas mains (for boilers with gas burners)

The cross section of the gas supply pipe must be equal to or greater than that of the burner.

Comply with the applicable standards and laws on boiler installation, which are considered an integral part of this handbook.

Perform a gas tightness test before starting up an indoor gas supply system and connecting to the meter.

If the system has any concealed parts, the tightness test must be carried out before covering the pipes.

The tightness test must not be carried out with combustible gas. Use air or nitrogen.

When there is gas in the pipes, never use a naked flame to detect gas leaks. Use a suitable product available from the trade.

3.2.9 Connecting to the fuel oil supply system (for boilers with an oil burner)

The fuel oil supply pipeline must be perfectly watertight. In particular, there must be no infiltration of air along the pipe leading from the tank. It is advisable to supply the burners using two pipes, from tanks positioned at a height of +4 metres (by gravity) to -5 metres (by suction).

For higher values, it is necessary to install a pressure reducer or an auxiliary pump, respectively.

With tanks operating by gravity or fuel oil systems having an auxiliary pump, it is mandatory to fit an additional shutoff solenoid valve that closes automatically when the burner switches off automatically.

If the boiler is installed in a particularly cold area, use fuel oil with a low paraffin content. If necessary, fit the burner with a fuel oil pre-heating system.

It is also advisable to install a filter for oil.

3.2.10 Connecting to the power mains (pic. 7, 8, 9, 10)

These boilers are supplied with a terminal for connecting a three-wire mains lead, and a cable clip to prevent it from being torn away.

The boiler must be connected to a 230V-50Hz power mains.

Make sure the positive, negative and neutral wires are connected properly.

Comply with the applicable standards and laws on boiler installation, which are considered an integral part of this handbook.

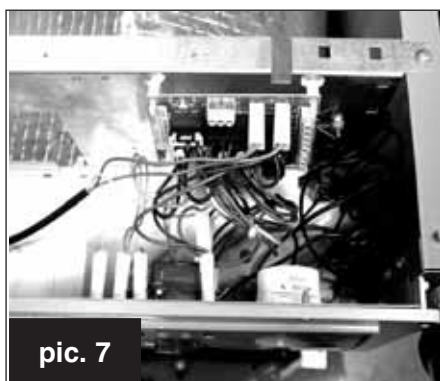
A bipolar switch must be fitted upstream of the boiler so that maintenance operations can be carried out safely.

The boiler mains supply must be protected by a differential magnetothermal switch with appropriate breaking power.

The mains power supply must be properly earthed. This basic safety requirement is mandatory.

In case of doubt, have the wiring thoroughly checked by a professionally qualified electrician.

The Manufacturer declines all liability for damage or injury resulting from failure to earth the system properly. Gas, hot water or heating system piping is not suitable for earthing.



3.2.11 Hydraulic connections

Before installing the boiler, it is important to clean the system thoroughly. This is to remove all impurities and particles from the components, which could damage the pump or heat exchanger.

The heating system delivery and return pipes must be connected to the relevant G1 1/4" fittings on the boiler.

When choosing the size of the pipes for the heating system, it is important to take account of load losses caused by radiators, any

thermostat valves, radiator stop valves and the actual configuration of the system.

3.2.12 Manufacturer original kits

The Manufacturer supplies original kits for installing the timer, the remote boiler control board and the temperature control.

These kits must be installed following the accompanying instructions.

3.3 Filling the system

After completion of all the system connections, the heating circuit can be filled with water.

This must be done with care as follows:

- Open the radiator air vents and check the relief valve on the hydraulic system.
- Gradually open the water inlet tap and check that the relief valves in the system, if there are any, are working properly.
- Close the radiator air vents as soon as water starts to come out.
- Check on the pressure gauge installed on the hydraulic system that the value is 0.8-1 bar.
- Turn off the water inlet tap and then release the air again through the radiator air vents.
- After switching on the boiler and after the system has reached the correct temperature, stop the pump and repeat the air relief operations.
- Allow the system to cool down and then set the water pressure to 0.8-1 bar.

