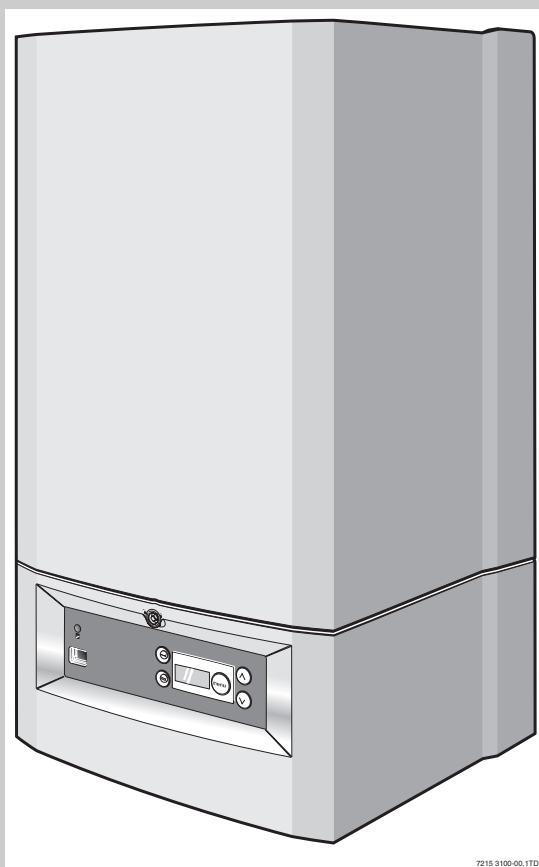


Installation and maintenance instructions

Gas wall hung Boiler
condensing



7215 3100-00.1TD

Buderus 500-24C
Buderus 500-28C

For the installer

Please read thoroughly



Buderus

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Preface

Important general instructions

The appliance is designed exclusively for heating water as part of a domestic central heating and/or hot water system. Do not use the appliance for any other purpose. Installation, maintenance and repair must be carried out by a competent engineer (e.g. CORGI registered). Only use the boiler in conjunction with Buderus accessories and spares. Other accessories and consumables may be used if they are expressly provided for the designated use and if system performance and safety are not affected in any way.

The boiler is suitable for connection to fully pumped, central heating systems ONLY.



BENCHMARK' Log Book

All Buderus gas fired boilers include an installation, commissioning and service record log book. The details of the log book will be required in the event of any warranty work being requested.

Please complete the appropriate sections on completion of the installation and commissioning.

REMEMBER: Please leave the log book with the installed boiler.

Gas Council Appliance No. :

Buderus 500-24C 47-110-04
Buderus 500-28C 47-110-03

These Installation and maintenance instructions apply to: Buderus wall-mounted condensing gas combi boilers models 500-24C and 500-28C.

Flue type: C_{13(x)}, C_{33(x)}, C_{53(x)}, C_{73(x)}
Type: GB/IE II_{2H3P} 20 mbar; 37 mbar
In this document: NG = 2H-G20-20 mbar
LPG = 3P-G31-37 mbar
Electrical rating: 230 VAC, 50 Hz, IP X4D
Fuse rating: 2.5 Ampere slow blow silica filled

The boiler type consists of the following components:

- 500 Gas condensing boiler
- 28 Maximum output is 28 kW
- C Combination boiler (Integrated domestic hot water supply).

Other manuals available for this boiler are:

- user manual;
- service instructions.

Regulations and directives

All gas appliances must be installed by a competent person in accordance with the current Gas Safety (Installation and Use) regulations.

Failure to install appliances correctly could lead to prosecution.

The appliance installation must comply with the current:

Gas Safety Regulations,
IEE Regulations,
Building Regulations,
Building Standards (Scotland) (Consolidation),
Building Regulations (Northern Ireland),
local water by-laws,

Health and Safety Document 635 (The Electricity Work regulations 1989) and any other local requirements.

The relevant British Standards should be followed, including:

BS7074:1 :	Code of practice for domestic and hot water supply
BS6891 :	Installation of low pressure gas pipework up to 28mm (R1)
BS5546 :	Installation of gas hot water supplies for domestic purposes
EN:12828 :	Central heating for domestic premises
BS5440:1 :	Flues and ventilation for gas appliances of rated heat input not exceeding 70 kW (net): Flues
BS5440:2 :	Flues and ventilation for gas appliances of rated heat input not exceeding 70 kW (net): Air Supply
BS5449 :	Forced circulation of hot water systems
BS7593 :	Treatment of water in domestic hot water central heating systems
BS6798 :	Installation of gas fired boilers of rated input up to 70 kW (net).

Where no specific instruction is given, reference should be made to the relevant British Standard codes of Practice.

The manufacturer's notes must not be taken, in any way, as overriding the statutory instrument laws.

The design and construction of the Buderus wall-mounted condensing gas combi boiler 500-24C and 500-28C conforms to the basic specifications listed in the European directive governing gas-fired appliances 90/396/EEC, and with respect to EN 625, EN 483 and EN 677.

For optimum long term reliable functioning under domestic conditions, the boiler must be inspected and maintained as per these instructions, at least once a year by an officially recognised service engineer.

The term "domestic conditions" means that the boiler is used to provide central heating and / or hot water to no more than one single family dwelling.

Failure to comply with these instructions will invalidate the appliance warranty.

Timer Frame Buildings

If the boiler is to be fitted in a timber framed building it should be fitted in accordance with the Institute of Gas Engineering document **IGE/UP** and **BS 5440:1**.

The appliance must only be installed along with Buderus flue kits, as these are certified for use with the boiler.



Warning: Notes relating to the heating system water.

Thoroughly flush the system before it is filled with water. Use only untreated water or water treatment product such as Sentinel X100 to fill and top up the system. For more information about Sentinel call 0151 420 9563.

When using water treatment, only products suitable for use with Buderus heat exchangers are permitted (e.g. Sentinel X100).

Your warranty is at risk if an incorrect water treatment product is used in conjunction with this appliance.

For more information, contact Buderus Technical Product Support Department.

It is most important that the correct concentration of the water treatment product is maintained in accordance with the manufacturer's instructions.

If the boiler is used in an existing system any unsuitable additives **MUST** be removed by thorough cleaning. **BS.7593** details the steps necessary to clean a domestic central heating system.



Warning: In hard water areas, treatment to prevent lime scale may be necessary - however, the use of artificially softened water is NOT permitted.

Under no circumstances should the boiler be fired before the system has been thoroughly flushed.

Do not use artificially softened water.

When using plastic pipes, then they must contain a polymeric barrier.

It is allowed to use copper for the first 600 mm. See also subsection 1.8: "Pipe connections" in this manual.



Notes related to domestic hot water.

- The domestic hot water service must be in accordance with **BS 5546** and **BS 6700**.
- The boilers are suitable for connection to most types of washing machine and dishwasher appliances.
- When connecting to suitable showers, ensure that:
 - a. The shower is capable of accepting mains pressures and temperatures up to 65 °C.
 - b. The shower is ideally thermostatic or pressure balancing.
- Where temporary hardness exceeds 150 mg/litre, it is recommended that a proprietary scale reducing device is fitted into the boiler cold supply with the requirements of the local water company.



Caution

Provision must be made to accommodate the expansion of DHW contained within the appliance, where a back flow prevention device is fitted **BS. 67989: §5.4.3**.

Safe handling of substances

No asbestos, mercury or CFCs are included in any part of the boiler and its manufacture.

Hazard definitions and abbreviations

Hazard definitions


Danger:

Indicates the presence of hazards that will cause severe personal injury, death or substantial property damage.


Warning:

Indicates the presence of hazards that can cause severe personal injury, death or substantial property damage.


Caution:

Indicates presence of hazards that can cause minor personal injury or property damage.


NOTICE:

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

Abbreviations

AB	= Automatic Bypass
AV	= Air Vent
BCT	= Buderus cylinder thermostat
BDV	= Buderus diverter valve
CB	= Connection Block
CH	= Central Heating
CHF	= Central Heating Flow
CHR	= Central Heating Return
CT	= Cylinder Thermostat
CWDO	= Condensate water drainage outlet
DHW	= Domestic Hot Water
DV	= Diverter Valve
E	= Earth
L	= Live
LSV	= Lock Shield Valve
MCW	= Mains Cold Water
N	= Neutral
JB	= Junction Box / RTH Relay
PL	= Permanent Live
Prog	= Programmer
PRV	= Pressure relief valve (safety valve)
RT	= Room Thermostat
RV	= ModuLink 250 RF Receiver
T	= Timer
TRV	= Thermostatic Radiator Valve
μ	= micro (as μA - micro Amps)
WC	= Wiring Centre
ZV	= Two Port Zone Valve

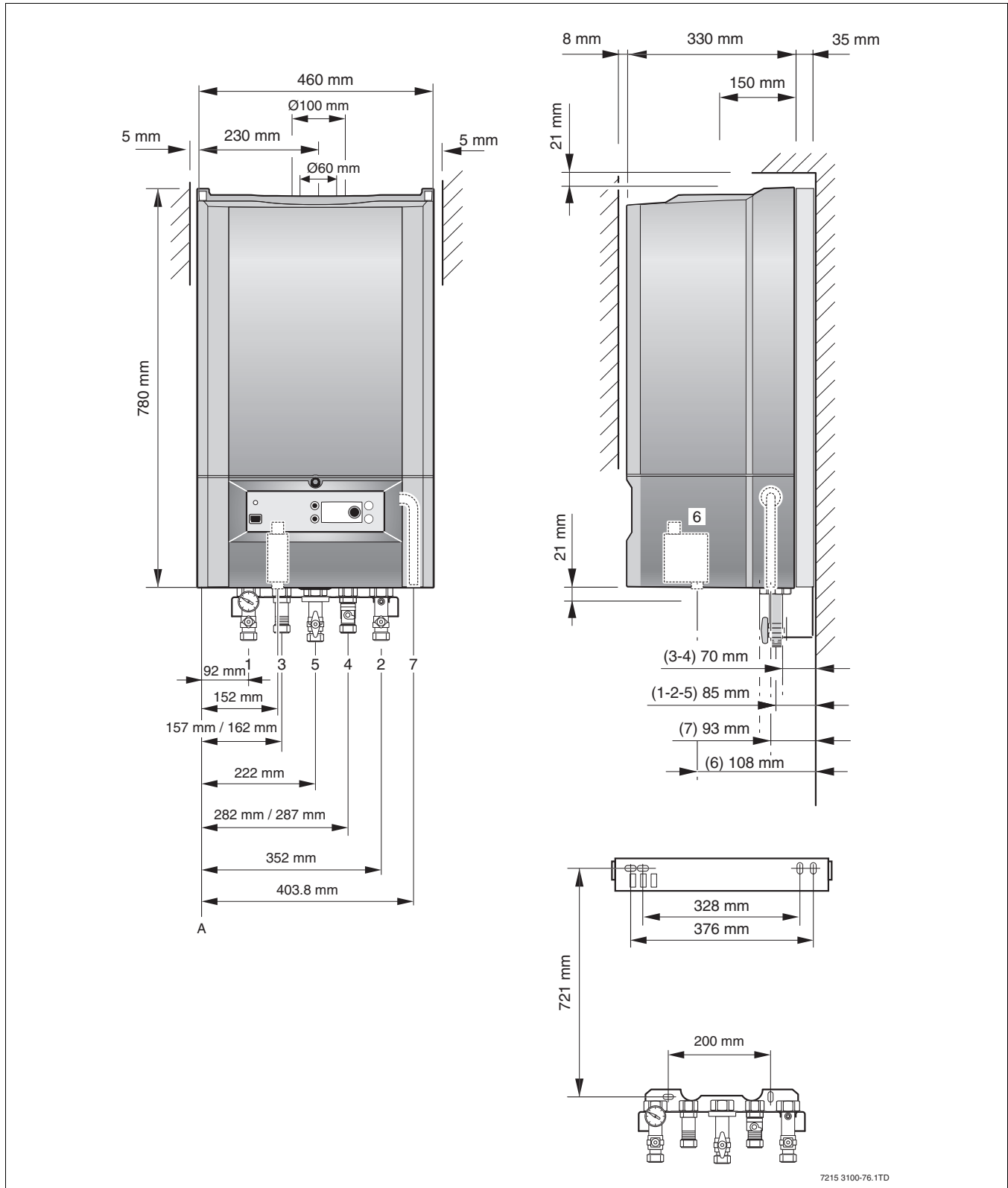
1 Installation

1.1 Technical specifications

Description	Unit	500 Series wall-mounted condensing gas combi-boiler	
		500-24C	500-28C
Type of gas supply as established in EN 437 (GB/IE)		GB/IE II _{2H3P} 20 mbar, 37 mbar (natural gas H and LPG P)	
Rated thermal load for heating	kW	5.7 - 23.0	5.7 - 23.0
Rated thermal load for preparing hot water	kW	5.7 - 23.0	5.7 - 28.5
Rated heating capacity for system temperature (modulating from 30° to 100°)			
Heating curve 75/60 °C	kW	5.3 - 22.0	5.3 - 22.0
Heating curve 40/30 °C	kW	6.0 - 24.0	6.0 - 24.0
Seasonal efficiency (SEDBUK) for natural gas	%	90.0	90.0
for LPG	%	92.3	92.3
Max. gas rate for heating	m ³ /h	2.43	2.43
Max. gas rate preparing hot water	m ³ /h	2.43	3.02
Central heating installation			
Heating water temperature	°C	30 - 80	30 - 80
ΔT at residual head of 200 mbar	°C	< 20	< 20
Max. operating pressure of boiler	bar	3.0	3.0
Pump over run time	min	5	5
Expansion vessel			
Capacity of expansion vessel	l	7.5	7.5
Admission pressure of expansion vessel	bar	1.0	1.0
Plate heat exchanger			
DHW flow rate at 35 °C rise	l/min	9.4	11.7
Adjustable hot water temperature	°C	40 - 60	40 - 60
Minimum connection pressure	bar	0.8	0.9
Maximum connection pressure	bar	10.0	10.0
Pipe connections			
Maximum connection pressure	∅ mm	22	
CH flow/return (compression fitting)	∅ mm	22	
MCW inlet / DHW outlet (compression fitting)	∅ mm	15	
Condensate-water outlet	∅ mm	21.5	
Pressure relief valve (compression fitting)	∅ mm	15 (adapter supplied with boiler)	

Description	Unit	500 Series wall-mounted condensing gas combi-boiler	
		500-24C	500-28C
Flue gas values			
Condensate water quantity, natural gas, 40/30 °C	l/h	1.6	1.6
Exhaust-fume mass-flow rate			
Full load	g/s	10.6	10.6
Part-load	g/s	4.3	4.3
Exhaust-fume temperature, full load			
Heating curve 75/60 °C	°C	77	77
Heating curve 40/30 °C	°C	55	55
Exhaust-fume temperature, partial load			
Heating curve 75/60 °C	°C	60	60
Heating curve 40/30 °C	°C	35	35
CO ₂ full load, natural gas standard test gas G20	%	9.2	9.2
CO ₂ full load, natural gas standard test gas LPG	%	10.3	10.3
Standard emission factor CO	mg/kWh	< 22	< 22
Standard emission factor NO _x	mg/kWh	< 30	< 30
Flow pressure available for use	Pa	75	75
Flue-gas system			
Type of exhaust-fume connection		C _{13(X)} , C _{33(X)} , C _{53(X)} , C _{73(X)}	
Diameter of flue take-off	mm	Concentric 60/100	
Electrical data			
Mains connection voltage (50 Hz)	V	230	
Electrical power consumption			
Full/Partial load/Standby	W	110/88/4	
Electrical protection rating		IP X4D	
Boiler dimensions and weight			
Height x Width x Depth	mm	780 x 460 x 330	780 x 460 x 330
Weight (without casing)	kg	31	31
Weight (without casing)	kg	3	3

1.2 Dimensions, connections and assembly



- A.** outside edge frame
1. CH flow = Ø 22 mm (compression fitting)
 2. CH return = Ø 22 mm (compression fitting)
 3. DHW outlet = Ø 15 mm (compression fitting)
 4. MCW inlet = Ø 15 mm (compression fitting)
 5. Gas = Gas connection Ø 22 mm (compression fitting)
 6. CDO = Condensate drainage outlet Ø 21.5 mm
 7. PRV = Pressure relief valve Ø 15 mm (compression fitting)



Note

See wall-mounting template for the necessary clearances.
The wall-spacing frame may not always be necessary.

1.3 Boiler locations and clearances

Bathroom Installations

This appliance is rated IP X4D.

The boiler may be installed in any room or internal space, although particular attention is drawn to the requirements of the current IEE (**BS.7671**) Wiring Regulations and, in Scotland, the electrical provisions of the building regulations applicable in Scotland, with respect to the installation of the boiler in a room or internal space containing a bath or shower. If the appliance is to be installed in a room containing a bath or shower then, providing water jets are not going to be used for cleaning purposes (as in communal baths/showers), the appliance can be installed in Zone 3, as detailed in **BS.7671**.

Compartment Installations

A compartment used to enclose the boiler should be designed and constructed especially for this purpose. An existing cupboard or compartment may be used, provided that it is modified for the purpose. In both cases, details of essential features of cupboard/ compartment design, including airing cupboard installation, are to conform to the following: **BS 6798** (No cupboard ventilation is required - see 'Air Supply' for details).

It is not necessary to have a purpose-provided air vent in the room or internal space in which the boiler is installed. Neither is it necessary to ventilate a cupboard or compartment in which the boiler is installed, due to the low surface temperatures of the boiler casing during operation; therefore the requirements of **BS 6798, Clause 12**, and **BS 5440:2** may be disregarded.

The permanent clearances required are:

A = in front	8 mm
B = below	21 mm
C = right side	5 mm
D = left side	5 mm
E = above	21 mm

The position selected for installation **MUST** allow adequate space for servicing:

A = in front	350 mm
B = below	180 mm
C = right side	5 mm
D = left side	5 mm
E = above	200 mm

In addition, sufficient space may be required to allow lifting access to the wall-mounting bracket.

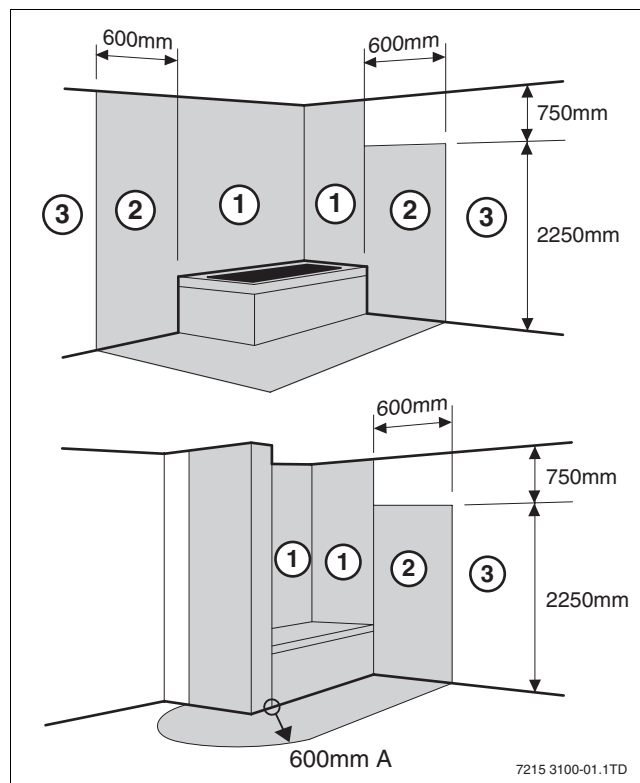


Fig. 1 Bathroom Installations

A = Radius

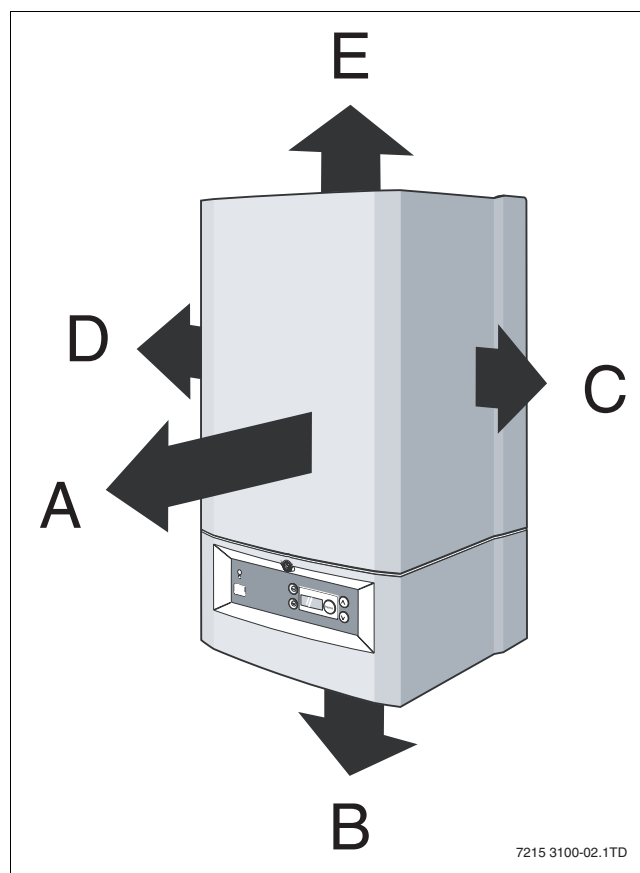


Fig. 2 Compartment Installations

1.4 Items supplied with unit

- Check the contents against the packing list to ensure that nothing is missing.

