Floor standing gas/oil condensing boiler
Issue 2013/08

Technical guide for contractors
Logano plus SB325, SB625, SB745

Output range from 50 kW to 1200 kW

Heat is our element

Buderus

Table of contents

1 Buderus condensing systems

1.1 Types and heating output

In the output range from 11 kW to 19200 kW, Buderus offers a full spectrum of wall mounted and floor standing gas and oil condensing boilers. Proven solutions using condensing technology and stainless steel are available in the output range from 50 kW to 1200 kW with the Logano plus SB325, SB625 and SB745 gas and oil condensing boilers. These boilers have an internal condensing heat exchanger and are available in the output range between 145 and 310 kW with extremely quiet, modulating gas premix burners.

1.2 Possible applications

The Logano plus SB325, SB625 and SB745 floor standing gas and oil condensing boilers are suitable for all heating systems to DIN EN 12828.

They are used in applications including central heating and DHW heating in apartment buildings, communal and commercial buildings, to heat commercial nurseries and for indirect swimming pool heating.

> Due to the open flue operating mode, the boiler must not be installed in habitable rooms (→ page 65).

1.3 Features and benefits

- **High flexibility**
  The Logano plus SB325, SB625 and SB745 floor standing condensing boilers can be used with natural gas and LPG, as well as low sulphur fuel oil EL and fuel oil EL A Bio 10, without any limitations.
- **High seasonal efficiency [to DIN]**
  The Logano plus SB325 and SB625 floor standing gas and oil condensing boilers represent top technology in energy utilisation with seasonal efficiency [to DIN] of up to 109 % for gas and 104 % for oil.
  The Logano plus SB745 achieves an even higher seasonal efficiency [to DIN] of up to 110 % for gas or 105 % for oil.
- **High condensation rate**
  The condensing plus -heating surface provides an optimum area for heat transfer and a very high condensation rate.
- **High operational reliability**
  All parts that come into contact with hot gas and condensate are made from high grade stainless steel.
- **Environmentally responsible with clean combustion**
  The 3-pass design of the SB325 and SB625, the design of the SB745 with burnout combustion chamber, and the water-cooled combustion chamber offer ideal conditions for clean operation, especially in conjunction with burners that are matched to the boiler. Floor standing condensing boilers with the Logatop VM gas premix burner from Buderus in the output range between 145 and 310 kW have extremely low pollutant and sound emissions. The factory-set burner operates very quietly, uses little power, and furthermore reduces the commissioning time since adjustments on site are usually unnecessary.
- **Integral sound insulation**
  For quieter operation, all boilers are designed to reduce sound emissions to a minimum.
  In addition, special sound insulation strips are included in the standard delivery of the SB745.
- **Installation even where space is tight**
  The floor standing boilers have a compact construction and can therefore be installed without difficulty even in small rooms. For Logano plus SB325, the maximum installation height is 1.22 m; for Logano plus SB625 it is 1.73 m, and for Logano plus SB745 it is 2.05 m.
- **Simple system technology**
  As there are no special requirements for operation, it is simple and straightforward to connect the Logano plus SB325, SB625 and SB745 floor standing condensing boilers to the heating system. This reduces the investment and operating costs.
- **Matching system technology**
  For all boiler designs, there are numerous matching components which enable an optimised overall system.
- **Easy maintenance and cleaning**
  The Logano plus SB325, SB625 and SB745 floor standing condensing boilers have generously sized inspection apertures. Once the front reversing chamber has been removed, it is possible to fully inspect the condensing plus -heating surface and it is easy to clean with the right cleaning equipment set (accessory).
- **Quick installation**
  The factory-fitted thermal insulation and casing of the Logano plus SB745 make it possible to install the boiler quickly and easily.

2 Basic principles

2.1 Basic principles of condensing technology

2.1.1 Net and gross calorific values

The net calorific value H_i (formerly H_u) specifies the amount of heat that can be obtained from one cubic metre of gas or one kilogram of fuel oil. With this reference figure, the products of combustion are present in a gaseous state.

Compared to the net calorific value H_i, the gross calorific value H_s (formerly H_o) also contains the condensation heat from the water vapour as additional energy.

2.1.2 Boiler efficiency above 100 %

The condensing boiler takes its name from the fact that it utilises not only the net calorific value H_i for heat recovery, but also the gross calorific value H_s, i.e. it also includes the heating energy released from the condensation of the flue gas.

For all efficiency calculations in German and European standards, the net calorific value H_i is always selected at 100 % as a reference figure, meaning that a boiler efficiency of over 100 % can result. This makes it possible to compare conventional boilers and condensing boilers.

In contrast to advanced low temperature boilers, the boiler efficiency can be increased by up to 15 %. Compared to older systems, it is even possible to make energy savings of up to 40 %.

A sample comparison of the energy utilisation of advanced low temperature boilers and condensing boilers gives an energy statement as shown in Fig. 1.

Condensation heat (latent heat)

- The proportion of condensation heat in natural gas is 11 % and in EL fuel oil is 6 %, relative to the net calorific value H_i.
  This proportion of heat is unused in low temperature boilers.
- By condensing the water vapour, a condensing boiler enables most of this potential heat to be utilised.

Flue loss (sensible heat)

- In a low temperature boiler, the flue gas is expelled at the relatively high temperatures of 150 °C to 180 °C. With it, approx. 6 % to 7 % of the heat is lost without being used.
- The dramatic reduction of the flue gas temperatures in a condensing boiler down to 30 °C makes use of the sensible heat in the hot gas and considerably reduces the flue loss.

Energy statements for low temperature boiler and condensing boiler compared

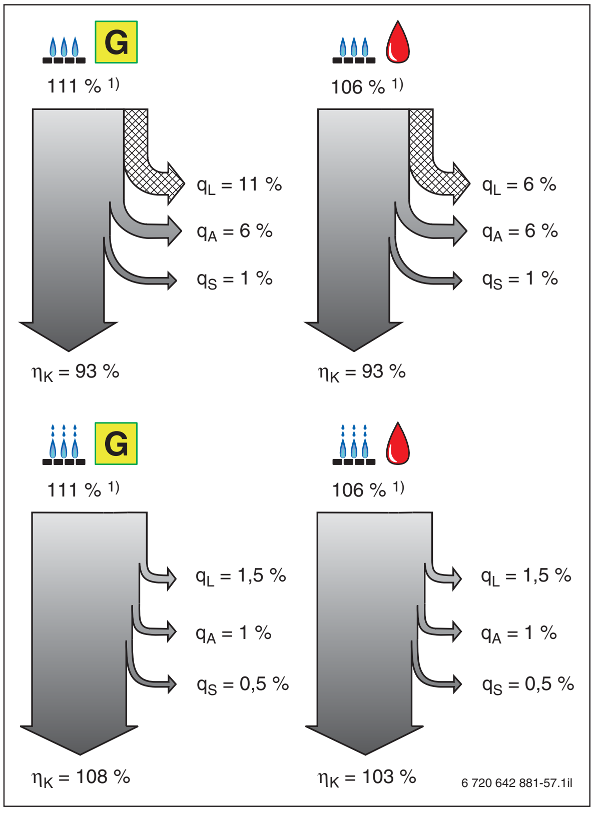


Fig. 1 Energy calculation

 Low temperature gas boiler

 Low temperature oil boiler

 Floor standing gas condensing boiler

 Floor standing oil condensing boiler

η_K Boiler efficiency

q_A Flue losses (sensible heat)

q_L Unused condensation heat (latent heat)

q_S Radiation losses

1) Relative to net calorific value H_i = 100 %

2.2 Making optimal use of condensing technology

2.2.1 Matching to the heating system

Condensing boilers can be installed in any heating system. However, the useable proportion of condensation heat and the efficiency resulting from this operating mode are dependent on the design of the heating system.

To be able to use the condensation heat of the water vapour in the hot gas, the hot gas must be cooled to below the dew point. The utilisation rate of the condensation heat is therefore necessarily subject to the system design temperatures and the hours run in the condensation range. This is shown by the graphs in Fig. 2 and Fig. 3.
In this example, the dew point temperature, which depends on the CO_2 content in the flue gas, is 50 °C for gas and 45 °C for oil.

Heating system 40/30 °C

In this heating system, the benefits of the performance capacity of condensing technology can be seen throughout the heating season. The low return temperatures are always below the dew point temperature, so condensation heat is always created (→ Fig. 2). This is achieved with low temperature panel heaters or underfloor heating systems, which are ideal for condensing boilers.

Heating system 75/60 °C

Even with design temperatures of 75/60 °C, an above average utilisation of the condensation heat is possible for approx. 95 % of the annual heat load. This applies with outside temperatures of –7 °C to +20 °C (→ Fig. 3).

Due to safety margins, older heating systems designed with 90/70 °C are now essentially operated as systems with 75/60 °C. Even if these systems are operated with system temperatures of 90/70 °C and modulating, weather-compensated boiler water temperatures, they use condensation heat for 80 % of the annual heat load.

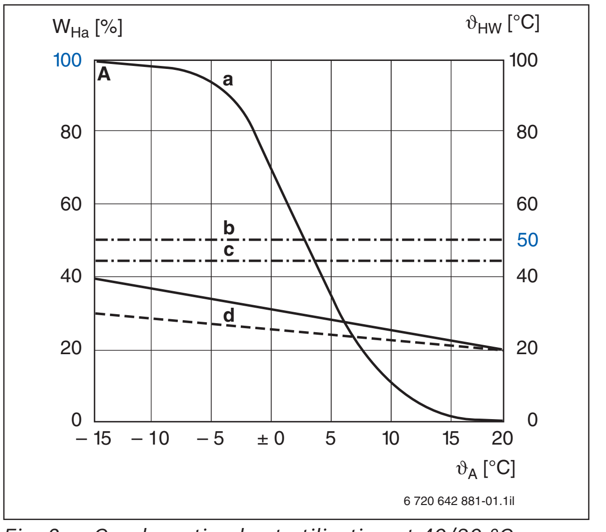


Fig. 2 Condensation heat utilisation at 40/30 °C

ϑ_A	Outside temperature
ϑ_{HW}	Heating water temperature
W_{Ha}	Annual heat load
A (gas/oil)	Proportion of operation with condensation heat utilisation
a	Annual heat load curve
b (gas)	Dew point temperature curve
c (oil)	Dew point temperature curve
d ___	Flow temperature at a system temperature of 40/30 °C
d ---	Return temperature at a system temperature of 40/30 °C

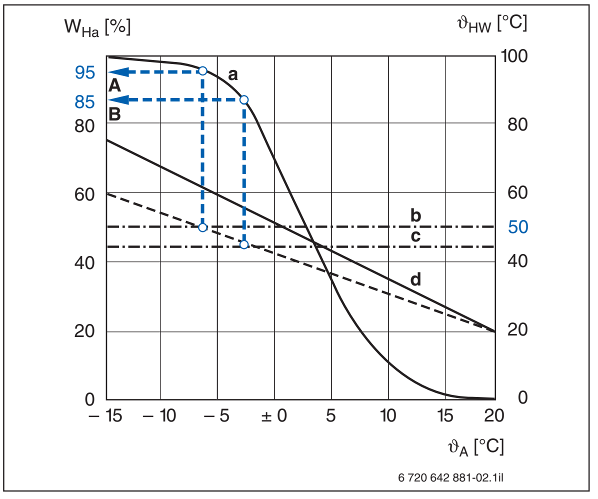


Fig. 3 Condensation heat utilisation at 75/60 °C

ϑ_A	Outside temperature
ϑ_{HW}	Heating water temperature
W_{Ha}	Annual heat load
A (gas)	Proportion of operation with condensation heat utilisation
B (oil)	Proportion of operation with condensation heat utilisation
a	Annual heat load curve
b (gas)	Dew point temperature curve
c (oil)	Dew point temperature curve
d ___	Flow temperature at a system temperature of 75/60 °C
d –––	Return temperature at a system temperature of 75/60 °C

2.2.2 High standard seasonal efficiency [to DIN]

The Logano plus SB325 and SB625 floor standing gas and oil condensing boilers represent top technology in energy utilisation with seasonal efficiency [to DIN] of up to 109 % for gas and 104 % for oil. The Logano plus SB745 achieves an even higher seasonal efficiency [to DIN] of up to 110 % for gas and 105 % for oil.

Example:

- ϑ_R = 30 °C – seasonal efficiency [to DIN] η_N = 108,9 %
- ϑ_R = 60 °C – seasonal efficiency [to DIN] η_N = 106,0 %

The high seasonal efficiency levels [to DIN] of condensing boilers can be traced back to the following influences:

- Achievement of high CO_2 levels. The higher the CO_2 level, the higher the dew point temperature of the hot gases.
- Lower system and return temperatures can be maintained. The lower the system and return temperatures, the higher the condensation rate and the lower the flue gas temperature.
- Optimised condensing plus heating surface for low flue gas temperatures and high condensation rates.

This results in almost complete utilisation of the heat contained in the hot gas and partial utilisation of the condensation heat in the water vapour.

2.2.3 Design information

With new installations, all options must be explored to ensure optimum operation of the condensing boiler.
A high standard seasonal efficiency [to DIN] is achieved if the following criteria are satisfied:

- Limit the return temperature to a maximum of 50 °C.
- Aim for a temperature spread between the flow and return of at least 20 K.
- Avoid installations for return temperature raising (e.g. 4-way mixers, bypass circuits, low loss headers, non-pressurised manifolds etc.).
- If the use of low loss headers or similar has been specified (e.g. modernisation project, extending an existing system, etc.), take suitable steps to prevent unwanted return temperature raising.

Detailed information on the hydraulic connection can be found in chapter 8 on page 43 ff.

2.3 Economic viability considerations

2.3.1 Simplified comparison of Ecostream boilers and gas condensing boilers

Fuel costs

- Given
  - Building heat demand Q_N = 375 kW
  - Net heating energy demand Q_A = 637500 kWh/a
  - Design system temperatures ϑ_V/ϑ_R = 75/60 °C
  - Fuel costs K_B = 0.75 Euro/m^3
  - Ecostream boiler Logano GE515, boiler size 400, η_N = 96 %
  - Logano plus SB625 floor standing gas condensing boiler, boiler size 400, η_N = 106 %
- Sought
  - Fuel consumption
  - Fuel costs
- Calculation

$$B_V = \frac{Q_A}{\eta_N \cdot H_i}$$

F. 1 Calculation of annual fuel consumption

B_V	Annual fuel consumption in m^3/a
H_i	Net calorific value; here natural gas simplified with 10 kWh/m^3
Q_A	Net heating energy demand in kWh/a
η_N	Standard seasonal efficiency in %

$$K_{Ba} = B_V \cdot K_B$$

F. 2 Calculation of annual fuel costs

B_V	Annual fuel consumption in m^3/a
K_B	Fuel costs
K_{Ba}	Annual fuel costs

- Result
  - Logano GE515, boiler size 400:
    Fuel consumption B_V = 66406 m^3/a,
    Fuel costs K_{Ba} = 46730 Euro/a
  - Logano SB625, boiler size 400:
    Fuel consumption B_V = 60142 m^3/a,
    Fuel costs K_{Ba} = 42345 Euro/a

Heating with the floor standing gas condensing boiler results in savings of 4385 Euros per year.

Investment costs

Extent of investment[1)2)]	Unit	Logano GE515, boiler size 400	Logano plus SB625, boiler size 400
Boiler, control unit and pressure-jet gas burner	Euro	16725	27615
Flue system (approx.)	Euro	2000	2000
Neutralising system NE1.1	Euro	N/A	692
Boiler safety equipment (safety valve etc.)	Euro	same price	same price
Total investment costs	**Euro**	**18725**	**30307**

Table 1 Comparison of investment costs for Ecostream boilers and floor standing gas condensing boilers (values rounded off)

1) Incl. accessories, excl. installation

2) Prices as of 2013

Reflux of capital

Type of cost	Unit	Logano GE515, boiler size 400	Logano plus SB625, boiler size 400
Investment costs	Euro	18725	30307
Costs linked to capital[1)]	Euro/a	1954	2955
Fuel costs	Euro/a	46730	42345
Total costs	**Euro/a**	**48684**	**45300**

Table 2 Total costs for Ecostream boilers and floor standing gas condensing boilers (values rounded off)

1) Annuity 9,44 %; interest 5 %; maintenance 1 %

In this example, the investment costs have been repaid after about three and a half years due to the lower fuel costs. In addition, the payback period decreases as energy prices rise. No subsidies have been taken into account.

2.4 Subsidies

In certain cases, a subsidy is granted for floor standing condensing boilers. Further information can be found atwww.bafa.de, for example.

As a general principle, subsidies are only granted if the application is submitted before the installation or modernisation of the system begins.

3 Technical description

3.1 Logano plus SB325, SB625 and SB745 floor standing gas and oil condensing boilers

3.1.1 Equipment overview

The Logano plus SB325, SB625 and SB745 floor standing gas and oil condensing boilers are consistently designed with stainless steel heating surfaces for condensing technology. They are tested to EN 15417 and EN 15034, type-tested and CE-designated. Quality assurance measures to DIN ISO 9001 and DIN EN 29001 contribute to the high manufacturing quality and functional reliability.

Additionally, the Unit version of the Logano plus SB625 VM floor standing condensing boiler with Logatop VM modulating gas premix burner from Buderus significantly reduces the sound emissions.

The cover of the Logano plus SB625 boiler has a load-bearing capacity of 100 kg/m^2.

Logano plus SB325

The floor standing condensing boilers in this series are available:

- With outputs of 50 kW to 115 kW (50/30 °C)
- Versions:
  – Unit version Logano plus SB325 with low-emission pressure-jet gas burner from Weishaupt or Riello for natural gas (E/LL)
  – Unit version Logano plus SB325 BE-A with Logatop BE-A blue flame oil burner from Buderus (boiler size 50-70)
  – Unit version Logano plus SB325 with pressure-jet oil burner from Weishaupt or Riello for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603 (boiler size 90-115)
  – Logano plus SB325 without burner:
    For the use of approved pressure-jet oil and gas burners for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603, natural gas (E/LL), LPG or dual fuel burner

Fig. 4 Logano plus SB325 floor standing condensing boiler with Logamatic 4211 control unit

Logano plus SB625

The floor standing condensing boilers in this series are available:

- With outputs of 145 kW to 640 kW (50/30 °C)
- Versions:
  – Unit version Logano plus SB625 VM (up to boiler size 310) with Logatop VM low-emission modulating gas premix burner from Buderus for natural gas (E/LL)
  – Unit version Logano plus SB625 with low-emission pressure-jet gas burner from Weishaupt or Riello for natural gas (E/LL)
  – Unit version Logano plus SB625 with pressure-jet oil burner from Weishaupt or Riello for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603
  – Logano plus SB625 without burner:
    For the use of approved pressure-jet oil burners for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603, and pressure-jet gas burners for natural gas (E/LL), LPG or dual fuel burner.

Logano plus SB745

The floor standing condensing boilers in this series are available:

- With outputs of 800 kW to 1200 kW (50/30 °C)
- Versions:
  – Logano plus SB745 with burner:
    Unit version Logano plus SB745 with low-emission pressure-jet gas burner from Weishaupt or Riello for natural gas (E/LL) and Unit version Logano plus SB745 with pressure-jet oil burner from Weishaupt or Riello for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603
  – Logano plus SB745 without burner:
    For the use of approved pressure-jet gas burners for natural gas (E/LL) or LPG, and pressure-jet oil burners for low sulphur fuel oil EL, fuel oil EL A Bio 10 to DIN 51603, or dual fuel burner.

Fig. 5 Logano plus SB745 floor standing condensing boiler with Logamatic 4321 control unit

3.1.2 Function principle

Boiler technology

With the Logano plus SB325, SB625 and SB745 floor standing condensing boilers, all parts that come into contact with hot gas or condensate are made from high grade stainless steel. This makes operation possible without limitations on the flow and return temperature, the flow rate or the burner low load. This keeps installation simple.

Hot gas routing

The Logano plus SB325 and SB625 floor standing condensing boilers are built using the 3-pass design and the countercurrent heat exchanger principle. The Logano plus SB745 is equipped with a burnout combustion chamber and is also constructed using the countercurrent heat exchanger principle. With regard to compact design, the combustion chamber and first and second condensation secondary heating surfaces are arranged one above the other.

In all Logano plus SB325, SB625 and SB745 floor standing condensing boilers, the condensation secondary heating surfaces consist of condensing plus-heating surfaces (→ page 13).

The burnout principle and low combustion chamber volume loading contribute to the low pollutant emissions because they create an undisturbed flame burnout and high flame stability.

Hot gas routing SB325and SB625

After leaving combustion chamber [1], the hot gases pass via a rear reversing chamber through the upper part [2] and via a front reversing chamber through the lower part of the condensation secondary heating surfaces [4] (→ Fig. 6).

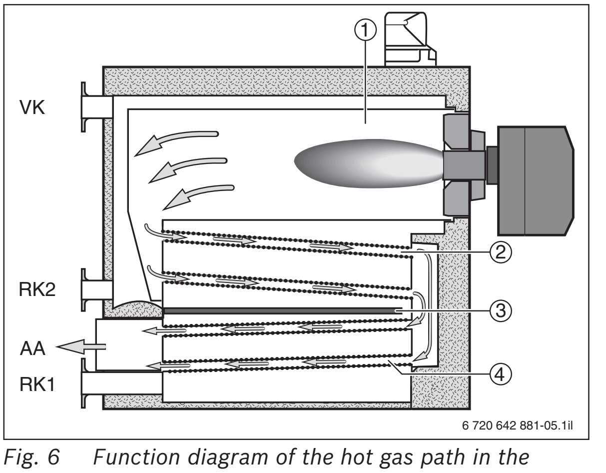


Fig. 6 Function diagram of the hot gas path in the Logano plus SB325 and SB625 floor standing condensing boilers

AA Exhaust gas outlet

RK1 Return for low temperature heating circuits

RK2 Return for high temperature heating circuits

VK Flow

[1] Combustion chamber (1st pass)

[2] Upper condensation secondary heating surface (condensing plus heating surface, 2nd pass)

[3] Water guide element

[4] Lower condensation secondary heating surface (condensing plus-heating surface, 3rd pass)

Hot gas routing SB745

The hot gases flow towards the back of combustion chamber [1] where they are reversed, and then pass to secondary heating surface [3]. In secondary heating surface [3], the hot gases flow forwards to flue gas collector [5] and are then routed through flue duct [4] integrated between the two pressure vessels, and out through flue outlet [2] (→ Fig. 7, page 11).

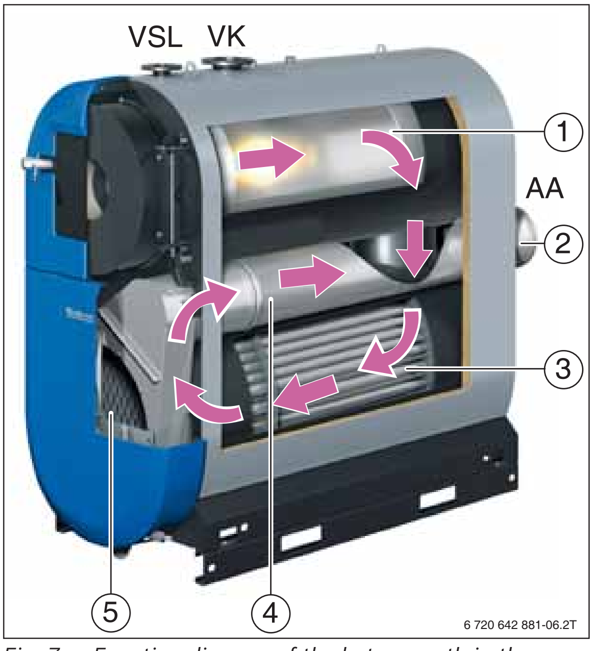


Fig. 7 Function diagram of the hot gas path in the Logano plus SB745 floor standing condensing boiler

VSL Safety pipe flow
VK Flow
AA Exhaust gas outlet
[1] Combustion chamber (1st pass)
[2] Exhaust gas outlet
[3] Condensation secondary heating surface (condensing plus-heating surface, 2nd pass)
[4] Flue duct
[5] Flue gas collector

Heating water countercurrent

Since the heating water flows in the opposite direction to the hot gas flow (→ Fig. 8 and Fig. 9, page 12), high condensation rates and low flue gas temperatures result.

For an optimum hydraulic connection, all Logano plus SB325, SB625 and SB745 floor standing condensing boilers have two return connectors to keep the connections of the high and low temperature heating circuits separate. The return from low temperature heating circuits flows through the larger low temperature return connector (RK 1) into the lower area (the front area of the SB745) of the condensing plus-heating surface, where maximum condensation takes place.
Heating circuits with high return temperatures (as with DHW heating or ventilation systems) are connected to the smaller return connector (RK 2).

For operation with two returns at different temperature levels, a water guide element between the high and low temperature return inlet ensures targeted heating water routing against the hot gas flow.

If at times only the smaller return connector (RK 2) needs to be loaded, special recesses in the water guide element enable a heating water flow into the lower area (into the front area in the case of the SB745) of the boiler, and in this case too, ensure that the entire condensation secondary heating surface receives a flow through convection.

The long, spacious path for heat transfer in combination with a large boiler water capacity reduces scaling inside the boiler and the associated thermal stresses.

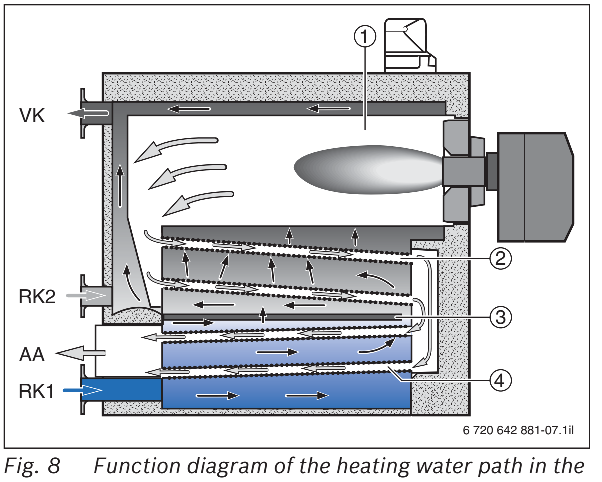


Fig. 8 Function diagram of the heating water path in the Logano plus SB325 and SB625 floor standing condensing boilers

AA Exhaust gas outlet
RK1 Return for low temperature heating circuits
RK2 Return for high temperature heating circuits
VK Flow
[1] Combustion chamber (1st pass)
[2] Upper condensation secondary heating surface (condensing plus-heating surface, 2nd pass)
[3] Water guide element
[4] Lower condensation secondary heating surface (condensing plus-heating surface, 3rd pass)

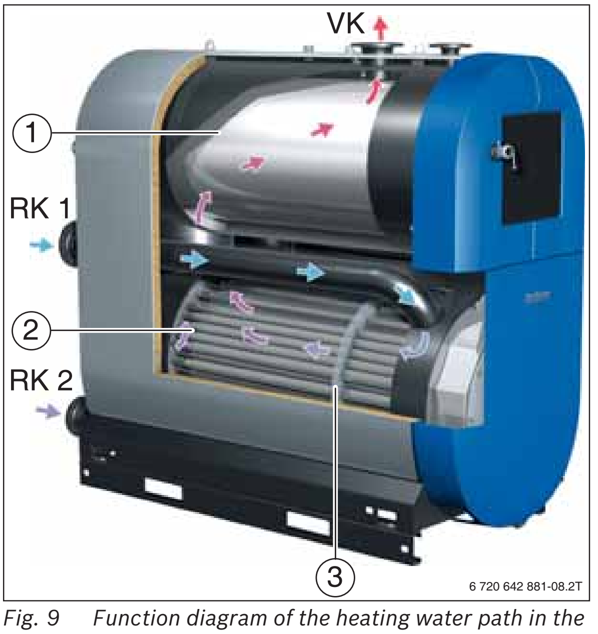


Fig. 9 Function diagram of the heating water path in the Logano plus SB745 floor standing condensing boiler

RK1 Return for low temperature heating circuits

RK2 Return for high temperature heating circuits

VK Flow

[1] Combustion chamber (1st pass)

[2] Condensation secondary heating surface (condensing plus -heating surface, 2nd pass)

[3] Water guide element

3.1.3 Condensing plus heating surface

A special feature of the condensing plus heating surface is the spiral tubes with a reduced cross-section to match the hot gas flow rate (→ Fig. 10).

The twisting creates microturbulence on the inside of the tube walls and therefore a greater condensation boundary layer. This leads to the hot gas molecules alternately being very close to the tube wall and reaching the main flow. This means that practically the entire hot gas flow comes into contact with the cold heating surface. This results in a very high condensation rate.