WARNING

In domestic heating systems, it is essential to treat the water using specific products that are compatible with multimetal systems. This is to optimise efficiency and safety, keep the system in good working order, ensure that ancillary equipment continues to function efficiently, and minimise energy consumption in line with current legal requirements.

NOTE: The boiler is equipped with a drain cock, located in the front, which can be used for emptying the system (pic. 6).

3.4 Starting up the boiler

3.4.1 Preliminary checks

Before starting up the boiler, it is good practice to carry out the following checks.

- Make sure the flue gas pipe has been installed according to the instructions. **When the boiler is running there must be no leakage of combustion products from any of the seals.**

- The supply voltage must be 230 V- 50 Hz.
- The system must be full of water (hydrometer pressure 0.8-1 bar).
- The cut-off valves on the system pipes must be open.
- The fuel supply cock must be open.
- Check for any oil or gas leaks.
- Check that the main switch has been turned on.
- Check the boiler safety valve.
- Check for water leaks.

3.4.2 Switching on and off

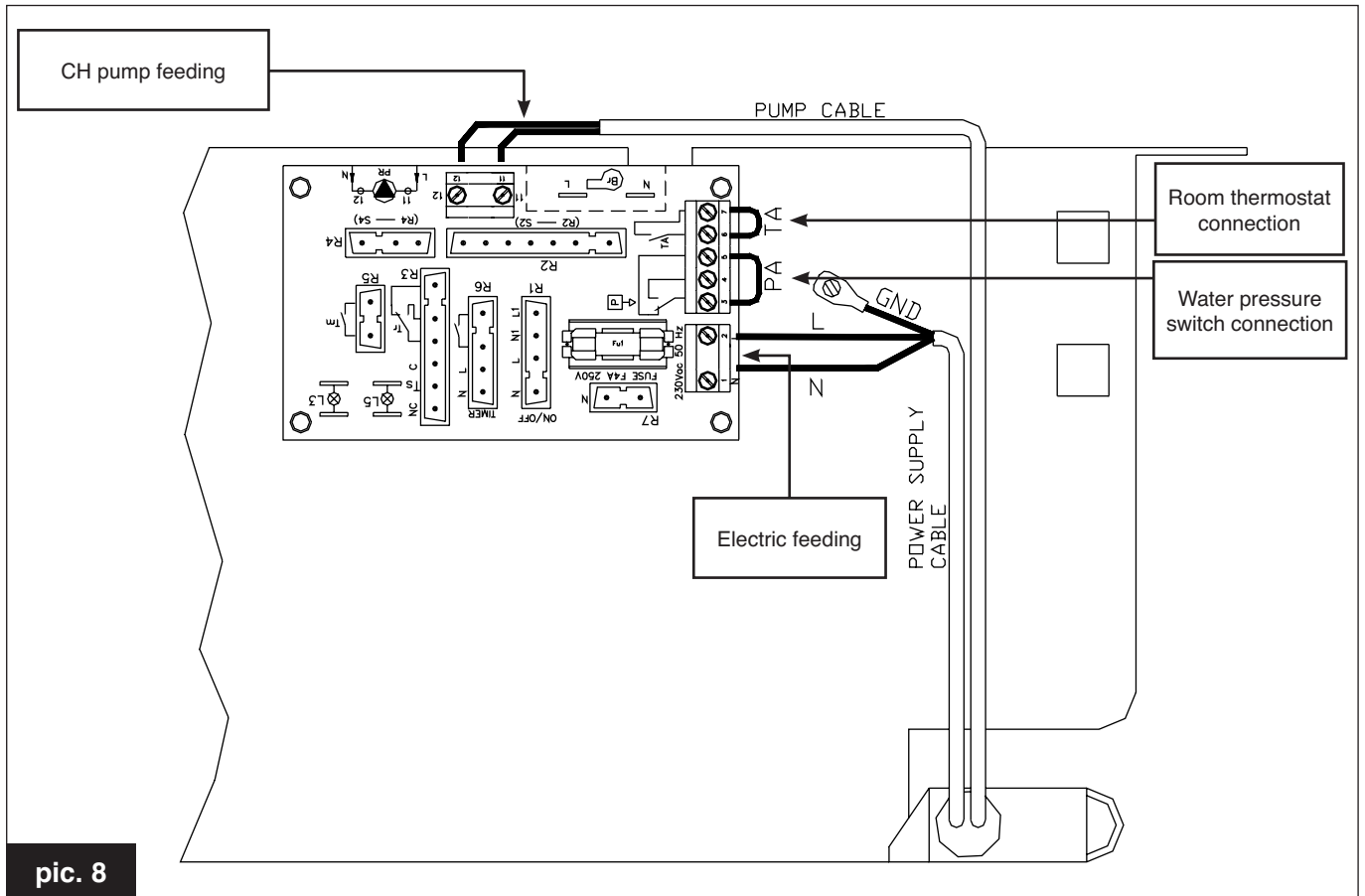
Refer to the "**User Instructions**" for switching the boiler on and off.