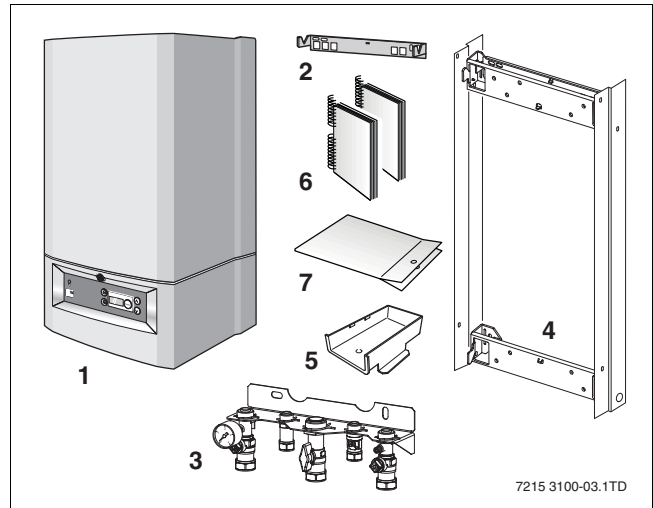


Fig. 3 Items supplied with unit

Key to fig. 3:

- 1:** Wall-mounted condensing gas boiler
- 2:** Wall bracket
- 3:** Manifold Assembly
- 4:** Wall-spacing frame
- 5:** Bracket for ModuLink 250 RF
- 6:** Technical documents:
 - 1 x Installation and maintenance manual
 - 1 x User manual
 - 1 x Wall-mounting template
 - 1 x Benchmark Logbook
 - 1 x Warranty card
 - 1 x Envelope for Warranty card
- 7:** Plastic bag containing the following accessories:
 - 4 x wall fixing screws
 - 4 x wall plugs
 - 4 x washers
 - 4 x push fit rivet for wall-spacing frame
 - 2 x rubber stops for wall-spacing frame
 - 3 x cable clamp - top part
 - 6 x cable clamp - fixing screw
 - Seals (1 x G $\frac{1}{2}$ " - 1", 2 x $\frac{3}{4}$ " - 22 mm, 2 x $\frac{1}{2}$ " - 15 mm)
 - 1 x MCW inlet filter
 - Initial start-up sticker
 - Second identification plate
 - Pressure Relief Valve compression fitting + brass insert
 - Radiator key

1.5 Hanging the boiler



Note

Pipework from the boiler is routed downwards as standard, but may be routed upwards behind the boiler using the wall-spacing frame (supplied with the boiler). If using the supplied wall-spacing frame, follow the procedure in section 1.6.



CAUTION!

DO NOT remove the polystyrene foam bottom slab until lifted into position. During installation work, cover the condensing boiler and flue connection to prevent site dirt from entering.

- Attach the wall-mounting template.
- Drill the necessary holes.
- Attach the manifold assembly to the wall (→ fig. 4, item 1).
- Make the pipework connections to the manifold.
- Attach the wall bracket (→ fig. 4, item 2).
- Open the locking mechanism using a radiator key (→ fig. 5, item 1). The radiator key is included in the delivery of the boiler in the accessories bag.
- Detach the casing of the condensing gas boiler (→ fig. 5).
- Remove the polystyrene foam piece from the top of the boiler.
- Hang the condensing gas boiler onto the wall bracket (→ fig. 4).



Note

If the boiler isn't connected to the pipework immediately, place caps on the pipe connections.

- Connect manifold unions to the boiler using supplied seals.

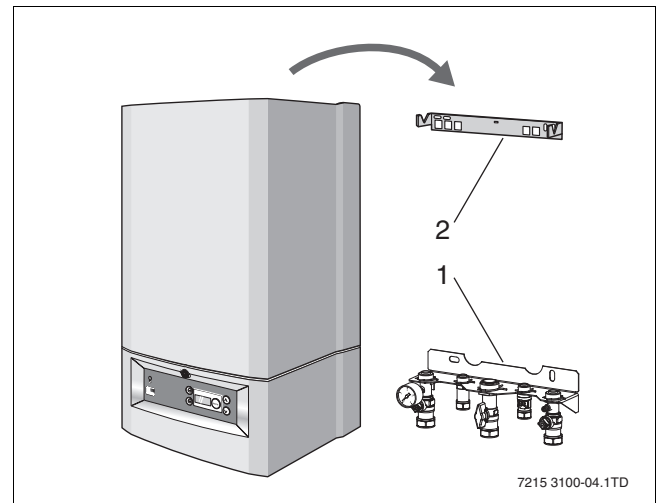


Fig. 4 Installation

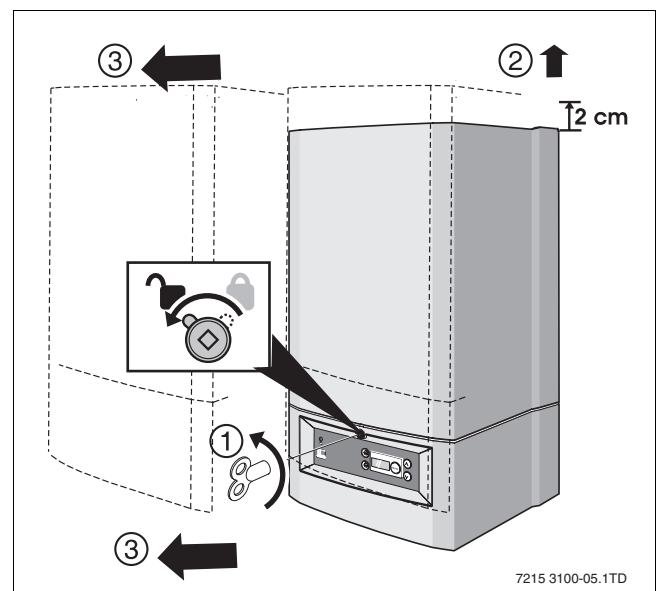


Fig. 5 Remove casing

1.6 Install the wall-spacing frame

- Attach the wall-mounting template.
- Drill the necessary holes.
- Attach the wall bracket (→ fig. 4, item 2).
- Mount the rubber stops in one of the wall-spacing brackets and hang this on the wall bracket (→ fig. 6).

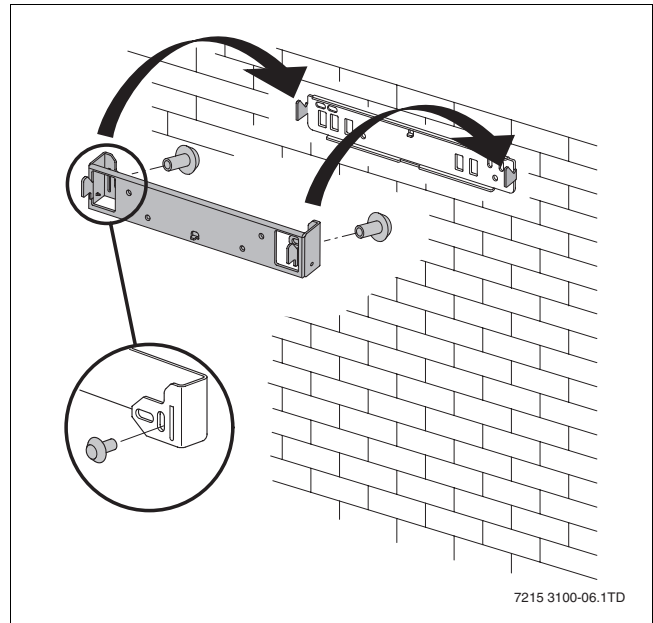


Fig. 6 Hanging the wall-spacing bracket

- Mount the two strips on the upper and lower wall-spacing brackets using the snap rivets (→ fig. 7). The lower wall-spacing bracket is fitted upside down compared to the upper wall-spacing bracket, ie. with the hooks facing down.
- Attach this lower wall-spacing bracket to the wall.

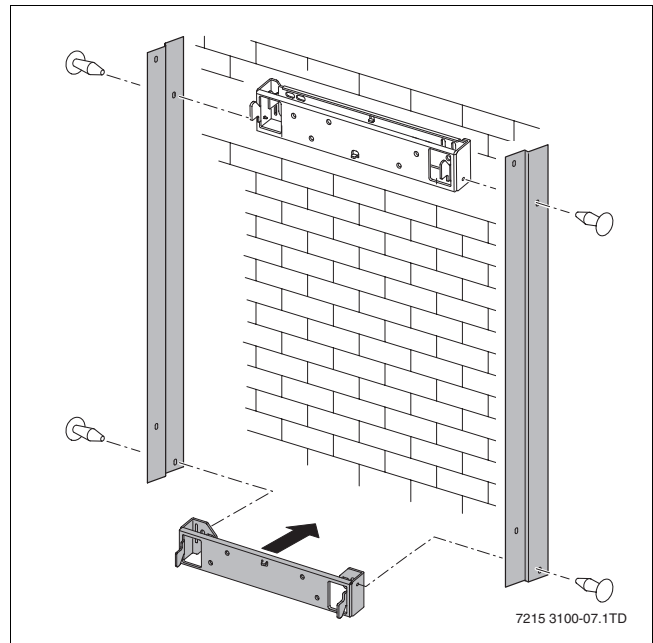


Fig. 7 Mounting the lower bracket

- Mount the lower bracket on the wall and attach the manifold assembly. If the manifold does not sit flat, check the orientation of the lower wall-spacing bracket (→ fig. 8).
- Make the pipework connections to the manifold. See also subsection 1.8.
- Open the case locking mechanism, using a radiator key (→ fig. 5, item 1). The radiator key is included in the delivery of the boiler, in the accessory bag.
- Remove the boiler case.
- Remove the polystyrene foam piece from the top of the boiler.



Note

If the boiler is not to be connected the pipework immediately, then place caps on the pipe connections.

- Connect the manifold unions to the boiler, using the seals supplied.
- Hang the boiler (→ fig. 9) onto the upper wall-spacing frame bracket.

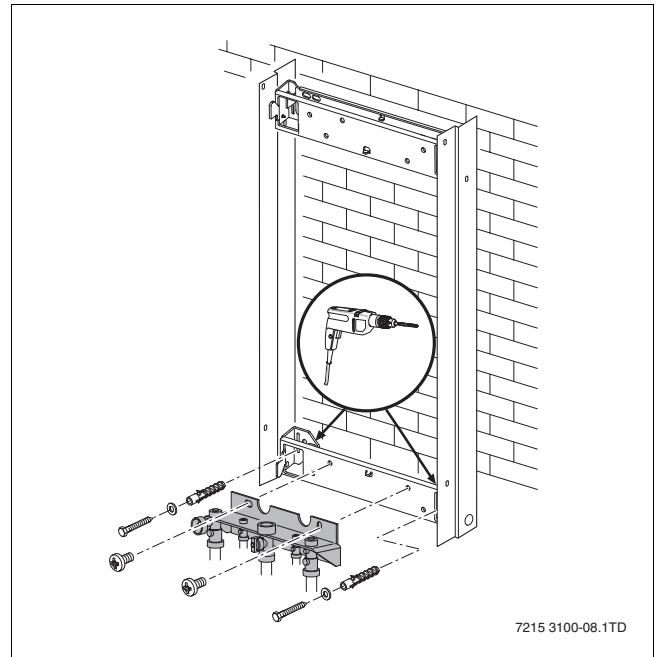


Fig. 8 Mounting the manifold

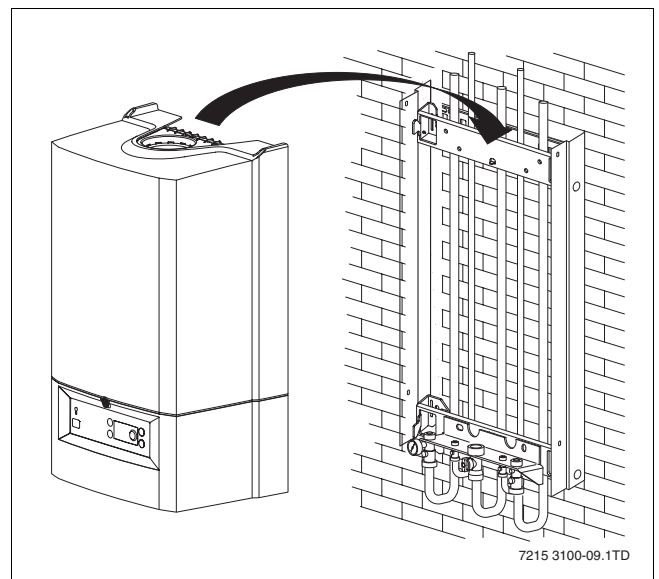


Fig. 9 Hanging the boiler

1.7 Water circulation system

The central heating system should be installed in accordance with **BS.6798** and, in addition, for smallbore and microbore systems, **BS.5449** or EN 12823.

1.8 Pipe connections

- Connect pipes as shown in fig. 10. Ensure that all pipework is routed so as to minimise any strain on the boiler fittings.

The first 600 mm of pipework must be in copper, then another approved material type can be used.



CAUTION!

Do not use galvanised radiators or pipes.

1.8.1 Gas supply

The gas installation must be installed in accordance with **BS.6891**.



CAUTION!

Pipework from the meter to the boiler **MUST** be of adequate size, generally $\text{Ø}22$ mm.

The complete installation **MUST** be tested for gas tightness and purged as described in **IGE/UP/1b**.

1.8.2 Gas connection

- Connect to gas supply according to relevant standards.

1.8.3 Compression fitting pressure relief valve outlet

- Insert the small piece of pipe (→ fig. 11).
- Attach the compression fitting (→ fig. 12).

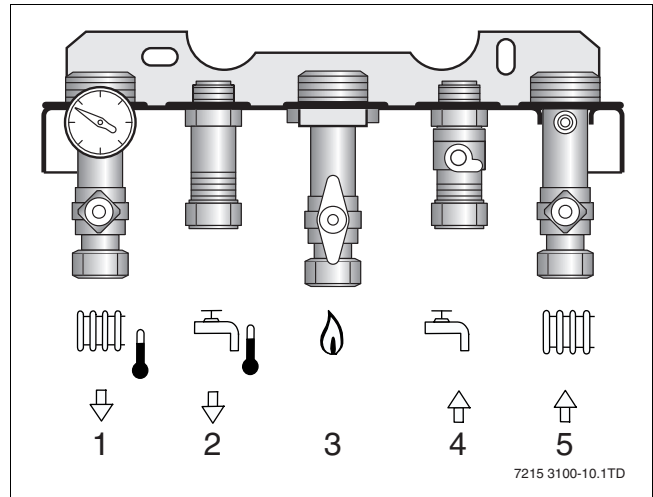


Fig. 10 Pipe connections
Key to fig. 6

- 1: CH flow
- 2: DHW outlet
- 3: Gas
- 4: MCW inlet
- 5: CH return

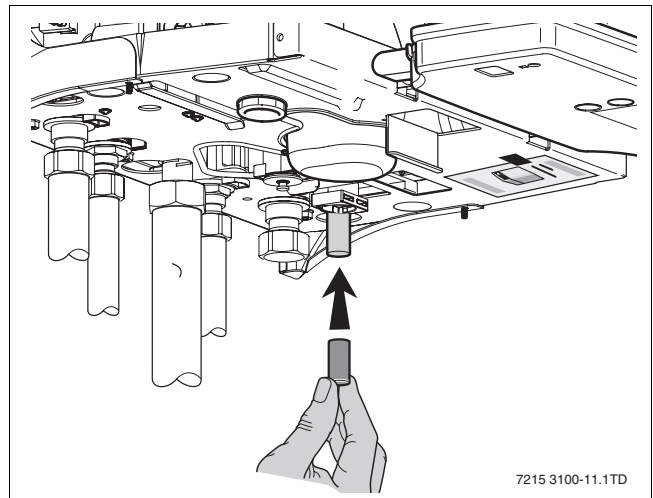


Fig. 11 Insert pipe

1.8.4 Hot-water temperature



CAUTION!

DO NOT use galvanised pipes or fittings. The hot water heat exchanger contains copper and can suffer from electrolytic corrosion.



Note

When using plastic pipes, observe the supplier's instructions - especially those referring to recommended jointing techniques and the notes relating to the heating system water on page 3.

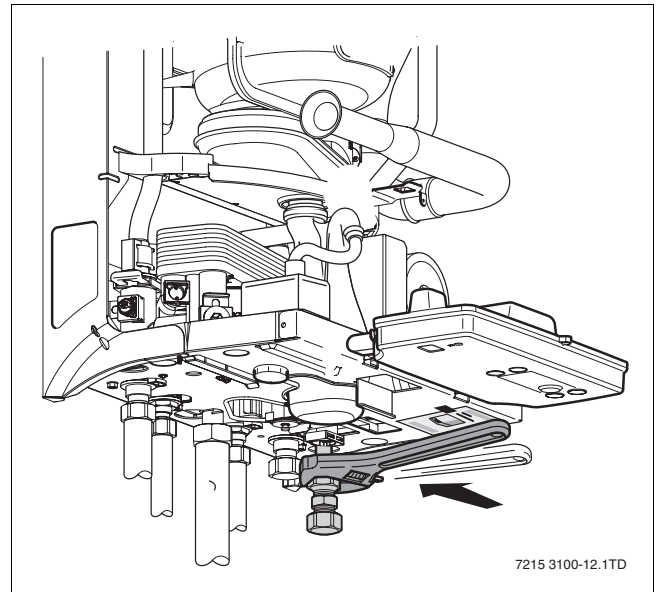


Fig. 12 Compression fitting

1.8.5 Condensate removal

Positioning and termination of the condensate drain pipe



Warning:

Any external run must be insulated with water proof insulation.

The condensate pipe should be run and terminate internally to the house soil and vent stack or waste pipe. Alternatively, the condensate can be discharged into the rainwater system if connected to a foul water draining system, or into a purpose-made soak away (condensate absorption point).

All connecting drainage pipework should generally have a fall of at least 2.5° to the horizontal, or approximately 50 mm per metre of pipe run. If this is can not be achieved, consider the use of a condens pump.

If an external pipe run is unavoidable then the run should be limited to 3 m in length. Should this be exceeded then the pipework diameter should be increased to 32 mm.

It should be noted that the connection of a condensate pipe to a drain may be subject to local building controls.

Materials for condensate



Note

Ensure that the condensate trap is filled with water.

The condensate drainage pipe should be run in a standard drain pipe material, e.g. PVC (polyvinyl-chloride), PVC-u (unplasticized polyvinyl-chloride), ABS (acrylonitrile-butadienestyrene), PP (polypropylene) or PVC-C (cross-linked polyvinyl-chloride).

The condensate drain can be attached to the syphon. Ensure that the black rubberised olive (→ fig. 13) is correctly aligned.

Any internal pipework should be of a diameter to match the requirements of the condensate exit pipe on the appliance.

Internal termination to internal stack

The condensate drainage pipe should have a minimum outside diameter of 21.5 mm with no length restriction. It should incorporate a trap with a 75 mm condensate seal and be connected to the stack at a point at least 450 mm above the invert of the stack. **The trap built into the boiler will provide this 75 mm (→ fig. 14) condensate seal.**

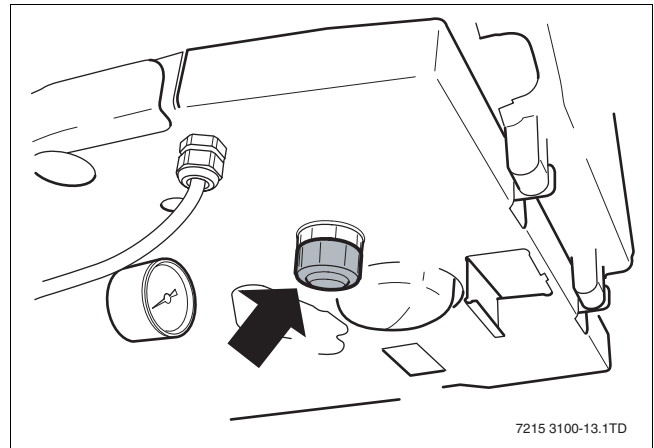


Fig. 13 Condensate outlet

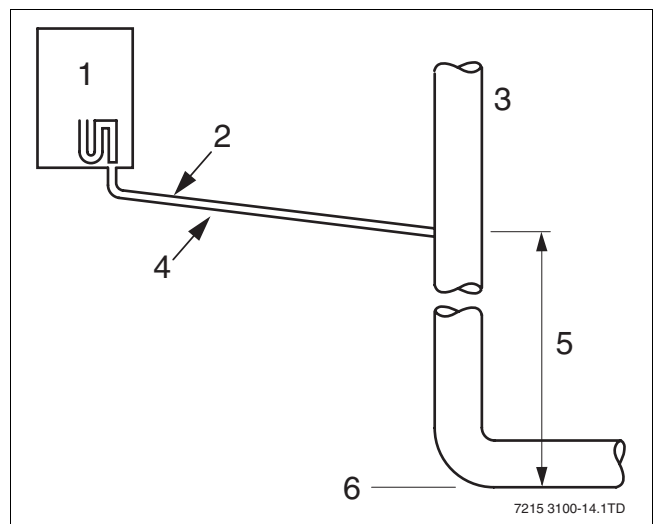


Fig. 14 Internal termination of condensate drainage pipe to internal stack

- 1. Boiler
- 2. Ø21.5 mm min.
- 3. internal soil and vent stack
- 4. No length restriction
- 5. 450 mm min.
- 6. invert

External termination via internal branche (e.g. sink waste)

The condensate drainage pipe should have a minimum outside diameter of 21.5 mm with no length restriction. The connection should preferably be made downstream of the sink waste trap. If the connection is only possible upstream, then the air break is needed between the two traps. This can be provided by the sink waste pipe (→ fig. 14 and fig. 15).