As a consequence of the reduced cross-section of the spiral tubes, the speed of the hot gas is almost constant. This results in high heat transfer at low flue gas temperatures.

Due to the design and arrangement of the condensing plus heating surface with a slight slope, the condensate drains continuously from top to bottom. This prevents reverse evaporation of condensate and deposits on the heating surfaces. The self-cleaning of the condensing plus heating surface that this achieves promotes trouble-free operation. At the same time, the maintenance required is reduced.

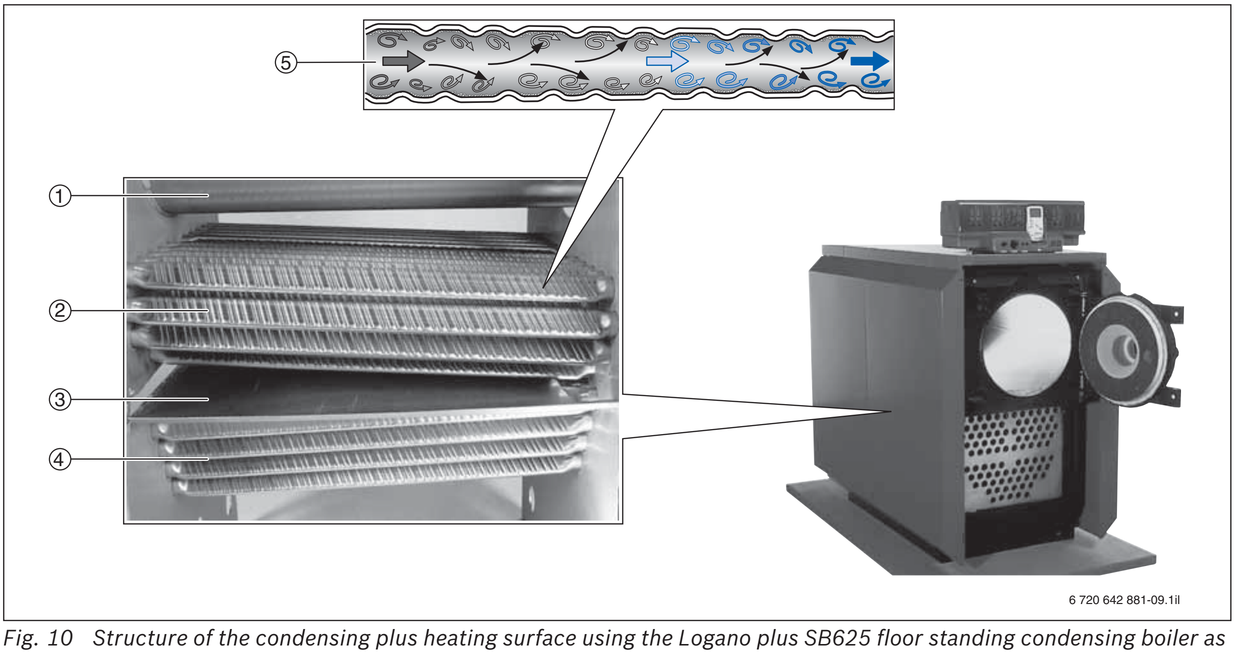


Fig. 10 Structure of the condensing plus heating surface using the Logano plus SB625 floor standing condensing boiler as an example

[1] Combustion chamber
[2] Upper condensing plus heating surface
[3] Water guide element
[4] Lower condensing plus heating surface
[5] Cross-section of a spiral tube in the condensing plus heating surface with the schematic passage of the hot gas flow

3.1.4 Thermal insulation and sound insulation

Thermal insulation

All floor standing condensing boilers have highly effective thermal insulation which fully encloses the boiler block. This reduces radiation and standby losses to a minimum.

The Logano plus SB745 is fitted at the factory with highly effective thermal insulation.

Integral sound insulation devices

The front and rear reversing areas of the Logano plus SB325 and SB625 floor standing condensing boilers are designed in such a way that any sound emitted is attenuated. The Logano plus SB325 and SB625 boilers are designed with an integral reflection area in the rear reversing chamber of the hot gas path. An insulating mat to absorb sound emissions is fitted in the front reversing area from the second to the third hot gas pass (→ Fig. 11). The two design elements reduce the sound emissions.
The Logano plus SB745 has a flue gas silencer integrated into the flue duct which ensures quiet operation.
As standard, all Logano plus SB325 floor standing condensing boilers have adjustable feet with vibration-absorbing rubber supports. For the Unit version Logano plus SB625 VM with the Logatop VM gas premix burner from Buderus, further sound insulation measures are not usually necessary.
For the Logano plus SB745, special sound insulation strips to reduce structure-borne noise are supplied as standard. For all other floor standing condensing boilers, boiler supports to reduce structure-borne noise are also available as accessories.

Additional measures

The sound level permitted around the installation room must be checked in each individual case. If the room is located in an unfavourable place, additional sound insulation measures may be necessary.

Matching burner silencer hoods, boiler supports to reduce structure-borne noise and flue gas silencers are available as accessories (→ page 73 ff.).

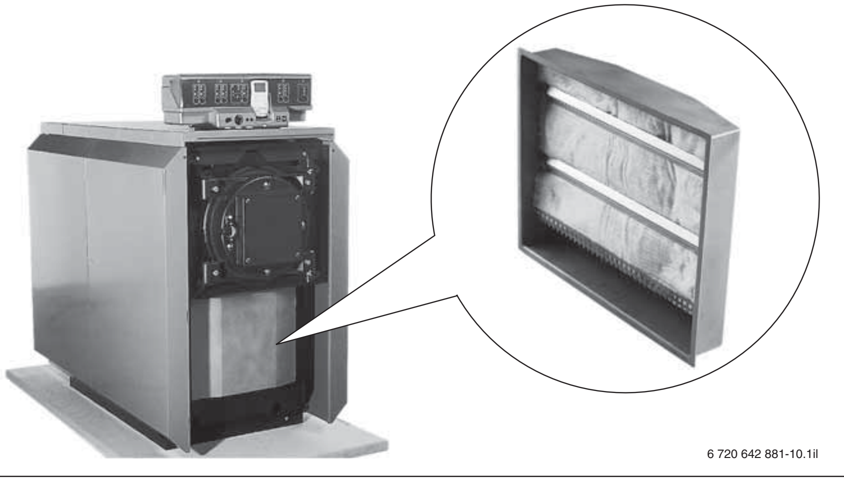


Fig. 11 Sound insulation mat in the front reversing chamber of the SB625 floor standing condensing boiler

3.1.5 Casing

The standard delivery of the Logano plus SB325 and SB625 floor standing condensing boilers includes the boiler casing parts that have to be fitted. The Logano plus SB745 is fitted with its casing at the factory.

3.2 Dimensions and specifications

3.2.1 Dimensions of the Logano plus SB325 floor standing condensing boiler

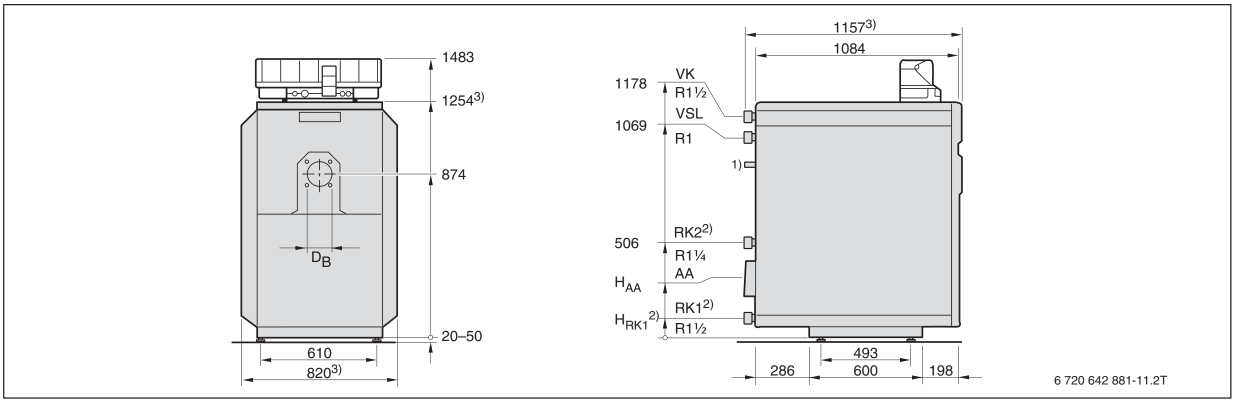


Fig. 12 Dimensions of the Logano plus SB325 floor standing condensing boiler (dim. in mm)

1) Connection for a minimum pressure switch as an alternative to the low water indicator to DIN EN 12828 (→ page 69)

2) In systems with only one return, connect this to RK1

3) Installation dimensions (→ page 66), handling details (→ page 64)

Boiler size		Unit	50	70	90	115
Length	L	mm	1084	1084	1084	1084
	L_K	mm	930	930	930	930
Width	B	mm	820	820	820	820
Height	H	mm	1254	1254	1254	1254
	H_{RG}	mm	1483	1483	1483	1483
Combustion chamber	Length	mm	890	890	890	890
	Ø	mm	370	370	370	370
Burner door	Depth	mm	95	95	70	70
	Ø D_B	mm	110	110	130	130
Return	H_{RK1}	mm	156	156	106	106
	Ø H_{RK2}	DN	R1¼	R1¼	R1¼	R1¼
Condensate drain	H_{AKO}	mm	257.5	257.5	207.5	207.5
Exhaust gas outlet	Ø D_{AA} internal	mm	153	153	183	183
	H_{AA}	mm	357	357	327	327
Weight	with Logatop VM	kg	310	316	330	337
	without burner	kg	294	300	314	321

Table 3 Dimensions of the Logano plus SB325 floor standing condensing boiler (specification → page 20)

3.2.2 Dimensions of the Logano plus SB625 and SB625 VM floor standing condensing boilers

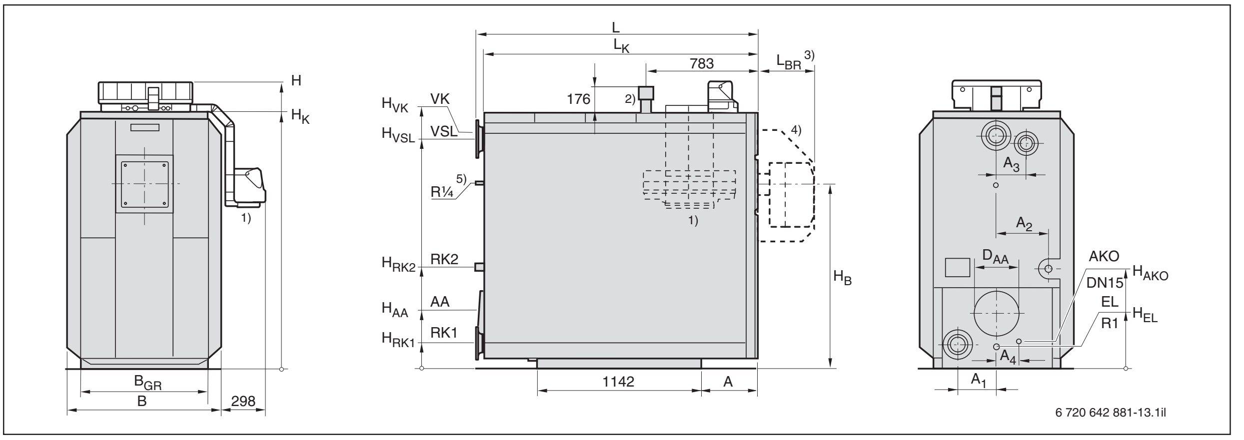


Fig. 13 Dimensions of the Logano plus SB625 and SB625 VM floor standing condensing boiler (dim. in mm)

1) Side control unit holder (left/right → page 80)
2) Connection for low water indicator from boiler size 400 acc. to DIN EN 12828 (→ page 69)
3) Depending on the burner used
4) Burner hood in conjunction with Logatop VM
5) Connection for minimum pressure switch with boiler size 145–240 or minimum pressure limiter for boiler size 310 as accessory as alternative to the low water indicator according to DIN-EN 12828 (→ page 69)

Boiler size		Unit	145	185	240[1]	310	400	510	640
Length	L	mm	1816	1816	1845	1845	1845	1980	1980
	L_K	mm	1746	1746	1774	1774	1774	1912	1912
Burner length[2]	LBR –	mm	376	376	376	376	–	–	–
	Logatop VM	mm	500	500	500	500	577	868	868
	L_{BR} – WG	mm	280	301	–	–	–	–	–
	L_{BR} – BS/M	mm	–	–	580	580	580	580	840
	L_{BR} – RS/M	mm	–	–	–	–	–	840	–
	L_{BR} – RS/M BLU								
Width	B	mm	900	900	970	970	970	1100	1100
Height	H	mm	1606	1606	1638	1638	1842	2000	2000
	HK	mm	1376	1376	1408	1408	1612	1770	1770
Handling	Length	mm	1735	1735	1760	1760	1760	1895	1895
	Width	mm	720	720	790	790	790	920	920
	Height	mm	1340	1340	1370	1370	1570	1730	1730
Clearance	O	mm	285	285	285	285	285	367	367
Base frame	B_{GR}	mm	720	720	790	790	790	920	920
	O	mm	285	285	285	285	285	367	367
Exhaust gas outlet	Ø D_{AA} internal	DN	183	183	203	203	253	303	303
	H_{AA}	mm	299	299	295	295	333	368	368
Combustion chamber	Length	mm	1460	1460	1460	1460	1460	1595	1595
	Ø	mm	453	453	453	453	550	650	650
Burner door	Depth	mm	185	185	185	185	185	185	185
	H_B	mm	985	985	1017	1017	1135	1275	1275
Flow[3]	Ø VK	DN	65	65	80	80	100	100	100
	H_{VK}	mm	1239	1239	1260	1260	1442	1612	1612

Table 4 Dimensions of the Logano plus SB625, SB625 VM and SB625 U floor standing condensing boilers (specification → page 21)

Boiler size		Unit	145	185	240[1]	310	400	510	640
Return[3]	Ø RK1	DN	65	65	80	80	100	100	100
	H_{RK1}	mm	142	142	142	142	150	150	150
	A_1	mm	275	275	300	300	290	284	284
	Ø RK2	–	R1½ "	R1½ "	R1½ "	DN65	DN65	DN80	DN80
	H_{RK2}	mm	495	495	512	512	597	685	685
	A_2	mm	295	295	310	310	315	360	360
Safety flow[4]	Ø VSL	–	R1¼ "	R1¼ "	DN32	DN32	DN50	DN50	DN50
	H_{VSL}	mm	1180	1180	1213	1213	1327	1549	1549
	A_3	mm	160	160	170	170	210	195	195
Condensate drain	H_{AKO}	mm	194	194	185	185	193	203	203
	A_4	mm	110	110	135	135	130	155	155
Drain	HEL	mm	85	85	82	82	85	141	141
Weight	Net	kg	613	620	685	705	953	1058	1079
	With burner	kg	643[5]	650[5]	715[5]	735[5]	1001	1156	1177

Table 4 Dimensions of the Logano plus SB625, SB625 VM and SB625 U floor standing condensing boilers (specification → page 21)

1) Rated heating output gas (at system temperature 50/30 °C) 230 kW in conjunction with Logatop VM
2) Guide value (exact value depends on burner)
3) Flange PN6 to EN 1092-1; in systems with only one return, connect this to RK1
4) Flange PN16to EN 1092-1
5) in conjunction with Logatop VM

3.2.3 Dimensions of the Logano plus SB745 floor standing condensing boiler

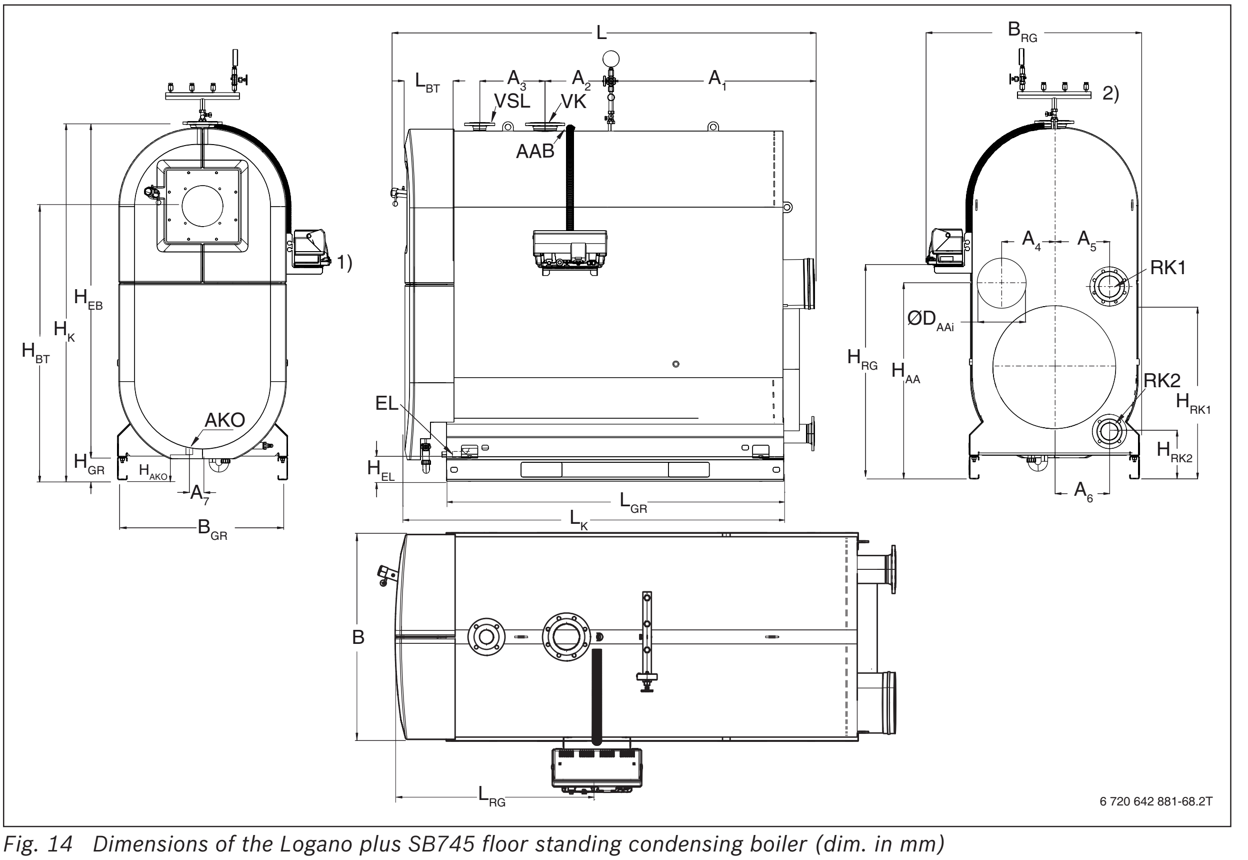


Fig. 14 Dimensions of the Logano plus SB745 floor standing condensing boiler (dim. in mm)

1) Side control unit holder (left/right → page 80)

2) Valve manifold with minimum pressure limiter (→ page 69)

Boiler size		Unit	800	1000	1200
Length	L	mm	2545	2580	2580
	L_K	mm	2360	2395	2395
Burner length	L_{BR}	mm	Subject to burner		
Width	B	mm	960	1040	1040
Width incl. control unit	B_{RG}	mm	1220	1330	1330
Height1)	HK	mm	2014	2192	2192
Installation clearance control unit, cable conduit	L_{RG}	mm	906	906	906
Installation height, control unit	H_{RG}	mm	1300	1300	1300
Handling	Length	mm	2545	2580	2580
	Width	mm	960	1040	1040
	Height2)	mm	1874	2052	2052
Installation area for base frame	L_{GR}	mm	2200	2200	2200
	B_{GR}	mm	960	1040	1040
Exhaust gas outlet	H_{AA}	mm	1064	1193	1193
	Ø D_{AA} internal	mm	253	303	303
	A_4	mm	229	348	348
Combustion chamber	Length	mm	1904	1954	1954
	Ø	mm	630	688	688

Table 5 Dimensions of the Logano plus SB745 floor standing condensing boiler (specification → page 23)

Boiler size		Unit	800	1000	1200
Combustion chamber door	L_{BT}	mm	227	227	227
	H_{BT}	mm	1508	1653	1653
Flow[3)]	Ø VK_{PN6}	DN	100	125	125
	A_2	mm	403	405	405
Return3[)]	Ø $RK1_{PN6}$	DN	100	125	125
	H_{RK1}	mm	1007	1148	1148
	A_5	mm	320	380	380
	Ø $RK2_{PN6}$	DN	80	100	100
	H_{RK2}	mm	300	263	263
	A_6	mm	320	390	390
Flow safety line[4)]	Ø VSL_{PN16}	DN	65	65	65
	A_3	mm	400	400	400
Valve manifold connection	Ø AAB	mm	G1	G1	G1
	A_1	mm	1200	1245	1245
Condensate outlet	Ø AKO	DN	40	40	40
	H_{AKO}	mm	180	180	180
	A_7	mm	71	70	70
Drain	Ø EL	DN	R1	R1	R1
	H_{EL}	mm	161	164	164

Table 5 Dimensions of the Logano plus SB745 floor standing condensing boiler (specification → page 23)

1) 12.5 mm additional height due to the sound insulation strips fitted as standard

2) The transport height can be reduced by 140 mm by removing the base frame rails.

3) Flange PN6 to EN 1092-1; in systems with only one return, connect this to RK1

4) Flange PN16 to EN 1092-1

3.2.4 Specification for the Logano plus SB325 floor standing condensing boilers

Boiler size		Unit	50	70	90	115
Rated heating output gas (at system temperature 50/30 °C)	Full load	kW	50	70	90	115
	Partial load 30%	kW	20.3	28.4	36.6	47.0
Rated heating output oil (at system temperature 50/30 °C)	Full load	kW	48.2	67.6	87.2	110.9
	Partial load 30%	kW	19.2	26.8	34.6	44.4
Rated heating output gas (at system temperature 80/60 °C)	Full load	kW	46.0	64.4	82.7	105.7
Rated heating output oil (at system temperature 80/60 °C)	Full load	kW	45.1	63.5	81.9	104.5
Rated heat input for gas [burner output Qn (H_i)]	Full load	kW	47.4	66.4	85.3	109.0
Rated heat input for oil [burner output Q_n (H_i)]	Full load	kW	46.4	65.1	83.9	107.5
CO_2 level gas		%	10	10	10	10
CO_2 level oil		%	13	13	13	13
Flue gas temperature[1] (at system temperature 50/30 °C)	Full load	°C	45	45	45	45
	Partial load 30%	°C	30	30	30	30
Flue gas temperature[1] (at system temperature 80/60 °C)	Full load	°C	72	72	72	72
	Partial load 30%	°C	40	40	40	40
Flue gas mass flow rate (at system temperature 50/30 °C)	Full load	kg/s	0.0189	0.0268	0.0344	0.0443
	Partial load 30%	kg/s	0.0074	0.0103	0.0133	0.0171
Flue gas mass flow rate (at system temperature 80/60 °C)	Full load	kg/s	0.0198	0.0277	0.0357	0.0458
	Partial load 30%	kg/s	0.0079	0.0111	0.0143	0.0183
Water capacity (approx.)		l	237	233	250	240
Gas content		l	90	120	138	142
Available draught	with Logatop BE-A	Pa	16	36	–	–
	without burner	Pa	depends on burner (50)[2]			
Pressure loss on the hot gas side		mbar	0.43	0.51	0.59	0.77
Permissible flow temperature[3]		°C	110	110	110	110
Permitted operating pressure		bar	4	4	4	4
Product ID no.		–	CE-0085 AT 0074			

Table 6 Specification for the Logano plus SB325 floor standing condensing boilers (dimensions → page 15)

1) Calculated flue gas temperature for cross-sectional calculation to DIN EN 13384 (average value across the series). The actual flue gas temperature may differ from this, subject to burner setting and actual system temperature.

2) Figure in brackets is the recommended draught.

3) Safety limit (high limit safety cut-out – STB); maximum possible flow temperature = safety limit (STB) – 18 K (see also table 13, page 33).
Example: safety limit (STB) = 100; maximum possible flow temperature = 100 °C – 18 °C = 82 °C

i The values for partial load can be used when designing the fireplace. The boiler itself has no required minimum load. A burner with the largest possible control ratio should be used.

3.2.5 Specification for the Logano plus SB625 and SB625 VM floor standing condensing boilers

Boiler size		Unit	145	185	240[1]	310	400	510	640
Rated heating output gas (at system temperature 50/30 °C)	Full load	kW	145	185	240	310	400	510	640
	Partial load	kW	59.2	75.6	97.8	126.3	162.4	208.8	261.5
Rated heating output oil (at system temperature 50/30 °C)	Full load	kW	141.1	176.7	229.3	295.9	380.2	487	611.2
	Partial load	kW	55.9	71.4	92.4	119.4	153.5	197.3	247.1
Rated heating output gas (at system temperature 80/60 °C)	Full load	kW	133	170	219	283	366	466	588
Rated heating output oil (at system temperature 80/60 °C)	Full load	kW	132.4	169.2	218.8	282.7	364.8	467.4	585.4
Rated heating output gas with Logatop VM (at system temperature 50/30 °C)	Full load	kW	145	185	230	310	–	–	–
	Partial load	kW	51.8	66.1	83.6	110.6	–	–	–
Rated heating output with Logatop VM (at system temperature 80/60 °C)	Full load	kW	132.7	169.2	210.7	282.8	–	–	–
	Partial load	kW	50.6	64.5	80.2	108.1	–	–	–
Rated heat input for gas [burner output Qn (H_i)]	Partial load, 40 %	kW	54.8	70.0	90.4	116.8	150.8	192.0	242.0
	Full load, max.	kW	137.0	175.0	226.0	292.0	377.0	480.0	605.0
	Logatop VM								
	Partial load, 35 %	kW	47.5	60.6	75.3	101.5	–	–	–
	Full load, max.	kW	135.8	173.2	215	289.9	–	–	–
Rated heat input for oil [burner output Q_n (H_i)]	Partial load, 40 %	kW	54.3	69.3	89.8	116.0	149.5	191.6	239.9
	Full load, max.	kW	135.8	173.2	224.4	289.9	373.8	478.9	599.8
CO_2 value	Gas	%	10	10	10	10	10	10	10
	Oil		13	13	13	13	13	13	13
Flue gas temperature[2] (at system temperature 50/30 °C)	Full load	°C	45	45	45	45	45	45	45
	Partial load, 40 %	°C	35	35	35	35	35	35	35
Flue gas temperature[2]) (at system temperature 80/60 °C)	Full load	°C	74	74	74	74	74	74	74
	Partial load, 40 %	°C	45	45	45	45	45	45	45
Flue gas mass flow rate (at system temperature 50/30 °C)	Full load	kg/s	0.0552	0.0704	0.0928	0.1200	0.1528	0.1969	0.2466
	Partial load, 40 %	kg/s	0.0217	0.0277	0.0360	0.0465	0.0603	0.0770	0.0958
Flue gas mass flow rate (at system temperature 80/60 °C)	Full load	kg/s	0.0579	0.0738	0.0956	0.1235	0.1592	0.2040	0.2555
	Partial load, 40 %	kg/s	0.0231	0.0295	0.0383	0.0494	0.0637	0.0816	0.1022

Table 7 Specification for the Logano plus SB625 and SB625 VM floor standing condensing boilers (dimensions → page 16 f.)

Boiler size		Unit	145	185	240[1]	310	400	510	640
Flue gas mass flow rate with Logatop VM (at system temperature 50/30 °C)	Full load	kg/s	0.0633	0.0808	0.1010	0.135	–	–	–
	Partial load, 35 %	kg/s	0.0220	0.0283	0.0352	0.0474	–	–	–
Flue gas mass flow rate with Logatop VM (at system temperature 80/60 °C)	Full load	kg/s	0.0633	0.0808	0.101	0.135	–	–	–
	Partial load, 35 %	kg/s	0.0220	0.0283	0.0352	0.0474	–	–	–
Water capacity (approx.)		l	560	555	675	645	680	865	845
Gas content		l	327	333	347	376	541	735	750
Available draught		Pa	depends on burner (50)[3)4)]						
Pressure loss on the hot gas side		mbar	1.20	1.55	2.20	2.40	3.00	3.55	4.40
Permissible flow temperature[5)]		°C	110	110	110	110	110	110	110
Permitted operating pressure		bar	4	4	5	5	5.5	5.5	5.5
Product ID no.		–	CE-0085 AT 0075						

Table 7 Specification for the Logano plus SB625 and SB625 VM floor standing condensing boilers (dimensions → page 16 f.)