3.4.3 Regulating thermal output

The burner thermal power must be regulated according to the boiler and heating system specifications.

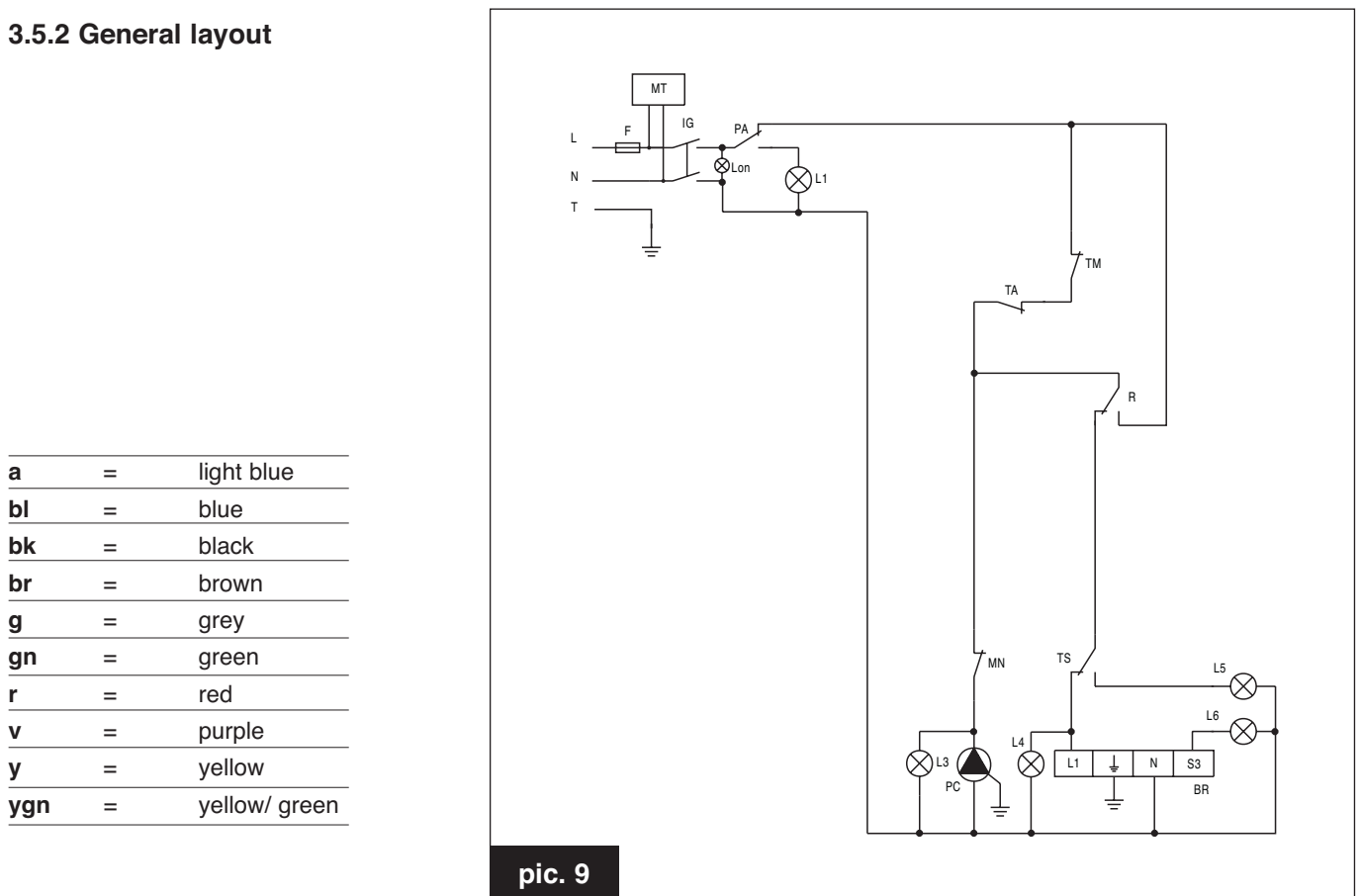
3.5 Wiring diagrams

3.5.1 Boiler layout



pic. 8

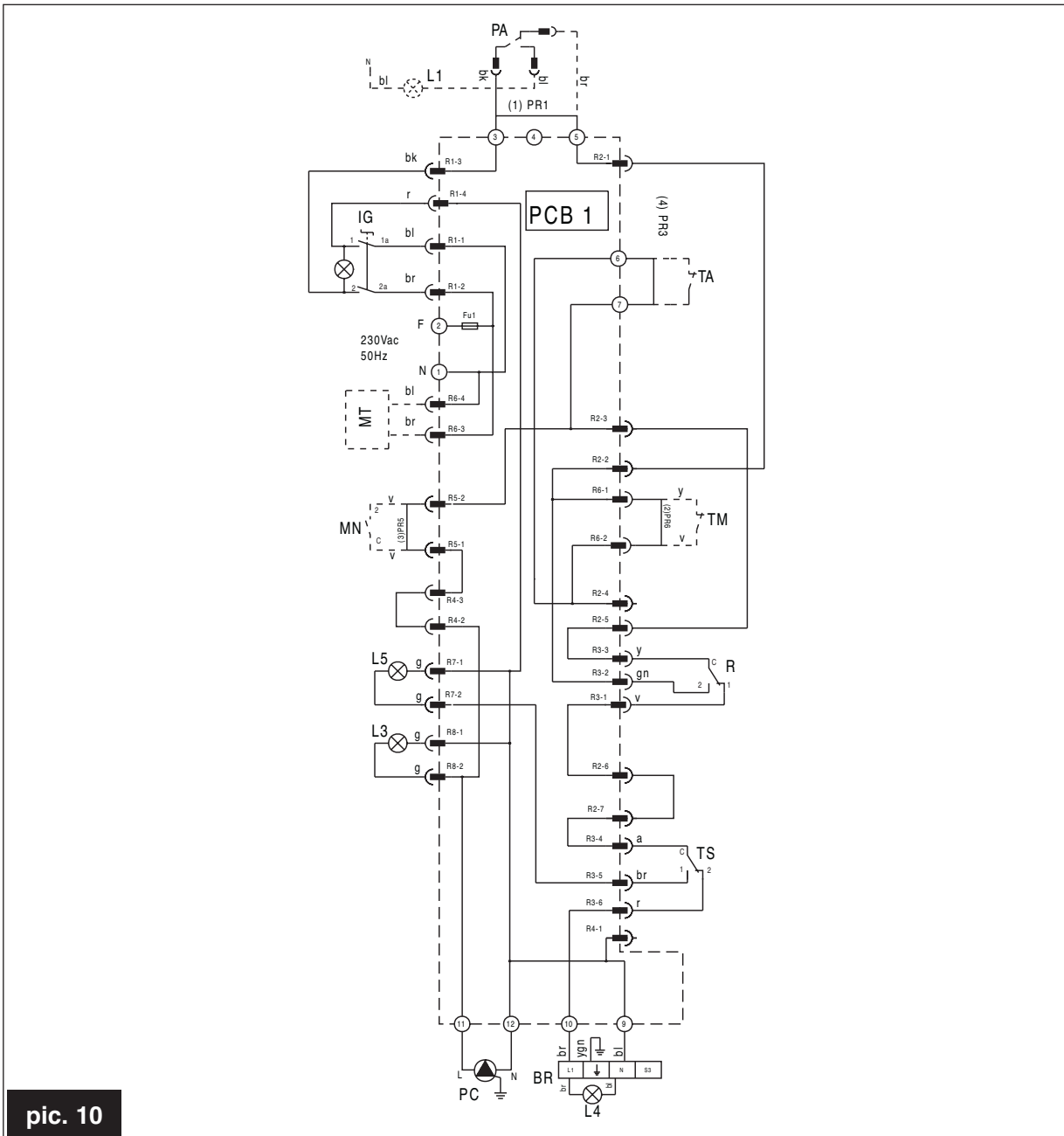
3.5.2 General layout



pic. 9

a	=	light blue
bl	=	blue
bk	=	black
br	=	brown
g	=	grey
gn	=	green
r	=	red
v	=	purple
y	=	yellow
ygn	=	yellow/ green

3.5.3 Topographical layout



pic. 10

Key to symbols:

- IG:** Main switch [on the printed circuit it is indicated with "on/off"]
- L1:** Low water light (optional)
- L3:** Heating pump light
- L4:** Burner light
- L5:** Overheating light
- L6:** Burner stop light (optional)
- MT:** Programming clock motor (optional) [indicated with TIMER on the PCB]
- TM:** Programming clock contact (optional) [indicated with TIMER on the PCB]
- PA:** Water pressure switch [on the printed circuit it is indicated with the water pressure switch symbol]

- MN:** Minimum temperature thermostat (optional) [on the printed circuit it is indicated with Tm]
 - TA:** Room thermostat
 - R:** Heating thermostat [on the printed circuit it is indicated with Tr]
 - TS:** Safety thermostat
 - Fu1:** Safety fuse type F4A 250V
 - BR:** Burner
 - PC:** Heating system circulating pump