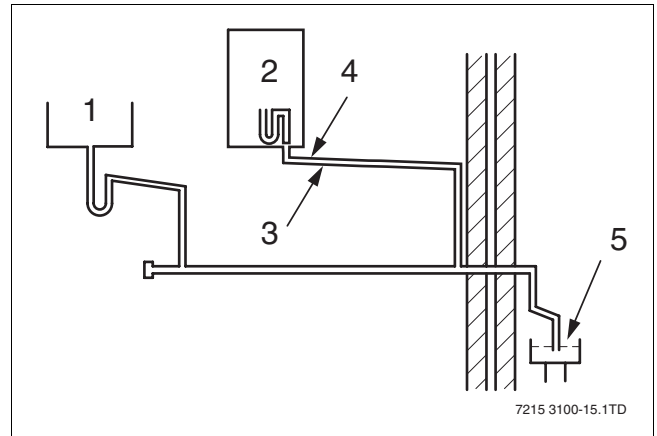


Fig. 15 External termination of condensate drainage pipe via internal discharge branch (e.g. sink waste) and condensate syphon

1. Sink
2. Boiler
3. No length restriction
4. Ø21.5 mm min.
5. open end of pipe direct into gully, below ground but above water level

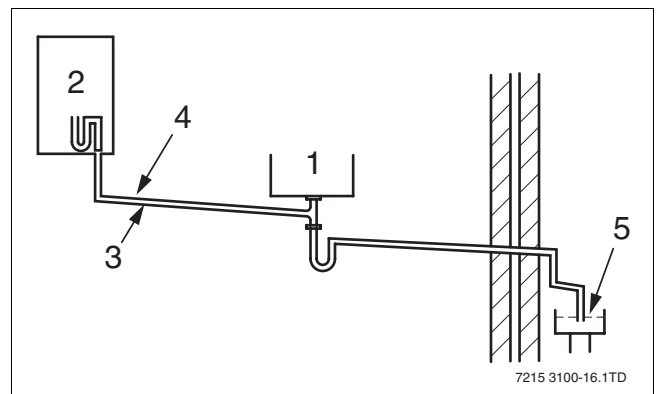


Fig. 16 External termination of condensate drainage pipe via internal discharge branch (e.g. sink waste) and condensate syphon

1. Sink
2. Boiler
3. No length restriction
4. Ø21.5 mm min.
5. open end of pipe direct into gully, below ground but above water level

Condensate absorption point

The condensate drainage pipe should have a minimum outside diameter of 21.5 mm and the external pipe length should not be more than 3 m. The condensate absorption point should be sited in a convenient position as close as possible to the boiler but not in the vicinity of other services. For information → fig. 17.



Note

When discharging condensate to an outside drain caution must be taken to ensure blockage cannot occur during freezing conditions. If this is likely to occur, the use of a syphon trap is recommended.

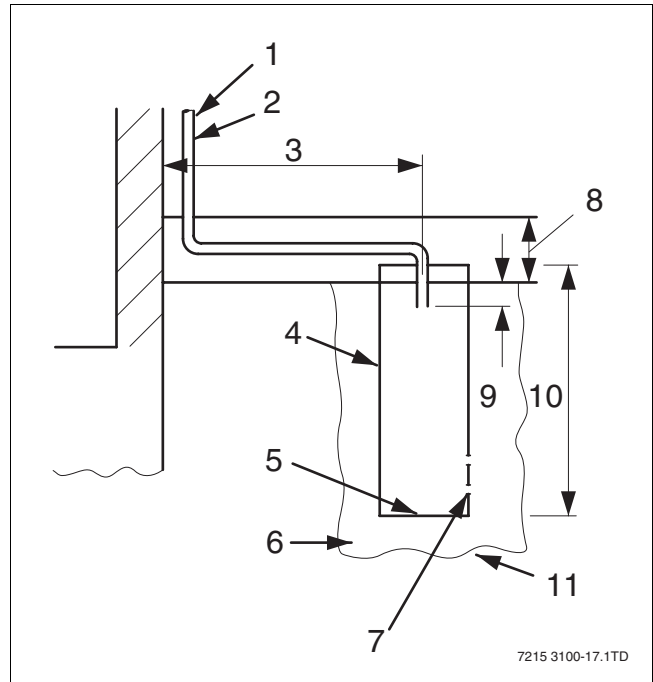


Fig. 17 External termination of condensate drainage pipe to absorption point

1. External length of pipe 3 m max.
2. Ø21.5 mm min.
3. Ø1000 mm min.
4. Ø100 mm min. plastic tube
5. bottom of tube sealed
6. limestone chippings
7. Two rows of three 12 mm holes at 25 mm centres 50 mm from bottom of tube and facing away from house
8. Ground (either/or)
9. 25 mm min.
10. 300 mm min.
11. hole depth 400 mm min.

1.9 Flue installation

1.9.1 Siting the flue terminal

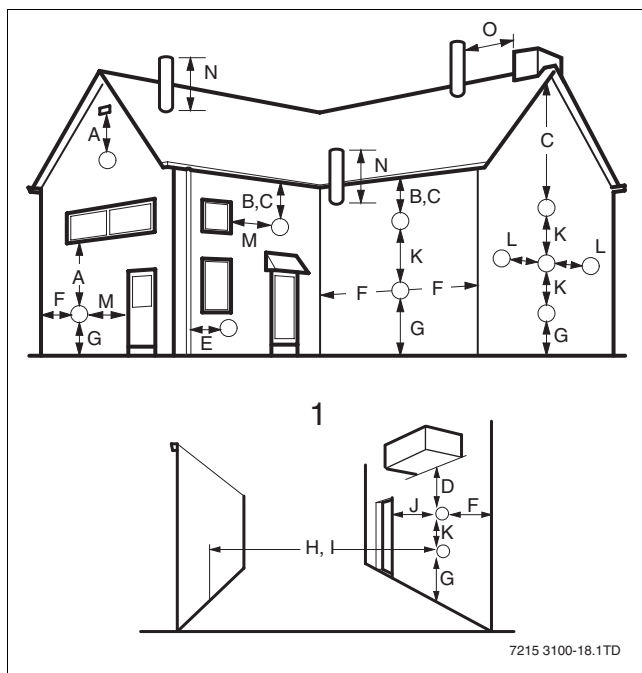



Fig. 18 Flue terminal position

1 under carport

Danger:
 Only use Buderus flue gas systems. As other flue gas systems are not tested with this appliance.

The flue must be installed in accordance with the recommendations of **BS.5440-1:2000**.

Plumbing will occur at the terminal so terminal positions where this could cause a nuisance should be avoided.

The air supply and the flue gas exhaust must meet the applicable general regulations. Please consult the instructions provided with the flue terminal kits prior to installation.

The boiler **MUST** be installed so that the terminal is exposed to external air.

It is important that the position of the terminal allows the free passage of air at all times.

Terminal position	Maximum Spacing
A. Directly below, above or alongside an opening window, air vent or other ventilation opening	300 mm
B. Below guttering, drain pipes or soil pipes	200 mm
C. Below eaves	200 mm
D. Below balconies or a car port roof Not recommended!	200 mm
E. From vertical drain pipes or soil pipes	150 mm
F. From internal or external corners	300 mm
G. Above adjacent ground, roof or balcony level	300 mm
H. From a surface facing the terminal	600 mm
I. From a terminal facing a terminal	1200 mm
J. From an opening in a car port (e.g. door or window) into dwelling. Not recommended!	1200 mm
K. Vertically from a terminal on the same wall	1500 mm
L. Horizontally from a terminal on the wall	300 mm
M. Adjacent to opening	300 mm
N. Above intersection with roof	300 mm
O. From a vertical structure on the roof	500 mm

Tab. 1 Balanced flue terminal position

Minimum acceptable spacing from the terminal to obstructions and ventilation openings are specified in table 1.

If the lowest part of the terminal is less than 2 metres above the level of the ground, balcony, flat roof or place to which any person has access, the terminal must be protected by a guard.

Ensure that the guard is fitted centrally.

The flue assembly shall be so placed or shielded as to prevent ignition or damage to any part of the building.

The air inlet/products outlet duct and the terminal of the boiler **MUST NOT** be closer than 25 mm to combustible material. Detailed recommendations on the protection of combustible material are given in **BS.5440-1:2000**.



NOTE

It is absolutely essential to ensure, in practice, that products of combustion discharging from the terminal cannot re-enter the building or any other adjacent building through ventilators, windows, doors, other sources of natural air infiltration, or forced ventilation/air-conditioning.

If this could occur the appliance **MUST** be turned off (with the owners permission), and labelled as unsafe until corrective action can be taken.

1.9.2 Air supply and flue gas exhaust in a closed installation

The boiler case incorporates the seal for the air supply system. It is important that the case is fitted correctly.

To ensure optimal operation, the 500 Series appliances must be connected to a Buderus horizontal or vertical flue terminal. These terminals have been developed specifically for Buderus condensing gas boilers and have been comprehensively tested for trouble free operation when correctly installed.

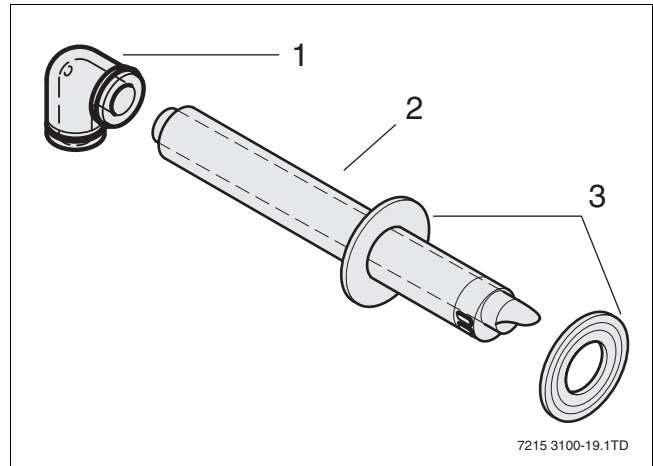


Fig. 19 Standard horizontal flue pack

Standard horizontal flue pack (→ fig 19):

- **item 1:** Flue turret 60/100;
- **item 2:** Horizontal flue terminal 60/100;
- **item 3:** Flue finishing kit.

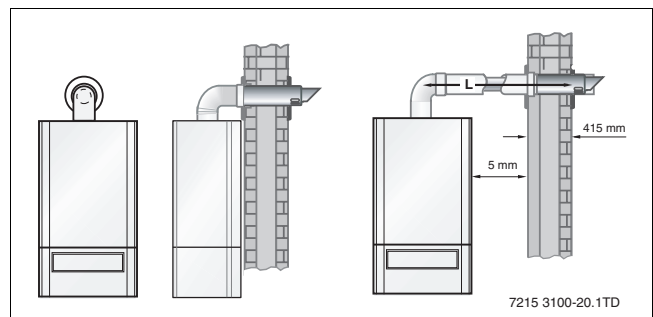


Fig. 20 Side flue and rear flue installation

Standard vertical flue pack (→ fig. 21):

- **item 1:** Vertical flue terminal 60/100;
- **item 2:** Weather collar;
- **item 3:** Flue support bracket;
- **item 3:** Vertical flue adaptor.

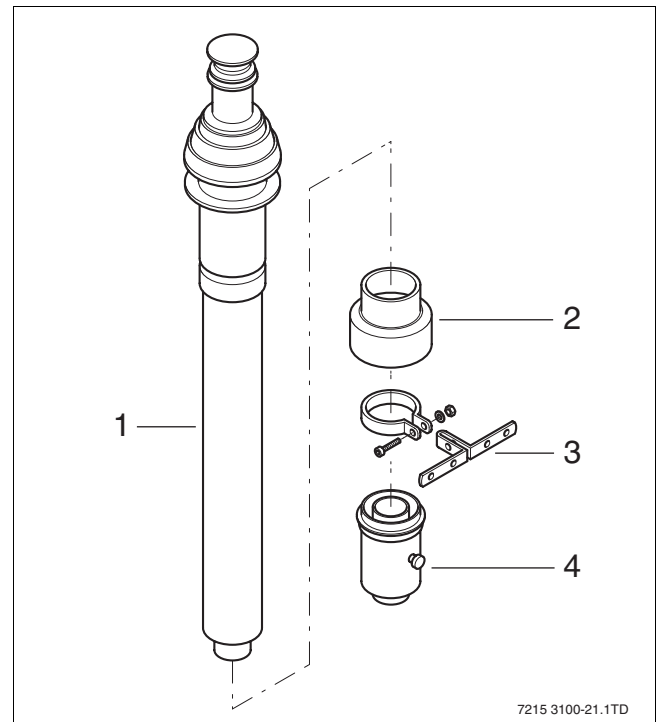


Fig. 21 Standard vertical flue pack

1.9.3 Maximum Flue length

A standard flue comprises a 90 degree takeoff bend and the horizontal flue outlet or straight takeoff and the vertical flue outlet. The flue can be extended upto a maximum effective length (L, → fig. 22 and 23).

The maximum effective flue length is:

- 12 metres for the 60/100 flue (→ table 2)
- 35 metres for the 80/125 flue (→ table 3)
(see also fig. 22 and 23).

When you have determined the length L for the flue system, add up all the bends and extensions used.

Refer to the appropriate table for the effective lengths of each bend or extension.

The total of the bends and extensions must not add up to more than the reduction lengths of the flue length L.

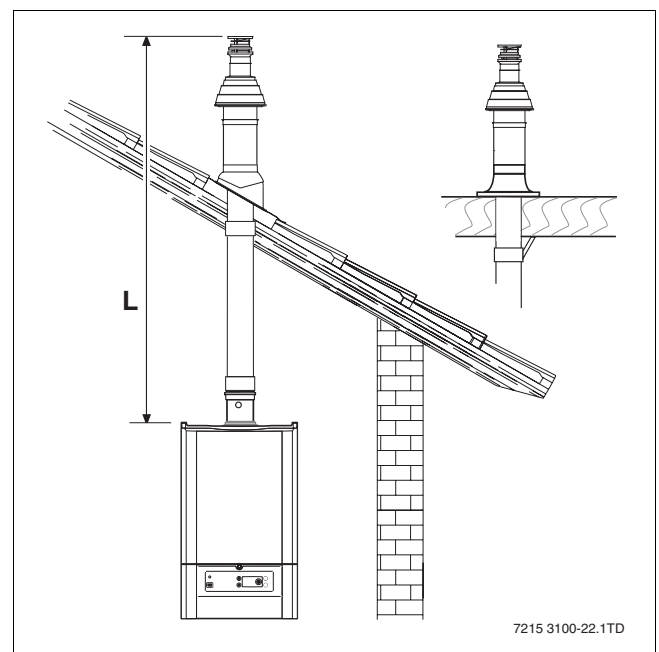


Fig. 22 Vertical flue length

Example 60/100:

- 2 x 1 metre extension = 2.0 m
- 2 x 90° bend = 2.8 m
- Total effective length = 4.8 m.

Maximum allowed is 12 m. So this is allowed.

Example 80/1250:

- 2 x 1 metre extension = 2.0 m
- 2 x 90° bend = 3.2 m
- Total effective length = 5.2 m.

Maximum allowed is 35 m. So this is allowed.



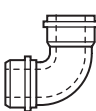
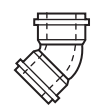
Take the flue terminal clearances into account when planning the layout of the place of installation (see subsection 1.9.1: "Siting the flue terminal" on page 19).

Maximum wall thickness without extensions is 415 mm. Maintain a minimum side clearance of 5 mm (→ fig. 20).

Ensure the flue is adequately supported. Buderus recommend securing each flue extension with a minimum of one wall bracket.

The additional flue parts listed can be ordered from your supplier.

Flue size 60/100:

60/100 flue system		For every bend or extension the max. flue length (L) has to be reduced by:
	500 mm extension	0.5 m
	1000 mm extension	1.0 m
	90° bend	1.4 m
	45° bend	0.7 m

Tab. 2

NOTE
The total reduction length must never exceed the maximum flue length.

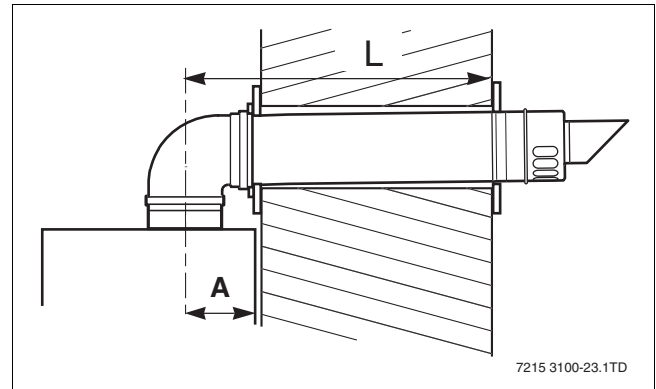


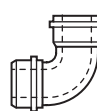



Fig. 23 Horizontal flue length

Flue size 80/125 (optional):

80/125 flue system		For every bend or extension the max. flue length (L) has to be reduced by:
	500 mm extension	0.5 m
	1000 mm extension	1.0 m
	90° bend	1.6 m
	45° bend	0.9 m

Tab. 3

NOTE
Vertical adaptor (60/100 --> 80/125) is required for 80/125 flue gas systems, because the flue outlet of the boiler is 60/100.

1.9.4 Standard 100 mm flue systems

The standard concentric flue system provides for a maximum horizontal straight length of upto 12.0 m for 60/100 flue connection (see subsection 1.9.3).

Full instructions for fitting this flue are in subsection 1.9.7: "Installation of the horizontal flue" on page 24.



IMPORTANT

Any horizontal flue system fitted to a condensing boiler must be inclined towards the appliance at an incline of 50 mm per metre length to prevent condensate dripping from the flue terminal. This means that the clearance above the appliance must be increased to match the duct length. See figure on page 8.



NOTE

Take into account the extra depth of the boiler when using the wall-spacing frame.

1.9.5 Connecting the vertical flue adaptor

- Push the vertical flue adaptor (→ fig. 23) onto the appliance flue connector. Ensure that the flue adaptor is fully engaged into the top of the boiler.

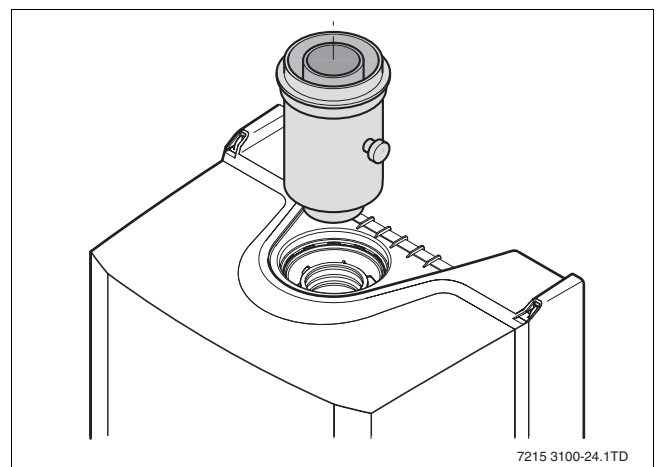


Fig. 24 Vertical flue adaptor

1.9.6 Connecting the horizontal flue turret

- Push the horizontal flue turret (→ fig. 23) onto the appliance flue connector. Ensure that the flue turret is fully engaged into the top of the boiler.

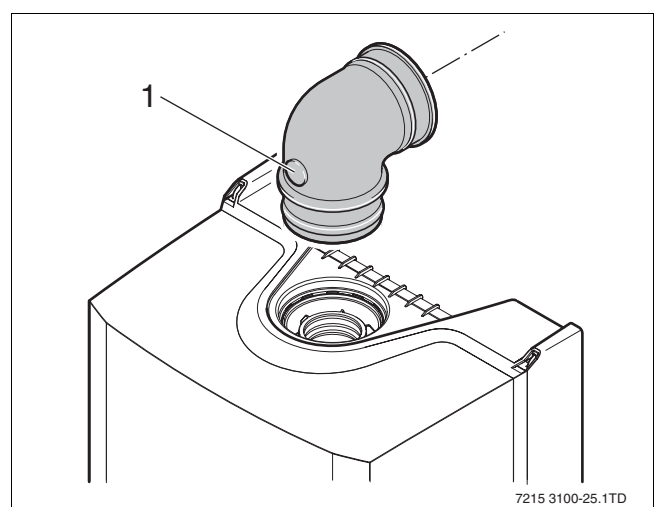


Fig. 25 Horizontal flue turret with flue gas testing point

1 Flue gas testing point

1.9.7 Installation of the horizontal flue

- The standard flue is suitable for lengths upto 660 mm (→ fig. 26). For longer flue runs upto 12.0 m, extension air/flue ducts are available.



NOTE

Use the wall-mounting template to help you mark the position of the side flue opening.

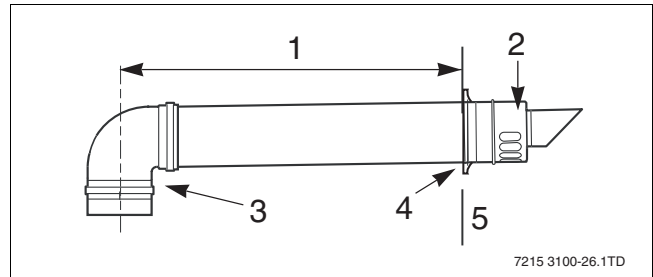


Fig. 26 Installation with horizontal flue gas turret

1. Maximum length
2. Terminal assembly
3. Flue turret
4. Finishing kit
5. Outer wall

1.9.8 Flue duct preparation and assembly

- Measure the flue length L. Refer to figures 27 and 28. The length L is from the centre line of the flue turret to the outside face of the wall.