1) Rated heating output gas (at system temperature 50/30 °C) 230 kW in conjunction with Logatop VM

2) Calculated flue gas temperature for cross-sectional calculation to DIN EN 13384 (average value across the series). The actual flue gas temperature may differ from this, subject to burner setting and actual system temperature.

3) Figure in brackets is the minimum recommended draught.

4) For Logano plus SB625 with third-party burner.

5) Safety limit (high limit safety cut-out - STB); maximum possible flow temperature = safety limit (STB) – 18 K (see also table 13, page 33).
Example: safety limit (STB) = 100; maximum possible flow temperature = 100 °C – 18 °C = 82 °C

---

i The values for partial load can be used when designing the fireplace. The boiler itself has no required minimum load. A burner with the largest possible control ratio should be used.

3.2.6 Specification for the Logano plus SB745 floor standing condensing boilers

Boiler size		Unit	800	1000	1200
Rated heating output gas (at system temperature 50/30 °C)	Full load	kW	800	1000	1200
	Partial load 30 %	kW	243	303	364
Rated heating output oil (at system temperature 50/30 °C)	Full load	kW	770	962	1155
	Partial load 30 %	kW	233	292	351
Rated heating output gas (at system temperature 80/60 °C)	Full load	kW	725	906	1090
Rated heating output oil (at system temperature 80/60 °C)	Full load	kW	725	906	1090
	Partial load 30 %	kW	240	301	362
Rated heat input for oil [burner output Qn (H_i)]	Full load, max.	kW	742	928	1114
	Partial load 30 %	kW	223	278	334
CO_2 value	Gas/oil	%	10 / 13	10 / 13	10 / 13
Flue gas temperature[1] (at system temperature 50/30 °C)	Full load	°C	40	40	40
	Partial load 30 %	°C	30	30	30
Flue gas temperature1) (at system temperature 80/60 °C)	Full load	°C	66	66	66
	Partial load 30 %	°C	36	36	36
Flue gas mass flow rate (at system temperature 50/30 °C)	Full load	kg/s	0.300	0.375	0.451
	Partial load 30 %	kg/s	0.089	0.112	0.134
Flue gas mass flow rate (at system temperature 80/60 °C)	Full load	kg/s	0.316	0.395	0.475
	Partial load 30 %	kg/s	0.095	0.118	0.142
Weight	Net	kg	1540	1792	1822
	Gross	kg	2470	2992	3012
Water capacity (approx.)		l	930	1200	1190
Hot gas volume		l	1020	1310	1320
Available draught (required draught)		Pa	depends on burner (50)[2]		
Pressure loss on the hot gas side		mbar	6.4	6.5	7.5
Permissible flow temperature[3]		°C	110	110	110
Permitted operating pressure		bar	6	6	6
Product ID no.		–	CE-0085 CM 0479	CE-0085 CM 0479	CE-0085 CM 0479

Table 8 Specification for the Logano plus SB745 floor standing condensing boilers (dimensions → page 18 f.)

1) Calculated flue gas temperature for cross-sectional calculation to DIN EN 13384 (average value across the series). The actual flue gas temperature may differ from this, subject to burner setting and actual system temperature.

2) Figure in brackets is the recommended draught.

3) Safety limit (high limit safety cut-out – STB); maximum possible flow temperature = safety limit (STB) – 18 K (see also table 13, page 33).
Example: safety limit (STB) = 100; maximum possible flow temperature = 100 °C – 18 °C = 82 °C

The values for partial load can be used when designing the fireplace. The boiler itself has no required minimum load. A burner with the largest possible control ratio should be used.

3.3 Boiler parameters

3.3.1 Pressure loss on the water side

The pressure drop on the water side is the differential pressure between the flow and return connections of the floor standing condensing boiler. It depends on the boiler size and the heating water flow rate.

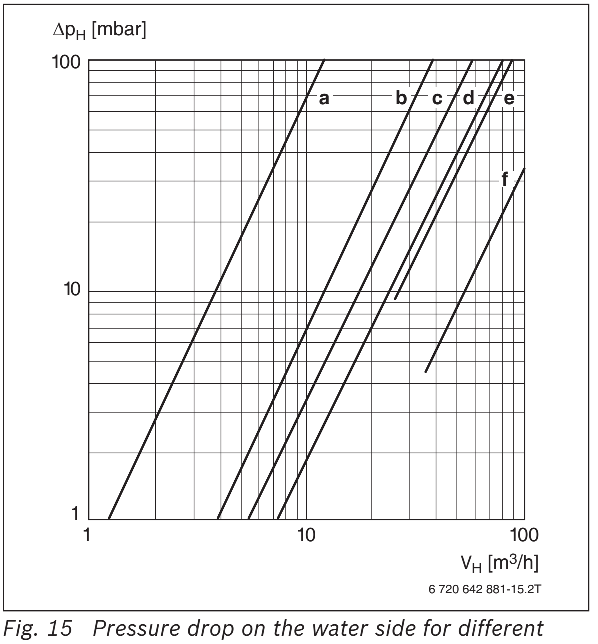


Fig. 15 Pressure drop on the water side for different boiler versions

- Δp_H pressure loss on the heating water side
- $\dot{V}_H$ Heating water flow rate
- a Logano plus SB325, boiler size 50 to 115
- b Logano plus SB625, SB625 VM, boiler size 145 to 185
- c Logano plus SB625, SB625 VM, boiler size 240 to 310
- d Logano plus SB625, SB625 VM, boiler size 400 to 640
- e Logano plus SB745, boiler size 800
- f Logano plus SB745, boiler size 1000/1200

3.3.2 Boiler efficiency

The boiler efficiency η_K denotes the ratio of heating output to heat input subject to the boiler load and heating circuit system temperature.

The graph in Fig. 16 shows the efficiency of the Logano plus SB325, SB625 and SB745 floor standing condensing boilers for gas. With the Logano plus SB325, SB625 and SB745 floor standing condensing boilers with low sulphur fuel oil EL, the efficiency is up to 5,5 % lower.

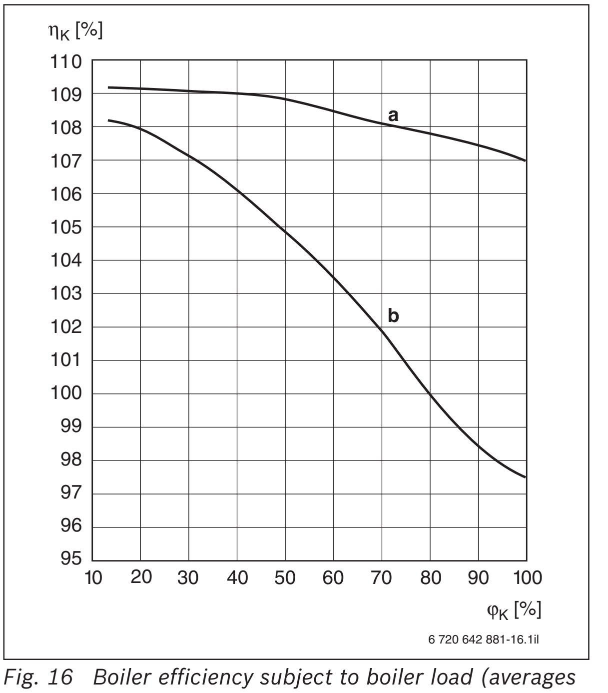


Fig. 16 Boiler efficiency subject to boiler load (averages for the Logano plus SB325, SB625 and SB745 series)

- φ_K Relative boiler load
- η_K Boiler efficiency
- a Line for heating curve at system temperature 50/30 °C
- b Line for heating curve at system temperature 80/60 °C

3.3.3 Flue gas temperature

The flue gas temperature ϑ_A is the temperature captured inside the flue pipe, specifically at the boiler flue outlet. It depends on the boiler load and the heating system return temperature.

The relevant return temperature is given for a clearer description.

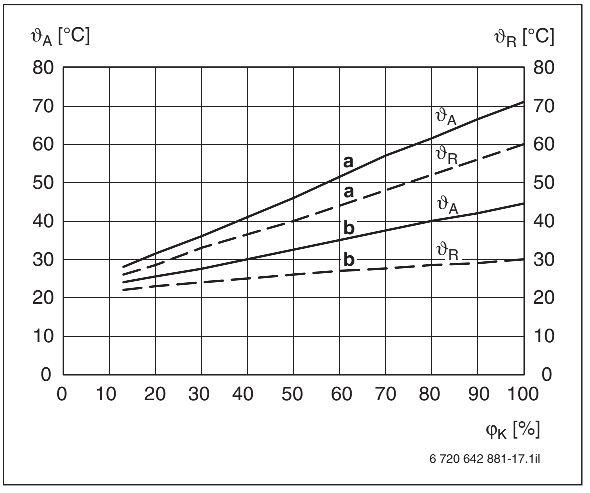


Fig. 17 Flue gas temperatures subject to the boiler load (averages for the Logano plus SB325 series)

ϑ_A Flue gas temperature

ϑ_R Return temperature (modulating operation)

φ_K Boiler load

a Line for heating curve at system temperature 80/60 °C

b Line for heating curve at system temperature 50/30 °C

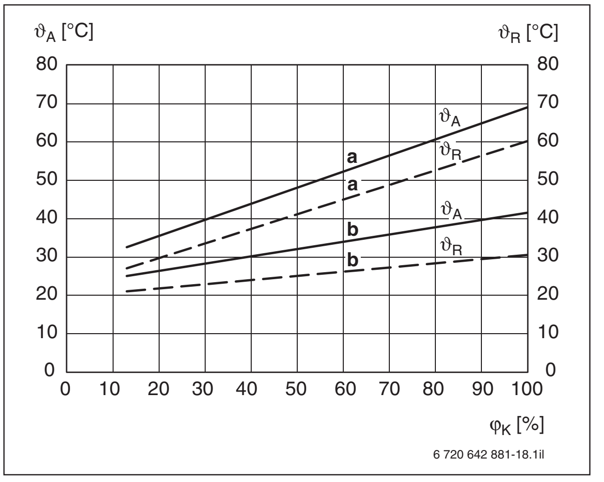


Fig. 18 Flue gas temperatures subject to the boiler load (averages for the Logano plus SB625 series)

ϑ_A Flue gas temperature

ϑ_R Return temperature

φ_K Boiler load

a Line for heating curve at system temperature 80/60 °C

b Line for heating curve at system temperature 50/30 °C

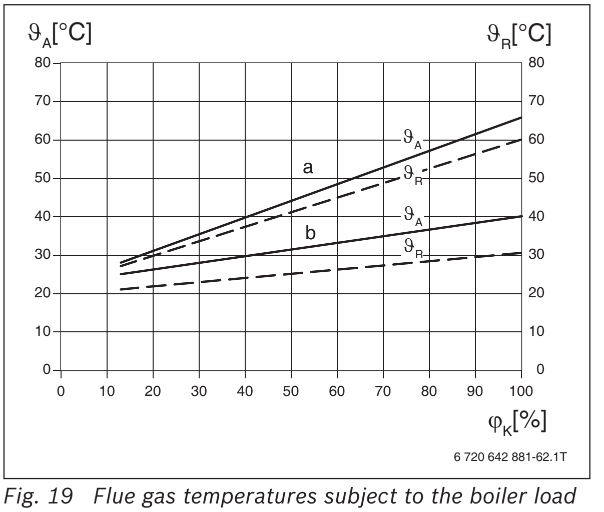


Fig. 19 Flue gas temperatures subject to the boiler load (averages for the Logano plus SB745 series)

ϑ_A Flue gas temperature t_{AG}

ϑ_R Return temperature (modulating operation t_R)

φ_K Boiler load

a Line for heating curve at system temperature 80/60 °C

b Line for heating curve at system temperature 50/30 °C

3.3.4 Standby loss

The standby loss q_B is the proportion of rated heat input required to maintain the specified boiler water temperature.

The cause of this loss is the cooling down of the boiler through radiation and convection during the standby time (burner idle time). Radiation and convection result in part of the heating output being transferred continuously from the boiler surface to the ambient air. In addition to this surface loss, the boiler can also cool down to a lesser degree through the chimney draught.

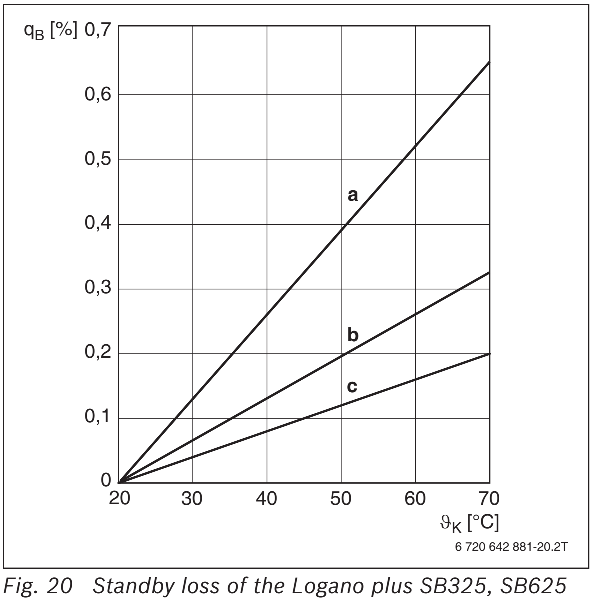


Fig. 20 Standby loss of the Logano plus SB325, SB625 and SB745, subject to the average boiler water temperature

q_B Standby loss
ϑ_K Average boiler temperature
a Logano plus SB325
b Logano plus SB625 and SB625 VM
c Logano plus SB745

3.4 Conversion factor for other system temperatures

The tables with the specifications for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers (→ page 15 ff.) contain the rated heating output levels at system temperatures 50/30 °C and 80/60 °C.

If it is necessary to calculate the rated heating output for varying design return temperatures, a conversion factor must be factored in (→ Fig. 21). The graph applies to a temperature differential between the flow and return of 10 to 25 K.

Example

For a Logano plus SB625 floor standing gas condensing boiler with a rated heating output of 640 kW at a system temperature of 50/30 °C, the rated heating output at a system temperature of 70/50 °C should be calculated. At a return temperature of 50 °C, a conversion factor of 0.935 results. The rated heating output at 70/50 °C is therefore 598.4 kW.

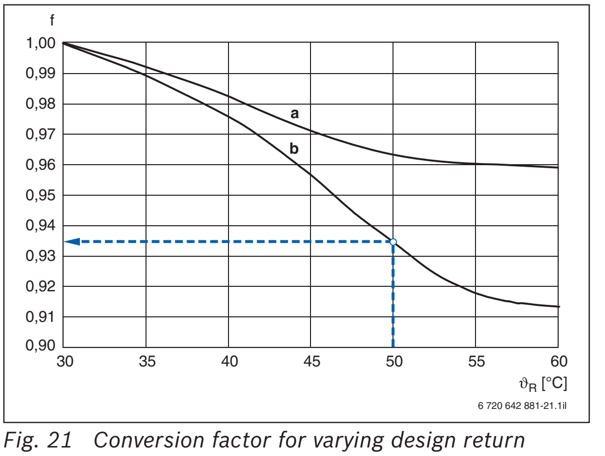


Fig. 21 Conversion factor for varying design return temperatures

f Conversion factor
ϑ_R Return temperature
a With oil burner
b With gas burner

4 Burner

4.1 Burner selection

For the Logano plus SB325, SB625 and SB745 floor standing gas condensing boilers, matching pressure-jet gas burners are required. They must be approved to EN 676 and bear the CE mark. Either 2-stage or modulating pressure-jet gas burners can be considered. For preference, modulating burners should be used. A minimum burner load is not required.

For Logano plus SB325, SB625 and SB745 floor standing oil condensing boilers, type-tested oil burners to EN 267 can be used if they are approved by the manufacturer for low sulphur fuel oil EL to DIN 51603-1 (sulphur content < 50 ppm) and for fuel oil EL A Bio 10 to DIN SPEC 51603-6, and if their operating range correlates with the boiler specification.

When selecting a burner, it must be ensured that the pressure drop on the hot gas side is reliably overcome. When positive pressure at the flue outlet is required (sizing of the flue system), this must be taken into consideration in addition to the pressure drop on the hot gas side.

To simplify planning and facilitate installation, the SB625 floor standing condensing boilers (up to 310 kW) are available as Unit versions with modulating gas premix burners of the Logatop VM type, and the SB325 (up to 70 kW) as a Unit version with the Logatop BE-A blue flame oil burner from Buderus. Furthermore, the Logano plus SB325, SB625 and SB745 floor standing gas condensing boilers are available with matching pressure-jet gas burners from the Weishaupt and Riello brands. The standard delivery includes the boiler, burner and drilled burner plate (for the SB625/745). With the versions without a burner, a drilled or non-drilled burner plate must be ordered separately for the SB625/745.

For further details regarding burners and associated burner plates, see the current Buderus catalogue.

The burner door can pivot either to the left or right. However, the opening direction is limited to only one side by the gas line or gas train. The selection of a suitable burner for the specific project can be discussed in detail with the Buderus sales office (→ back cover).

For the pressure-jet oil and gas burners in the Unit version, the quotation includes commissioning and adjustment as well as commissioning optimisation as extras.

4.2 Modulating Logatop VM gas premix burner

4.2.1 Equipment overview

The Logano plus SB625 VM floor standing condensing boilers are supplied with the matching modulating Logatop VM4.0 and 5.0 gas premix burners (→ Fig. 22, page 28) from Buderus up to boiler size 310.

All Unit versions with Logatop VM are characterised by factory matching and testing of the burners at operating temperature. Precisely matching the burner output to the boiler size results in high levels of efficiency and low pollutant and sound emissions. The compact design and low weight of the Logatop VM burners enables easy handling.

The central component of all Logatop VM is the metal fibre burner rod. In the mixing zone of this rod, the combustion air and fuel gas undergo optimal premixing and are then distributed evenly over the surface. The large flame surface area and even distribution of the mixture cause combustion to begin smoothly at low temperatures and with low NO_x emissions. As a result of modulating operation, the noise level is so low that the Logatop VM burner is practically inaudible even without the burner hood, particularly in partial load operation. Additional sound insulation measures are usually unnecessary.

The Logatop VM premix gas burner is fitted as standard to the boiler door, which can be pivoted open for maintenance. All components that are important for correct function are easily accessible for service work. The burner control unit of the burner shows current operating and service conditions.

4.2.2 Logatop VM4.0 and 5.0 for Logano plus SB625 VM (up to 310 kW)

The Logatop VM4.0/5.0 has electrical ignition and flame monitoring. The gas is supplied via a gas combi valve on the left hand side of the burner. The gas combi valve contains a double solenoid valve with continuous tightness test integrated as standard. All important parameters are factory-set to natural gas E; subsequent adjustments are not necessary (plug and burn). The Logatop VM4.0/5.0 is suitable for natural gas E and LL. For information on converting to other gas types, see page 28.

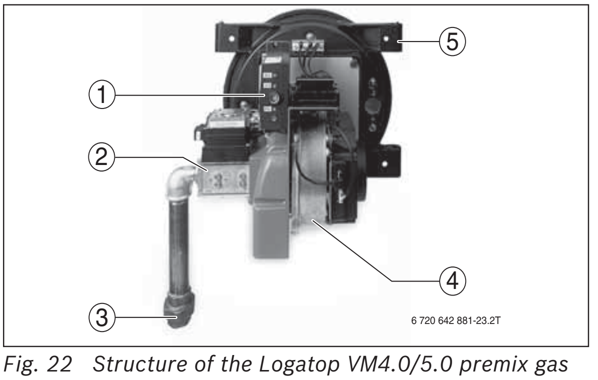


Fig. 22 Structure of the Logatop VM4.0/5.0 premix gas burner from Buderus

[1] Digital burner control unit

[2] Gas combi valve with integral tightness test

[3] Gas connection (Rp1½ or Rp2 for boiler size 310)

[4] Electronically controlled fan

[5] Door hinge

4.2.3 Combustion air control for low pollutant emissions

A further important feature of all Logatop VM is the combustion air control. This regulates the ratio of air to gas via a pneumatically activated differential pressure controller. This measures the differential pressure between the static fan pressure and the pressure in the mixing zone, and if it deviates from the set value, the gas pressure is automatically adjusted. This results in excellent combustion with optimum, consistently high CO_2 levels throughout the operating range. The combustion air control also compensates for fluctuations caused by the system or environmental conditions (e.g. chimney draught fluctuations).

4.2.4 Gas connection and specification

All Logatop VM gas premix burners are prepared for modulating operation with natural gas E and LL.
All burners are set to natural gas E at the factory.
The Logatop VM4.0/5.0 can be converted to natural gas LL by replacing the central gas nozzle at the fan inlet (included in the burner standard delivery).

A fitting is made available at the factory for the gas connection (→ Fig. 22, [5], page 28).

With the Logatop VM4.0/5.0, the gas connection is made on the left hand side. Outside the burner hood, it can be moved to the required position (on site).

Floor standing condensing boiler		Unit	Logano plus SB625 VM			
Boiler size			**145**	**185**	**240**	**310**
Rated heating output (at system temperature 50/30 °C)		kW	145	185	230	310
Logatop VM burner		–	4.0	4.0	5.0	5.0
Electrical connection		V/Hz	230/50			
Fan power consumption[1)]		W	140	160	180	200
Gas supply pressure		mbar	20	20	20	20
Modulation range		–	1:3	1:3	1:3	1:3
Sound pressure level	Room	min/max dB(A)	< 62	< 62	< 62	< 62
	Flue pipe	min/max dB(A)	< 91	< 91	< 91	< 91
Standard emissions factor	NO_x	mg/kWh	≤ 40	≤ 40	≤ 40	≤ 40
	CO[2)]	mg/kWh	≤ 5	≤ 5	≤ 5	≤ 5

Table 9 Specification for the Logatop VM premix gas burner for the Logano plus SB625 VM Unit version

1) At approx. 50 % load

2) Average for series

4.3 Logatop BE-A blue flame oil burner

4.3.1 Equipment overview

The Logano plus SB325 floor standing condensing boiler up to boiler size 70 kW is supplied as a Unit version with the Logatop BE-A single stage pressure-jet oil burner from Buderus.

Thanks to the blue flame burner principle with optimised recirculation, the Logatop BE-A operates with particularly clean combustion, and due to the low NO_x and CO levels, is below the requirements of the BImSchV for NO_x < 110 mg/kWh. It is type-tested to EN 267 and registered.

The Logatop BE-A is tested at operating temperature at the factory. It is therefore ready for immediate operation and can simply be optimised on site. Furthermore, it is characterised by high energy utilisation and practically soot-free combustion.

To stop fuel dripping after shut-off and to reduce emissions, the burner is equipped with an integral oil anti-leak system. It can be serviced easily on account of its easily accessible components and bayonet fitting. The ceramic blast tube is highly robust with all qualities of EL fuel oil.

The burner complies with the following EC directives:

- Machinery Directive 89/37/EC
- Electromagnetic compatibility EMV 89/336/EEC
- Low Voltage Directive 73/23/EEC

Certification	Approval number
TÜV certification to EN 267	00099414001
EC type test to Efficiency Directive	CE00360305/00

Table 10 Certification

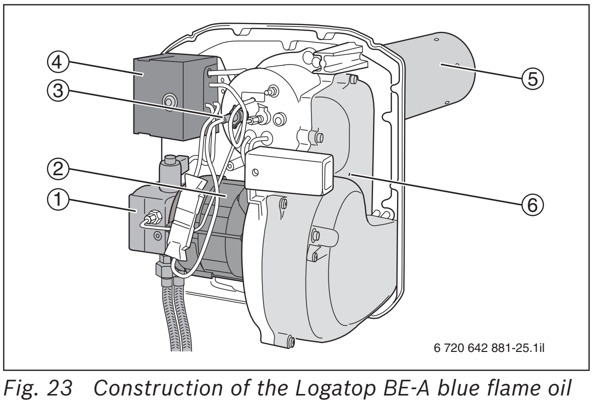


Fig. 23 Construction of the Logatop BE-A blue flame oil burner

[1] Oil pump with solenoid valve and oil connection hoses

[2] Burner motor

[3] Flame sensor

[4] Oil burner control unit with reset button

[5] Blast tube

[6] Burner casing

In addition, the burner has a connection for a 7-pole burner plug (behind the oil burner control unit).

The Logatop BE-A (from date of manufacture 06/2010) is operated in conjunction with the Logano plus SB325 oil/gas with low sulphur fuel oil EL to DIN 51603-1. Furthermore, brand fuel oils can be used with up to 10 % FAME (low sulphur fuel oil EL with up to 10 % FAME to DIN SPEC 51603-6).

4.3.2 Function principle

The burner is controlled and monitored by the oil burner control unit. Following a heat demand via the electronic boiler and heating circuit control unit, the burner is switched on and the oil upstream of and in the nozzle is heated to approx. 65 °C. When starting from cold, this process can take up to three minutes.

After the pre-ignition time, the solenoid valve is activated to release oil and the fuel/air mixture is ignited. A blue flame appears immediately after ignition. The oil that is atomised by the nozzle is evaporated (gaseous) in this combustion system by means of the returned hot gases. It is then mixed homogeneously with the combustion air and burned inside the blast tube. The flame sensor must report a flame signal before the safety time has elapsed, otherwise a fault shutdown will occur.

4.3.3 Dimensions and specifications

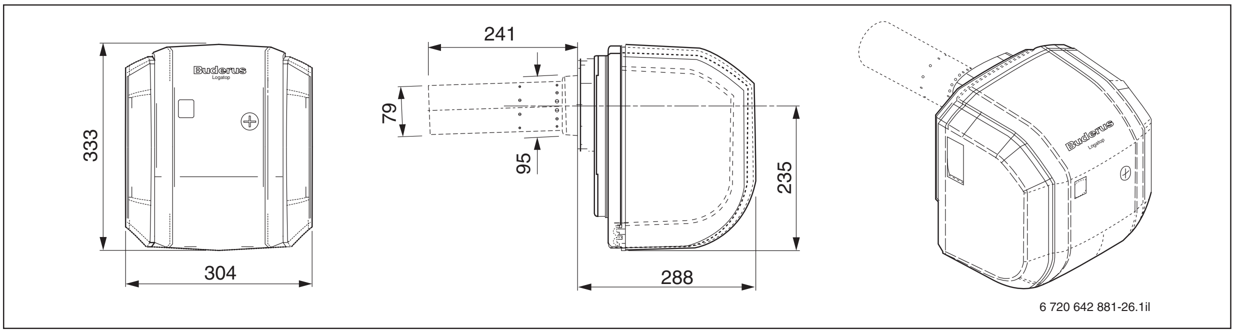


Fig. 24 Dimensions of Logatop BE-A blue flame oil burner (dim. in mm)

Burner type	Unit	BE-A 2.1–55		BE-A 2.1–68
Rated boiler output	kW	47.5–51.0	50.0–55.0	57.0–65.0
Mixing system	–	2.1–55	2.1–55	2.1–68
Nozzle type[1)]	–	Danfoss 0.85 gph 80° HF[2)]	Danfoss 1.00 gph 80° HF	Monarch 1.35 gph 80° NS
Oil pressure	bar	17.0–25.0	15.0–25.0	15.0–25.0
Oil flow rate	kg/h	4.35–4.70	4.60–5.00	5.22–5.97
Burner output	kW	51.5–55.5	54.5–59.0	62.0–70.5
Intake air duct (ALF) preset	–	1.0	1.0	0
Static fan pressure	mbar	7.5–12.0	7.5–12.0	7.5–11.0
CO_2 value with burner hood	%	13.5–14.0	13.5–14.0	13.0–13.5
CO value	ppm	< 50	< 50	< 50

Table 11 Setting values and nozzle fittings for Logatop BE-A blue flame oil burner

1) Recommendation: Only use the nozzle types listed here

2) Factory fitting

4.4 Third party burners

4.4.1 Burner requirements

Observe the installation instructions issued by the burner manufacturer where the burner installation is concerned.