 - PCB1:** Heating system printed circuit
- Notes: (1) PR1: Remove jumper and connect PA
 (2) PR6: Remove jumper and connect TM
 (3) PR5: Remove jumper and connect MN
 (4) PR3: Remove jumper and connect TA

4 Maintenance

To ensure that the boiler continues to run efficiently, it must be serviced once a year as specified below.

Maintenance or repairs must be performed by qualified personnel.

For maintenance and repairs, users are advised to contact a qualified technician or a Service Centre where the personnel is specifically trained for the purpose.

Before replacing any component or cleaning the inside of the boiler, turn off the main switch.

Maintenance schedule

Routine maintenance should include the following functional checks:

- general conditions of the boiler
- tightness of the system supplying gas or oil to the boiler
- boiler ignition
- boiler combustion parameters through flue gas analysis. Individually-installed boilers need to be checked once every two years, cascade boilers need to be checked once a year.

- condition and tightness of the flue gas pipes
- condition of all the boiler safety devices
- water tightness and scaling of the boiler connections
- efficiency of the system safety valve

and the following cleaning operations (with the boiler cold)

- the boiler as a whole
- the burner: this may also need to be reset according to the manufacturer's instructions (see combustion check)
- boiler room ventilation grille
- flue gas side of the heat exchanger. Use a brush or suction device to remove soot deposits from the walls and heat exchanger fins.

Alternatively, specific chemical products can be used provided that the manufacturer's instructions are followed carefully.

Do not clean the heat exchanger with flammable products such as petrol or solvent.

When remounting the front panels, check the state of the seals and **replace them if necessary.**

Before acting on the boiler for the first time, check the existence of the following:

- heating system documents and/or certificates complying with the applicable laws (if any) issued by the installer

Also check that:

- the room where the boiler is installed is suitable for the purpose
- the room is adequately ventilated
- flue gas pipes are the right diameters and lengths
- the boiler has been installed correctly in compliance with the instructions in this manual

If the boiler does not function correctly or there is a hazard to persons, animals or property, notify the supervisor and write a report specifying details.

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