NOTE

The flue must be inclined from the boiler.



NOTE

An inner flue finishing kit is provided which should be fitted to the ducts before assembly.

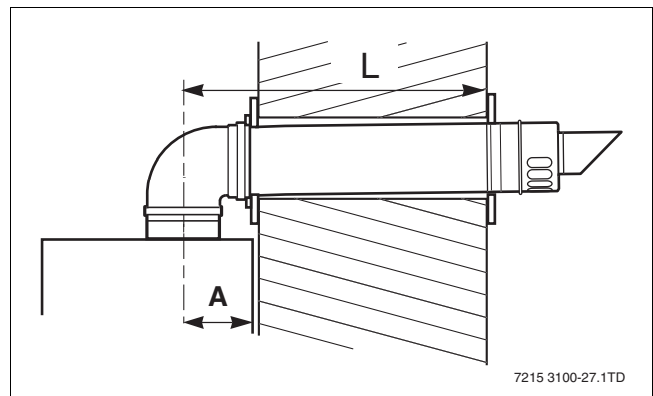


Fig. 27 Flue length - rear

- item A = 150 mm without the use of a wall-spacing frame
- item A = 185 mm with the use of a wall-spacing frame

- When just the terminal assembly is to be used, measure the length L from the raise ring back (→ fig. 29). The overall measurement for the outer duct is L minus 70 mm. The overall measurement for the inner duct is L minus 50 mm. Ensure that the cuts are made square and a free from burrs.
- If the final flue piece is an extension, measure from the formed end, back. As before the final measurement are minus 70 mm for the outer and minus 50 mm for the inner.
- Assemble flue system completely. Push the ducts fully together. The assembly will be made easier if a solvent free grease is lightly applied to the male end of the ducts.

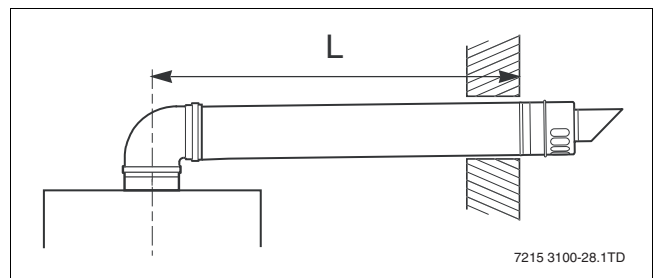


Fig. 28 Flue length - side

- Push the assembly through the wall and slide the turret onto the flue connector. Refer to figure 25. Ensure that the turret is fully engaged into the socket on the boiler.
- From the outside fix the flue finishing kit to the terminal and, after ensuring the duct is properly inclined towards the boiler, fix the finishing kit to the wall. If the terminal is within 2 m of the ground where there is access then an approved terminal guard must be fitted. The guard must give a clearance of at least 50 mm around the terminal and be fixed with corrosion resistant screws.

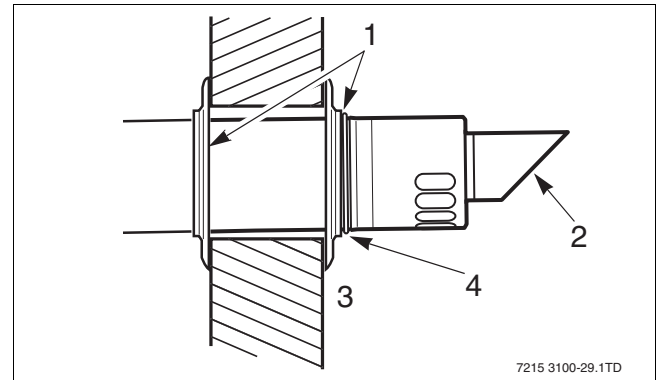


Fig. 29 Flue terminal position

1. Flue Finishing Kit
2. Flue Terminal
3. Outer Wall Face
4. Raised Ring locating the terminal relative to the outside wall face

1.10 Electrical connections

Mains connection to the appliance



Warning: Boiler damage!

- Connect the supply cable supplied with the boiler to the 230 Volt mains.
- DO NOT connect 230 Volts mains supply to any other point on the boiler.



Caution: Electric shock!

Electrically isolate the appliance at the fused spur before removing the case (→ fig. 30).



NOTE

All Buderus boilers require a permanent mains supply of 230 Volts at 50 Hz.

Wiring to the boiler MUST be in accordance with the current I.E.E. (BS.7671) Wiring Regulations and any local regulations. Wiring should be a 3 core PVC insulated cable, not less than 0.75 mm² (24 x 0.2 mm), and to table 16 of **BS.6500**.

The mains supply to the appliance, and any system controls (thermostat, timer), must be from a dedicated fused spur.

The spur must be capable of being isolated by either a double pole switch, having 3 mm contact separation on both poles, or by a three pin plug and socket arrangement.

Damaged mains supply cables must be replaced using cable as described above, and fitted by a qualified electrician.

The means of isolation must be accessible to the user after installation (fig. 30, item 1).

The electrical connection to the mains supply should be readily accessible and adjacent to the boiler.

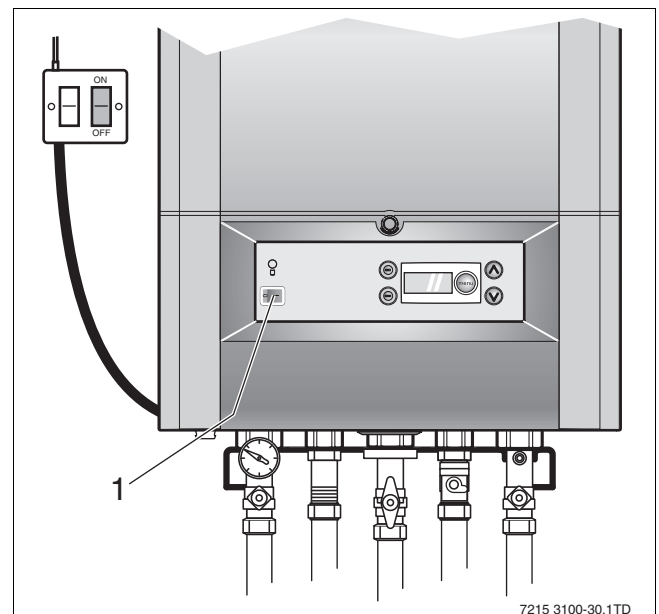


Fig. 30 DBA

Electrical wiring



Caution:
THIS APPLIANCE MUST BE EARTHED

Ensure that your appliance is connected correctly. If you are in any doubt consult a qualified electrician.



NOTE

The wires in this mains lead are coloured in accordance with the following code:

- EARTH - GREEN AND YELLOW**
- NEUTRAL - BLUE**
- LIVE - BROWN**

The appliance mains cable, wire colours may not correspond with the markings that identify the terminals on the fuse spur connector, refer to the guide below:

- Connect green and yellow wire to terminal marked E or \perp or coloured green or green-and-yellow
- Connect brown wire to terminal marked L or coloured red
- Connect blue wire to terminal marked N or coloured black

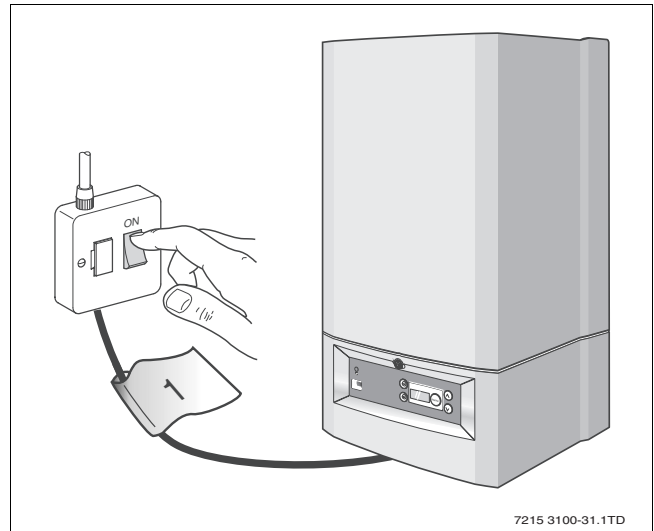


Fig. 31 Electrical wiring

- 1 Permanent live

1.11 External controls

Buderus boilers are designed to modulate based on room temperature, this reduces the amount of energy used to heat the property, when compared with using 230V or volt free controls.

Buderus recommend thermostats from the ModuLink and RC series in order that the customer can benefit from the increased comfort and savings of modulating on room temperature.

The wall-mounted condensing gas combi boiler can be fitted with the following external controls:

1. ModuLink 250 RF (→ subsection 1.11.1) or other recommended Buderus 24V controls.
2. Room-temperature control device and timer at 230V connected under the grey cover (→ subsection 1.11.2).
3. ON/OFF temperature controller, volt free (→ subsection 1.11.3).

Connecting any external controls will require the case removal to gain access to the boiler control unit (DBA)

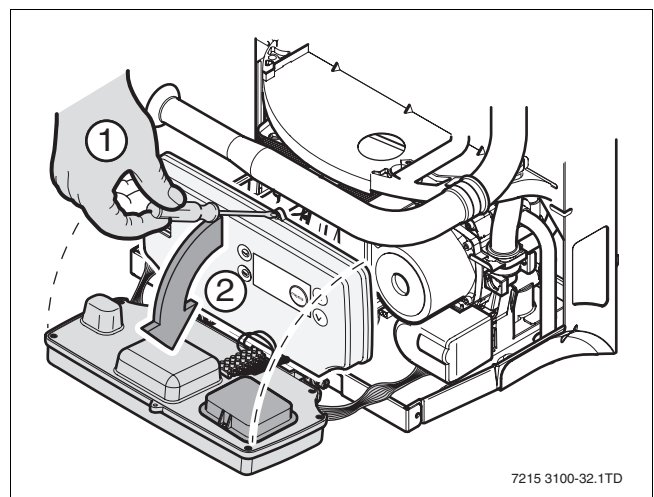


Fig. 32 Lower the DBA

Gain access to the DBA connection block

- Remove the boiler's case (→ fig. 5 on page 11).
- Remove the securing screw (→ fig. 32, item 1).
- Lower the boiler control unit (DBA) (→ fig. 32, item 2).

1.11.1 ModuLink 250 RF thermostat connection

The ModuLink 250 RF thermostat modulates on room temperature. The Buderus boilers work most efficiently with Buderus thermostats. Therefore these thermostats are recommended by Buderus.

See subsection 1.12 for an installation example with the ModuLink 250 RF.

The ModuLink 250 RF thermostat comprises:

- wall bracket;
- receiver;
- thermostat.



For installation and operation of the Buderus thermostat/programmer, refer to the instructions supplied with that thermostat.

ModuLink Receiver and bracket installation



Warning:

Do not connect 230 V AC to the receiver.



The receiver is not waterproof.

Prevent water coming into contact with the receiver.

- Remove the receiver terminal cover (→ fig. 33, item 1).

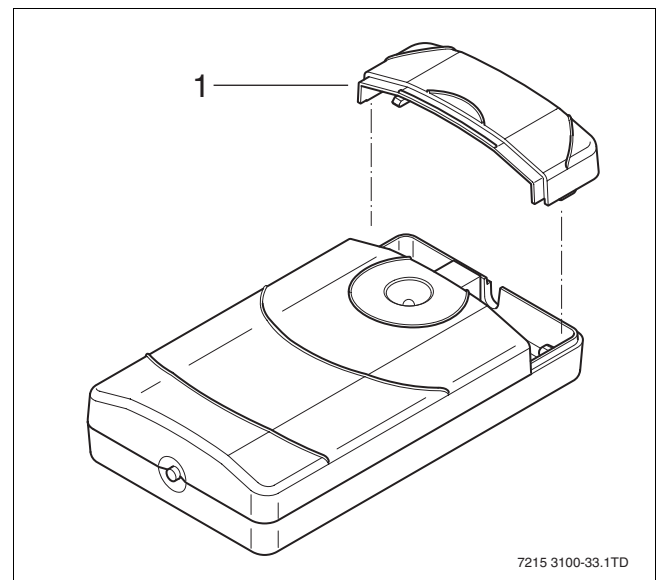


Fig. 33 Receiver bracket

- Connect the grey 2 core cable (supplied with ModuLink 250 RF thermostat) to the receiver (→ fig. 34). The wires are not polarity sensitive.
- To refit the cover, slide back on and click into place (→ fig. 34, item 1).

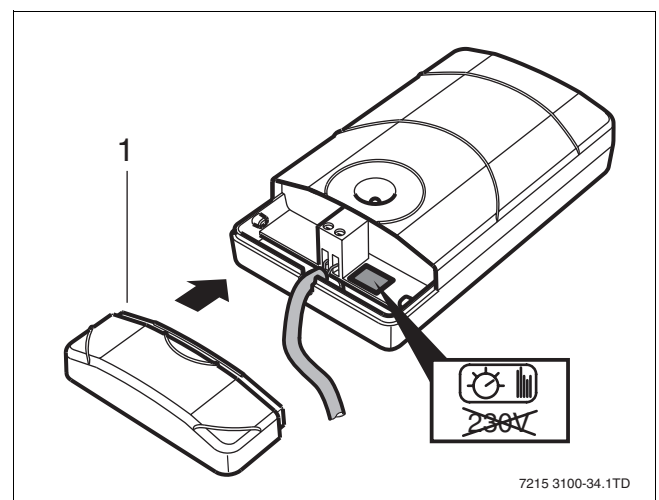


Fig. 34 Connect cable

- Slide the receiver securely into the bracket, supplied with the boiler (→ fig. 35).

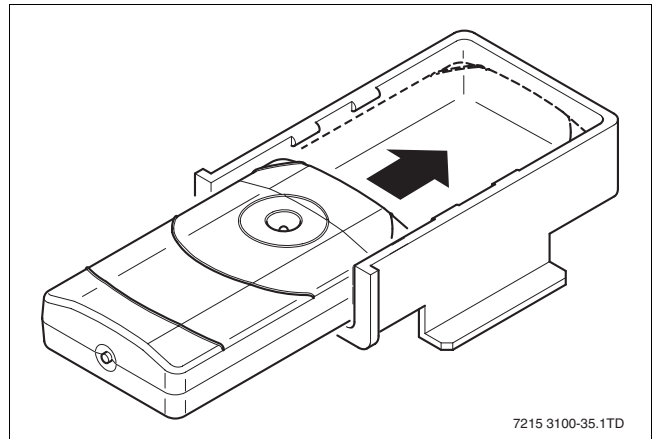


Fig. 35 Place receiver into bracket

- Slide the bracket in the guide rails on the underside of the boiler (→ fig. 36).

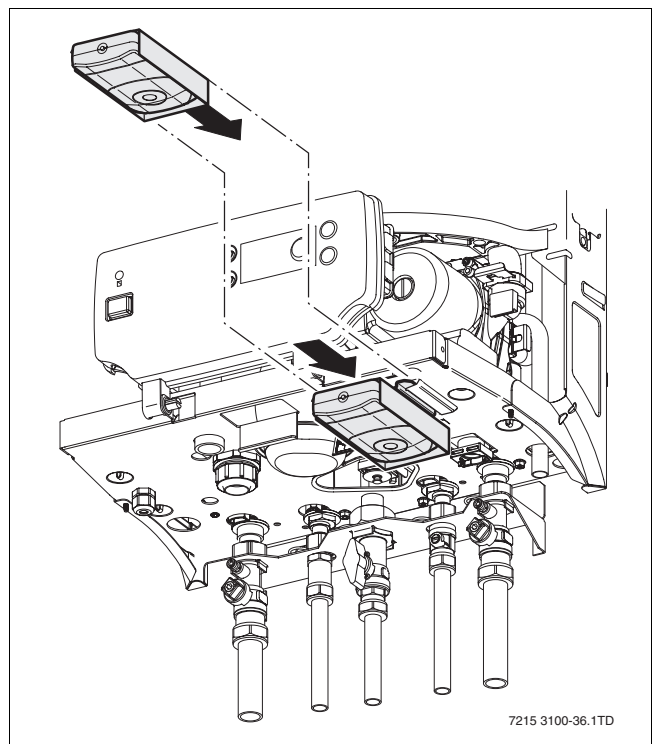



Fig. 36 Hang bracket under boiler

- Remove the securing screw (→ fig. 32, item 1) and lower the Boiler Control Unit (DBA) (→ fig. 32, item 2).

- Connect the two wires of cable from the ModuLink receiver to terminal 1 and 2 of the connection block on the back of the DBA (→ fig. 37). The wires are not polarity sensitive.
A green LED will light on the receiver, when installed correctly and the boiler is reconnected to the mains electricity supply.

There is no requirement to setup the RF link between the thermostat and receiver. This has been completed as part of the manufacturing process.

The room thermostat sends a signal to the receiver at least every 30 minutes to see if they are still in contact with each other.

- If you want to test whether you have reception then press the **m** button on the thermostat for more than 5 seconds. The thermostat will now send out a signal continuously (The LED on the receiver flashes green and the thermostat shows connecting in the display).
- The receiver will stay in this test mode until the  button on the thermostat is pressed.
- Raise and secure the DBA.
- Refit the boiler casing if necessary.

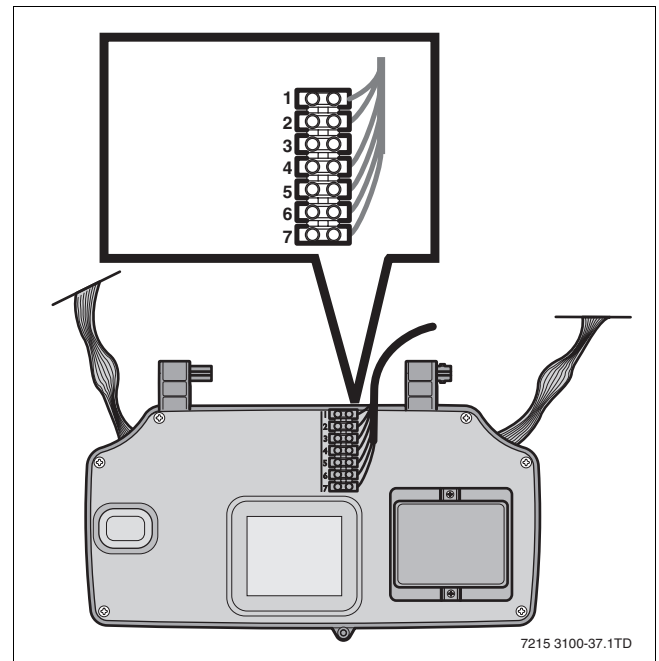


Fig. 37 Room thermostat connection on DBA

- 1, 2 Room Thermostat
- 3 HW Tank Sensor
- 5 24 VAC
- 6, 7 3-Way Valve

1.11.2 External 230 V controls



Caution:

This appliance must be earthed.

- Remove the securing screw and lower the DBA (→ fig. 32).
- Using a screwdriver, remove the grey 230V cover (→ fig. 38, item 1).

The grey 230V cover houses one fused circuit board. The board has four terminals (→ fig. 39):

- L_{OUT}
- L_{RTN}
- N_{OUT}
- S_{PARE}

L_{OUT} & N_{OUT} are optional LIVE & NEUTRAL supplies from the boiler which are isolated via the on/off power switch on the front of the DBA. If required, these can be used to power a third party 230V thermostat / programmer etc.

Alternatively 230V controls can be powered from a separate mains supply external to the boiler (i.e. L_{OUT} & N_{OUT} terminals are not used).

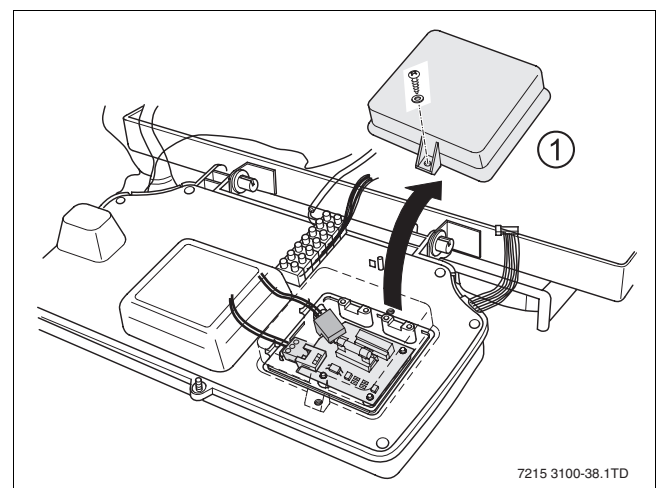


Fig. 38 Room thermostat connection on DBA

Using a separate supply is not recommended as the third party controls will not be isolated by the power switch on the front of the DBA, although in some replacement installations this may be unavoidable.



The direct external mains supply to third party 230V controls must be from the same fused spur that supplies the boiler, described in subsection 1.10.

L_RTN must be connected with the live return / switched live signal from the third party 230V controls.

S_PA_RE is a terminal not connected to the circuit board and can be used as a connection point.

There are two strain relief clamps. The clamps are supplied in the accessory bag, on top of the boiler.