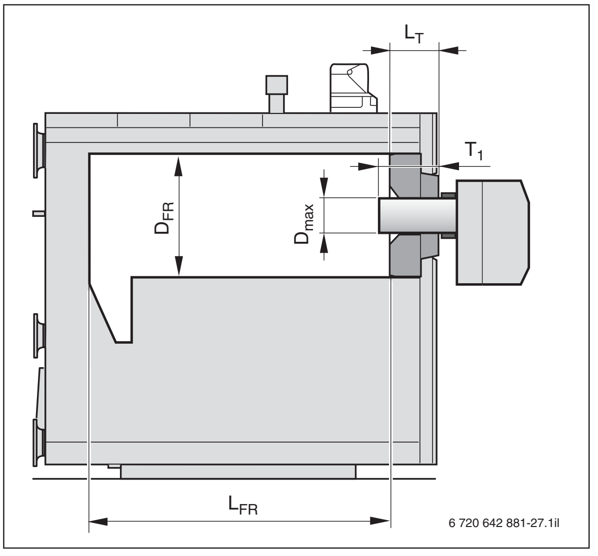


Fig. 25 Burner installation dimensions

D_{FR} Combustion chamber diameter

D_{max} Maximum blast tube diameter

L_{FR} Combustion chamber length

L_T Door depth

T_1 Minimum depth, blast tube

Boiler size	Blast tube dimensions		
	Minimum depth T_1 [mm]	Door depth [mm]	Maximum diameter D_{max} [mm]
50–70	45	95	109
90–115	70	120	129
145–310	185	235	247
400	185	235	279
510–640	185	235	319
800–1200	210	260	350

Table 12 Blast tube dimensions for Logano plus SB325, SB625 and SB745 floor standing condensing boilers

4.4.2 Third party burners for Logano plus SB325 floor standing condensing boilers

Matched and approved pressure-jet gas and oil burners are recommended for the Logano plus SB325 floor standing condensing boilers. The can be fitted directly to the prepared burner door.

Hole dimensions:

- Up to 70 kW:
  - Hole circle diameter 150 mm
    Threaded holes 4 × M8 (45°)
    Flame tube hole 110 mm
- From 90 kW:
  - Hole circle diameter 170 mm
    Threaded holes 4 × M8 (45°)
    Flame tube hole 130 mm

4.4.3 Third party burners for Logano plus SB625 and SB745 floor standing condensing boilers

Matched and approved pressure-jet gas and oil burners are recommended for the Logano plus SB625 and SB745 floor standing condensing boilers. A burner plate drilled for installation of the right burner is available as an accessory. Alternatively, the holes can be drilled on site in the dummy burner plate, available separately.

5 Regulations and operating conditions

5.1 Extracts from the regulations

The design and operating characteristics of the Buderus Logano plus SB325, SB625 and SB745 floor standing condensing boilers meet the requirements of EN 267, EN 303, EN 676, EN 677 and DIN 4702-6. During installation and operation of the system, standard engineering practices and the provisions of the buildings inspectorate and any legislative and regional requirements must be observed.

Installation, gas and flue gas connections, commissioning, power supply, maintenance and repair work must only be carried out by authorised contractors.

Approval

Floor standing gas condensing boilers may only be operated with a flue system that has been designed for the specific boiler type and that has been approved according to relevant building regulations.

The installation of a gas condensing boiler must also be reported to and approved by the respective gas supplier.

Where required, inform your local flue gas inspector and water board prior to installation. Regional approvals for the flue system and the drainage of condensate into the public sewage system may be required.

Service

According to para. 11 of the Energy Savings Order EnEV [Germany] we recommend the regular inspection of boiler and burner to ensure environmentally responsible and trouble-free operation. As part of this, it should be checked that the entire system is working properly.

We recommend that system users enter into a maintenance and inspection contract with the manufacturer's service department or with their contractor. Regular maintenance is the prerequisite for safe and economical operation.

5.2 Operating requirements

Thanks to the optimised technology of the Logano plus SB325, SB625 and SB745 floor standing condensing boilers with condensing plus heating surfaces, there are no special requirements for a minimum return temperature or minimum flow rate.

This facilitates system design and keeps installation affordable.

The heating circuit control unit with 3-way mixers improves the control characteristics and is specifically recommended for systems with several heating circuits. 4-way mixers and injection circuits should be avoided as these reduce the condensing effect.

Further information can be found in the section on hydraulic connection (→ page 43).

5.3 Burner selection and settings

The sizing and settings of the burner have a significant influence on the service life of the heating system. Every load cycle (burner on/off) causes thermal stresses (loads on the boiler shell). The number of burner starts must therefore not exceed 15,000 per year.
The following recommendations and settings are designed to meet this criterion (see also information on setting the control unit and the hydraulic connection to the heating system). If you still cannot meet this criterion, please contact the Buderus sales or service department.

The number of burner starts can be checked in the MEC (→ chapter 5.4, page 33), on the third-party control unit or alternatively on the burner control unit.

- Use modulating burners where possible.
- Select burners that are suitable for the boiler and heat demand to keep the available modulation range as broad as possible.
- Set the burner output as low as possible.
- Set the burner to the rated heat input QN specified on the data plate as a maximum (→ Fig. 26).
- Never overload the boiler.
- Take fluctuating net calorific values of the gas into account; check the maximum value with the gas supplier
- Only use burners that are suitable for the specified fuels. Ensure that the oil burner used is suitable for low sulphur fuel oil (otherwise corrosion from metal dusting may occur). Observe the burner manufacturer's instructions.
- Burners must only be adjusted by qualified contractors!

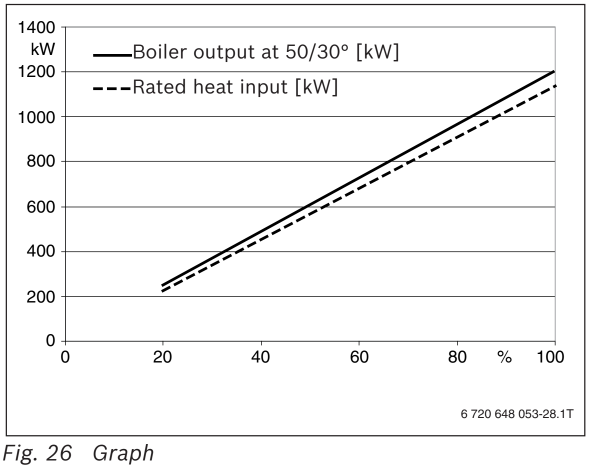


Fig. 26 Graph

5.4 Control unit settings

We recommend using a Buderus Logamatic control unit from the 4000 series.

The purpose of optimum control unit settings is to achieve long burner runtimes and avoid rapid temperature changes in the boiler. Gentle temperature changes result in a longer service life of the heating system. The control strategy of the control unit must therefore be prevented from becoming ineffective, i.e. through the boiler water controller switching the burner on and off.

- ▶ Maintain the minimum differential between the selected shutdown temperature of the high limit safety cut-out, the temperature controller, the maximum boiler water temperature and the maximum temperature demand (→ tab. 13).

The maximum boiler water temperature can be selected on the control unit (MEC) in the “Boiler parameters” menu, under menu item “Max. shutdown temperature”.

- ▶ Select set temperatures for the heating circuits that are as low as possible.
- ▶ Start heating circuits (e.g. when starting up in the mornings) in 5-minute intervals.

If the Buderus Logamatic 4000 control unit is used, burner modulation in standard mode is not enabled for 3 minutes. Never modulate upwards more quickly than this.

Adjustable parameter (max. temperature)	Logamatic 4321	Logamatic 4211	
High limit safety cut-out (STB) [1]	110 °C	110 °C	
	↓↑ at least 5 K ↓↑		
Temperature controller (TR)[1]	105 °C	90 °C	↑
	↓↑ at least 6 K ↓↑		at least 18 K
Max. boiler water temperature	99 °C	84 °C	↓
	↓↑ at least 7 K ↓↑		
Max. temperature demand [2]of HC [3] and DHW [4]	92 °C	77 °C	

Table 13 Adjustable parameters Logamatic 4321 and Logamatic 4211

1) Set the high limit safety cut-out and temperature controller as high as possible, but ensure the settings are at least 5 K apart.

2) Both temperature demands must always be at least 7 K below the maximum boiler water temperature.

3) The temperature demand of heating circuits equipped with an actuator is composed of the set flow temperature and parameter “Boiler rise” in the heating circuit data menu.

4) The temperature demand of DHW heating is composed of the set DHW temperature and parameter “Boiler rise” in the DHW menu.

Settings for boiler water controller and maximum boiler water temperature

The boiler water controller is only designed to provide emergency operation with an adjustable boiler water temperature if the control electronics fail. In standard control mode, the function of the boiler water controller is provided by the maximum boiler water temperature. The maximum boiler temperature can be selected in the control unit in the “Boiler parameters” menu, under menu item “Max. shutdown temperature”.

Control unit settings

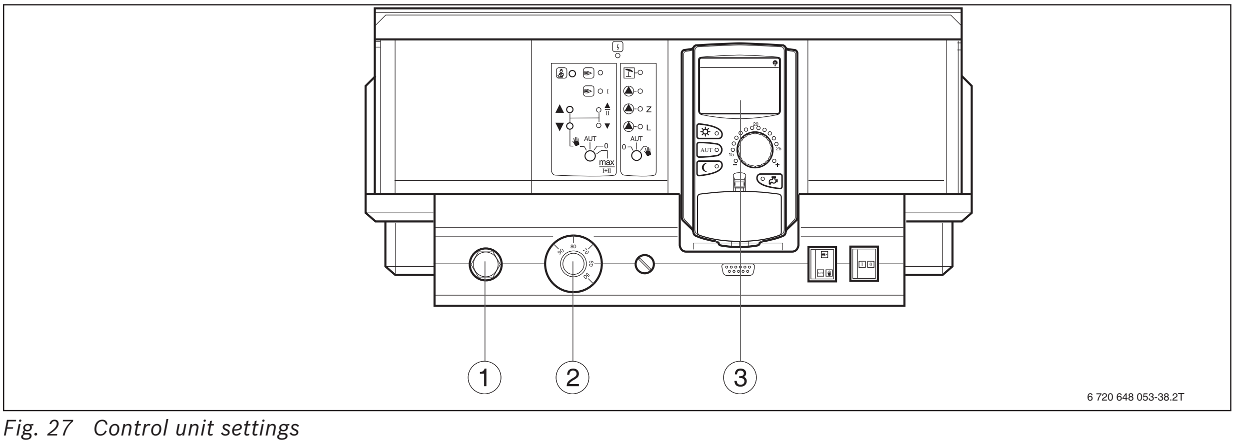


Fig. 27 Control unit settings

[1] High limit safety cut-out

[2] Control thermostat

[3] MEC

▶ Select temperatures (→ tab. 13, page 33) at high limit safety cut-out [1] in the control unit and at temperature controller [2].

▶ Select the maximum boiler water temperature at the MEC [3].

The maximum temperature demand is not a value that is directly selected. The maximum temperature demand is composed of the set temperature and the rise.

Example DHW demand:

Sum of the set DHW temperature (60 °C) and parameter “Boiler rise” (20 °C) in the “DHW” menu:

60 °C + 20 °C = 80 °C
(maximum temperature demand)

Example heating circuits:

Sum of the set temperature of the heating circuit with mixer with the highest temperature required (70 °C) and parameter “Boiler rise” (5 °C) in the “Heating circuit data” menu:

70 °C + 5 °C = 75 °C
(maximum temperature demand)

All maximum temperature demands must always be 7 K below the maximum selected boiler water temperature.

Notes on setting third party control units

Observe the operating conditions in → chapter 5, page 32.

- The third party control unit (building management system or PLC controllers) must ensure a maximum internal boiler water temperature that is sufficiently different from the high limit safety cut-out. It must also be ensured that the control electronics rather than the boiler water controller switch the burner on and off.
- The control unit must ensure that the burner is switched to low load before being shut down. If this is not observed, the safety shut-off valve (SAV) in the gas train may lock out.
- Select control equipment that allows a gentle start-up with a time delay when the system is cold.
- After the burner demand, an automatic timer (for example) should limit the burner to low load for a period of approx. 180 seconds. A restricted heat demand will prevent uncontrolled starting and stopping of the burner.
- It must be possible to show the number of burner starts on the control unit used.

	Unit	Value
Time constant on temperature controller, max.	s	40
Time constant on switch/limiter, max.	s	40
Minimum difference between burner on and off temperatures	K	7

Table 14 Operating conditions and time constants

5.5 Hydraulic connection to the heating system

- If the system temperatures are different, use both return connectors RK1 (top) and RK2 (bottom).
- Connect heating circuits with high return temperatures to connector RK2, and heating circuits with low return temperatures to connector RK1.

For an optimum energy yield, we recommend supplying a flow rate of > 10 % of the total nominal flow rate via connector RK1, with a return temperature below the dew point.

If there are no varying return temperatures, only return connector RK1 needs to be connected.

- Restrict the water flow rate in the boiler to a temperature spread of at least 7 K.

Restriction of the temperature spread is not necessary if the system is equipped with a sludge trap device.

- Size the pump correctly.

High flow rates and oversized pumps can result in the accumulation of sludge or deposits on the heat exchanger surfaces.

- Before connecting the boiler, flush sludge and dirt out of the heating system.
- Ensure that no oxygen enters the heating water during operation.
- Only operate the boiler in sealed unvented systems.

If the boiler is nonetheless used in an open vented heating system, additional measures are required to protect against corrosion and prevent sludge entering the boiler.
Furthermore, the safety equipment must also be suitable (equipment and settings).

- Consult the manufacturer's sales or service department.

5.6 Fuel

The Unit versions of the Logano plus SB325, SB625 and SB745 floor standing gas condensing boilers are designed for natural gas E or LL.

The gas quality must comply with the requirements of the DVGW Code of Practice G 260 [Germany]. Industrial gases containing sulphur or hydrogen sulphide (e.g. coke oven gas, industrial compound gases) are unsuitable for the gas burner.

To be able to adjust the gas throughput, install a gas meter that can be checked even in the lower load range of the burner. This also applies to LPG systems.

The Unit versions of the Logano plus SB325, SB625 and SB745 floor standing condensing boilers are designed for low sulphur fuel oil EL or fuel oil EL A Bio 10 to DIN 51603.

All boilers for third party burners are suitable for low sulphur fuel oil EL and fuel oil EL A Bio 10 to DIN 51603, natural gas E or LL and LPG.

Observe the burner manufacturer's details.

5.7 Water treatment

As pure water cannot be used for heat transfer, water quality is important. Poor water quality can lead to limescale formation and corrosion. Consequently, particular attention must be paid to water quality, water treatment and, above all, continuous water monitoring. Water treatment is an essential factor in ensuring trouble-free operation, availability, a long service life and the efficiency of the heating system.

5.7.1 Definition of terms

Limescale formation is the formation of hard deposits on walls inside hot water heating systems. These deposits are made up of substances contained in the water, essentially calcium carbonate.

Heating water is any water used for heating purposes in a hot water heating system.

Fill water is the water used to completely fill the heating system on the heating water side for the first time and with which it is then heated up.

Top-up water is any water used to top up the system on the heating water side after the first time it is heated up.

Operating temperature is the temperature captured at the flow connector of the heating appliance in a hot water heating system when operating correctly.

Water volume V_{max} is the maximum volume of untreated fill and top-up water in m^3 that may be introduced over the entire service life of the boiler.

Corrosion-inhibiting sealed unvented systems are heating systems in which no significant amount of oxygen ingress into the heating water is possible.

5.7.2 Prevention of corrosion damage

In most cases, corrosion plays only a minor role in heating systems. That is based on the fundamental requirement that the system is a corrosion-inhibiting sealed unvented system, i.e. one that prevents a continuous ingress of oxygen.

Continuous ingress of oxygen leads to corrosion and can thus cause rusting and the formation of rust sludge. Sludge formation can not only cause blockages and therefore a diminished heat supply but also deposits (similar to limescale deposits) on the hot surfaces of heat exchangers.

The amounts of oxygen introduced by the fill and top-up water are generally very small and can therefore be ignored.

The most important factor with regard to ingress of oxygen is generally pressure maintenance and, in particular, the function, correct sizing and adjustment (pre-charge pressure) of the expansion vessel. Check the function and pre-charge pressure annually. If continuous ingress of oxygen cannot be prevented (e.g. due to plastic pipes that are permeable to oxygen) or if the system cannot be designed as a sealed unvented system, anti-corrosion measures such as the addition of approved chemical additives or system separation by means of a heat exchanger are necessary.

Oxygen binding agents can be used, for example, to bind the oxygen.

The pH value of untreated heating water should be between 8.2. and 10.0. Ensure that the pH level changes after commissioning, especially due to the separation of oxygen and limescale. We recommend checking the pH value after several months of heating system operation.

If necessary, the water can be alkalised by the addition of trisodium phosphate, for example.

If additives or antifreeze (where approved by Buderus) are used in the heating system, check the heating water regularly in accordance with the manufacturer's instructions. Any corrective measures must be carried out.

5.7.3 Prevention of damage through scale formation

VDI 2035-1 “Prevention of damage to hot water central heating systems through limescale formation”, issue 12/2005, applies to DHW heating systems to DIN 4753 and hot water central heating systems to DIN 12828 with a design operating temperature of up to 100 °C.

One of the aims of the current edition of VDI 2035-1 is to simply its application. For this reason, recommended values for the amount of limescale-forming substances (total alkaline earths) for specified heat output ranges are recommended. This specification is based on practical experience which has shown that damage from scaling can occur subject to:

- the total heating output,
- the system volume,
- the sum of fill and top-up water over the entire service life and
- the boiler design.

The details given below in respect of Buderus boilers are based on many years of experience and service life tests, and specify the maximum cumulative amount of fill and top-up water subject to output, water hardness and boiler material. This ensures compliance with the aims of VDI 2035-1 “Prevention of damage through limescale formation in hot water heating systems”.

Warranty claims in respect of Buderus boilers are only valid in conjunction with the requirements specified herein and a fully completed system log.

5.7.4 Requirements of the fill and top-up water

To protect boilers against limescale damage over their entire service life and to ensure trouble-free operation, the total amount of limescale-forming substances in the fill and top-up water in heating systems must be restricted.

Therefore, the fill and top-up water has to meet certain requirements that are dependent on the total boiler output and the resulting total volume of water in the heating system (→ table 15).

The permissible amount of water based on the fill water quality can be determined simply with the aid of the graphs in Fig. 28, page 37, and Fig. 29, page 38, or with a calculation method to determine the permissible amounts of fill and top-up water (→ chapter 5.7.7, page 39).

Total output in kW	Requirements for water hardness and volume V_{max} of fill and top-up water
≤ 50	No requirements for V_{max}
> 50 to 600	V_{max} calculated according to Fig. 28, page 37 and Fig. 29, page 38
> 600	Water treatment is generally required (total hardness to VDI 2035 < 0.11 °dH)
Regardless of output	In the case of systems with very large water capacities (>50 l/kW), water treatment should always be carried out

Table 15 Requirements of the fill and top-up water for Logano plus SB625, SB625 and SB745

5.7.5 Limits of use for Logano plus SB325, SB625 and SB745

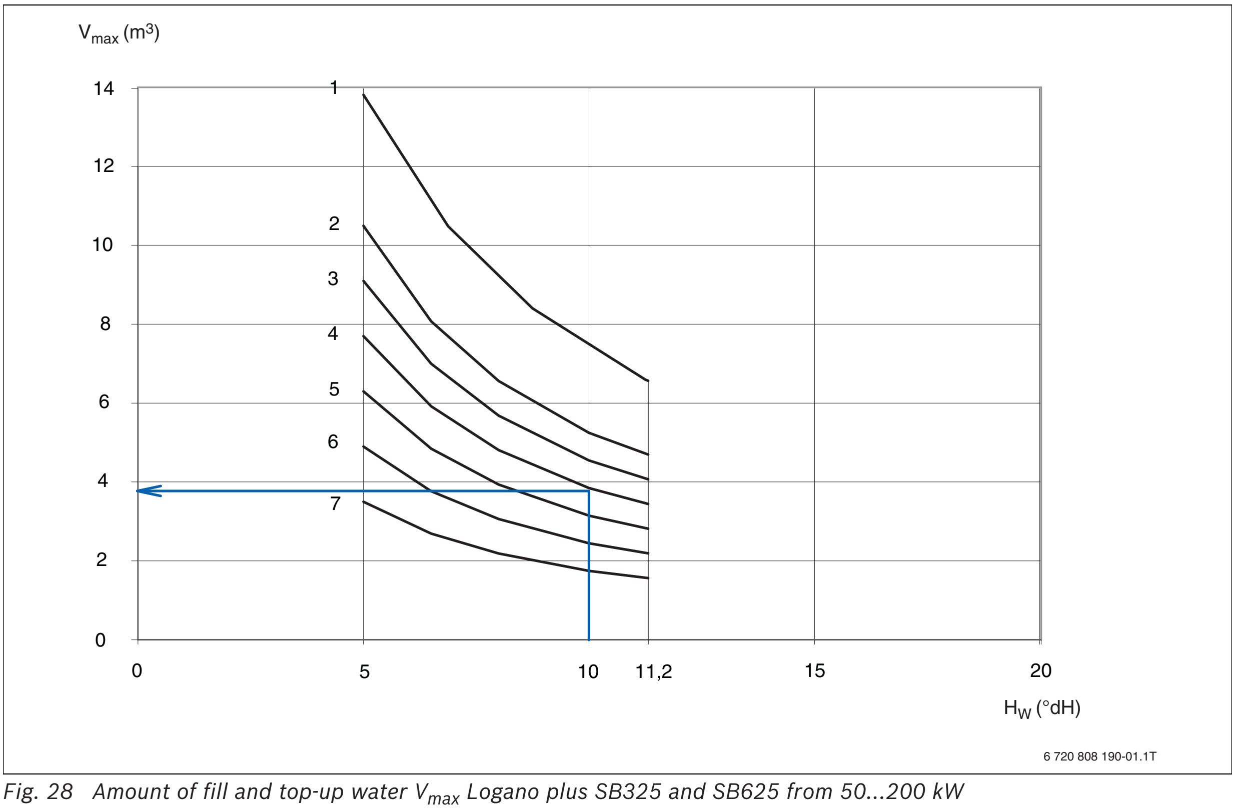


Fig. 28 Amount of fill and top-up water V_{max} Logano plus SB325 and SB625 from 50...200 kW

H_W Total hardness in °dH (for the purposes of simplification, it is assumed that this total hardness equals the carbonate hardness)

V Maximum possible water volume over the service life of the heat appliance in m^3

[1] Boilers up to 200 kW

[2] Boilers up to 150 kW

[3] Boilers up to 130 kW

[4] Boilers up to 110 kW

[5] Boilers up to 90 kW

[6] Boilers up to 70 kW

[7] Boilers up to 50 kW

Measures are required above these output curves and for a water hardness greater than 11.2 °dH; fill with untreated tap water below the curves. For multi-boiler systems (≤ 600 kW total output), the output curves for the smallest single boiler output apply.

Example

Given:

- Boiler output = 105 kW
- System volume = approx. 1.5 m^3
- Total hardness = 10 °dH

At a total water hardness level of 10 °dH, the maximum amount of fill and top-up water is approx. 3.8 m^3.

Result:

- This system can be filled with untreated tap water.

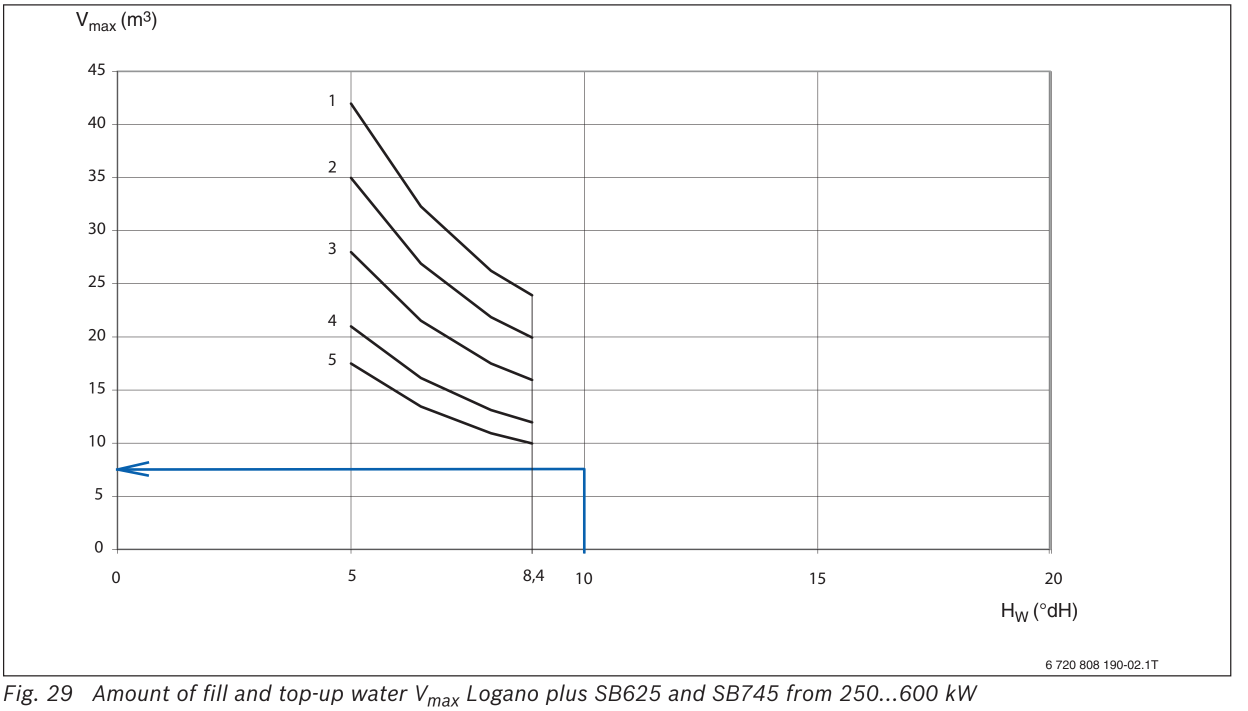


Fig. 29 Amount of fill and top-up water V_{max} Logano plus SB625 and SB745 from 250...600 kW

H_W Total hardness in °dH (for the purposes of simplification, it is assumed that this total hardness equals the carbonate hardness)

V Maximum possible water volume over the service life of the heat appliance in m^3

[1] Boilers up to 600 kW

[2] Boilers up to 500 kW

[3] Boilers up to 400 kW

[4] Boilers up to 300 kW

[5] Boiler size 201...250 kW

Measures are required above these output curves and for a water hardness greater than 8.4 °dH; fill with untreated tap water below the curves. For multi-boiler systems (≤ 600 kW total output), the output curves for the smallest single boiler output apply.

Example

Given:

- Boiler output = 295 kW
- System volume = approx. 7.5 m^3
- Total hardness is 10°dH

For a total hardness above 8.4 °dH, the water must generally be treated.

Result:

- Fill the system with treated water.

5.7.6 Measuring the amount of fill and top-up water

For heating systems > 50 kW, VDI 2035-1 specifies the fitting of a water meter and the keeping of a system log.

You will find the log with the technical documents supplied with Buderus boilers. Warranty claims in respect of Buderus boilers are only valid in conjunction with the requirements specified herein and a fully completed system log.

5.7.7 Calculation to determine the permissible amounts of fill and top-up water

The fill and top-up water has to meet certain requirements depending on the total boiler output and the resulting water volume of a heating system.

The maximum amount of fill water that the system can contain without treatment is calculated with the following formula[1]:

$$V_{max} = 0{,}0626 \times \frac{\dot{Q}}{Ca(HCO_3)_2}$$

F. 3 Calculation of the maximum amount of water that may be introduced without treatment

$Ca(HCO_3)_2$ Concentration of calcium hydrogen carbonate in mol/m^3

$\dot{Q}$ Boiler output in kW (with multi boiler systems, the output of the smallest boiler)

V_{max} Maximum volume of untreated fill and top-up water in m^3 that may be introduced over the entire service life of the boiler

Example

Calculation of the maximum permissible amount of fill and top-up water V_{max} for a heating system with a total boiler output of 150 kW. The analysis values for carbonate hardness and calcium hardness are quoted in the older unit °dH.

Carbonate hardness: 10.7 °dH
Calcium hardness: 8.9 °dH

From the carbonate hardness, we obtain:

$Ca(HCO3)_2$ = 10.7 °dH × 0.179 = 1.91 mol/m^3

From the calcium hardness, we obtain:

$Ca(HCO_3)_2$ = 8.9 °dH × 0.179 = 1.59 mol/m^3

The lower of the two values calculated, either the calcium or carbonate hardness, is the definitive figure for calculating the maximum permissible water volume V_{max}:

$$V_{max} = 0{,}0626 \times \frac{150\ kW}{1{,}59\ mol/m^3} = 5{,}9\ m^3$$

1) For heat sources in the SB325/625 type series, the concentration of calcium hydrogen carbonate must not exceed 2.0 mol/m^3 (which equates to 11.2 °dH) for an output of up to 200 kW and 1.5 mol/m^3 (which equates to 8.4 °dH) for an output of up to 600 kW.

5.7.8 Additional protection against corrosion

Damage through corrosion occurs if oxygen constantly enters the heating water. This may be the case if, for example, an underfloor heating system is used with plastic pipes that are permeable to oxygen.

If the heating system cannot be realised as a sealed unvented system, additional corrosion protection measures are required. Suitable measures include softened water, oxygen binders or chemicals that form a coating on the material surface (e.g. in underfloor heating systems with plastic pipes). In such cases, ask the manufacturer of these chemical additives for a certificate verifying the compatibility with different parts of the system and the materials used in the heating system.

If the ingress of oxygen cannot be prevented, system separation by means of a heat exchanger is recommended. Further information can be found in VDI guideline 2035-2.

i Chemical additives that are not certified as harmless by the manufacturer must not be used.

Using antifreeze

For decades now, antifreeze based on glycol has been used in heating systems (e.g. Antifrogen N). The use of alternatives is acceptable, as long as the product properties are equivalent to those of Antifrogen N.

The information supplied by the antifreeze manufacturer must be observed. Follow the manufacturer's details regarding mixing ratios.

The specific thermal capacity of an antifreeze (e.g. Antifrogen N) is lower than the specific thermal capacity of water.

5.8 Combustion air

Where combustion air is concerned, ensure that it is not heavily contaminated with dust and contains no halogenated compounds. Otherwise there would be a risk of damage to the combustion chamber and secondary heating surfaces.

Halogen compounds are highly corrosive. These are contained, for example, in spray cans, thinners, cleaning & degreasing agents and in solvents.

Design the combustion air supply so that, for example, no extract air is drawn in from chemical cleaners or paint shops. Special requirements apply to the supply of combustion air in the installation room (→ page 65).

6 Heating controls

6.1 Logamatic 4000 control systems

A control unit is required to operate the floor standing condensing boilers. The Buderus control systems are of modular design. This enables the system to be matched affordably to all applications and equipment installed in the intended heating system.

The Logamatic 4000 control system is suitable for most Buderus boilers. The standard equipment level and extension modules offer a wide range of control functions.

For more detailed information, see the technical guides on “Logamatic 4000 modular control system” for floor standing boilers and “Logamatic 4411 control panel system”.

6.1.1 Logamatic 4211 control unit

The Logamatic 4211 can be used for single boiler systems. It is designed for low temperature and condensing operation with a 2-stage or modulating burner. In the standard equipment level, the device regulates one heating circuit without mixer and DHW heating with a DHW circulation pump. Up to four heating circuits with mixer can be controlled with corresponding function modules.

6.1.2 Logamatic 4212 control unit

The Logamatic 4212 control unit is a conventional device for operation with a constant boiler water temperature. Burner switching commands from a higher ranking control unit (if installed, e.g. Logamatic 4411, DDC (direct digital control) systems, building management systems, etc.) are forwarded to the burner via the Logamatic 4212 control unit. The standard equipment levels includes the safety equipment for 2-stage burner operation. The ZM427 auxiliary module enables a boiler circuit actuator to be controlled or burner stages to be released via a higher ranking control unit using floating contacts.

6.1.3 Logamatic 4321 and 4322 control units

The Logamatic 4321 control unit is designed for low temperature and condensing operation in single boiler systems with up to eight heating circuits with mixer. 2- and 3-boiler systems require a Logamatic 4321 control unit for the first boiler that functions as the “master” and a Logamatic 4322 control unit as the lag appliance for each of the second and third boilers. The combination of devices with corresponding function modules can control up to 22 heating circuits with actuator.

Further benefits with the Logamatic 4321 and 4322 include:

- output-dependent control of modulating burners
- burner control, either via three-point stepper controller or 0-10 V, enables optimum energy savings
- speed control for modulating boiler circuit pump via 0-10 V guarantees power saving pump operation.

6.1.4 Logamatic 4411 control panel system

The Logamatic 4411 control panel system from Buderus is the comprehensive solution, representing advanced control technology for complex heating systems that require system-specific control. Your local sales office (→ back cover) can assist with the engineering and supply optimum system solutions for each individual case. This also applies to DDC (direct digital control) systems and building management systems.

6.2 Logamatic telecontrol system

The Logamatic telecontrol system is the ideal addition to all Buderus control systems. It comprises several software and hardware components and enables heating contractors to provide even better customer support and services via a powerful remote control facility. It can be used in rental apartment buildings, holiday homes as well as in medium and large heating systems. The Logamatic telecontrol system is suitable for remote monitoring, parameter setting and fault diagnosis in heating systems. It offers ideal conditions for heat supply concepts and maintenance and inspection contracts.

The technical guide for the “Logamatic telecontrol system” contains more detailed information.

7 DHW heating

7.1 Systems for DHW heating

The Logano plus SB325, SB625 and SB745 floor standing condensing boilers can also be used for DHW heating. DHW cylinders matched to these boilers are available as horizontal or vertical versions in different sizes. Subject to application, they are equipped with an internal indirect coil or external heat exchanger.

Primary store systems are ideal for DHW heating in combination with a floor standing condensing boiler. The Buderus range includes the Logalux LAP primary store systems (positioned on the cylinder) and the Logalux LSP (primary store system at the side of the cylinder with plate heat exchanger) in many output sizes.

If the external DHW heat exchanger is sized correctly with low return temperatures, high levels of efficiency can be achieved. A design return temperature of no more than 40 °C is recommended (→ Fig. 30).

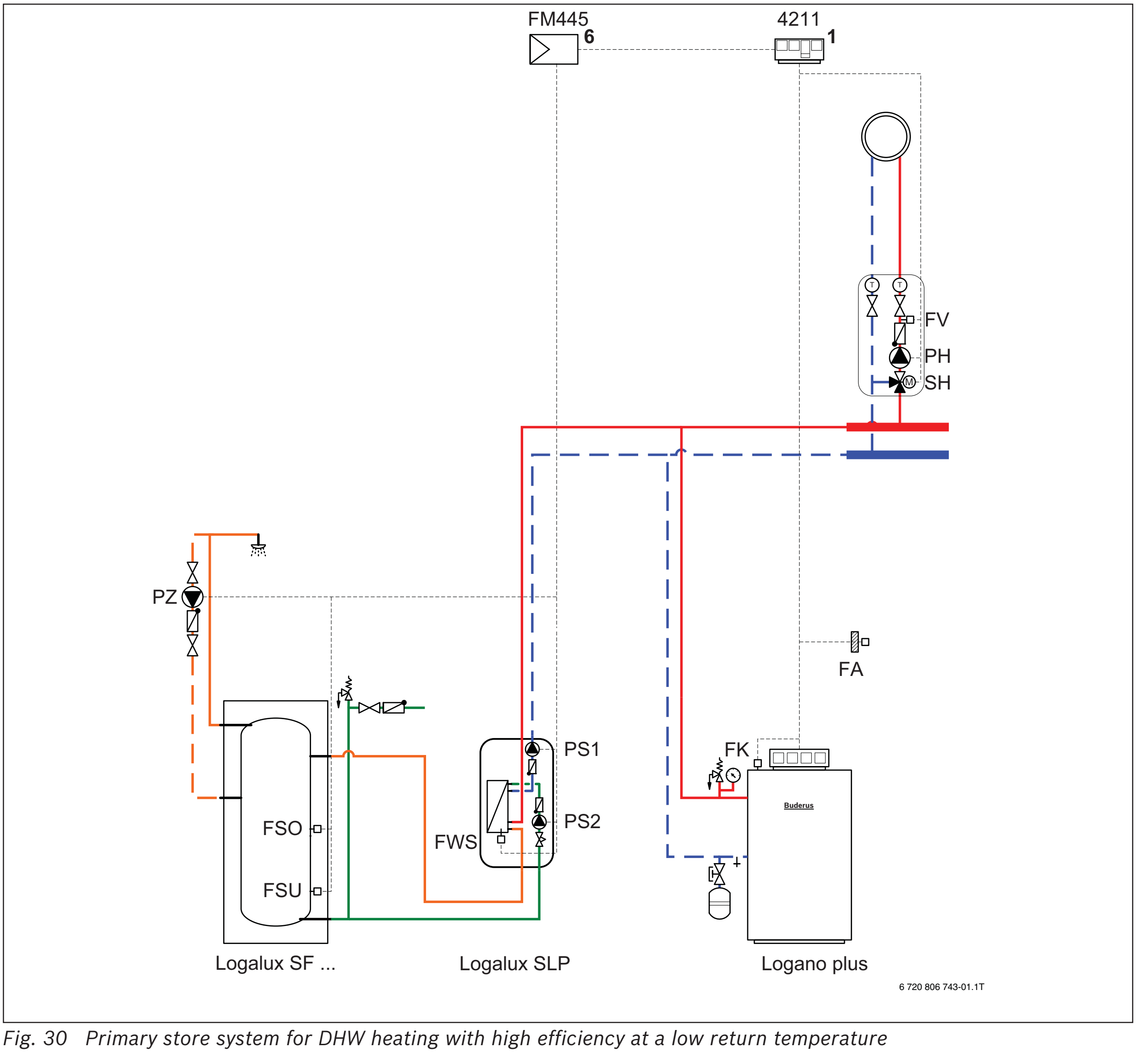


Fig. 30 Primary store system for DHW heating with high efficiency at a low return temperature

[1] Module at the heat source
[6] Module in Logamatic 4211 control unit
FA Outside temperature sensor
FK Boiler water temperature sensor
FV Flow temperature sensor
FSO DHW temperature sensor, cylinder top
FSU DHW temperature sensor, cylinder bottom
FWS DHW temperature sensor, heat exchanger, secondary side
PS1 Cylinder primary pump (primary circuit pump)
PS2 Cylinder primary pump (secondary circuit pump)
PH Heating pump
PZ Circulation pump
SH Heating circuit actuator

7.2 DHW temperature control

The DHW temperature is set and regulated either by means of a module inside the Logamatic 4000 control unit (e.g. FM445 function module for primary store systems) or via a separate control unit dedicated to DHW heating.

More detailed information on this can be found in the technical guides “Sizing and selecting DHW cylinders” and “Logamatic 4000 modular control system”.

8 System examples

8.1 Information regarding all system examples

The examples in this section indicate possible ways to hydraulically connect the Logano plus SB325, SB625 and SB745 floor standing gas condensing boilers.

For detailed information regarding the number, equipment level and control of the heating circuits as well as on the installation of DHW cylinders as well as other consumers, see the respective technical guides.

This particular system example does not represent a binding recommendation for implementing a specific heating network. Practical implementation is subject to currently applicable technical rules.

Information regarding further options for system layout and engineering aids are available from the staff in Buderus sales offices.

8.1.1 Hydraulic connection

Second return connector

Heating systems with outputs above 50 kW often comprise several heating circuits with different system temperatures. In general, all heating circuits are brought together in a common return. This leads to a mixed temperature which is higher than the lowest return temperature. As a result of the raised return temperature, the system efficiency decreases.

In order to prevent this unintentional return temperature raising, the Logano plus SB325, SB625 and SB745 floor standing condensing boilers are equipped with an additional second return connector. The system is hydraulically optimised by the separate connection of the low temperature and high temperature heating circuits.

The return from low temperature heating circuits flows through the low temperature return connector (RK 1) into the coldest area of the floor standing condensing boiler, where maximum condensation takes place. Heating circuits with high return temperatures, as with DHW heating or ventilation systems, are connected to the second return connector (RK 2). For a high rate of energy utilisation, the flow rate through low temperature return connector RK1 should be more than 10 % of the total flow rate. This optimisation allows the efficiency to be raised further. As a result, additional energy and heating cost savings are possible.

Heating circuit pumps

Heating circuit pumps in central heating systems must be sized in accordance with recognised technical rules, e.g. the Energy Savings Order (EnEV) [Germany].

For boiler outputs from 25 kW, the power consumption must be adjusted automatically in at least three stages to the pump rate required by the operation.

Flow water should not be mixed into the return (e.g. with an pressure relief valve or low loss header) so that the highest possible efficiency can be achieved. One option is to install a heating pump controlled by differential pressure.

Dirt traps

Deposits in the heating system can lead to local overheating, noise and corrosion. Any resulting boiler damage falls outside the warranty obligations.

To remove dirt and sludge deposits, flush the heating system thoroughly before connecting a boiler to an existing system. In addition, we recommend the installation of dirt traps or a blow-down facility.

Dirt traps retain contaminants and thereby prevent operating faults in control devices, pipework and boilers. Fit these near the lowest point of the heating system in an easily accessible position. Clean the dirt traps every time the heating system is serviced.

8.1.2 Control system

The operating temperatures should be controlled with a Buderus Logamatic control unit in weather-compensated mode. It is possible to control individual heating circuits in room temperature-dependent mode (with a room temperature sensor in a reference room). For this, the actuators and heating circuit pumps are constantly actuated by the Logamatic control unit. Number and version of the controllable heating circuits are dependent on the selection and equipment level of the control unit.

The Logamatic control system can also take over control of the burners:

- 2-stage or modulating (with single boiler systems)
- 4-stage or modulating (with 2-boiler systems)
- 6-stage or modulating (with 3-boiler systems)

The control and electrical connection of 3-phase burners and 3-phase pumps must be made on site.

For more detailed information, see the technical guides to the control units.

8.1.3 DHW heating

Given an appropriate design, the DHW temperature control by means of a Logamatic control unit offers special functions, such as the switching of a DHW circulation pump or thermal disinfection to protect against the growth of legionella bacteria, for example.

When connecting a DHW cylinder with an internal indirect coil to the high temperature return, we recommend operating the heating circuit with the lowest return temperature at the same time as DHW heating. This increases the efficiency and additional energy and heating cost savings of up to 4 % are possible. Due to the significant cooling of the heating water, primary store systems with external heat exchanger must be connected to the low temperature return (→ Fig. 30, page 41).

The floor standing condensing boiler achieves its highest efficiency at low system temperatures. To achieve maximum efficiency, we recommend implementing DHW heating, which requires high flow temperatures, with a separate boiler that has a matching output.
If DHW heating is connected to the boiler, the DHW cylinder should be sized to ensure that the lowest boiler heating output (subject to burner) does not exceed the transfer rate of the DHW heat exchanger.
An excessive boiler output in relation to the transfer rate of the indirect coil results in the burner starting too frequently.

For more detailed information, see the technical guides “Sizing and selecting DHW cylinders” and “Logamatic 4000 modular control system”.

8.2 Safety equipment to DIN EN 12828

8.2.1 Requirements

No claim is made as to the completeness of the diagrams or the corresponding design information for system examples. Each system example is a non-binding recommendation for certain versions of the heating system. The practical implementation is subject to currently applicable technical rules. Safety equipment should be installed in accordance with local regulations.

DIN EN 12828 specifies the safety equipment for safety temperatures up to 110 °C.

The schematic diagrams in Fig. 31 and Fig. 32 can be used as engineering aids.

8.2.2 Low water indicator

According to DIN EN 12828, a minimum pressure limiter can be installed instead of the low water indicator.
A further reasonably priced alternative to the low water indicator is the minimum pressure switch sold by Buderus. This can be used for boiler outputs ≤ 300 kW if verified by the manufacturer. At an equally competitive price, Buderus offers a water level limiter as a low water indicator for boiler outputs from 310 kW (→ page 69).

The Logano plus SB325, SB625 and SB745 floor standing condensing boilers have a special connector fitted as standard to facilitate the installation of this attractively priced safety equipment.
See chapter 9.5 for detailed information.

8.2.3 Pressure maintenance

The system must be equipped with an expansion vessel. It is designed in accordance with the applicable standards and regulations. It is essential to prevent water hammer from pump-controlled pressure maintaining devices without **or** with an undersized expansion vessel by fitting every heat source with an additional diaphragm expansion vessel. For further information, see BDH information sheet no. 30 and Code of Practice K4 Buderus catalogue for large heat sources/ applications.

8.2.4 Arrangement of safety components to DIN EN 12828; operating temperature ≤ 105 °C; shutdown temperature (high limit safety cut-out) ≤ 110 °C

Boiler ≤ 300 kW; operating temperature ≤ 105 °C; shutdown temperature (high limit safety cut-out) ≤ 110 °C – direct heating

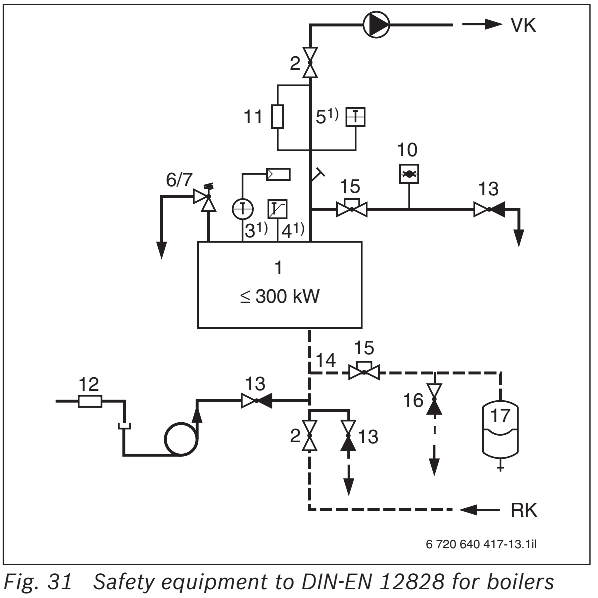


Fig. 31 Safety equipment to DIN-EN 12828 for boilers ≤ 300 kW with high limit safety cut-out (STB) ≤ 110 °C

The schematic diagrams show the safety equipment to DIN EN 12828 for the system versions referred to here – with no claim to completeness. Practical implementation is subject to currently applicable technical rules.

Boiler > 300 kW; operating temperature ≤ 105 °C; shutdown temperature (high limit safety cut-out) ≤ 110 °C – direct heating

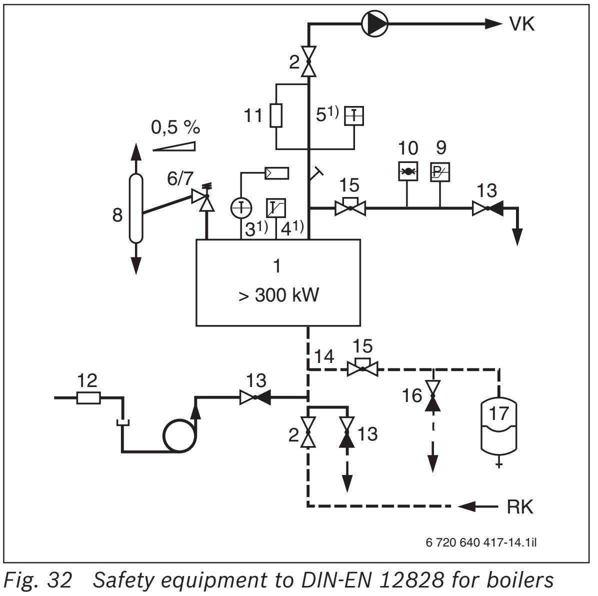


Fig. 32 Safety equipment to DIN-EN 12828 for boilers > 300 kW with high limit safety cut-out (STB) ≤ 110 °C

Key to Fig. 31 and Fig. 32:

RK Return
VK Flow
[1] Heat sources
[2] Shut-off valve, flow/return
[3] Temperature controller (TR)
[4] High limit safety cut-out (STB)
[5] Temperature capturing facility
[6] Diaphragm safety valve MSV 2.5 bar/3.0 bar or
[7] Lift spring safety valve HFS ≥ 2.5 bar
[8] Flash trap (ET); not required in systems > 300 kW if a high limit safety cut-out with a limit of ≤ 110 °C and a maximum pressure limiter are additionally provided for each boiler.
[9] Maximum pressure limiter
[10] Pressure gauge
[11] Low water indicator (WMS); not in systems ≤ 300 kW, where instead a minimum pressure limiter or a replacement measure approved by the manufacturer is provided ≤ for each boiler
[12] Non-return valve
[13] Boiler drain & fill valve (KFE)
[14] Expansion line
[15] Shut-off valve with lockout against unintentional closure, e.g. by sealed cap valve
[16] Drain upstream of diaphragm expansion vessel
[17] Diaphragm expansion vessel (DIN EN 13831)

1) The maximum achievable flow temperature in combination with Logamatic control units is approx. 18 K below the shutdown temperature (high limit safety cut-out).

8.3 Selecting control equipment

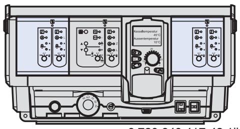
Logamatic 4211 control unit
Possible full equipment level (auxiliary equipment shown in blue)  6 720 640 417-43.1il
Logamatic 4211[1] for a single boiler system, with temperature controller TR (90 °C) and adjustable high limit safety cut-out STB (100/110/120 °C); to control a single stage, 2-stage or modulating burner. Space for up to two function modules.
Standard equipment
Safety equipment
CM421 – Controller module
ZM422 – **Central module** for the boiler with burner control, one heating circuit without mixer and one DHW circuit[2] with DHW circulation pump (display, operating and power components for CM421)
MEC2 – **Digital programming unit** for setting parameters and checking the control unit; integral room temperature sensor and radio clock receiver
Optional equipment
FM442 – Function module for two heating circuits with mixer; incl. one FV/FZ sensor set (up to two modules per control unit)
FM445 – Function module[2] for DHW heating via a primary store system to control two cylinder primary pumps and one DHW circulation pump; incl. LAP/LSP cylinder connection set with DHW temperature sensors (up to one module per control unit)
Burner cable for stage 2
Room installation set with wall retainer for MEC2 and boiler display
Online cable with holder for MEC2 and connection plug
BFU – Remote control incl. room temperature sensor for controlling a heating circuit from the living space
BFU/F – Remote control like the BFU, but with an integral radio clock receiver
Separate room temperature sensor for BFU and BFU/F remote control units
FV/FZ – Sensor set with flow temperature sensor for heating circuits with mixer or auxiliary temperature sensors for boiler circuit functions; incl. connection plug and accessories
FG – Flue gas temperature sensor for a digital display of the flue gas temperature; in a stainless steel sleeve; version suitable for positive pressure
Sensor pocket R½ , 100 mm long for Logamatic cylindrical sensors

Table 16 Possible equipment for the Logamatic 4211 control unit

1) The max. temperature demand from the system is 77 °C

2) The DHW function of the ZM422 central module is not available for DHW heating via a primary store system with the FM445 function module.

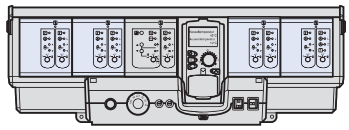
Logamatic 4321 control unit
Possible full equipment level (auxiliary equipment shown in blue)  6 720 640 417-42.1il
Logamatic 4321[1]. for a single boiler system, with temperature controller TR (90/105 °C) and adjustable high limit safety cut-out (100/110/120 °C); to control a single stage, 2-stage or modulating burner. Incl. burner cable for stage 2, boiler water temperature sensor and outside temperature sensor. Space for up to four function modules.
Standard equipment
Safety equipment
CM431 – Controller module
ZM432 – **Central module** for switching burners and boiler circuit functions; with manual operating level
MEC2 – **Digital programming unit** for setting parameters and checking the control unit; integral room temperature sensor and radio clock receiver
Optional equipment
FM441 – Function moduleDHW[2] for one heating circuit with mixer and one DHW circuit with DHW circulation pump; incl. DHW temperature sensor (up to one module per control unit)
FM442 – Function module for two heating circuits with mixer; incl. one FV/FZ sensor set (up to four modules per control unit)
FM445 – Function module[2] for DHW heating via a primary store system to control two cylinder primary pumps and one DHW circulation pump; incl. LAP/LSP cylinder connection set with DHW temperature sensors (up to one module per control unit)
Room installation set with wall retainer for MEC2 and boiler display
Online cable with holder for MEC2 and connection plug
BFU – Remote control incl. room temperature sensor for controlling a heating circuit from the living space
BFU/F – Remote control like the BFU, but with an integral radio clock receiver
Separate room temperature sensor for BFU and BFU/F remote control units
FV/FZ – Sensor set with flow temperature sensor for heating circuits with mixer or auxiliary temperature sensors for boiler circuit functions; incl. connection plug and accessories
FG – Flue gas temperature sensor for a digital display of the flue gas temperature; in a stainless steel sleeve; version suitable for positive pressure
Sensor pocket R½ , 100 mm long for Logamatic cylindrical sensors

Table 17 Possible equipment for the Logamatic 4321 control unit

1) For boiler temperatures above 80 °C, adjust the high limit safety cut-out to 110 °C

2) heating possible either via a primary store system with FM445 function module or via DHW cylinder with FM441 function module.

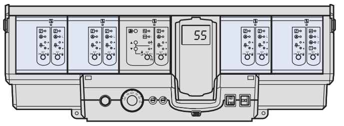
Logamatic 4322 control unit
Possible full equipment level (auxiliary equipment shown in blue)  6 720 640 417-44.1il
Logamatic 4322[1] as a lag control unit for the second and third boilers in a multi-boiler system, with temperature controller TR (90/105 °C) and adjustable high limit safety cut-out STB (100/110/120 °C); to control a single stage, 2-stage or modulating burner. Incl. burner cable for stage 2 and boiler water temperature sensor. Space for up to four function modules.
Standard equipment
Safety equipment
CM431 – Controller module
ZM432 – **Central module** for switching burners and boiler circuit functions; with manual operating level
Boiler display to show the boiler water temperature at the control unit
Optional equipment
MEC2 – **Digital programming unit** in place of the boiler display for setting parameters and checking the control unit; integral room temperature sensor and radio clock receiver
FM441 – Function module[2] for one heating circuit with mixer and one DHW circuit with DHW circulation pump; incl. DHW temperature sensor (up to one module per control unit)
FM442 – Function module for two heating circuits with mixer; incl. one FV/FZ sensor set (up to four modules per control unit)
FM445 – Function module[2] for DHW heating via a primary store system to control two cylinder primary pumps and one DHW circulation pump; incl. LAP/LSP cylinder connection set with DHW temperature sensors (up to one module per control unit)
Online cable with holder for MEC2 and connection plug
BFU – Remote control incl. room temperature sensor for controlling a heating circuit from the living space
BFU/F – Remote control like the BFU, but with an integral radio clock receiver

Table 18 Possible equipment for the Logamatic 4322 control unit

Logamatic 4322 control unit
Separate room temperature sensor for BFU and BFU/F remote control units
FV/FZ – Sensor set with flow temperature sensor for heating circuits with mixer or auxiliary temperature sensors for boiler circuit functions; incl. connection plug and accessories
FA - **Additional outside temperature sensor**
FG – Flue gas temperature sensor for a digital display of the flue gas temperature; in a stainless steel sleeve; version suitable for positive pressure
Sensor pocket R½ , 100 mm long for Logamatic cylindrical sensor

Table 18 Possible equipment for the Logamatic 4322 control unit

1) For boiler temperatures above 80 °C, adjust the high limit safety cut-out to 110 °C

2) DHW heating possible either via a primary store system with FM445 function module or via DHW cylinder with FM441 function module.

The technical guide “Logamatic 4000 modular control system” contains more detailed information.