The underside of the grey 230V cover contains a holder for a spare fuse. Only 2.5 Ampere slow-blow silica filled fuses should be used.

- Tighten the strain relief clamps to secure the cables.
- Replace the grey 230V cover.
- Raise and secure the Boiler Control Unit (DBA).
- Refit the boiler casing if necessary (→ fig. 5).

1.11.3 Volt free external control device connection

- Remove the securing screw of the DBA and lower the DBA (→ fig. 32).
- Connect the wire to terminal 1 and 2 of the connection block, marked Room Thermostat (→ fig. 37).

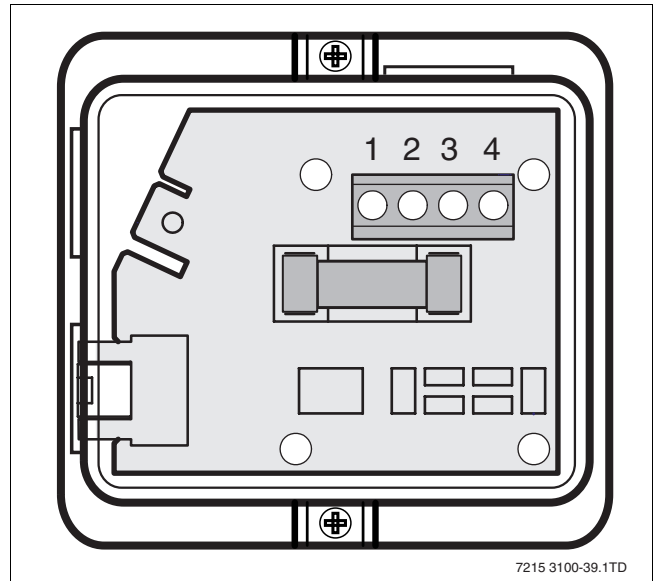


Fig. 39 Connection box - 230 Volt connection

- 1 N_{OUT}
- 2 L_{OUT}
- 3 L_RTN
- 4 S_PA_RE

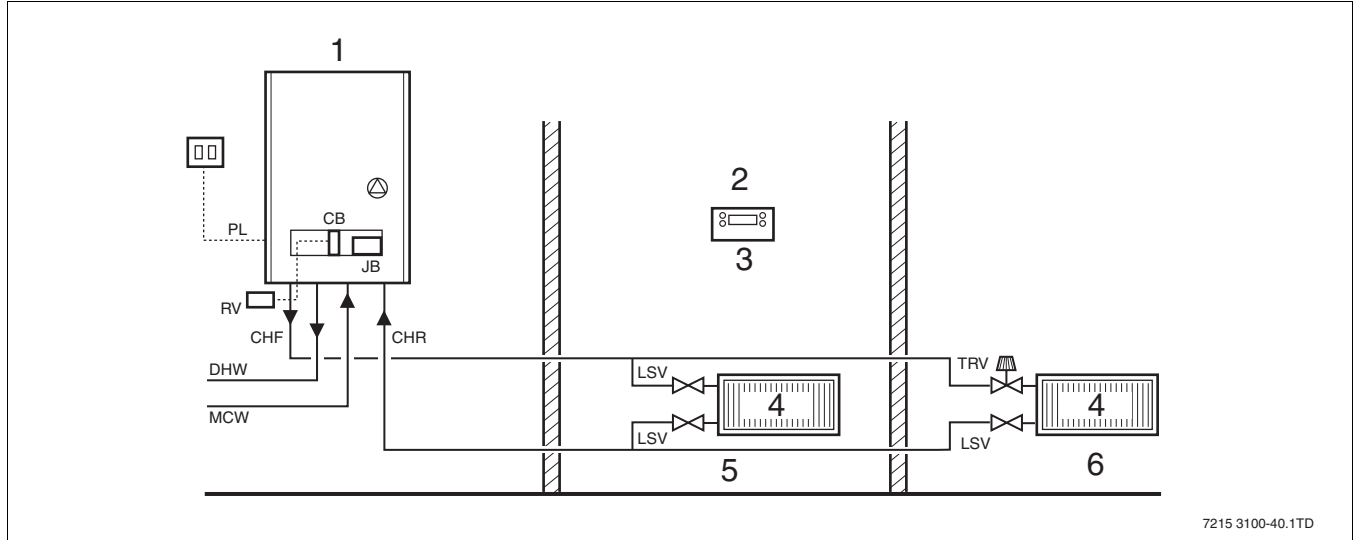
1.12 System examples



NOTE

These system schematics are simplified heating schematics showing the main electrical and water connections.

Buderus 500-24C or 500-28C with ModuLink 250 RF (or other Buderus controls)



7215 3100-40.1TD

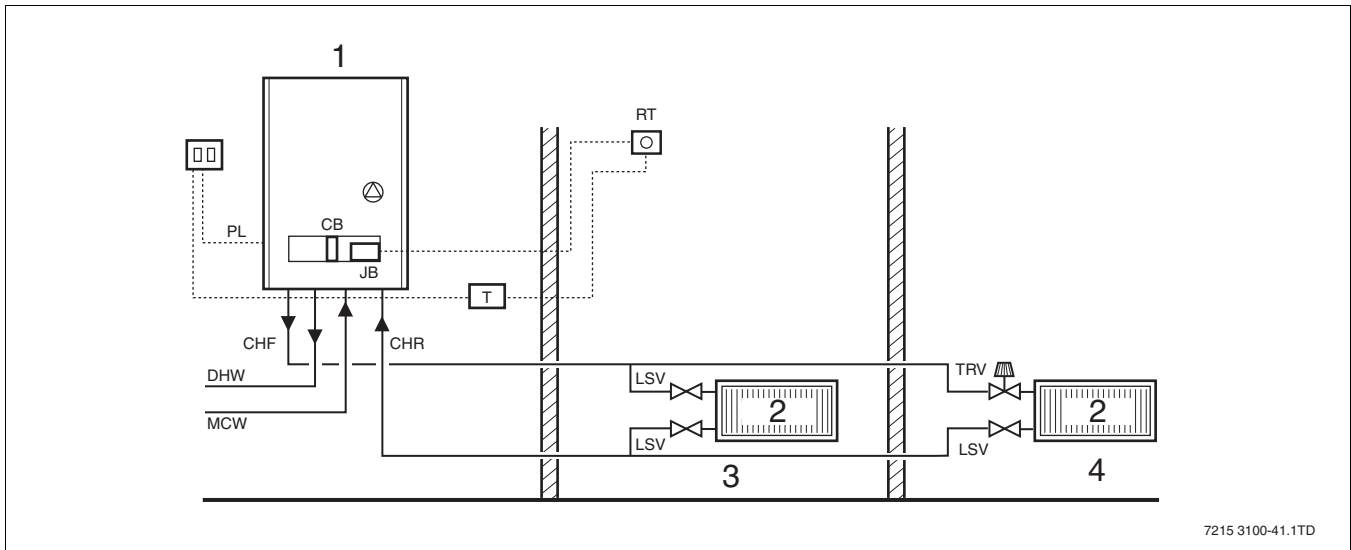
Fig. 40

- 1 Condensing gas boiler 500-24C / 28C
- 2 RT/programmer
- 3 ModuLink 250 RF
- 4 radiator
- 5 reference room / main living area
- 6 other rooms

Key to abbreviations:

- CB = Connection Block
- CHF = Central Heating Flow
- CHR = Central Heating Return
- DHW = Domestic Hot Water
- JB = Junction Box
- LSV = Lock Shield Valve
- MCW = Mains Cold Water
- PL = Permanent Live
- RT = Room Thermostat
- RV = ModuLink 250 RF Receiver
- TRV = Thermostatic Radiator Valve

Buderus 500-24C or 500-28C with external 230V controls



7215 3100-41.1TD

Fig. 41

- 1 Condensing gas boiler 500-24C / 28C
- 2 radiator
- 3 reference room / main living area
- 4 other rooms

Key to abbreviations:

- CB = Connection Block
- CHF = Central Heating Flow
- CHR = Central Heating Return
- DHW = Domestic Hot Water
- JB = Junction Box
- LSV = Lock Shield Valve
- MCW = Mains Cold Water
- PL = Permanent Live
- RT = Room Thermostat
- T = Timer
- TRV = Thermostatic Radiator Valve

Buderus 500-24C or 500-28C with external Volt Programmable Room thermostat

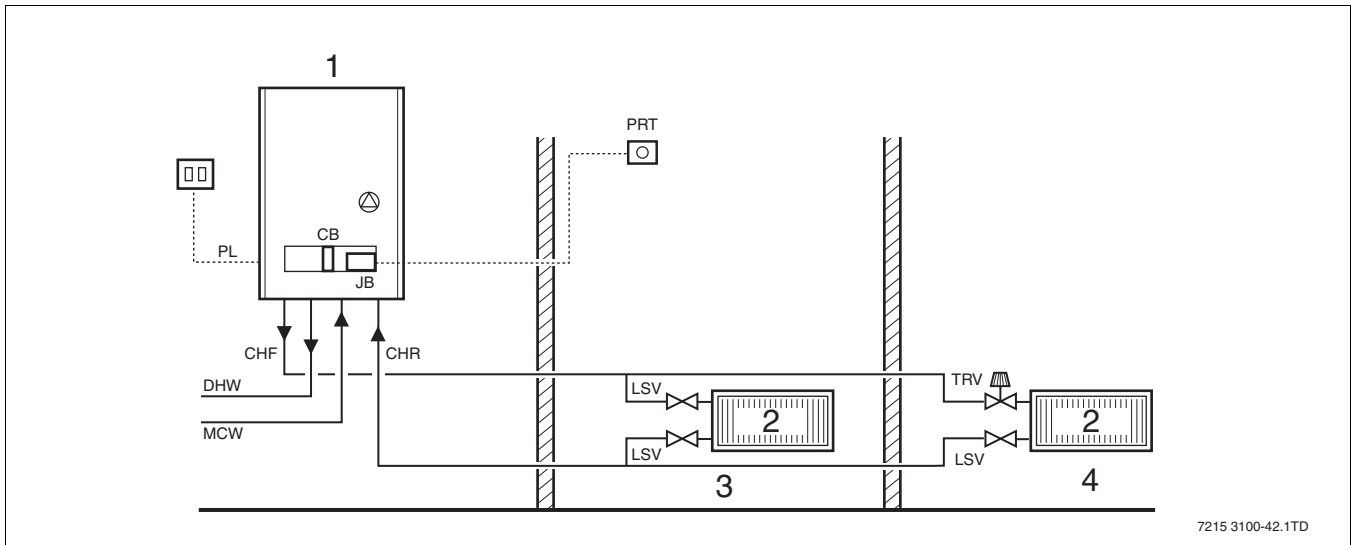


Fig. 42

- 1 Condensing gas boiler 500-24C / 28C
- 2 radiator
- 3 reference room / main living area
- 4 other rooms

Key to abbreviations:

- CB = Connection Block
- CHF = Central Heating Flow
- CHR = Central Heating Return
- DHW = Domestic Hot Water
- JB = Junction Box/RTh Relay
- LSV = Lock Shield Valve
- MCW = Mains Cold Water
- PL = Permanent Live
- PRT = Programmable Room Thermostat (Volt Free Contacts)
- T = Timer
- TRV = Thermostatic Radiator Valve

2 Commissioning

When a boiler starts up there are a couple of things that happen. Below is a short process description:

When there is a heat demand:

The fan starts up and the glow ignitor turns on.

When there is a DHW request then the three-way-valve switches from CH operation to DHW operation.

The pump starts up as soon as the three-way-valve is in the right position.

Once all the requirements are met (glow ignitor is hot enough, fan is operating at the correct speed and the pump is on) then the gas valve will open.

A flame may or may not develop, but regardless of that fact, the glow ignitor extinguishes. The operating controls are released once a flame is sensed. After a possible check, the boiler will deliver the requested output.

Should the flow check fail, the boiler will shut down for a short while and then try to start up again.

If no flame develops then the gas valve closes and the fan continues to run for a while to purge the appliance. The boiler will try to start up three times. If no flame develops after three attempts the boiler will lock-out.

When the heat demand stops:

The gas valve closes.

The fan will run for a short time to purge the appliance.

The pump will continue to run for a short time to disperse any remaining heat energy from the boiler into the heating system.

If there has been a heat request, then the three-way-valve will switch back to the central heating setting.

Follow the steps described in this chapter to properly commission the boiler and fill out the commissioning log book.



NOTE

If a fault occurs, then refer to the servicing manual or contact Buderus.

2.1 Preparing the boiler for operation



Caution:

DO NOT operate the condensing gas boiler if large amounts of dust are present, e.g. due to building work in and around the place of installation.

2.1.1 Fill the heating system



Caution:

The wall-mounted condensing gas combi boiler must not be activated at this stage.



NOTE

Please read the notes on heating system water and domestic hot water on page 3 carefully.

- Loosen the automated air vent one turn (→ fig. 43).
- If necessary open the CH flow and CH return servicing valves (→ fig. 44, item 1 and 2).

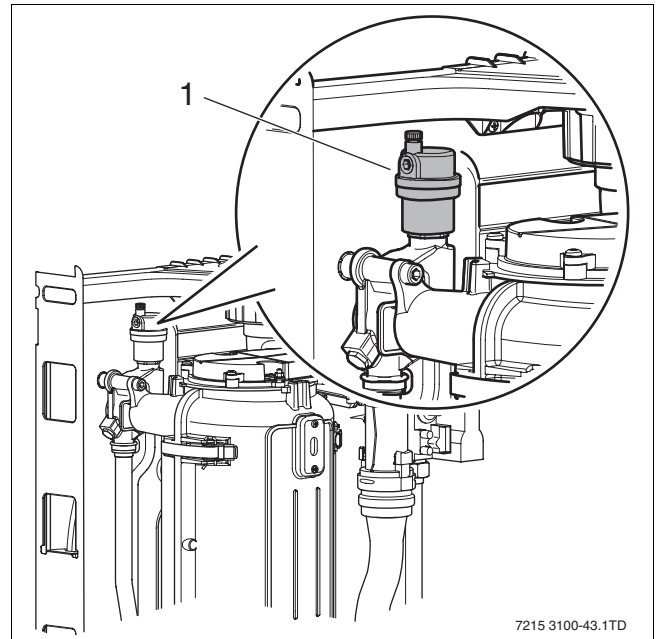


Fig. 43 Automatic air vent

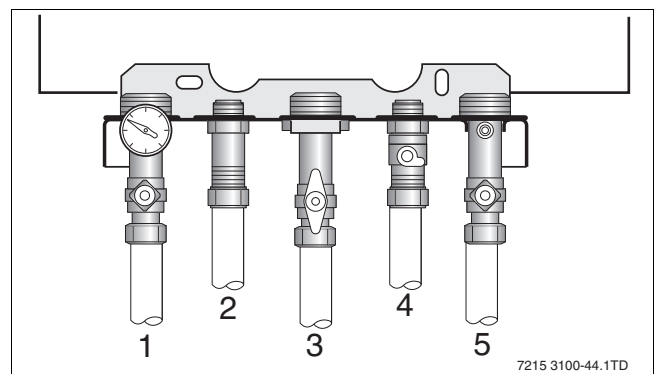


Fig. 44 Servicing shut off valves

- 1 CH flow
- 2 DHW outlet
- 3 Gas
- 4 MCW inlet
- 5 CH return

- Connect filling loop (→ fig. 45).
- Open both stop valves (→ fig. 45).
- Fill the system to a pressure of approx. 1.5 bar (→ fig. 44, item 3).
- Close both stop valves.
- Vent the air from all radiators starting with the lowest radiator and working up to the highest point.
- Check the pressure after venting. If the pressure has dropped under 1.0 bar then top up the system as described previously.
- Disconnect the filling loop and cap off.

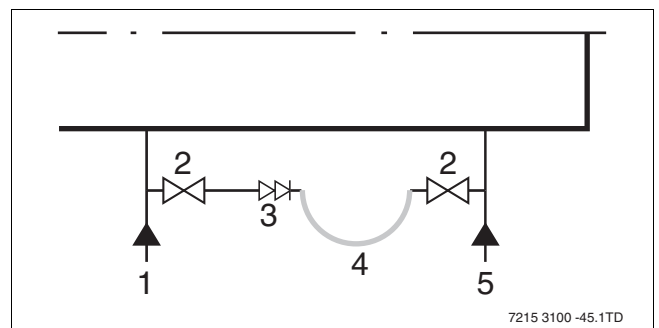


Fig. 45 Connecting filling loop

- 1 MCW inlet
- 2 stop valve
- 3 double check valve
- 4 filling loop
- 5 CH return

To drain the boiler take the following steps:

- Close the MCW inlet and the CH return valve.
- Connect drainage hose (→ fig. 46).
- Close the CH return and CH flow valves.
- Connect draining hose to draining point on the manifold (→ fig. 46, item 1).
- Open draining point to drain the boiler (→ fig. 46, item 1).

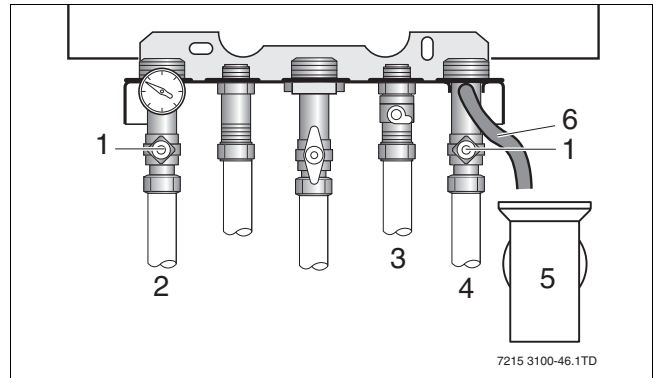


Fig. 46 Draining the boiler

- 1 stop valve
- 2 CH flow
- 3 MCW inlet
- 4 CH return
- 5 drain
- 6 drainage hose

Fill the condensate trap

- Remove the condensate trap and fill with water (→ fig. 47 and fig. 48).

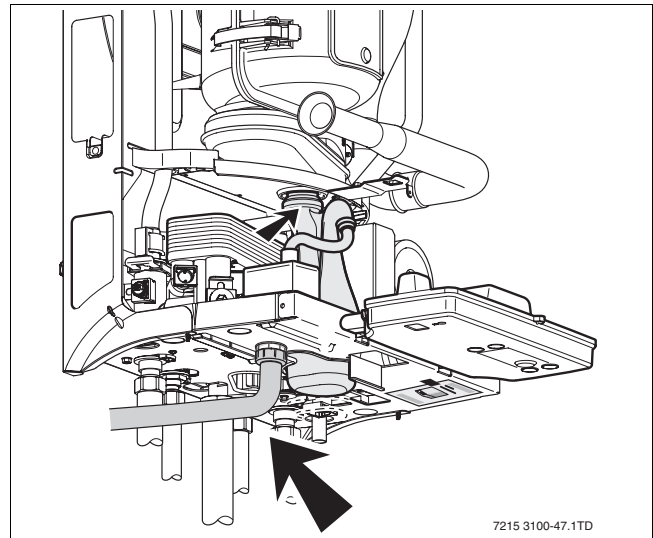


Fig. 47 Disconnect hose from condensate trap

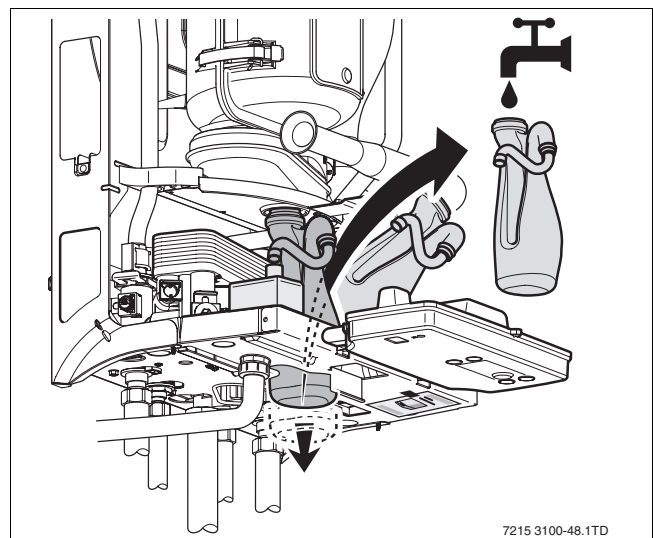


Fig. 48 Remove the condensate trap and fill with water

2.1.2 DBA adjustments

The boiler is equipped with a boiler control unit (DBA). This is the internal control of the boiler. The DBA is located behind the access panel.

The DBA allows you to operate the boiler and to make adjustments in its settings.

DBA overview:

1. Mains switch (→ fig. 49)

Use this switch to turn the boiler on or off.

2. Reset button (→ fig. 49)

When a blinking code is in the display, it is possible to try and restart the boiler by pressing this button.



NOTE

It is not possible to reset the boiler when there is no fault code blinking in the display.