8.4 Single boiler system with floor standing condensing boiler: Heating circuits and DHW cylinder at the low temperature return

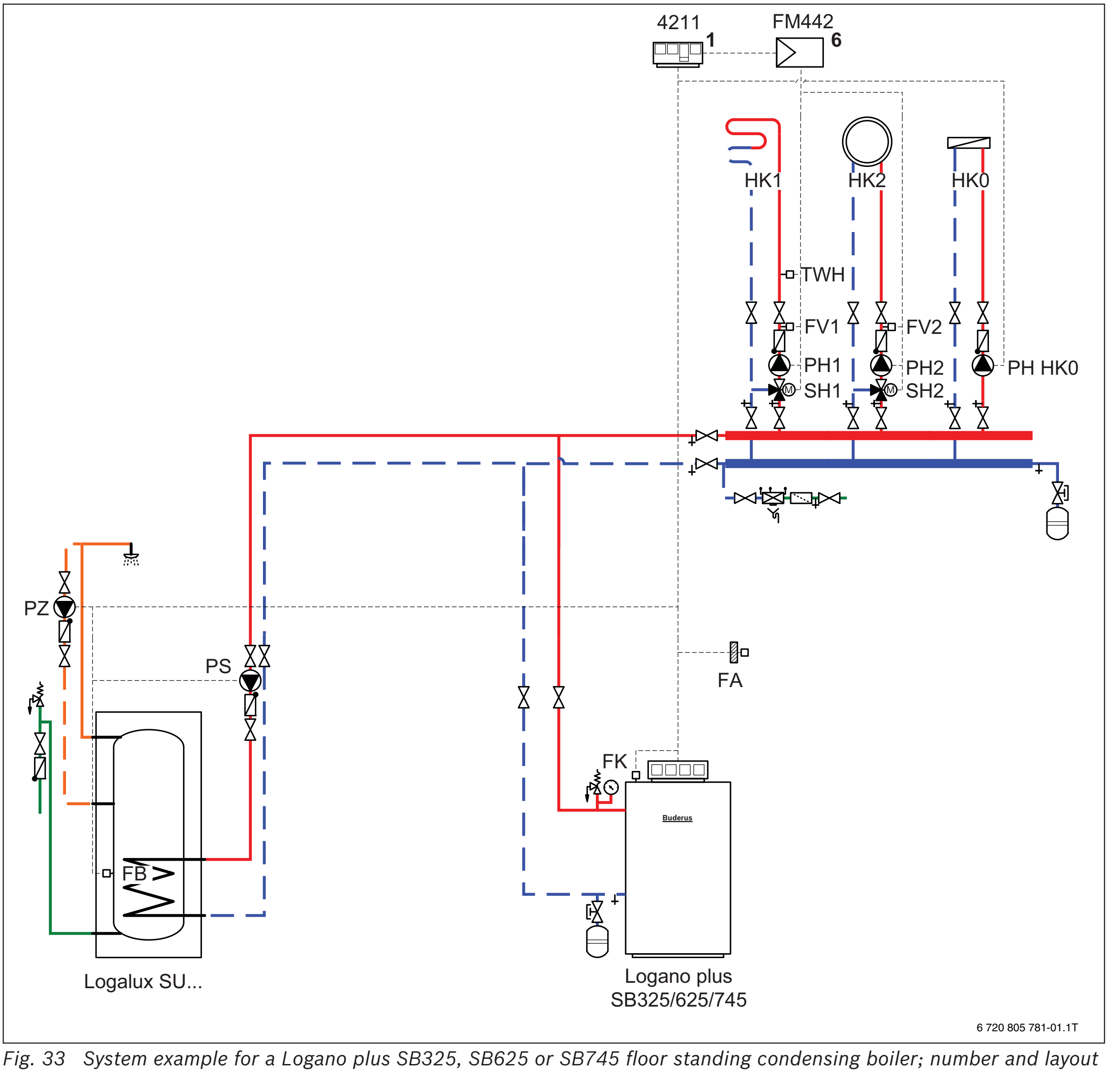


Fig. 33 System example for a Logano plus SB325, SB625 or SB745 floor standing condensing boiler; number and layout of the heating circuits subject to the control unit

[1] Control unit at the heat source
[6] Module in control unit 4211
FA Outside temperature sensor
FB Hot water temperature sensor
FK Boiler water temperature sensor
FV Flow temperature sensor
HK Heating circuit
PH Heating pump
PS Cylinder charging pump
PZ Circulation pump
SH Heating circuit actuator
TWH Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers
- Logamatic boiler and heating circuit control unit

Function description

The actuators and heating circuit pumps are constantly controlled by a Logamatic control unit. As an alternative, the heating circuit can be controlled by a third party device (e.g. in the case of system modernisation if only the boiler is being replaced and the existing control unit will continue to be used).

---

i You can check the system hydraulics (6720805781) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

---

i The Logamatic 4211 control unit has a temperature controller up to 90 °C. The demand from the heating and DHW circuit (including return temperature raising) must not exceed 77 °C for this reason. When the maximum temperature demand is higher than this, the Logamatic 4321 control unit must be used.

8.5 Single boiler system with floor standing condensing boiler: Low and high temperature heating circuits, DHW cylinder at the high temperature return

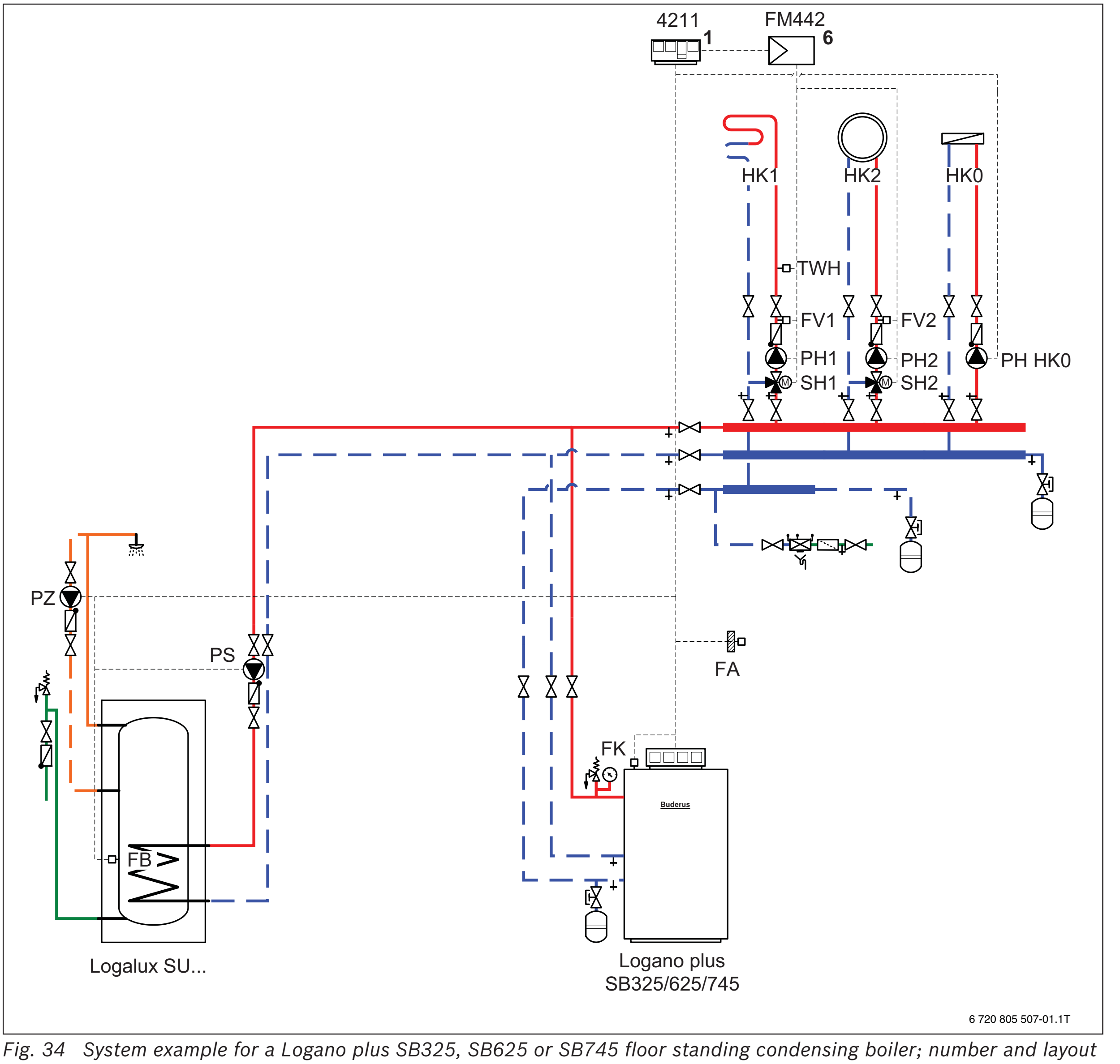


Fig. 34 System example for a Logano plus SB325, SB625 or SB745 floor standing condensing boiler; number and layout of the heating circuits subject to the control unit

[1] Control unit at the heat source
[6] Module in control unit 4211
FA Outside temperature sensor
FB Hot water temperature sensor
FK Boiler water temperature sensor
FV Flow temperature sensor
HK Heating circuit
PH Heating pump
PS Cylinder charging pump
PZ Circulation pump
SH Heating circuit actuator
TWH Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers
- Logamatic boiler and heating circuit control unit

Function description

Optimum use of the condensing effect in conjunction with high temperature heating circuits is ensured by separate returns on the water side.

The actuators and heating circuit pumps are constantly controlled by one Logamatic control unit. As an alternative, the heating circuit can also be controlled by a third party device (e.g. in the case of system modernisation if only the boiler is being replaced and the existing control unit will continue to be used).

With the Logano plus SB325 and SB625, low temperature return connector RK 1 is located at the bottom of the back panel, and with the Logano plus SB745, it is in the middle of the back panel.

You can check the system hydraulics (6720805507) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

The Logamatic 4211 control unit has a temperature controller up to 90 °C. The demand from the heating and DHW circuit (including return temperature raising) must not exceed 77 °C for this reason. When the maximum temperature demand is higher than this, the Logamatic 4321 control unit must be used.

8.6 Single boiler system with floor standing condensing boiler: Low and high temperature heating circuits, primary store system at the low temperature return

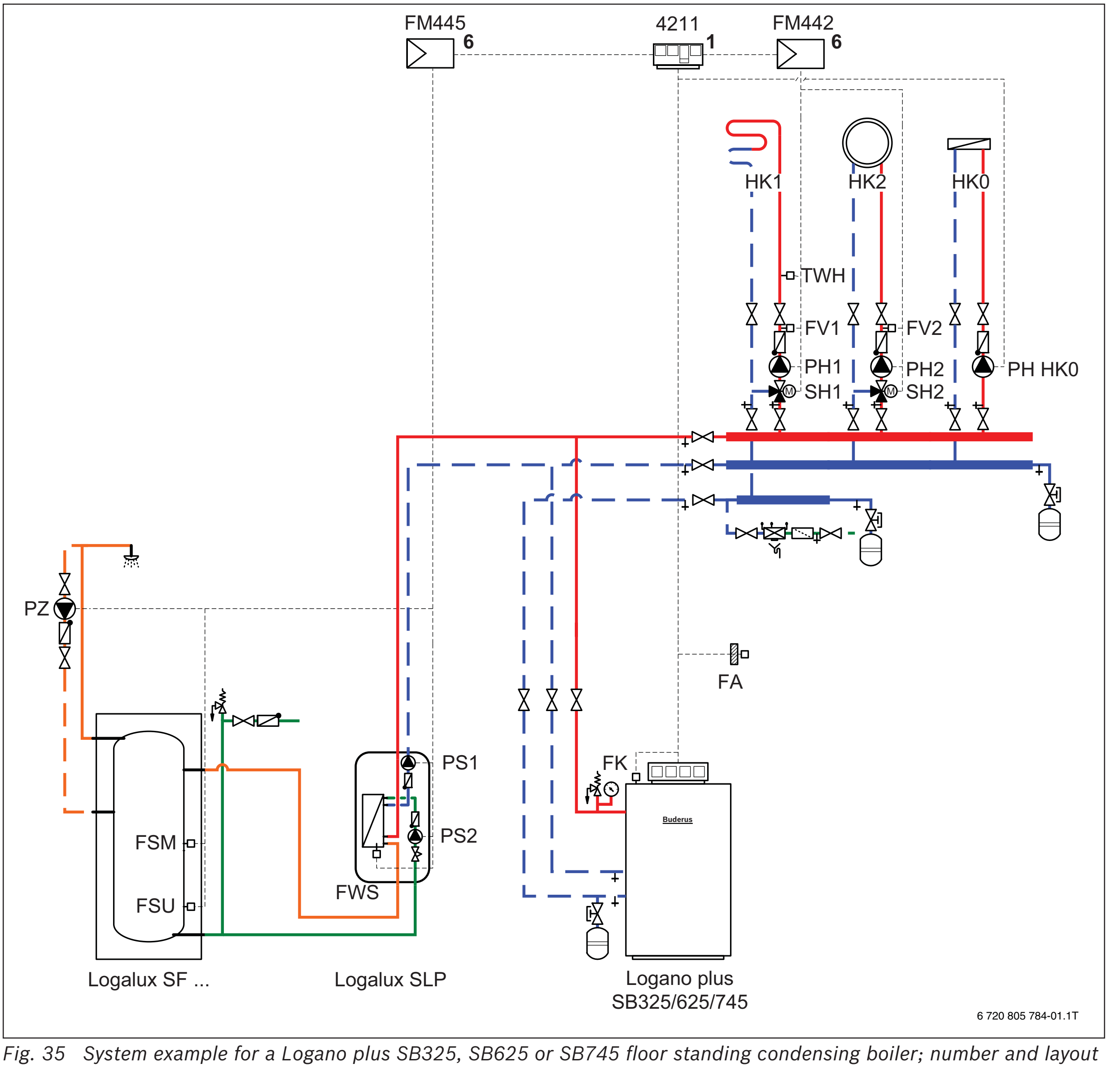


Fig. 35 System example for a Logano plus SB325, SB625 or SB745 floor standing condensing boiler; number and layout of the heating circuits subject to the control unit

[1] Control unit at the heat source
[6] Module in control unit 4211
FA Outside temperature sensor
FK Boiler water temperature sensor
FSM DHW temperature sensor, cylinder middle
FSU DHW temperature sensor, cylinder bottom
FWS DHW temperature sensor, heat exchanger, secondary side
FV Flow temperature sensor
HK Heating circuit
PH Heating pump
PS1 Cylinder primary pump (primary circuit pump)
PS2 Cylinder primary pump (secondary circuit pump)
PZ Circulation pump
SH Heating circuit actuator
TWH Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers
- Logamatic boiler and heating circuit control unit

Function description

Optimum use of the condensing effect in conjunction with high temperature heating circuits is ensured by separate returns on the water side.

The actuators and heating circuit pumps are constantly controlled by one Logamatic control unit. As an alternative, the heating circuit can also be controlled by a third party device (e.g. in the case of system modernisation if only the boiler is being replaced and the existing control unit will continue to be used).

DHW is heated via a primary store system which is controlled by the FM445. For optimum energy utilisation, the return is connected to low temperature return connector RK 1.

With the Logano plus SB325 and SB625, low temperature return connector RK 1 is located at the bottom of the back panel, and with the Logano plus SB745, it is in the middle of the back panel.

You can check the system hydraulics (6720805784) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

The Logamatic 4211 control unit has a temperature controller up to 90 °C. The demand from the heating and DHW circuit (including return temperature raising) must not exceed 77 °C for this reason. When the maximum temperature demand is higher than this, the Logamatic 4321 control unit must be used.

8.7 2-boiler system with floor standing condensing boilers connected in parallel: Heating circuits and DHW cylinder at the low temperature return

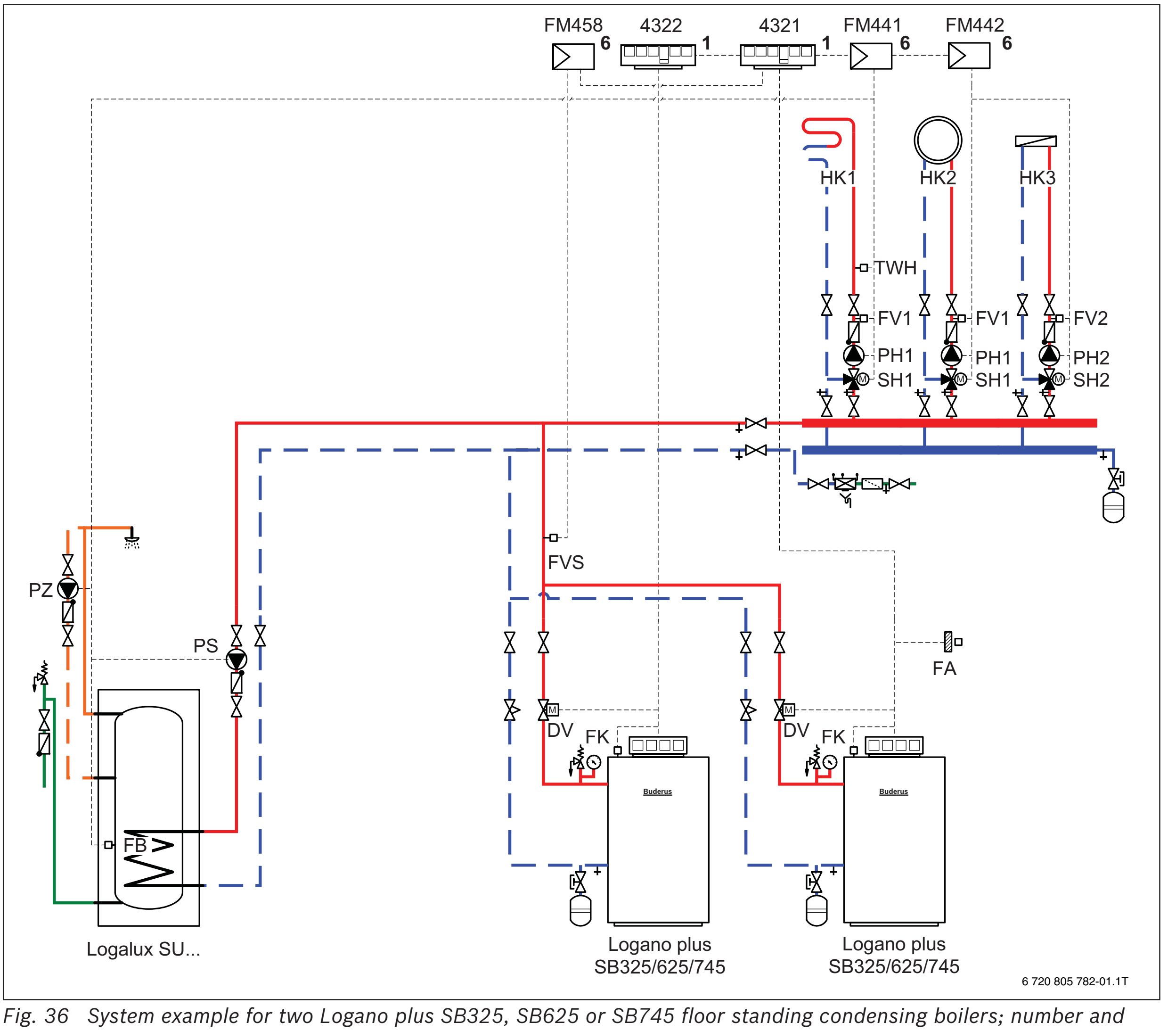


Fig. 36 System example for two Logano plus SB325, SB625 or SB745 floor standing condensing boilers; number and layout of the heating circuits subject to the control unit

[1]	Control unit at the heat source
[6]	Module in control unit 4321
DV	Throttle valve
FA	Outside temperature sensor
FB	Hot water temperature sensor
FK	Boiler water temperature sensor
FV	Flow temperature sensor
FVS	Strategy sensor
HK	Heating circuit
PH	Heating pump
PS	Cylinder charging pump
PZ	Circulation pump
SH	Heating circuit actuator
TWH	Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers
- Logamatic boiler and heating circuit control unit

Function description

Both floor standing condensing boilers can be shut off hydraulically. The boiler sequence can be switched on the basis of load and time. The lead boiler starts when the actual temperature falls below the set flow temperature.
The lag boiler is hydraulically shut off by the relevant butterfly valve DV until it starts operating.

When the heat demand increases, the lag boiler is started automatically via the relevant butterfly valve DV. When the load falls, the switching processes run in reverse order.

Special design information

- If a boiler sequence reversal is required, set this manually or automatically.
- We recommend distributing the total output between the boilers so each has 50 %.
- Design the connections in such a way that the boilers can be separated, independently of each other, to ensure an emergency supply during maintenance work.
- Make the boiler pipework connections in accordance with the “Tichelmann system”. If the pipework is routed awkwardly or the load is split unevenly, regulating valves must be installed.

---

i You can check the system hydraulics (6720805782) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

8.8 2-boiler system with floor standing condensing boiler and Ecostream boiler connected in series: Heating circuits and DHW cylinder at the low temperature return

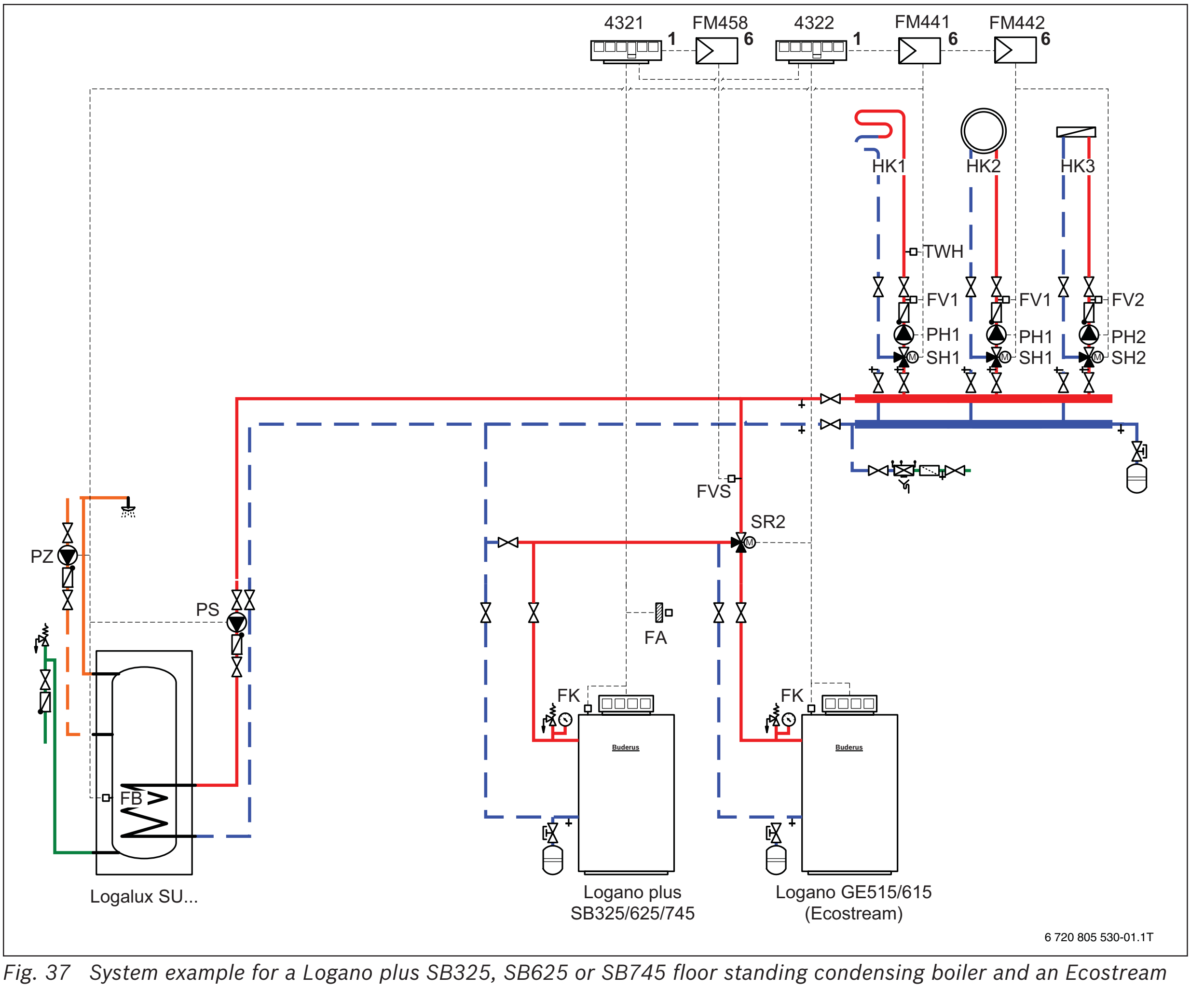


Fig. 37 System example for a Logano plus SB325, SB625 or SB745 floor standing condensing boiler and an Ecostream boiler connected in series; number and layout of the heating circuits subject to the control unit

[1] Control unit at the heat source
[6] Module in control unit 4321/4322
FA Outside temperature sensor
FB Hot water temperature sensor
FK Boiler water temperature sensor
FV Flow temperature sensor
FVS Strategy sensor
HK Heating circuit
PH Heating pump
PS Cylinder charging pump
PZ Circulation pump
SH Heating circuit actuator
SR2 Actuator, return temperature raising facility
TWH Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers (lead boilers)
- Logano Ecostream boiler
- Logamatic boiler and heating circuit control unit

Function description

The boiler sequence can be switched on the basis of load and time. The lead boiler starts when the actual temperature falls below the set flow temperature. When the heat demand increases, the lag boiler is automatically started via return temperature raising actuator SR2.

When the operating flow temperature in the lag boiler is reached, the entire flow rate is channelled through the Ecostream boiler. When the load falls, the switching processes run in reverse order.

Special design information

- The boiler sequence cannot be reversed.
- Size the heating circuit pumps in accordance with the calculated maximum pressure drop in the heating and boiler circuit. The pressure drop levels of both boilers must be reliably overcome.
- To keep the pressure drop on the water side low, when sizing the heating circuits maintain a minimum spread of 20 K if possible.
- We recommend distributing the total output between the boilers so each has 50 %.
- Design the connections in such a way that the boilers can be separated, independently of each other, to ensure an emergency supply during maintenance work.
- Optimum use of the condensing effect in conjunction with high temperature heating circuits is possible due to separate returns on the water side. In such cases, a primary store system should be connected to the low temperature return.

You can check the system hydraulics (6720805530) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

8.9 2-boiler system with floor standing condensing boiler and floor standing residential conventional boiler connected in series: Heating circuits and DHW cylinder at the low temperature return

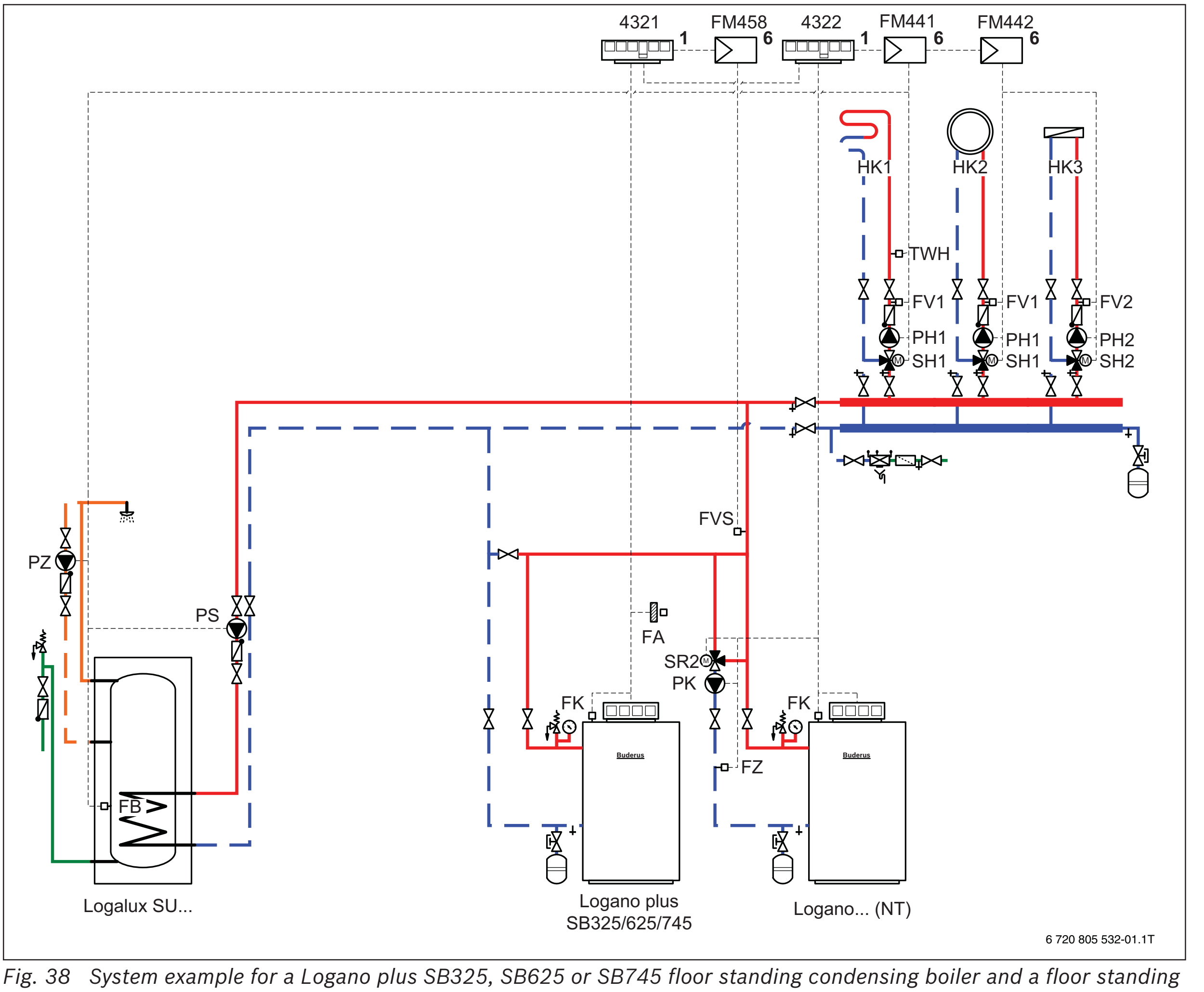


Fig. 38 System example for a Logano plus SB325, SB625 or SB745 floor standing condensing boiler and a floor standing residential conventional boiler connected in series; number and layout of the heating circuits subject to the control unit

[1]	Control unit at the heat source
[6]	Module in control unit 4321/4322
FA	Outside temperature sensor
FB	Hot water temperature sensor
FK	Boiler water temperature sensor
FV	Flow temperature sensor
FVS	Strategy sensor
HK	Heating circuit
PH	Heating pump
PK	Boiler circuit pump
PS	Cylinder charging pump
PZ	Circulation pump
SH	Heating circuit actuator
SR2	Actuator, return temperature raising facility
TWH	Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers (lead boilers)
- Logano boiler
- Logano Ecostream boiler with high system pressure drop on the water side (alternative to the system example on page 56)
- Logamatic boiler and heating circuit control unit

Function description

The boiler sequence can be switched on the basis of load and time. The lead boiler starts when the actual temperature falls below the set flow temperature. When the heat demand increases, the lag boiler is automatically started via return temperature raising actuator SR2 and boiler circuit pump PK.