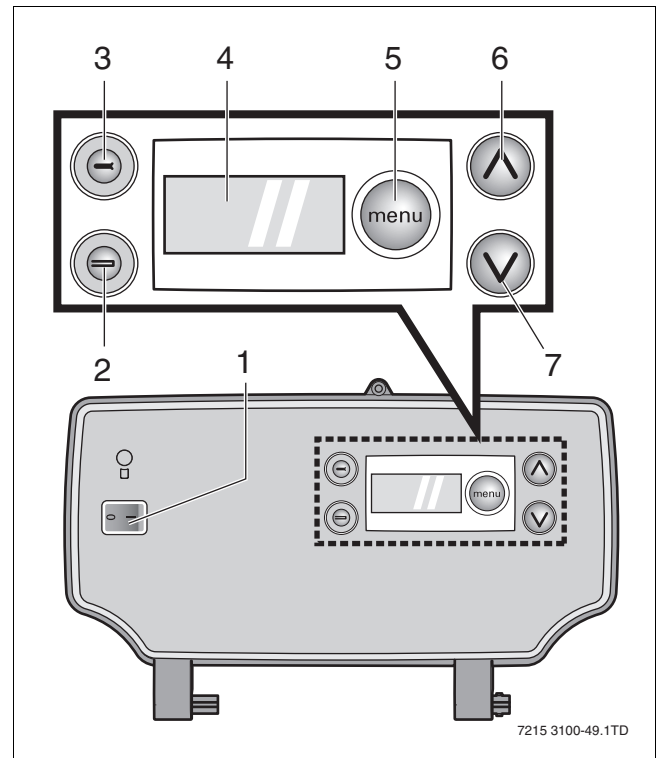




Fig. 49 DBA

- 1 mains switch
- 2 "reset" button
- 3 "service" button
- 4 display
- 5 "menu" button
- 6 adjusting arrow up
- 7 adjusting arrow down

3. Service button (→ fig. 49)

The boiler will operate on partial load when the Service button  is pressed once. An open-ended spanner  appears in the top left hand corner of the display (→ fig. 50).

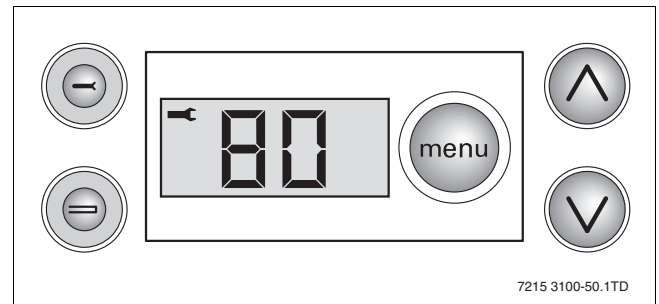



Fig. 50 DBA with open-ended spanner

Press the  button if you want to make sure that the boiler is actually operating at partial load ('Lo' appears in the display, → fig. 51).

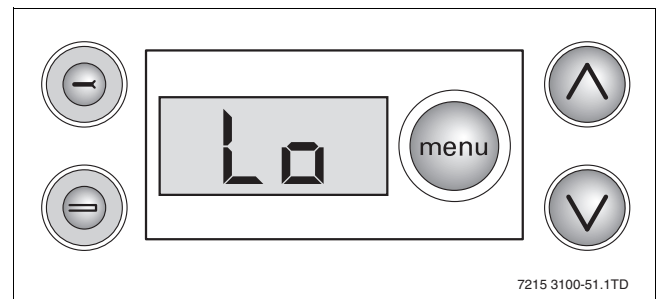






Fig. 51 DBA display Lo

The boiler operates at full load when the Service button  is pressed again. An open-end spanner  appears in the top left hand corner of the display.

Press the  button if you want to make sure that the boiler is actually operating at full load ('Hi' appears in the display, → fig. 52).

The boiler returns to regular operation when the Service button  is pressed once again or after the boiler has operated at partial- or full load for 30 minutes.

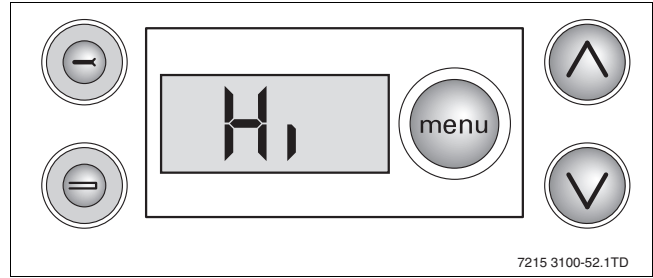




Fig. 52 DBA display Hi


4. Display (→ fig. 49)


Setting, adjustments and fault codes are displayed on the DBA (see fig. 53).


5. Menu button  (→ fig. 49)

The menu button  allows you to scroll through the menu items.

Press the  button once, to display the current warm start function setting.

Press the  button twice to display the current DHW temperature setting.

Press the  button three times to display the current setting of summer operation.

Press the  button four times to display the current CH flow temperature setting.

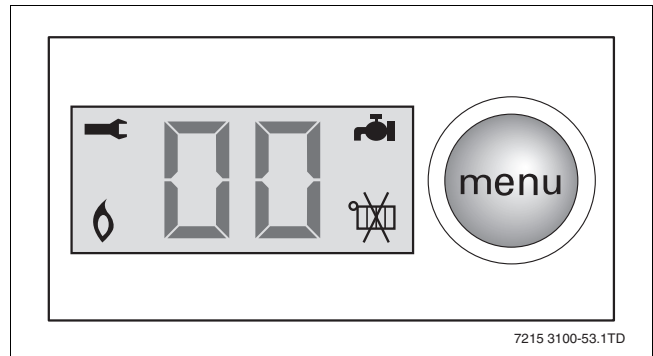






Fig. 53 DBA display



6. and 7. Up  and Down  keys (→ fig. 49)

These keys can be used for adjusting temperatures and activating or de-activating certain summer operation.

The  key, when pressed, gives the current operating status of the boiler. Press the  key once to display the current DHW flow in l/m.




Setting the warm start function

- Press the menu button once.
- Use the  and  keys to turn the warm start function on or off.
Factory setting: warm start function is "on".

Setting	Meaning
 - ECO / cold start	More energy efficient, less chance of calcification, longer waiting periods.
 - comfort / warm start	Maximum comfort due to short waiting period for warm water. Not as energy efficient as the cold start and there is more chance of calcification.

Tab. 4 Warm start function

Setting the domestic hot water (DHW) temperature

- Press  button twice then adjust the DHW temperature to the desired temperature (40 °C - 60 °C) using the  and  keys (→ fig. 54, item 1).
Factory setting is 48 °C.

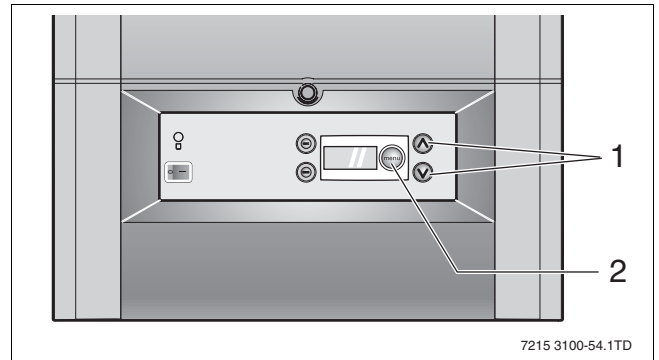







Fig. 54 DBA – adjusting arrows

Setting the boiler to summer operation

When you want to make sure that your boiler will not operate for central heating in the summer then you can set the boiler to summer operation. The boiler will then only operate for DHW.

- Press the  button (→ fig. 54, item 2) three times. The current setting blinks.
- Use the  or  keys to adjust to desired setting.

	Central heating is on.
	Central heating is off (summer operation). DHW is still available.



NOTE




When summer operation is active then the boiler will not operate for central heating until summer operation has been deactivated.

Setting the flow temperature



NOTE

It is not possible to set the flow temperature when the boiler is set to summer operation.

- Press  button (→ fig. 54, item 2) four times then adjust the flow temperature to the desired temperature (30 °C – 80 °C) using the  and  keys (→ fig. 49, item 1). Factory setting is 80 °C.

Frost protection

The boiler has an automatic frost protection. When the CH flow temperature drops below 7 °C then the boiler will start up.

2.1.3 Checking for gas leaks

Use a suitable pressure gauge for the different pressure readings. It should be able to handle pressures up to 50 mbar with an accuracy of 0.01 mbar minimum.

- Disconnect the system from the power supply.
- Check all sections of gas pipework and connections for signs of leaks before starting up the system for the first time. If a leak is detected during tightness testing, use an approved leak detector to check all connections for possible escapes. The product must be certified as a gas leak-testing agent. DO NOT allow the product to come into contact with electrical wiring.

The test pressure of the gas pipe when the gas shut off valve is open may not exceed 150 mbar.



Warning: ATTENTION

Check the used measuring nipples for gas tightness.

2.1.4 Checking the gas type

Ensure that the boiler is set up to run on the gas type available. If this is not the case, then the boiler must not be put into operation.

- Check the gas type with your gas supplier and compare this to the boiler's gas type as registered on the identification tag (→ table 6).

It is possible to change the boiler to another gas type (→ table 5). This accessory can be ordered from your supplier.

Type of gas	Factory settings of gas burners
Natural gas H	When delivered ready for operation and set to Wobbe index 14.1 kWh/m ³ (referred to 15 °C, 1013 mbar), applicable for Wobbe index range 11.3 to 15.2 kWh/m ³ . Inscription on gas-type indicating label: Category setting: 2H G 20_20 mbar
LPG	After adaptation by a CORGI registered installer, the unit can be run on LPG. Inscription on gas-type indicating label: Category setting: 3P G 31_37 mbar

Tab. 5 Gas-supply types

Type of gas	Gas injectors Ø [mm]		Venturi tubes
	24C	28C	
Buderus 500			
Natural gas H (G20)	4.45	4.45	Standard
LPG	3.45	3.45	Standard

Tab. 6 Gas injector diameter

2.1.5 Adjusting the DHW flow regulator



Caution:

It is important to adjust the flow of hot water, due to the resistance of the pipes in the installation and the differences in water pressure.

The DHW flow regulator is located on the bottom frame of the boiler (→ fig. 55).

- Adjust the DHW flow regulator (fig. 55) to the desired setting:
 - To increase the flow of hot water: turn valve clockwise “+”.
 - To reduce the flow of hot water: turn valve counterclockwise “-”.

Factory setting:

10 l/min of 48 °C, assuming that the DHW cold is 10 °C and there is a pre-pressure of 2.5 bar.

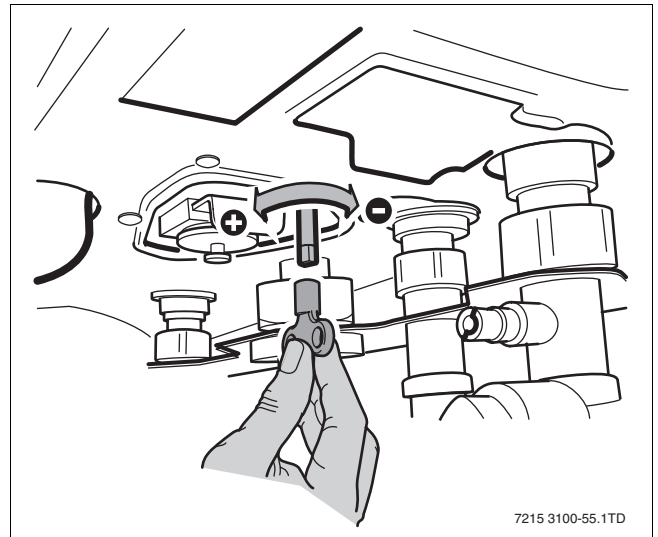


Fig. 55 DHW flow regulator

2.1.6 Measuring the gas-supply pressure (flow pressure)

There are two ways to measure the gas-supply pressure:

- measuring the standing gas-supply pressure (boiler not in operation);
- measuring the working gas-supply pressure (boiler operating at full power).



NOTE

The difference between the standing and working pressure may never be greater than 5 mbar. If the difference between the two is greater than 5 mbar then the pressure loss in the gas pipe is too great.

Measuring the standing gas-supply pressure

- Take the boiler out of service by pressing the mains switch (→ fig. 56, item 1) to "0".
- Close the gas shut off valve (→ fig. 57, item 1).
- Set the pressure gauge to "0".
- Loosen the gas test nipple screw two turns.
- Attach a tube from the pressure gauge to the gas test nipple (the lower one, → fig. 58, item 2).
- Slowly open the gas shut off valve (→ fig. 57, item 2).
- Measure the standing gas-supply pressure.
- Pull off the tube from the gas test nipple.
- Tighten the gas testing nipple screw.
- Tighten the gas testing nipple screw.

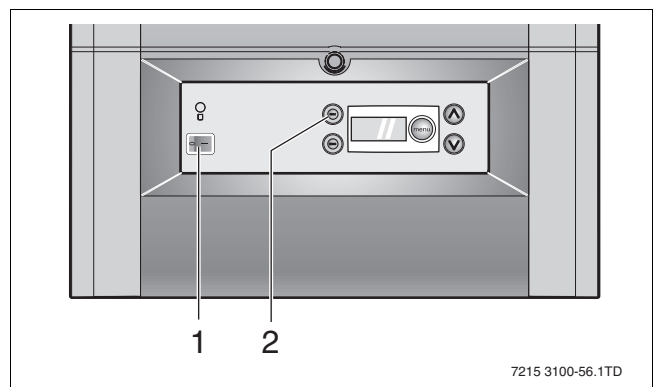





Fig. 56 DBA front

Measuring the working pressure

- Take the boiler out of service by pressing the mains switch (→ fig. 56, item 1) to "0".
- Close the gas shut off valve (→ fig. 57, item 1).
- Set the pressure gauge to "0".
- Loosen the gas test nipple screw two turns.
- Attach a tube from the pressure gauge to the gas test nipple (the lower one, → fig. 58, item 2).
- Slowly open the gas shut off valve (→ fig. 57, item 2).
- Ensure at least two radiators are open to hot water flow.
- Set the mains switch (→ fig. 56, item 1) to "1".
- Create a heat demand by pressing the service button  (→ fig. 56, item 2), until an open-ended spanner  appears in the top left hand corner of the display.
- Measure the working gas-supply pressure.
- The working gas-supply pressure should be between:
 - a minimum of 17 mbar and a maximum of 25 mbar (nominal connection pressure of 20 mbar) for Natural gas.
 - a minimum of 30 mbar and a maximum 50 mbar (nominal connection pressure 37 mbar for LPG).
- Pull off the tube from the gas testing nipple.
- Tighten the gas testing nipple screw.

 **ATTENTION**
 If the required connection pressure is incorrect, contact your gas supplier.

Ensure that all disturbed joints and connections are checked for gas tightness on completion of tasks.

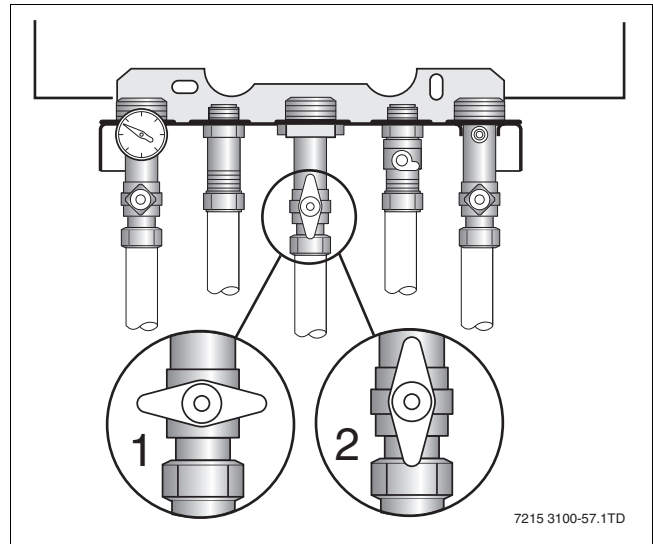


Fig. 57 Gas valve

- item 1:** Gas valve closed
- item 2:** Gas valve open

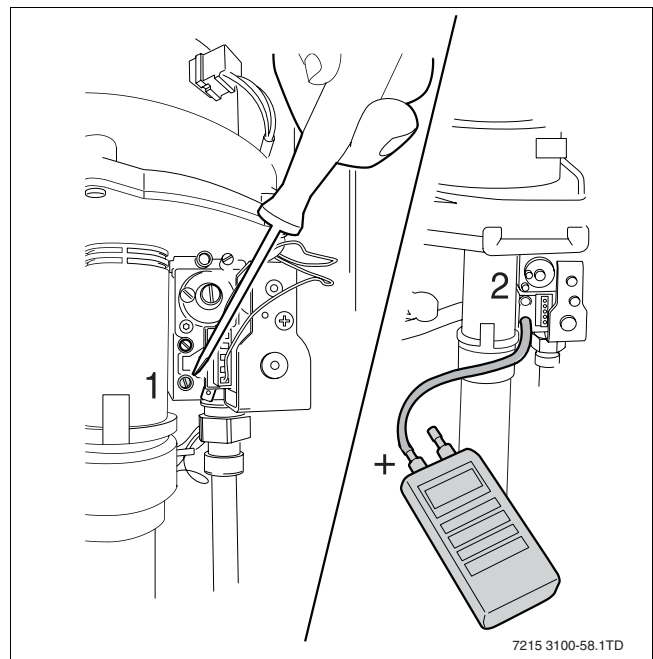


Fig. 58 Measuring the gas-supply pressure

2.1.7 Checking the gas/air ratio and adjust as required

- Turn mains power switch to "0" (→ fig. 56, item 1).
- Shut the gas shut off valve underneath the boiler (→ fig. 57, item 1).
- Ensure at least two radiators are open to hot water flow.
- Open the top measuring nipple (→ fig. 59, item 1) two turns.
- Set the pressure gauge to "0".
- Connect a tube from the "+" side of the pressure gauge to burner-pressure testing nipple (→ fig. 59, item 2).
- Open the gas shut off valve (→ fig. 57, item 2).
- Set the mains switch to "1" (→ fig. 56, item 1).

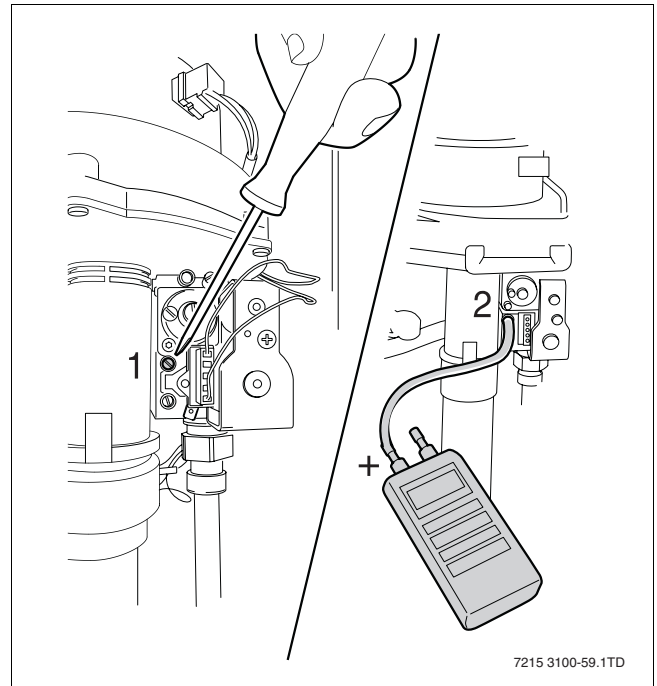



Fig. 59 Check the gas/air ratio

- Set the boiler to partial load by pressing the service button \ominus once. A symbol of an open-ended spanner  appears in the upper left hand corner of the display (see fig. 60).

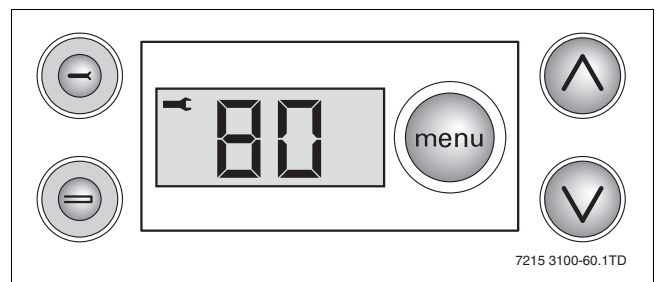


Fig. 60 DBA with open-ended spanner

- The optimum gas/air ratio is -5 Pa (-0.05 mbar). The pressure difference should be between -10 and 0 Pa (→ fig. 61).



NOTE

If the reading is in the shaded area no adjustment is required.

If this is not the case then adjustment is needed:

- Remove the safety screw with a flat head screwdriver (→ fig. 62, item 1).
- Adjust the adjustment screw of the burner pressure to the correct gas/air ratio using an (4 mm) Allen key and by referring to fig. 61.
- Replace the safety screw (→ fig. 62, item 1).
- Set mains power switch to "0" (→ fig. 56, item 1).
- Close the gas shut off valve (→ fig. 57, item 1).

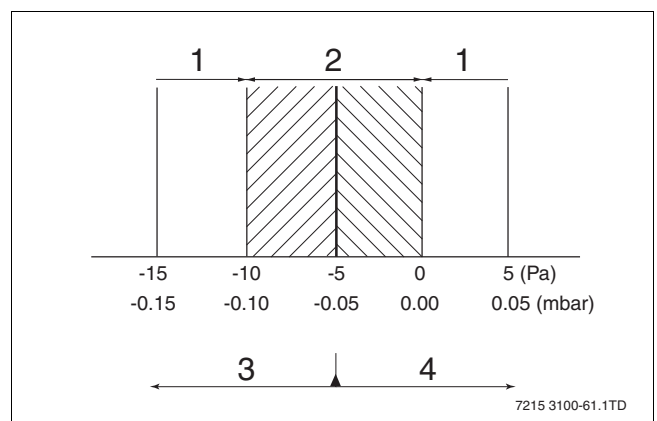


Fig. 61 Pressure difference of gas/air ratio at partial load

1. wrong
2. correct
3. left turn
4. right turn

- Remove the tube from from the burner-pressure testing nipple.
- Tighten the screw on the burner-pressure testing nipple (→ fig. 59, item 1).
- Open the gas shut off valve (→ fig. 57, item 2).
- Turn the mains power switch to "1" (→ fig. 56, item 1).