When the minimum return temperature or the operating flow temperature in the lag boiler is reached, the entire flow rate is channelled through the boiler. When the load falls, the switching processes run in reverse order.

Special design information

- The boiler sequence cannot be reversed.
- Size the heating circuit pumps in accordance with the calculated maximum pressure drop in the heating and boiler circuit. The additional boiler circuit pump PK overcomes the pressure drop on the water side of the lag boiler at the maximum calculated boiler flow rate.
- We recommend dividing the total heating output so there is 50 % to 60 % for the floor standing condensing boiler and 40 % to 50 % for the floor standing residential conventional boiler.
- Design the connections in such a way that the boilers can be separated, independently of each other, to ensure an emergency supply during maintenance work.
- Optimum use of the condensing effect in conjunction with high temperature heating circuits is possible due to separate returns on the water side. In such cases, a primary store system should be connected to the low temperature return.

---

i You can check the system hydraulics (6720805532) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

8.10 2-boiler system with two floor standing condensing boilers connected in parallel and with hydraulic balancing

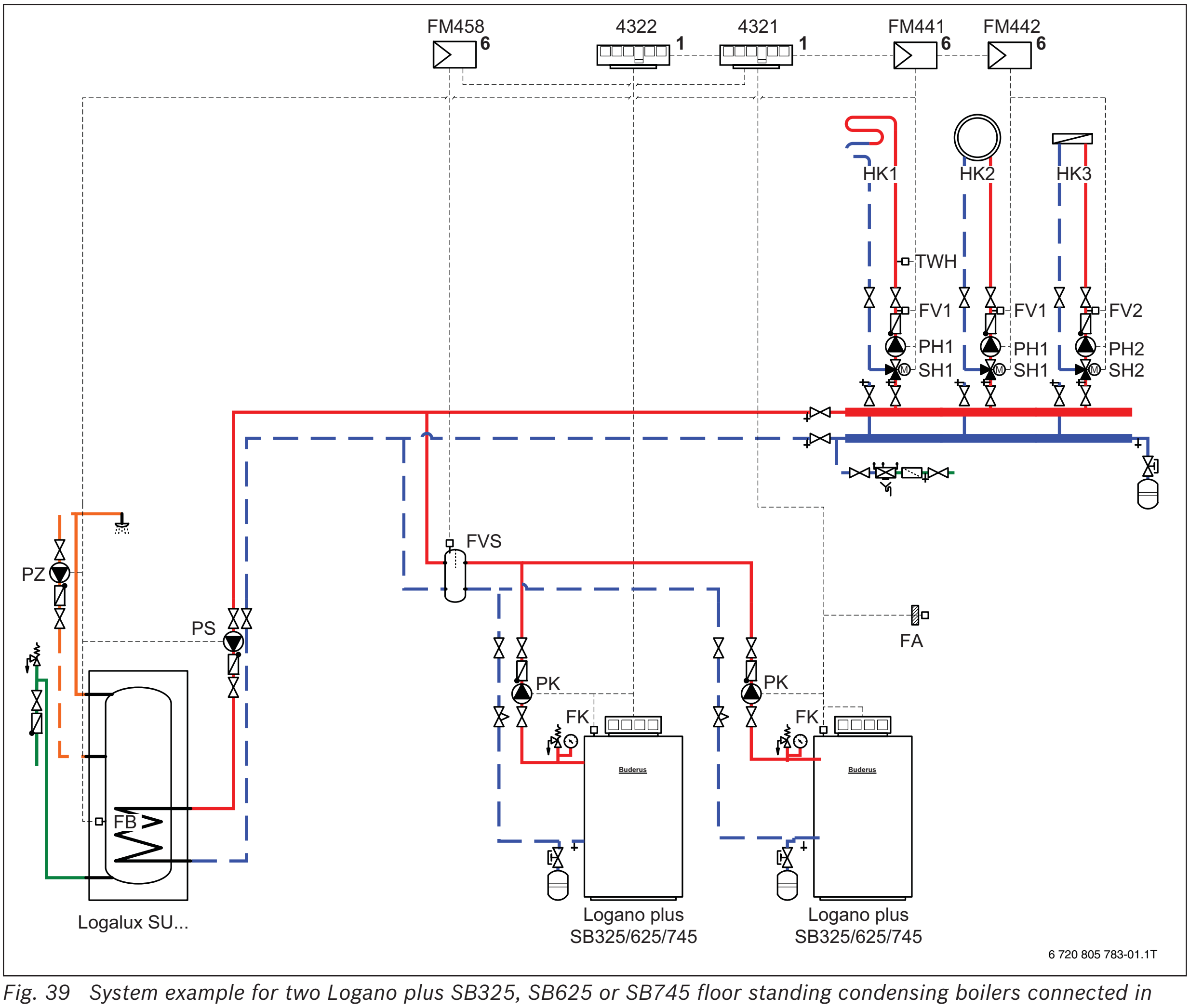


Fig. 39 System example for two Logano plus SB325, SB625 or SB745 floor standing condensing boilers connected in parallel; number and layout of the heating circuits subject to the control unit

[1]	Control unit at the heat source
[6]	Module in control unit 4321
FA	Outside temperature sensor
FB	Hot water temperature sensor
FK	Boiler water temperature sensor
FV	Flow temperature sensor
FVS	Strategy sensor
HK	Heating circuit
PH	Heating pump
PK	Boiler circuit pump
PS	Cylinder charging pump
PZ	Circulation pump
SH	Heating circuit actuator
TWH	Boiler water temperature controller

The circuit diagram is only a schematic illustration!
Information regarding all system examples → page 43.

AREA OF APPLICATION

- Logano plus SB325, SB625 and SB745 floor standing condensing boilers
- Logamatic 4321/4322 boiler and heating circuit control unit

Function description

The boiler sequence can be switched on the basis of load and time. The lead boiler starts when the actual temperature captured by the strategy sensor in the low loss header or common flow falls below the set flow temperature. The lag boiler is hydraulically shut off via the check valve in the flow. When the heat demand increases, the lag boiler is automatically started. When the load falls, the switching processes run in reverse order.

Special design information

- If a boiler sequence reversal is required, this can be set manually or automatically.
- In conjunction with hydraulic balancing, the boiler circuit pump PK is advisable if there are several distributor stations, or if these are far apart. A low loss header or low pressure distributor with bypass and check valve can be used for hydraulic balancing.
- The low loss header is also suitable for de-sludging.
- With the Flow-Control function, it is possible to reduce the running costs through increased utilisation of the condensing effect as well as lowering the power consumption.
  (Speed control of the modulating boiler circuit pumps via 0 -10 V to prevent mixing in the low loss header from the boiler flow to the return: pump with 0 -10 V interface required)

You can check the system hydraulics (6720805783) in the Buderus hydraulic database at www.buderus.de/hydraulikdatenbank.

---

9 Fitting

9.1 Transport and handling

9.1.1 Delivery method and transport options

Floor standing condensing boiler	Logano plus SB325 BE-A with Logatop BE-A pressure-jet oil burner from Buderus	Logano plus SB325	Logano plus SB325 with "Weishaupt" and "RIELLO" pressure-jet burner
Boiler block	Transport unit	Transport unit	Transport unit
Boiler jacket and thermal insulation	Carton	Carton	Transport unit
Logatop VM premix gas burner	–	–	–
Logatop BE-A pressure-jet oil burner	Carton	–	–
Front panel	–	Carton	–
Fan-assisted burner	–	–	Carton
Technical documentation	Foil bag	Foil bag	Foil bag

Table 19 Delivery method for Logano plus SB325 floor standing condensing boilers

Floor standing condensing boiler	Logano plus SB625 VM with Logatop VM premix gas burner from Buderus	Logano plus SB625	Logano plus SB625 with "Weishaupt" and "RIELLO" pressure-jet burner	Logano plus SB745[1)]	Logano plus SB745 with "Weishaupt" and "RIELLO" pressure-jet burner
Boiler block	Transport unit	Transport unit	Transport unit	Transport unit	Transport unit
Boiler jacket and thermal insulation	Transport unit	Transport unit	Transport unit	Part of boiler block[2)]	Part of boiler block[2)]
Burner cover	Carton	–	–	–	–
Logatop VM premix gas burner	Carton	–	–	–	–
Logatop BE-A pressure-jet oil burner	–	–	–	–	–
Front panel	–	–	–	Carton	Carton
Fan-assisted burner	–	–	Carton[3)]	–	Carton
Technical documentation	Foil bag	Foil bag	Foil bag	Foil bag	Foil bag
Burner plate	–	–	Carton	–	Carton

Table 20 Delivery method for Logano plus SB625 and SB745 floor standing condensing boilers

1) With the Logano plus SB745, sound insulation strips are provided to attenuate structure-borne noise.

2) The Logano plus SB745 is thermally insulated at the factory and delivered in its casing.

3) With Riello products, the burner plate is supplied with the burner.

The boiler block can be transported on its base frame, e.g. on rollers.

Two transport eyes are fitted at the top of the boiler for transporting the Logano plus SB325, SB625 and SB745 boiler block with a crane (→ Fig. 41, Fig. 41 and Fig. 42).

There are special apertures in the frame of the Logano plus SB745 boiler block for transporting with a forklift truck or using trolley jacks.

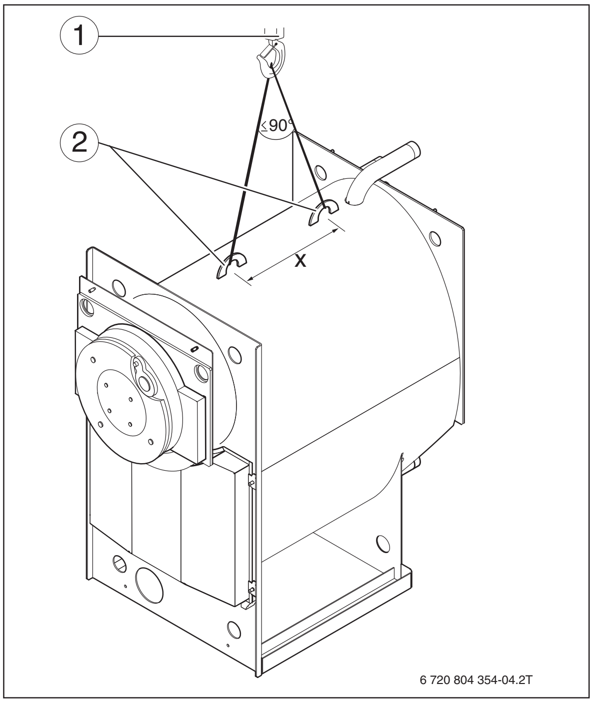


Fig. 40 Logano plus SB325 transport with a crane

[1] Crane hooks with safety mechanisms

[2] Lifting points

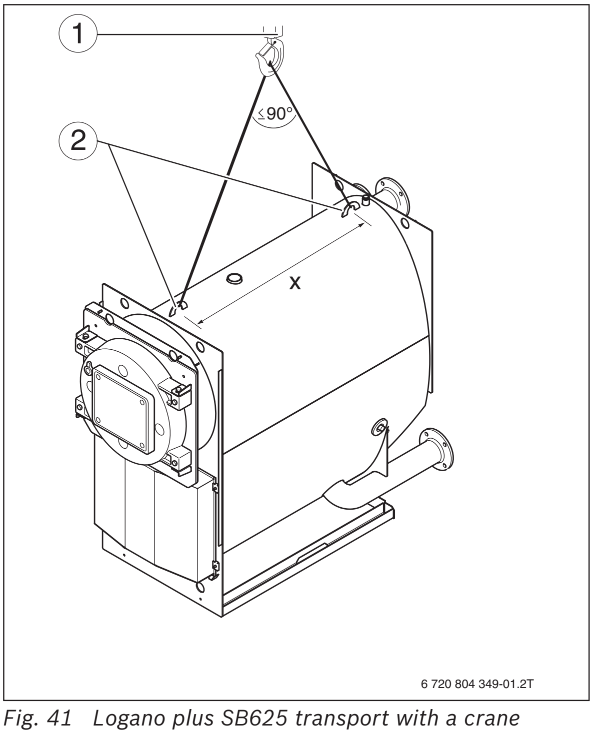


Fig. 41 Logano plus SB625 transport with a crane

[1] Crane hooks with safety mechanisms

[2] Lifting points

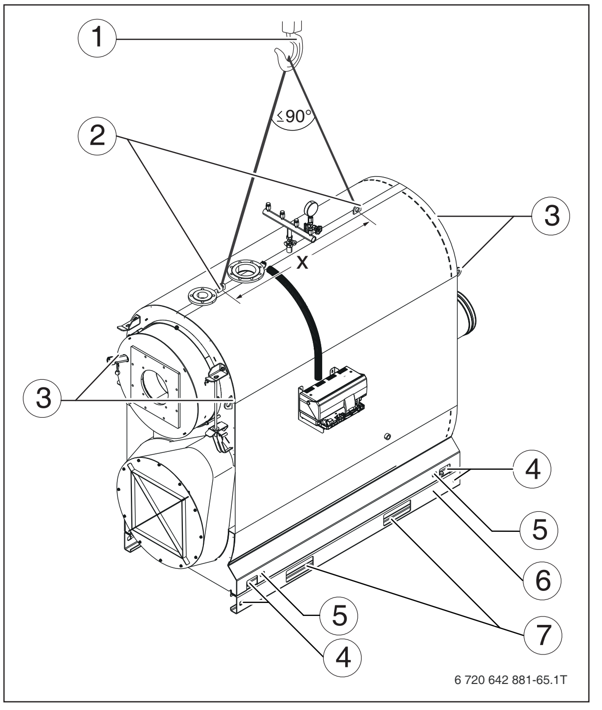


Fig. 42 Logano plus SB745 transport with a crane

[1] Crane hook

[2] Lifting points

[3] Locking lugs (not suitable for transport)

[4] Contact points for lifting with a trolley jack

[5] Towing points for tow ropes

[6] Base frame rail

[7] Contact points for lifting with a forklift truck

Floor standing condensing boiler		Logano plus SB325			
Boiler size	**Unit**	**50**	**70**	**90**	**115**
X	mm	368	368	368	368

Table 21 Distances for the transport eyes on the Logano plus SB325 floor standing condensing boiler

Floor standing condensing boiler		Logano plus SB625						
Boiler size	**Unit**	**145**	**185**	**240**	**310**	**400**	**510**	**640**
X	mm	1112	1112	1138	1138	1141	1195	1195

Table 22 Distances for the transport eyes on the Logano plus SB625 floor standing condensing boiler

Floor standing condensing boiler		Logano plus SB745		
Boiler size	**Unit**	**800**	**1000**	**1200**
X	mm	1075	1255	1255

Table 23 Distances for the transport eyes on the Logano plus SB745 floor standing condensing boiler

9.1.2 Minimum handling details

The minimum handling data in tables 24 to table 26 correspond to the delivered condition of the floor standing condensing boiler, minus the values for the burner door and flue outlet. The burner door and flue outlet (with the Logano plus SB325/615) can be removed if space for handling is tight. The minimum dimensions for width and height indicate the boiler without thermal insulation or casing.

Floor standing condensing boiler		Logano plus SB325			
Boiler size	**Unit**	**50**	**70**	**90**	**115**
Minimum length	mm	1115	1115	1115	1115
Minimum width	mm	680	680	680	680
Minimum height	mm	1215	1215	1215	1215
Minimum weight	kg	294	300	314	321

Table 24 Minimum handling data for the Logano plus SB325 floor standing condensing boilers

Floor standing condensing boiler		Logano plus SB625						
Boiler size	**Unit**	**145**	**185**	**240**	**310**	**400**	**510**	**640**
Minimum length	mm	1735	1735	1760	1760	1760	1895	1895
Minimum width	mm	720	720	790	790	790	920	920
Minimum height	mm	1340	1340	1370	1370	1570	1730	1730
Minimum weight	kg	615	620	685	705	953	1058	1079

Table 25 Minimum handling data for the Logano plus SB625 floor standing condensing boilers

Floor standing condensing boiler		Logano plus SB745		
Boiler size	**Unit**	**800**	**1000**	**1200**
Minimum length	mm	2405	2455	2455
Minimum width	mm	960	1040	1040
Minimum height	mm	1874	2052	2052
Minimum weight	kg	1510	1760	1790

Table 26 Minimum handling data for the Logano plus SB745 floor standing condensing boilers

9.2 Design of installation rooms

9.2.1 Combustion air supply

Installation rooms and gas/oil boiler installations should meet the conditions specified by the relevant national, regional or local building and fire regulations.

An adequate supply of fresh air must be ensured. We recommend designing the internal diameter of the combustion air vents in accordance with the following table. The details apply to one boiler. Take into account additional consumers of supply air (e.g. compressors) when sizing.

The Logano plus SB325, SB625 and SB745 floor standing condensing boilers are only approved for open flue operation.

Floor standing condensing boiler		Logano plus SB325			
Boiler size	Unit	50	70	90	115
Internal cross-section of vent in cm^2	mm	300	350	400	465

Table 27 Internal diameter of combustion air vents for Logano plus SB325 floor standing condensing boilers

Floor standing condensing boiler		Logano plus SB625						
Boiler size	Unit	145	185	240	310	400	510	640
Internal cross-section of vent in cm^2	mm	540	640	700	775	1175	1450	1775

Table 28 Internal diameter of combustion air vents for Logano plus plus SB625 floor standing condensing boilers

Floor standing condensing boiler		Logano plus SB745		
Boiler size	Unit	800	1000	1200
Internal cross-section of vent in cm^2	mm	2175	2675	3175

Table 29 Internal diameter of combustion air vents for Logano plus SB745 floor standing condensing boilers

Fundamental requirements

- Combustion air vents and lines must never be closed or covered if appropriate safety equipment cannot ensure that the combustion equipment can only operate when the flow cross-section is free.
- The required cross-section must not be restricted by a closure or grille.
- An adequate supply of combustion air can also be verified by other means.
- Special requirements must be followed for LPG combustion equipment.

9.2.2 Siting combustion equipment

Gas combustion equipment with a total rated heating output in excess of 100 kW may **only** be installed in rooms:

- that are not used for any other purpose
- that have no opening towards other rooms, except doors
- the doors of which are tight and self-closing **or**
- that can be ventilated.

Burners and fuel supply devices to the combustion equipment must be able to be shut down at any time by a switch (emergency stop switch) located outside the installation room. A sign reading “EMERGENCY STOP SWITCH-COMBUSTION” must be placed next to the emergency stop switch.

Notwithstanding these rules, combustion equipment may also be installed in other rooms, if:

- the use of these rooms makes this necessary and the combustion equipment can be operated safely **or**
- the rooms are in freestanding buildings that only serve to operate the combustion equipment and store the fuel.

Open flue combustion equipment must **not** be installed:

- in stairwells, except in residential buildings with no more than two apartments
- in generally accessible hallways that serve as escape routes **or**
- in garages.

in rooms with systems that extract air

Open flue combustion equipment may only be installed in rooms equipped with systems that extract air subject to the following conditions:

- simultaneous operation of the combustion equipment and the air extractor systems will be prevented by safety equipment
- the flue gas routing will be monitored by appropriate safety equipment **or**
- flue gas will be routed via the air extractor systems or it will be ensured that such systems cannot create dangerous negative pressure.

Thermally activated shut-off device

Gas combustion equipment or the fuel line directly upstream of such equipment must be fitted with a thermally activated shut-off device (TAE) (→ page 80).

9.3 Installation dimensions

To ensure condensate drainage, brick or cast concrete boiler foundations should be 5 cm to 10 cm high and correspond to the boiler dimensions, and should not reach the side walls of the installation room to prevent vibrations being transmitted through such contact. Allow extra space for measures to provide sound insulation (→ page 73 ff.). Select greater wall clearances to enable easy access for installation, maintenance and service work.

Combustion equipment and flues (for flue gas temperature up to 160 °C) must be positioned far enough away or shielded from combustible components and fitted furniture that temperatures in excess of 85 °C are safely prevented at the rated heating output. Maintain the specified minimum dimensions.

9.3.1 Installation dimensions of the Logano plus SB325 floor standing condensing boilers

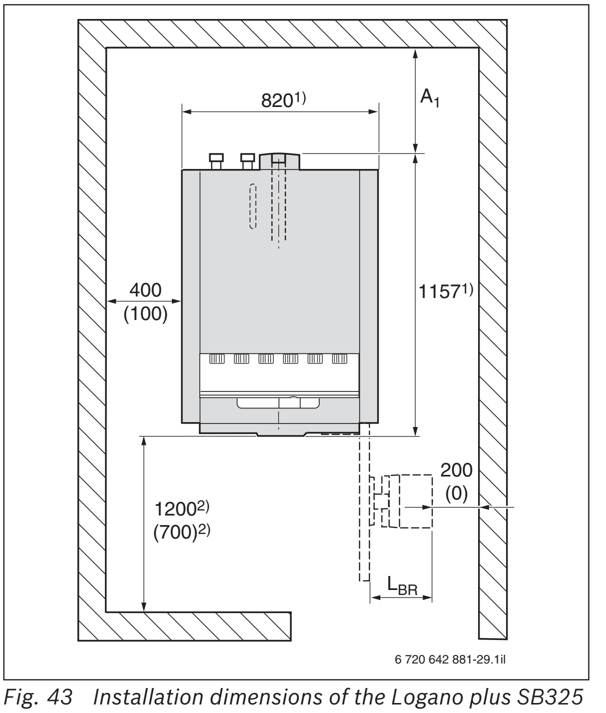


Fig. 43 Installation dimensions of the Logano plus SB325 floor standing condensing boilers (dim. in mm; figures in brackets are minimum clearances)

1) Handling dimensions are smaller (→ tab. 24 on page 64)

2) Dimensions also subject to the burner length L_{BR}

Boiler size	Clearance A_1 [mm]
50	700 (400)
70	700 (400)
90–115	760 (460)

Table 30 Recommended wall clearances for siting Logano plus SB325 floor standing condensing boilers (minimum figures in brackets)

9.3.2 Installation dimensions of the Logano plus SB625 floor standing condensing boilers

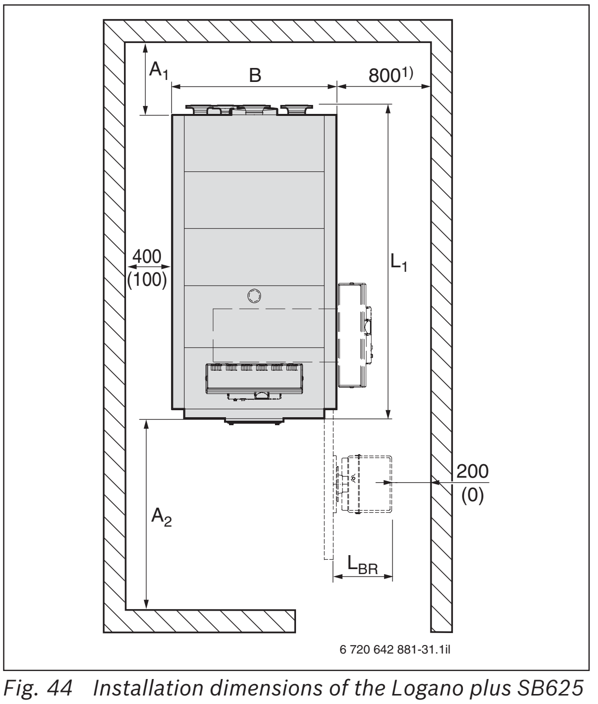


Fig. 44 Installation dimensions of the Logano plus SB625 floor standing condensing boilers (dim. in mm; figures in brackets are minimum clearances)

1) With side control unit holder (→ page 80)

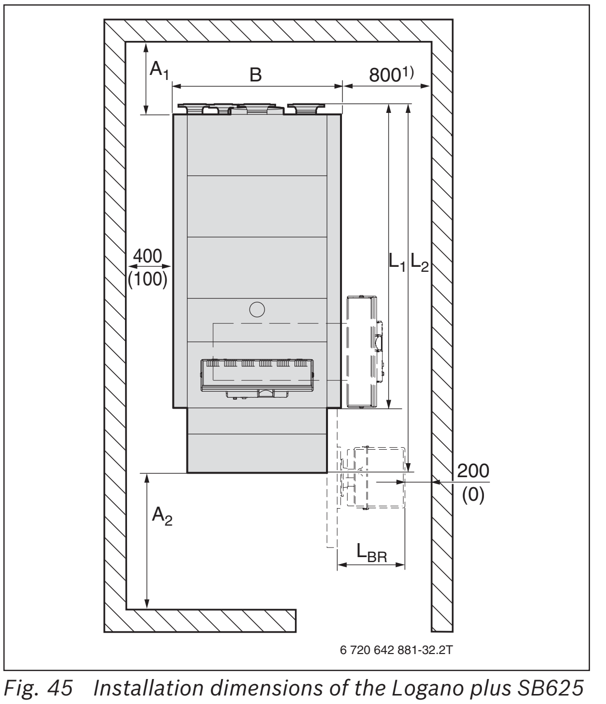


Fig. 45 Installation dimensions of the Logano plus SB625 VM floor standing condensing boilers (dim. in mm; figures in brackets are minimum clearances)

1) With side control unit holder (→ page 80)

Boiler size	Clearance A_1 [mm]	Clearance A_2 1) [mm]	Length L_1 2) [mm]	Length L_2 [mm]	Width B 2) [mm]
145–185	760 (460)	1700 (1200)	1816	2133	900
240–310	800 (500)	1700 (1200)	1845	2162	970
400	900 (600)	1750 (1250)	1845	–	970
510–640	1000 (700)	2000 (1500)	1980	–	1100

Table 31 Recommended wall clearances for siting Logano plus SB625 floor standing condensing boilers (minimum figures in brackets)

1) Dimension A_2 also subject to the burner length L_{BR}

2) Handling dimensions are smaller (→ tab. 25, page 64)

9.3.3 Installation dimensions of the Logano plus SB745 floor standing condensing boilers

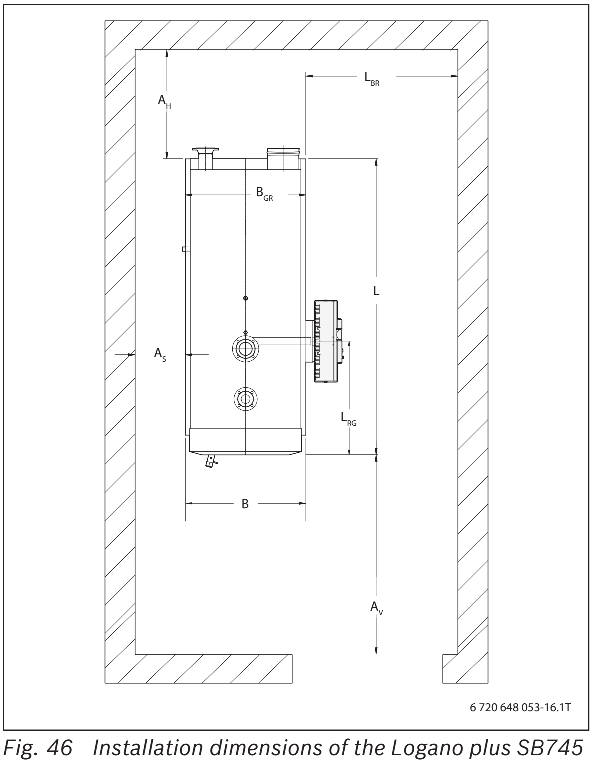


Fig. 46 Installation dimensions of the Logano plus SB745 floor standing condensing boilers (dim. in mm; figures in brackets are minimum clearances)

	Boiler size		
	800 kW	**1000 kW**	**1200 kW**
A_H[1)] [mm]	1000 (800)	1000 (800)	1000 (800)
A_V [mm] [2)3)]	1800 (900)	1800 (1100)	1800 (1100)
A_S [mm]	400 (50)	400 (50)	400 (50)
L_{BR} [mm]	Burner length + 200 (800)		
L_{RG} [mm]	906	906	906
Installation clearance control unit	906	906	906
Cable conduit	906	906	906
Length (L) foundations	2300	2300	2300
Width (B) foundations	1060	1140	1140

Table 32 Recommended wall clearances for siting Logano plus SB745 floor standing condensing boilers (minimum figures in brackets)

1) If using a flue gas silencer, take its installation dimensions into account.