**Caution:**

Check the test nipples for gas tightness.

**NOTE**

Technically it is not necessary to use a combustion analyzer for CO₂ measurements. The CO₂ level is secured by the gas/air ratio as described above.

A combustion analyzer, if available, can be used to confirm CO₂ levels (→ technical specifications on page 6).

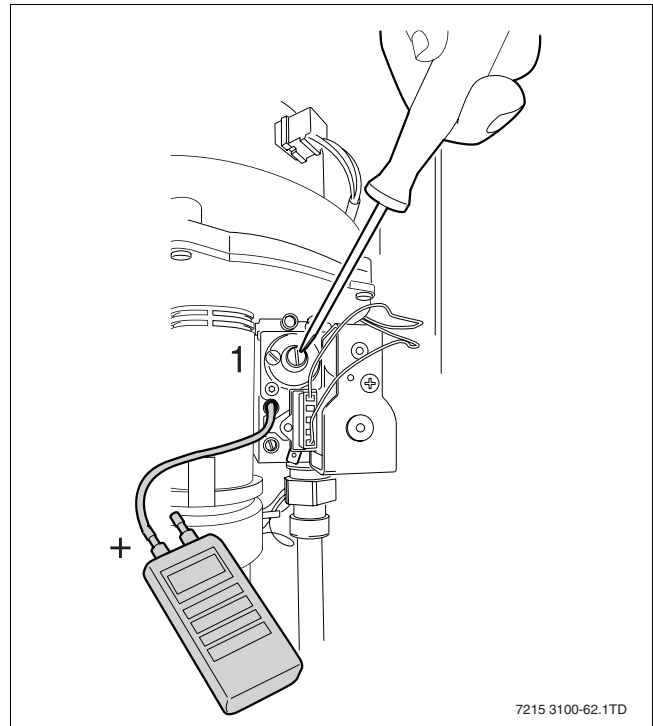



Fig. 62 Adjust gas/air ratio

2.1.8 Gas rating test

- Isolate all other appliances.
- Press the service button  to set the boiler to full load.
- Ensure that there is no modulating of the fan gas valve.
- Carry out the Gas Rating procedure as described in "Essential Gas Safety" 3rd edition on pages 169-176.

2.1.9 Checking for leaks while boiler is in operation

- Use an approved leak detector to check all connections for possible leaks. The product must be certified as a gas leak testing agent.
- Do not allow the product to come into contact with the electrical wiring.

2.1.10 Function testing**NOTE**

During initial start-up and annual servicing, make sure that all control, regulating and safety devices are in full working order and, if applicable, check for correct adjustment.

Measuring the ionisation current (→ fig 63)

- Turn the mains power switch to "0" (→ fig. 56, item 1).
- Loosen the connector-and-socket connection of the ionisation electrode and connect the multimeter in series.

- On the measuring device, select the μ Amp d.c. range. The measuring device must have a resolution of at least $1 \mu\text{A}$ (1 micro ampere).
- Set mains power switch to "1" (\rightarrow fig. 56, item 1).
- Set the boiler in to partial load by pressing the Service button \ominus once.
- Measure the ionisation current. The ionisation current being checked must measure $>2 \mu\text{A}$ (>2 micro ampere) direct current.
- Enter the reading on the report form.
- Set the mains power switch to "0" (\rightarrow fig. 56, item 1).
- Remove multimeter and restore the connector-and-socket connection to its original state.

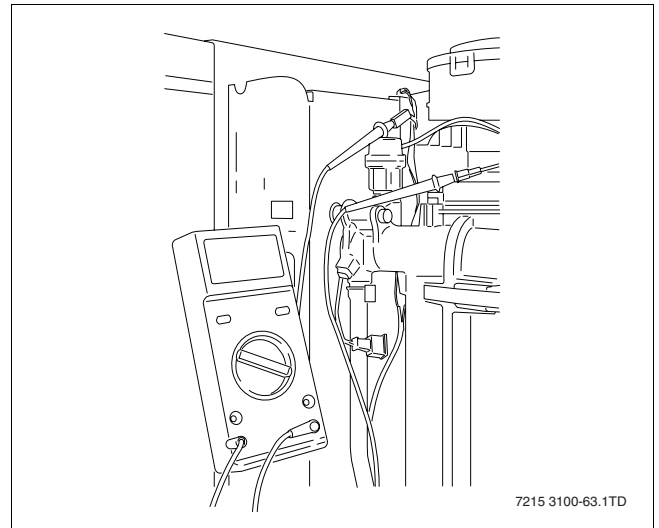


Fig. 63 Measuring the ionisation current

- Refit the casing and secure the boiler with the radiator key (\rightarrow fig. 64).
- Set the mains power switch to "1" (\rightarrow fig. 56, item 1).

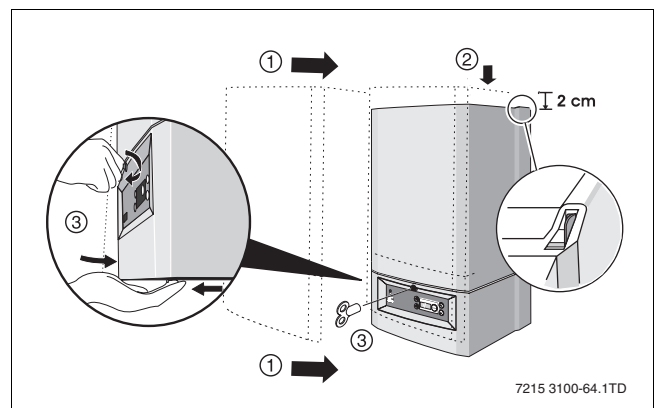


Fig. 64 Refit casing

2.1.11 Handing over

After completing the installation and commissioning of the system the installer should hand over to the householder by the following actions:

- Hand over all relevant documentation to the end user and explain his/her responsibilities under the relevant national and regional regulations.
- Explain and demonstrate the lighting and shutting down procedures.



NOTE

Always keep the user manual and installation and servicing instructions with the boiler for future reference.

3 Inspection

3.1 General directions

- Do a visual and functional test of the installation.

3.2 Preparing the boiler for inspection

- Disconnect the boiler from the mains power supply.



DANGER OF FATAL INJURY

due to electric shock when system is opened.

- Before opening the system:
Isolate the boiler at the dedicated electrical spur.
- Ensure that the heating system cannot be reconnected by accident.

- Remove the burner housing or cover from the heating boiler.



NOTE

If the gas supply pipes are to be disconnected from the burner, the housing **MUST ONLY** be removed by a qualified service technician and checked for tightness on reassembly.

- Replace the following seals two-yearly:
 - Flat seal between the gas pipe and gas air unit;
 - Seal ignition unit;
 - Seal ionisation electrode;
 - Seal heat exchanger;
 - Burner seal.
- Fill out the **Benchmark**.

3.2.1 Internal leak test

- Disconnect the boiler from the mains power supply.
- Do not allow the product to come into contact with the electrical wiring.

3.2.2 Check the combustion chamber and heat exchanger for contamination

3.2.3 Check the burner

3.2.4 Check the functioning and safety of the flue gas exhaust

3.2.5 Check the pre-pressure of the expansion vessel

3.2.6 Check the programming of the room thermostat

4 Maintenance



NOTE

The described cleaning of the burner and heat exchanger is only necessary when the boiler is heavily contaminated. Otherwise it is sufficient to clean the burner and heat exchanger with a soft brush or compressed air without disassembling them.

4.1 Cleaning the heat exchanger and burner

- Switch the boiler off by setting the mains switch to "0" (→ fig. 56, item 1).
- Close the gas shut off valve (→ fig. 57, item 1).
- Unlock the securing screw with a radiator key and remove the casing.
- Loosen the gas connection between the gas supply and the gas air unit (→ fig. 65).

- Replace the flat seal between the gas pipe and the gas air unit (→ fig 66.)

- Remove the connectors (→ fig. 67, item 1, 2 and 3) from the gas air unit.
- Remove the air silencer from the gas air unit (→ fig. 67, item 4).
- Then remove the connectors of the glow ignitor (→ fig. 67, item 5) and the ionisation electrode (→ fig. 67, item 6).

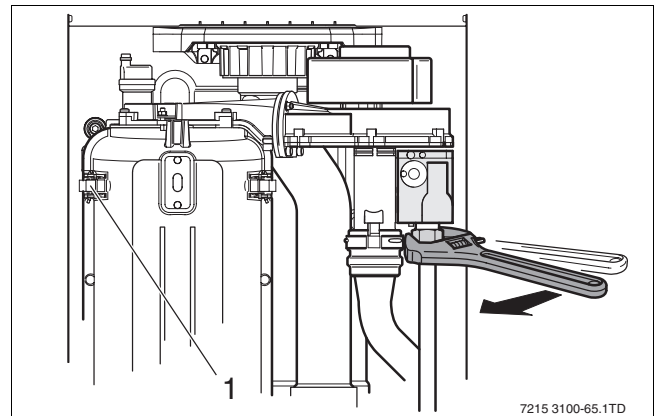


Fig. 65 Loosen gas connection

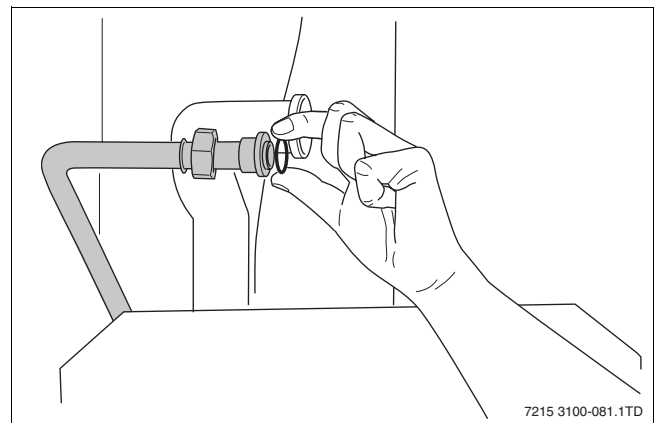


Fig. 66 Replace the flat seal of the gas pipe

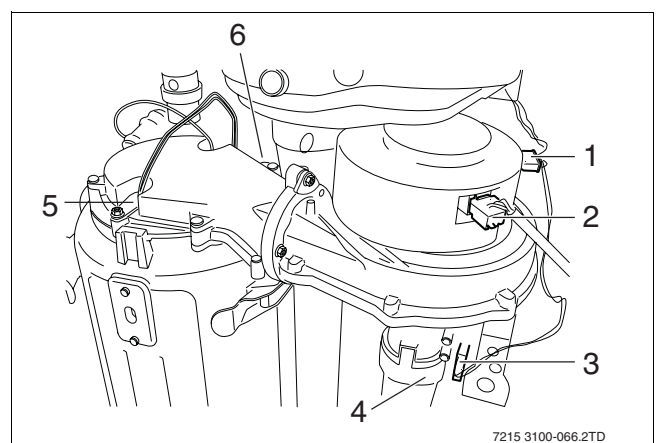


Fig. 67 Remove connectors of the gas air unit

- Remove the glow ignitor (→ fig. 55, item 1) and ionisation electrode (→ fig. 55, item 2).
- Mount a new glow ignitor with mounting plate and nut.
- Mount the old ionisation electrode with a new seal, mounting plate and nut.

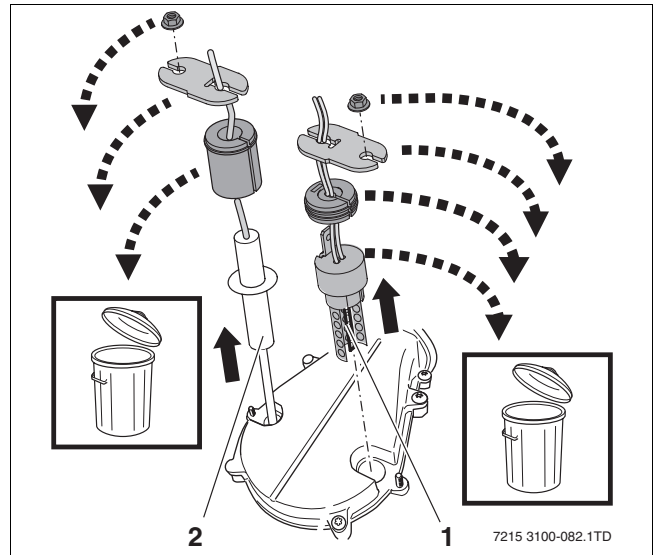


Fig. 68 Remove the glow ignitor and ionisation electrode

- By turning the unit a quarter turn (→ fig. 69, step 1), the unit can be removed by lifting it out of the boiler (→ fig. 69, step 2).
- Clean the burner when necessary. The burner may only be cleaned with a soft brush or compressed air.

Caution: Replace the burner seal after removing the burner from the gas air unit.

- Now the front cover of the heat exchanger can be removed by opening the latches (→ fig. 65, item 1).

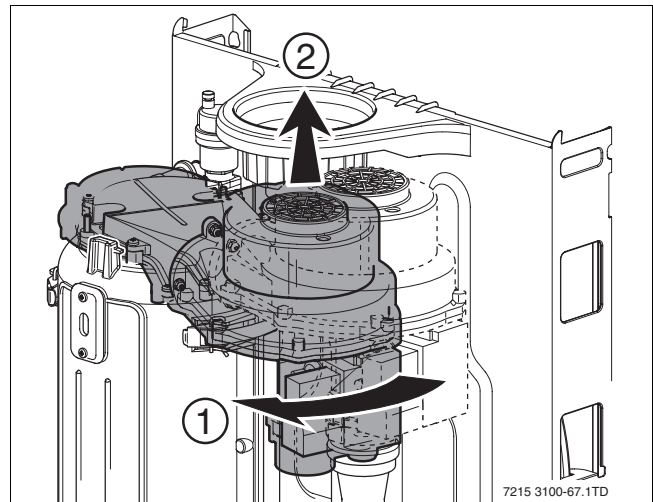


Fig. 69 Remove gas air unit

- Remove the restrictor baffle from the heat exchanger (→ fig. 70, item 1).
- Inspect the heat exchanger. When required, clean the heat exchanger with a soft brush or compressed air.

NOTE Only when a heat exchanger is heavily soiled is it recommended to drain the system, to remove the heat exchanger for cleaning.

- Check the seal for damage. Always replace the seal if in doubt.

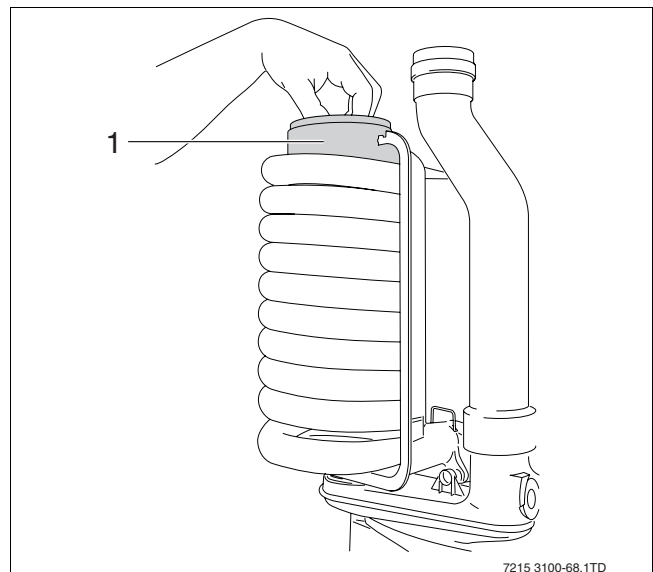


Fig. 70 Remove restrictor baffle

- Replace the seal of the heat exchanger (→ fig. 71, item 1). The seal must be placed without tension and cut at the proper length at the end of it.
- Replace the 4 o-rings (→ fig. 71, item 2), 2 pieces at each side.

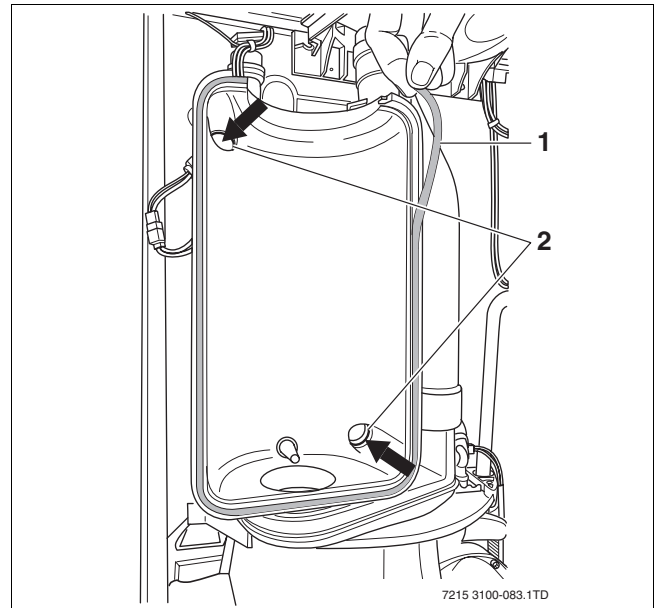


Fig. 71 Replace the seal of the heat exchanger

- Remove the old burner seal (→ fig. 72).
- Place a new burner seal.

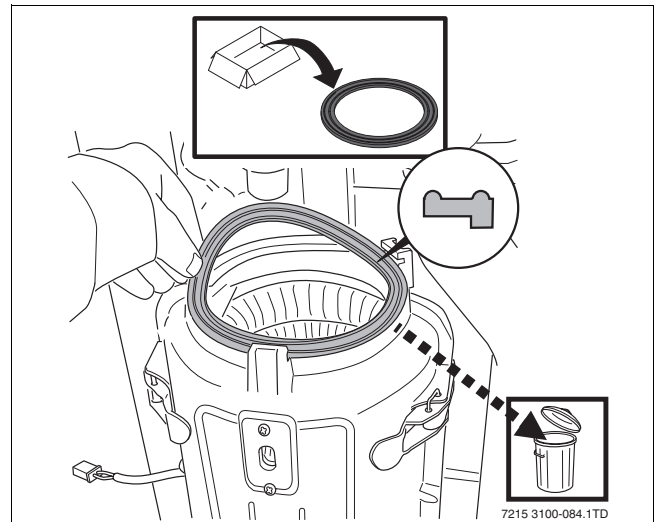


Fig. 72 Replace burner seal

- Place a new flat seal between the gas pipe and the gas valve (→ fig. 73).
- Reassemble in reverse order.

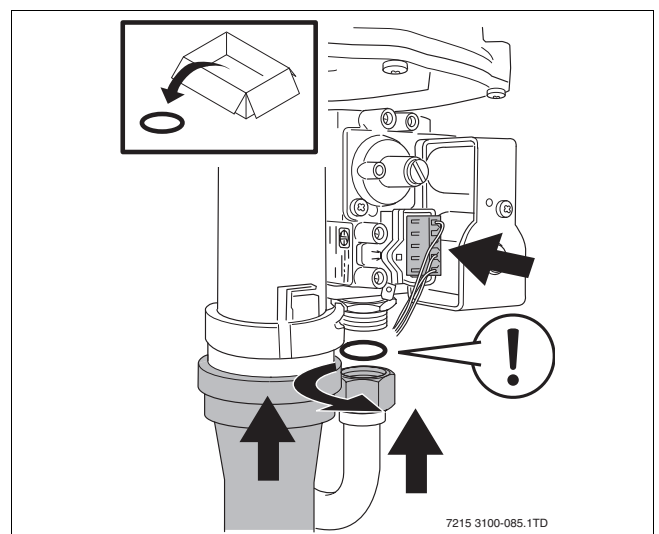


Fig. 73 Place a new flat seal

4.2 Cleaning the condensate trap and syphon

- Remove the condensate trap (→ fig. 74 and fig. 75).

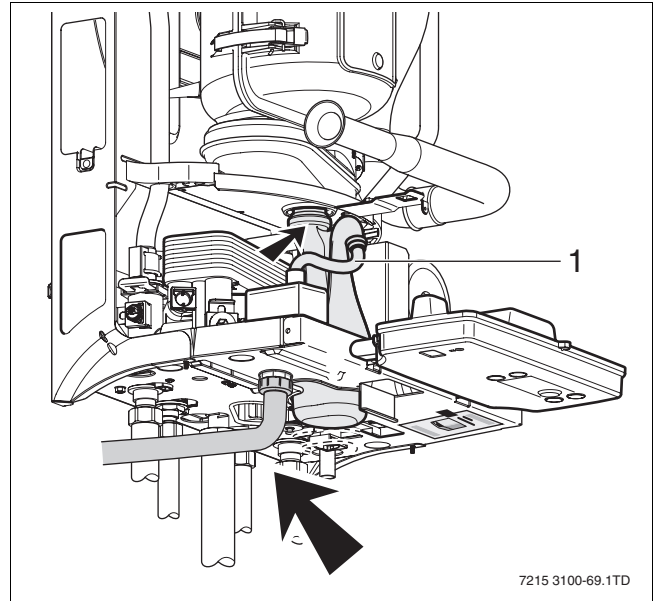


Fig. 74 Disconnect hose from condensate trap

- Clean the condensate trap with tap water and a brush.
- If required, place a new lip seal.
- Fill the condensate trap with water and reassemble.
- Undo the condensate drain connection (→ fig. 74, item 1) and remove the syphon.
- Rinse and refit the syphon.

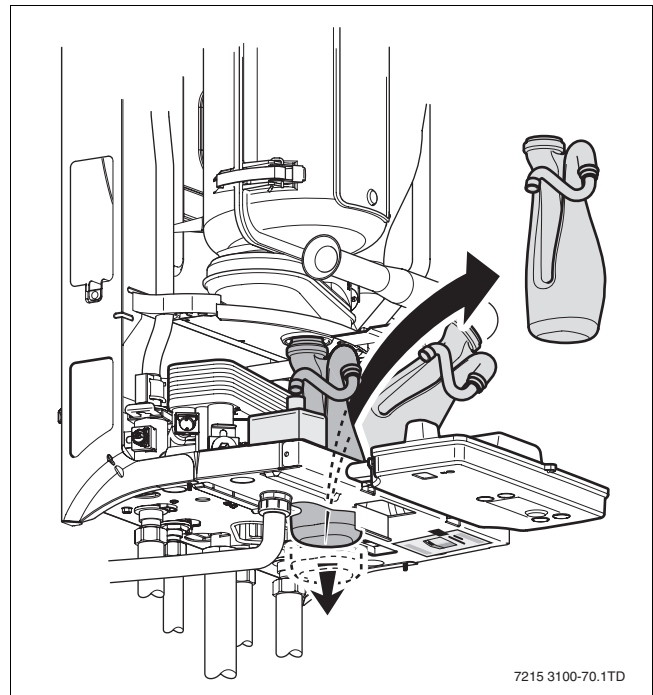


Fig. 75 Remove the condensate trap

4.3 Cleaning or replacing the plate heat exchanger

- Disconnect the boiler from the mains power supply.
- Drain the system (→ page 36).
- Remove the condensate trap and the syphon (→ page 36).
- Remove the two screws of the plate heat exchanger (→ fig. 76).

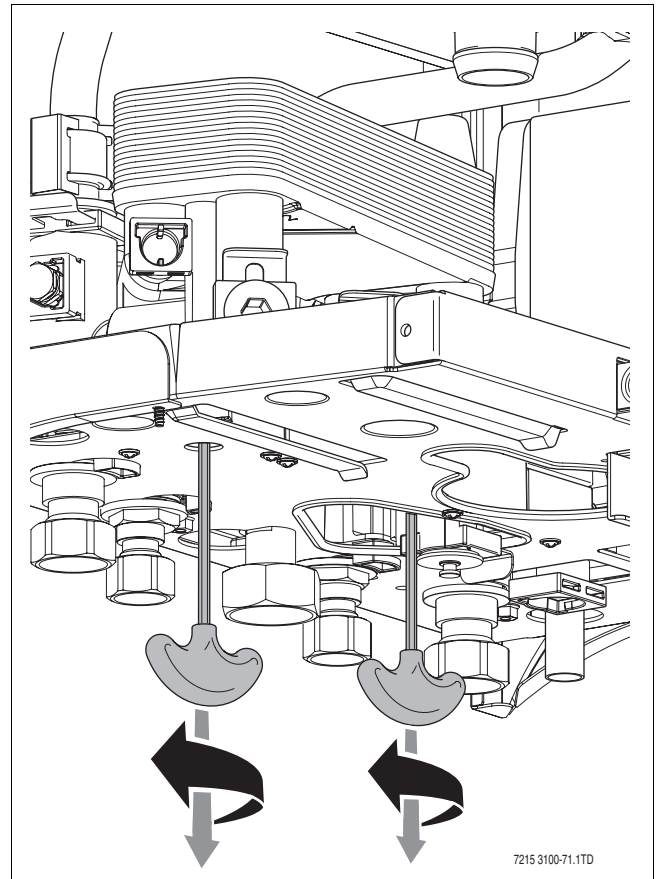


Fig. 76 Remove screws of plate heat exchanger

- Remove the plate heat exchanger (→ fig. 77).
- Hook up a descaling device and clean the plate heat exchanger.
- Thoroughly rinse the plate heat exchanger before reassembly.
- Replace the o-rings when necessary.
- Open a hot water faucet to rinse and purge the system.
- Close the hot water faucet and reconnect the boiler to the mains supply.

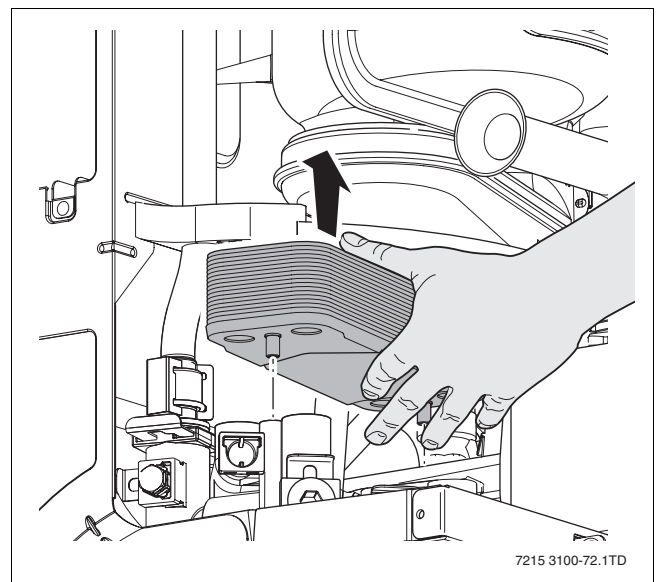



Fig. 77 Remove plate heat exchanger

5 Appendix

5.1 Fault codes

Code		Key to display code
0	4	The flow sensor or safety sensor has detected that the current CH flow temperature is higher than 95 °C.
1	⌈	The flue-gas STL (flue-monitoring device) or the burner thermostat has detected too high a temperature and has been opened.
2	F	The flow sensor and safety sensor have, after burner startup, not detected any temperature increase in the heating water, or they have determined that the temperature difference between the flow sensor and safety sensor is too high.
	P	The flow sensor has detected a temperature increase, in the heating system water, of over 5 °C/sec.
3	R	The tachometer signal from the fan has failed during the operating phase.
	L	The tachometer signal from the fan is not present during the preoperative or operating phase or there is no current of air after a certain time.
	4	The fan runs too slowly or too fast.
4	R	The flow sensor and safety sensor have detected a CH flow temperature of over 105 °C.
	E	The sensor test has failed.
	L	The contacts of the flow sensor and safety sensor are shorted to each other, or there is a short-circuit to earth (ground), or the flow or safety sensor has detected a CH flow temperature of above 130 °C.
	P	The contacts of the flow sensor or safety sensor are broken.

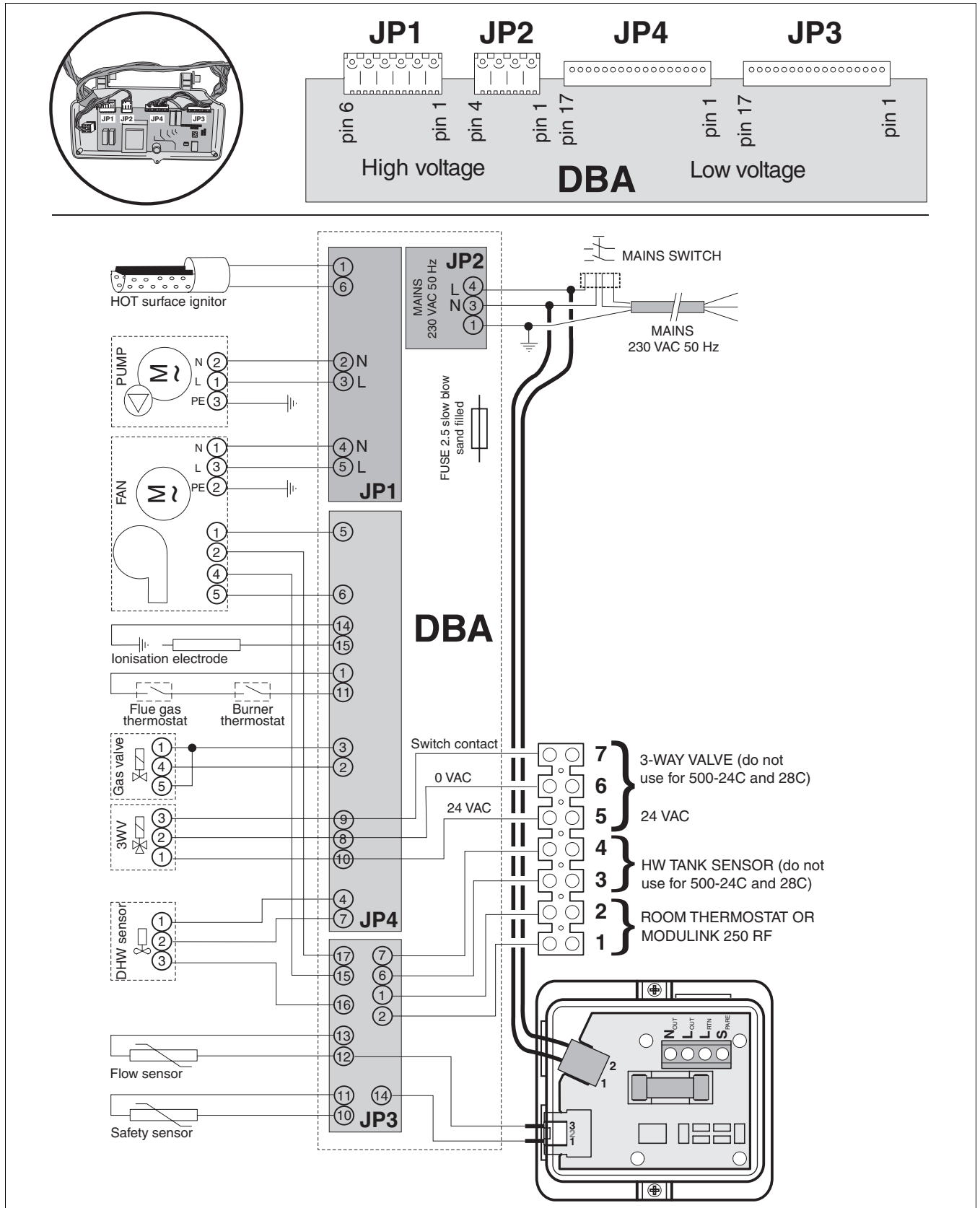
Code		Key to display code
5	R	After four startup attempts, the system has detected insufficient ionisation current.
	⌈	The system has detected an ionisation current before burner startup or an ionisation current has been measured as soon as the burner shuts down.
	L	The flame goes out during the operating phase.
7	⌈	The power supply was shut off during a crucial breakdown.
9	R	The DBA control panel is defective.
	F	The contacts of the gas valve have been broken.
	H	The DBA control panel is defective.
	L	The contacts of the gas valve have been broken or the DBA control panel is defective.
	P	The DBA control panel is defective.
	4	Short circuit in the gas valve.
E	1	The DBA control panel is defective.
	2	
	3	
	4	
	R	
	⌈	The contacts of the KIM (EEPROM on the DBA control panel circuit board) may be loose or short-circuited.
r	E	Reset is carried out. This code appears after the reset button  is pressed for 5 seconds.

5.2 Wiring diagram



Warning:

Do not connect 230 V to the connection block on the back of the DBA.



IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

GREEN AND YELLOW - EARTH ;
BLEU - NEUTRAL ;
BROWN - LIVE

As the colours of the wires in the mains lead of of the appliance may not correspond with the coloured markings identifying the terminals in your connector proceed as follows:

The wire coloured green and yellow must be connected to the terminal on the connector marked with the letter E or by the earth symbol or coloured green or green-and-yellow. The wire coloured brown must be connected to the terminal marked with the letter L or coloured red. The wire coloured blue must be connected to the terminal marked with the letter N or coloured black.

WARNING**THIS APPLIANCE MUST BE EARTHED**

Ensure that your appliance is connected correctly - if you are in any doubt consult a qualified electrician.

For location of individual components, see service section and the exploded views in this manual.

5.3 Residual pump lift

This graphic shows the amount of pump lift remaining for the heating system.

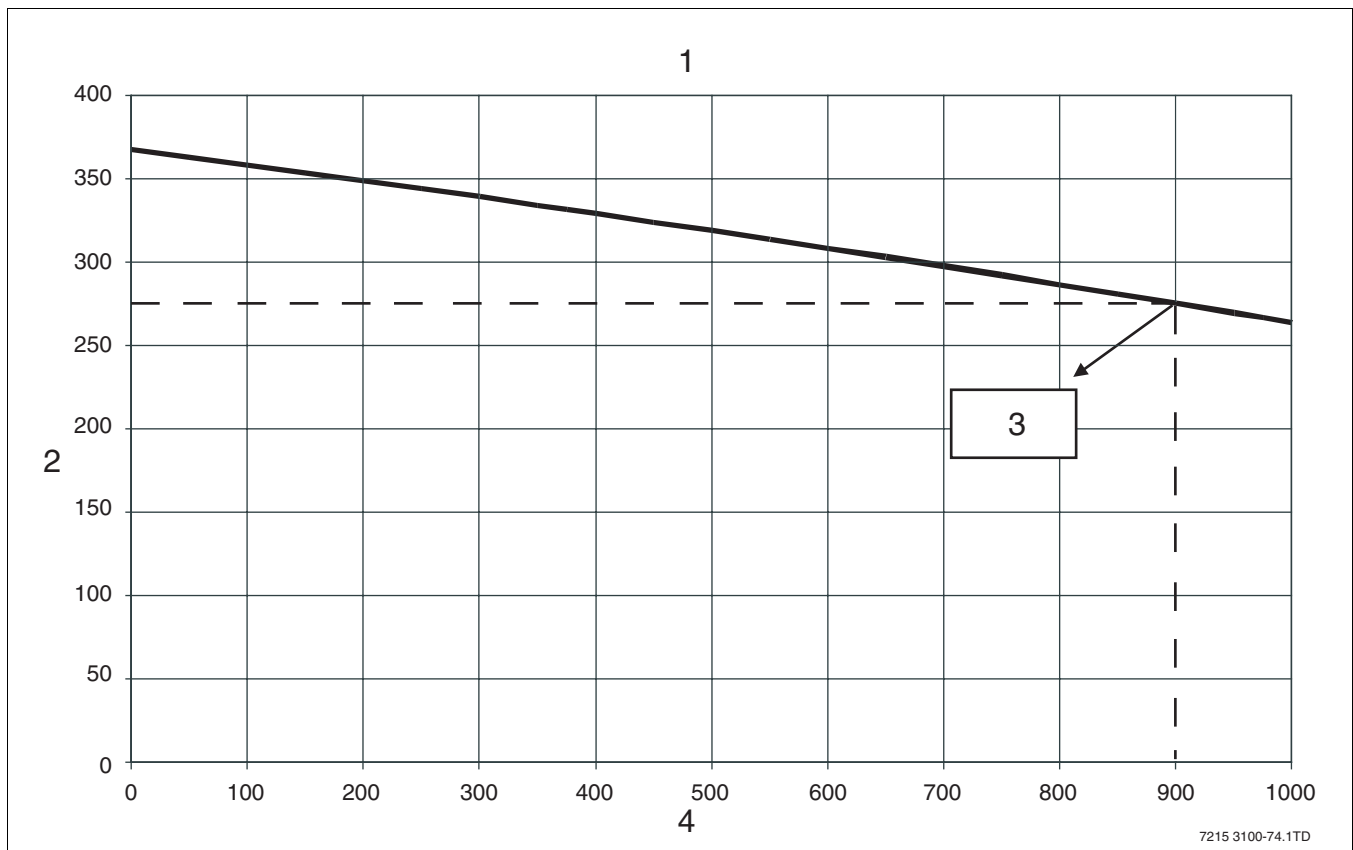


Fig. 78

1. Buderus 500-24C and 500-28C series
2. Residual pump lift [mbar]
3. 275 mbar at 900 l/h
4. Flow [l/h]

5.4 Spare parts list

The following are parts commonly required due to damage or expendability. Their failure or absence is likely to affect safety or performance of this appliance. For a pictorial representation of the part see the respective position number on the exploded view pictures on page 57.

	Description	Product No.
1	Casing	78155
2	Bracket	38092
3	Grommet cover	78145
4	Fan	73639
5	Fan seal (set of 5 pc.)	73640s
6	Gas injector 2E	73210
7	Gas valve	73645
8	Venturi	73641
9	50mm seal	73574
10	Air silencer tube	73646
11	Gas/air supply valve	73756s
12	Syphon	75986
13	Service set GLE complete (also includes item 5, 11, 14, 16, 23, 24, 25, 27, 68 and 92)	7746900411
14	Burner seal (set of 2 pc.)	8718600197
15	–	–
16	Heat exchanger - Gas/air supply seal	73728
17	Backside heat exchanger	8718600023
18	Gasket heat exchanger	8718600021
19	Heat exchanger	73659
20	Frontside heat exchanger	6718600141
21	Sight glass	73662
22	Combustion divider	73670
23	Ignition unit	8718600054
24	Ionisation electrode	38320
25	Ionisation electrode seal (set of 2 pc.)	73666s
26	–	–
27	Bracket ionisation electrode and glow ignitor (2 pc.)	–
28	–	–
29	Concentric adapter	78120
30	100 mm Lipring	78121
31	60 mm seal (bottom flue gas pipe)	73563
32	Flue gas pipe	78122
33	60 mm seal (top flue gas pipe)	73736
34	Flue gas pipe seal	73579

	Description	Product No.
35	Flue gas thermostat (STL) (push in type)	87105062670
36	Condensate collector	73630
37	Condensate trap	7746900187
38	Connection return	73583
39	Gas pipe	8718600028
40	Connection supply	73672
41	Automatic airvent	38618
42	Spring heat exchanger	73582s
43	O-ring heat exchanger (set of 10 pc.)	73580s
44	Heat exchanger seal (set of 2 pc.)	73584s
45	Safety sensor	78154
46	Supply pipe	78130
46	Supply pipe	7746900068
47	Pump Uper 15-50	78142
48	Connection return pipe	78133
49	Return pipe	78132
50	Connection return combi	78165
51	Internal mechanism three-way valve	73685
52	Servomotor three-way valve	73686
53	Securing pin of the servomotor	73687
54	Discharge pipe of pressure relief valve	78134
55a	Pressure relief valve 3 bar	78198
55b	Key to Pressure relief valve 3 bar	78202
56	By-pass	78143
57	Expansion vessel pipe	78135
58	Expansion vessel	78163
59	Connection plate heat exchanger	78167
60	DHW flow regulator	78138
61	DHW flow sensor	78137
62	Connection supply combi	78166
63	Flow sensor	78136
64	Mounting button	7746900854
65	Plate heat exchanger	78144
66	O-ring (set of 10 pc.)	78158s

	Description	Product No.
67	Clips (set of 2x3 pc.)	78156s
68	Burner thermostat	7746900412
69	CH connector	78161
70	Sanitary connector	78162
71	DBA 24/S and 28/C	7746900063
71	DBA 24C	7746900069
72	Power switch	73660
73	Cable harness	7746900064
74	Clips (set of 5 pc.)	73653s
75	Clips (set of 5 pc.)	73056s
76	Condensate trap seal	73463
77	Drainpipe seal (set of 5 pc.)	73638s
78	O-ring (set of 10 pc.)	78151s
79	O-ring small (set of 10 pc.)	78152s
80	O-ring 73 x 5	78177
81	O-ring 48.9 x 2.62	78178
82	O-ring (set of 10 pc.)	78157s
83	Screw + screwcase (set of 2 pc.)	78181s
84	Drain plug	78139
85	CH return pipe	7746900067
86	O-ring (set of 10 pc.)	38472s
87	¾" Seal (set of 10 pc.)	15002s
88	O-ring (set of 10 pc.)	38478s
89	Cover seal	78174
90	Seal	73561
91	O-ring (set of 2x2 pc.)	73642s
92	Seal (set of 10 pc.)	8718600045
93	1" Seal (set of 5 pc.)	73527s
94	Casing lock	73901
95	Cut off cock with pressure gauge	78150
96	Valve Sanitary Hot	75962
97	Gas valve	78201
98	Valve Sanitary Cold	75963
99	Valve CH return	75964
100	Spring (set of 5 pc.)	73490s
101	Spring Hydroframe (set of 5 pc.)	78164s
102	½" Seal (set of 10 pc.)	15033s
103	1" Seal (set of 5 pc.)	73527s
104	Connection set combi	73784
105	-	-

	Description	Product No.
106	-	-
107	Receiver bracket	78200
108	Wall-spacing frame	75972
-	Spring gaspipe (set of 5 pc.)	73531
-	LPG kit 24 kW - 28 kW	73734
-	O-ring sensor (set of 10 pc.)	38434s
-	O-ring 16x2 pressure relief valve (set of 10 pc.)	73729s
-	Fuse 2.5 AT (DBA) (set of 10 pc.)	73739s
-	O-ring (large) flow sensor (set of 10 pc.)	78153s
-	O-ring 9.19 x 2.62 sensor supply/return (set of 10 pc.)	78175s
-	Screw 4 x 20 Hydroframe (set of 5 pc.)	78179s
-	Screw M5 x 30 Pump (set of 5 pc.)	78180s



Notes



Notes

Buderus

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In the UK and IE, Buderus is a brand name of Bosch Thermotechnology Ltd.

Buderus

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