2) Factor in dimension L_{BR} (burner length) subject to burner overhang

3) This dimension depends on the burner length.

9.4 Information on installation

Pipework installation

- Ensure the boiler is vented.
- In open vented systems, route pipework with a rise towards the diaphragm expansion vessel.
- Do not design reductions in the pipework in horizontal lines.
- Ensure pipework is not subject to mechanical stress.

Electrical installation

- Permanent connection required to VDE 0100, VDE 0116 and VDE 0722. It may be necessary to adhere to local regulations.
- Ensure cables and capillaries are routed carefully.

COMMISSIONING

- Check the quality of the fill and top-up water (→ page 35).
- Flush the entire heating system before filling.

Tightness test

- Carry out leak test to standard DIN 18380. The test pressure is 1.3 times the operating pressure, but should be at least 1 bar.
- In sealed unvented systems, separate the safety valve from the diaphragm expansion vessel before the pressure test.

Handover

- When handing over the system, show the user how it functions and how to operate it.
- Give the technical documentation to the user.
- Explain the maintenance conditions (→ page 32) and recommend a maintenance and inspection contract.

9.5 Additional safety equipment to DIN EN 12828

9.5.1 Low water indicator to protect against overheating

In accordance with DIN EN 12828, a low water indicator is required to protect the boiler against overheating.

Minimum pressure limiter and minimum pressure switch

DIN EN 12828 permits an approved minimum pressure limiter as an alternative to the low water indicator. In heating systems with outputs < 300 kW, a reasonably priced alternative to the low water indicator is the minimum pressure switch sold by Buderus (→ tab. 33). The Logano plus SB325 and SB625 floor standing condensing boilers up to boiler size 240 kW have a connector at the back where a minimum pressure switch can easily be installed.

For the Logano plus SB745, a minimum pressure limiter is available as an accessory, which can be fitted to a valve distributor. Both accessories are available from Buderus.

Water level limiter (low water indicator)

From boiler outputs > 300 kW, Buderus offers an affordable water level limiter for the Logano plus SB625 (→ tab. 33). For its positioning and installation, all Logano plus SB625 floor standing condensing boilers into which it could be fitted have a special connector at the top (→ page 16). Compared to the usual installation in the heating system flow, this reduces the overall installation height of the boiler. A minimum pressure limiter is available for boiler size 310 kW. It can be attached to the back of the boiler with an adaptor.

The following pieces of equipment are components of the EC type inspection. We therefore recommend that you purchase safety equipment with the boiler.

The following safety equipment is included within the boiler's type-test qualification.

Safety component	Used with boiler size	Make	Component designation
Minimum pressure switch[1)]	Boiler output < 300 kW	Fantini Cosmi B01AS1	Suitability confirmed by a test report
Minimum pressure limiter as low water indicator	Boiler output > 300 kW	Sauter DSL 143 F001	TÜV ID ...6022
Water level limiter as low water indicator	Boiler output > 300 kW	Sasserath SYR 09333.20.011	TÜV.HWB. ... .190
Maximum pressure limiter	Boiler output > 300 kW	Sauter DSH 143 F001	TÜV ID ...6023
High limit safety cut-out	general	Sauter RAK 13.5050 B	TÜV ID: 0000006982

Table 33 Approval designations of additional safety equipment in accordance with EN 12828:2003 for the Logano plus SB625 floor standing condensing boilers.

1) With fully wired connecting cable for Buderus control units, only permissible for 300 kW. For boiler sizes > 300kW, EN 12828: 2003 specifies that a low water indicator or suitable alternative, e.g. minimum pressure limiter is used.

9.5.2 Safety equipment versions

Safety equipment version	$t_R \leq$ 105 °C, high limit safety cut-out with shutdown temperature $\leq$ 110 °C to DIN EN 12828 Heat sources	
	$\leq$ 300 kW	> 300 kW
Safety equipment assembly, standard equipment level	+	+
Maximum pressure limiter	–	+
Set with STB and maximum pressure limiter	–	+[1)]
Minimum pressure limiter	–[2)]	+[2)]

Table 34 Safety equipment versions for Logano plus SB325, SB625 and SB745 floor standing condensing boilers

1) Instead of the flash trap to DIN EN 12828 in systems with $t_R \leq$ 105 °C (high limit safety cut-out 110 °C).

2) Instead of the low water indicator, or as a recommended measure for heat sources > 300 kW to DIN EN 12828 in systems with $t_R \leq$ 105 °C (high limit safety cut-out 110 °C).

+ required
– not required

9.5.3 Requirements for alternative items of safety equipment and other pieces of equipment

If using different safety equipment to the type listed in tab. 33, the following information must be observed so that the boiler's type-test qualification is not invalidated.

Safety valve requirements

Each heat source in a heating system must have at least one safety valve in order to protect the system if the maximum operating pressure is exceeded.

If the heat source is not fitted with a safety valve at the factory, this device must be installed as close to the heat source as possible.

If more than one safety valve is in use, the smaller valve must have a discharge capacity of at least 40 % of the total flow rate.

The safety valve must be designed in such a way that the total pressure created in the whole system or in parts of the system can be discharged safely.

Safety valves must fulfil the following requirements:

- The safety valves must have a minimum diameter of DN 15.
- The safety valves must open at a pressure lower than the maximum design pressure of the system. Safety valves must be able to prevent the maximum operating pressure from being exceeded by more than 10 %.
  Maximum operating pressures ≤ 3 bar may be exceeded by 0.5 bar.
- The safety valves must be installed so that the pressure loss does not exceed 3 % of the set pressure of the safety valve at the inlet line and 10 % at the outlet line.
- The safety valves must be installed in an accessible position in the immediate vicinity of the flow line of the heat source. No shut-off valve is to be placed between the heat source and the safety valve(s).
- In order to ensure that water and any steam that is produced can be drained away safely, the outlet connector of the safety valve must be designed and arranged accordingly.

Heat sources with an output of more than 300 kW must have a flash trap in the discharge pipe in the immediate vicinity of the valve.

The flash trap must be connected to a steam discharge pipe which leads outside and must have a safe water drainage pipe.

This also applies to heat exchangers where the formation of steam cannot be ruled out in the event of a system fault. A flash trap is not required if every heat source or heat exchanger has an additional temperature limiter and pressure limiter.

High limit safety cut-out requirements

- Appliances which are suitable for responding must be installed (e.g. type-tested appliances with the TÜV.STB ID... or appliances according to EN 60730-2-9 (appliance type 2) or EN 14597).
- Observe the information in chapter 5.4 when adjusting the high limit safety cut-out.
- Limiters with a time delay are not to be installed.
- The limiter is generally installed with the sensor set in the designated socket branch with a sensor pocket. The installation situation for other appliances is yet to be established. The sensor pocket is screwed in ex works.

Maximum pressure limiter requirements

- Appliances which are suitable for responding under increasing pressure must be installed (e.g. type-tested appliances with the TÜV.SDB...S... ID).
- Observe the information in the installation instructions.
- Limiters with a time delay are not to be installed.
- The limiter sits on the boiler safety assembly (→ chapter 9.5.4). Possible connection with G½ ".

Minimum pressure switch as low water indicator requirements

- Appliances which are suitable for responding under decreasing pressure must be installed (e.g. type-tested appliances with the TÜV.STB/F/... ID).
- Observe the information in the installation instructions.
- Limiters with a time delay are not to be installed.
- The limiter sits on the boiler safety assembly (→ chapter 9.5.4). Possible connection with G½ ".

Minimum pressure limiter as low water indicator requirements

- Appliances which are suitable for responding under decreasing pressure must be installed (e.g. type-tested appliances with the TÜV.STB/F/... ID).
- Observe the information in the installation instructions.
- The limiter sits on the boiler safety assembly (→ chapter 9.5.4). Possible connection with G½ ".

Water level limiter as low water indicator requirements

- Appliances which are suitable for responding with a lack of water must be installed (e.g. type-tested appliances with the TÜV.HWB... or TÜV.WB... ID).
- The low water indicator is installed on the boiler; possible connection G 2".

Burner requirements

- Oil burner certified in accordance with EN 267.
- Gas burner certified in accordance with EN 676.
- Please observe EMC and Low Voltage Directives, and other relevant European guidelines.
- Please observe the instructions in chapter 2.2.

Boiler controller

- EMC and Low Voltage Directives must be observed.
- Please observe the instructions in chapter 5.4.

9.5.4 Boiler safety valve assembly to DIN EN 12828

An intermediate flow piece and valve distributor are required to install the safety equipment at the Logano plus SB625.

- Versions: DN65/80/100/125
- Type approval number: 06-226-671

Port	H [mm]
DN65	462
DN80	500
DN100	552

Table 35 Height of the boiler safety valve assembly for the Logano plus SB625 floor standing condensing boilers

The standard delivery of the boiler safety equipment assembly includes a complete gasket set and installation instructions.

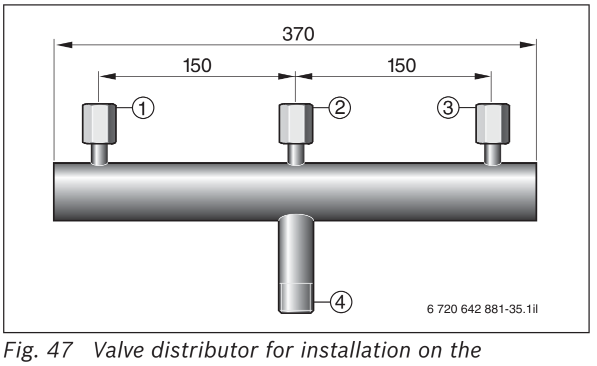


Fig. 47 Valve distributor for installation on the intermediate flow piece of the boiler safety valve assembly for the Logano plus SB625 floor standing condensing boilers (dim. in mm)

[1] Connection for maximum pressure limiter (½ ")

[2] Connection for 2nd maximum pressure limiter (½ ")

[3] Connection for pressure gauge (½ ")

[4] Connection of valve distributor and intermediate flow piece via cap valve with BDF valve (adaptor from 1" to ¾ ")

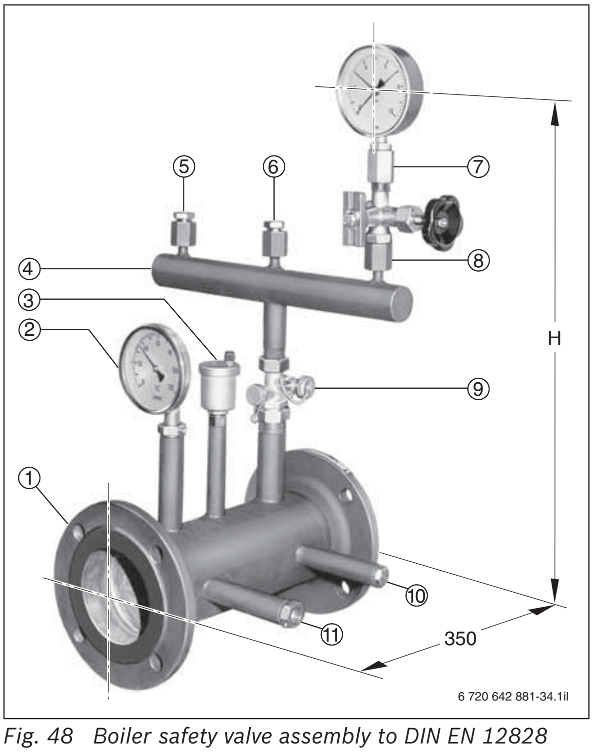


Fig. 48 Boiler safety valve assembly to DIN EN 12828 (intermediate flow piece with valve distributor and valves) for the Logano plus SB625 floor standing condensing boilers (dim. in mm)

[1] Intermediate flow piece

[2] Sensor pocket with thermometer

[3] Automatic air vent valve

[4] Valve manifold

[5] Connection for maximum pressure limiter (½ ")

[6] Connection for 2nd maximum pressure limiter (½ ")

[7] Pressure gauge shut-off valve with test device and pressure gauge

[8] Connection for pressure gauge (½ ")

[9] Connection of valve distributor and intermediate flow piece via cap valve with BDF valve (adaptor from 1" to ¾ ")

[10] Connection for temperature test device

[11] Connection for 2nd high limit safety cut-out

The Logano plus SB745 requires only a valve distributor which is fitted directly to the connector provided. The valve distributor has connections for a pressure gauge, a minimum pressure limiter and two maximum pressure limiters.

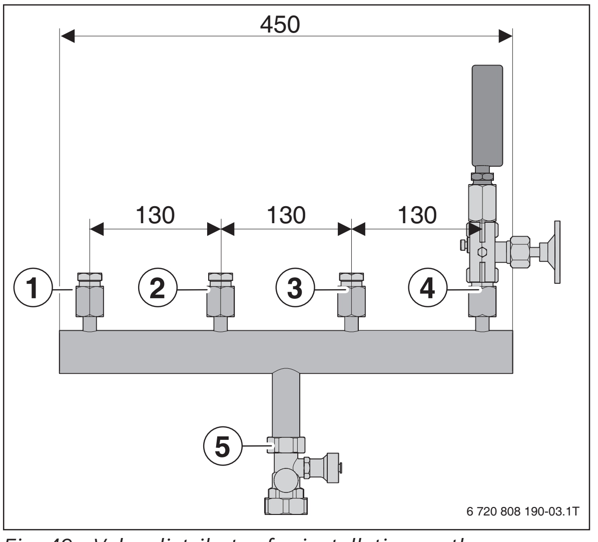


Fig. 49 Valve distributor for installation on the intermediate flow piece of the boiler safety valve assembly for the Logano plus SB745 floor standing condensing boilers (dim. in mm)

[1] Connection for maximum pressure limiter (½ ")

[2] Connection for 2nd maximum pressure limiter (½ ")

[3] Connection for minimum pressure limiter (½ ")

[4] Connection for pressure gauge (½ ")

[5] Connection of valve distributor and intermediate flow piece via cap valve with BDF valve (adaptor from 1" to ¾ ")

9.6 Accessories for sound insulation

9.6.1 Requirements

The necessity and scope of measures for sound insulation are based on the sound level and the noise disturbance this causes. Buderus offers three devices for sound insulation that are specially suited to floor standing condensing boilers, and can be supplemented with additional on-site sound insulation measures.

On-site measures include fixing the pipework to attenuate structure-borne noise, compensators in the connection lines and flexible connections with the building. The devices for sound insulation require extra space, which should be factored in at the planning stage.

9.6.2 Burner silencer hoods from Buderus

Burner silencer hoods reduce the intake and combustion noises of pressure-jet oil and gas burners which are created due to turbulence and pressure fluctuations in the combustion chamber. They reduce the airborne noise generated by the burner and reduce the sound pressure level in the installation room from between 10 dB(A) and 18 dB(A) (total level).

In order to ensure effective sound insulation, burner silencer hoods must always be combined with other sound insulation measures, e.g. anti-vibration boiler supports or flue gas silencers.

The burner silencer hood from Buderus consists of a sheet steel casing which fully surrounds the burner. The combustion air is drawn in by the burner via a large, sound-insulated duct. Nonetheless, the combustion values must be checked with and without the burner silencer hood to be able to make any necessary corrections to the burner settings.

The connection to the boiler is made without gaps, with anti-vibration foam seal and lockable castors. Height adjustable base with castors enables precise adjustments to the relevant boiler/burner combination, and easy access to the burner for installation work and maintenance.

Burner silencer hoods from Buderus are both functional and specially colour-matched to Buderus boilers. They can be used for all common pressure-jet oil and gas burners (→ Fig. 50).

The choice of burner silencer hood is guided by both the dimensions of the burner and the boiler used (→ page 74).

When designing the installation room, allow extra space for the burner silencer hood. This means the space required in front of the boiler to remove the burner silencer hood. However, this is usually already factored in because of the access required for cleaning the boiler.

In order for the burner silencer hood to function securely, the fuel line must be soundproofed. The sealing material is delivered with the burner silencer hood.

Fig. 50 Oil burner silencer hood

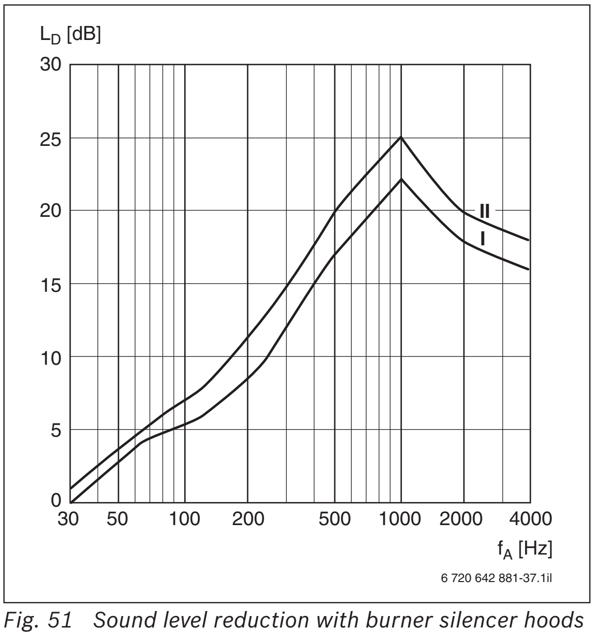


Fig. 51 Sound level reduction with burner silencer hoods from Buderus (dimensions → page 74)

f_A Frequency
L_D Sound level reduction (sound insulation)
I Burner silencer hood SH I
II Burner silencer hood SH II

Dimensions of burner silencer hoods from Buderus

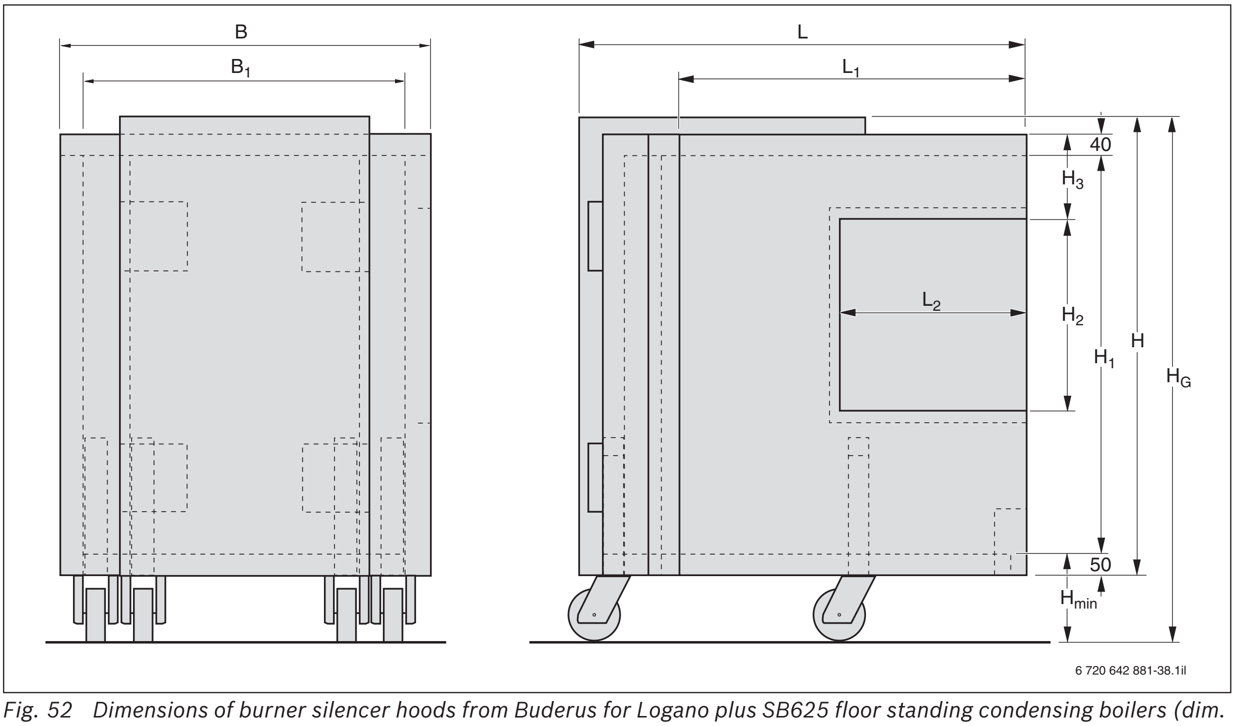


Fig. 52 Dimensions of burner silencer hoods from Buderus for Logano plus SB625 floor standing condensing boilers (dim. in mm)

Size of hood	Logano plus floor standing condensing boiler (boiler size)	Length			Height					Width		Weight
		L [mm]	L1 [mm]	L_2 [mm]	H_1 [mm]	H_2 [mm]	H_3 [mm]	H_G [mm]	H_{min} [mm]	B [mm]	B_1 [mm]	(approx.) [kg]
SH I	**SB625 (145–400)**	850	650	350	710	350	110	900	110	600	520	77
SH II a	**SB625 (510–640)**	1150	900	400	920	590	330	1140	120	800	720	127
Special sizes	**SB745 (800–1200)**	Technical explanation (dimensions) is essential as this is a special version Details → current catalogue of large heat sources/applications, accessories for burner silencer hoods										

Table 36 Dimensions and boiler allocation of burner silencer hoods from Buderus for Logano plus SB625 and SB745 floor standing condensing boilers

In addition to the silencer hoods, connectors must be ordered separately for all floor standing condensing boilers (accessory part number: 80423200).

9.6.3 Boiler supports to prevent the transmission of structure-borne noise, and sound insulation strips

Boiler supports to attenuate structure-borne noise prevent the transmission of structure-borne noise to the foundation and the building, and are used in combination with the Logano plus SB325 and SB625. They are channel sections, into which Ω-shaped longitudinal attenuation brackets are inserted (→ Fig. 53). The longitudinal attenuation brackets are made of spring steel and are coated with an anti-drumming mass to prevent the radiation of air-borne noise. When a load is applied, they are compressed by approx. 5 mm.

When designing boiler supports to attenuate structure-borne noise, bear in mind that the installation height of the boiler and therefore the position of the pipework connections can vary. To compensate for the spring deflection of the longitudinal attenuation brackets and to further minimise sound transmission via the water connections, we also recommend installing pipe compensators in the heating water lines.

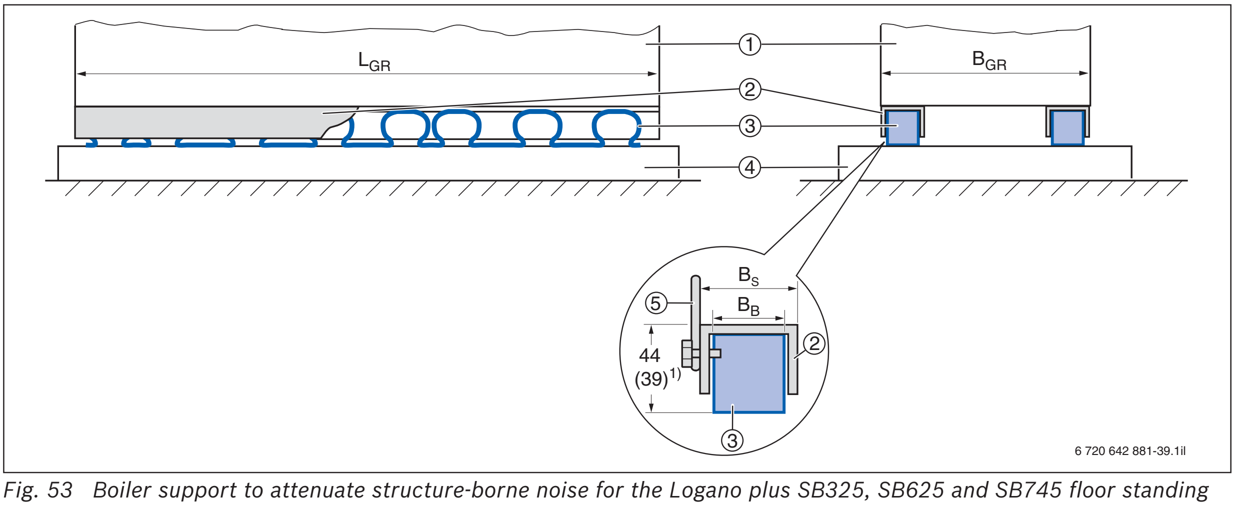


Fig. 53 Boiler support to attenuate structure-borne noise for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers (dim. in mm)

[1] Boiler
[2] Channel section
[3] Longitudinal attenuation bracket
[4] Foundation
[5] Side catch
1) When subject to a load

The standard delivery of the Logano plus SB745 includes special sound insulation strips to attenuate structure-borne noise which are made from 12 mm thick polyurethane (→ Fig. 54).

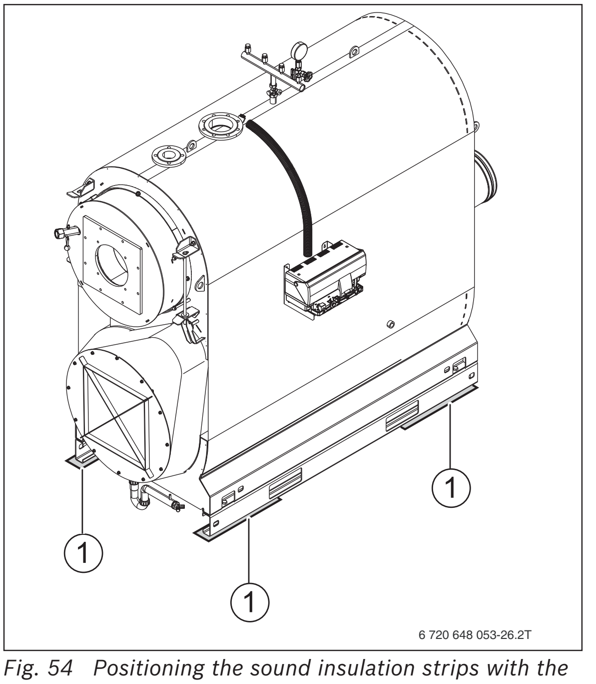


Fig. 54 Positioning the sound insulation strips with the Logano plus SB745

[1] Position of the sound insulation strips

Logano plus floor standing condensing boiler	Boiler size	Channel section		Dimensions of longitudinal insulation bracket/sound insulation strip			Weight
		Length L_{GR} [mm]	Width B_S [mm]	Width B_{GR} [mm]	Quantity × length [pce × mm]	Width B_B [mm]	[kg]
SB325	**50–115**	600	60	650	4 × 250	30	7.9
SB625	**145–185**	1140	60	690	2 × 312.5 + 2 × 500	30	12.2
	240–310	1140	60	760	2 × 312.5 + 2 × 500	30	12.2
	400	1140	60	760	4 × 500	30	12.7
	510–640	1140	60	890	4 × 500	50	12.7
SB745[1)]	**800**	–	–	–	4 × 640	55	–
	100/1200				4 × 790	55	

Table 37 Dimensions of the boiler supports to attenuate structure-borne noise for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers

1) The sound insulation strips are laid flush with the front and back of the boiler, below the base frame of the Logano plus SB745. Sound insulation strips which prevent the transmission of structure-borne noise are included in the boiler standard delivery.

9.6.4 Flue gas silencer

A large proportion of the noise caused by combustion can be transferred via the flue system to the building. The flue gas silencer (→ Fig. 55) reduces the sound level in the flue pipe by approx. 10 dB(A). The pressure drop is 10 Pa to 15 Pa and should be taken into consideration when sizing the flue system.

If stringent requirements are made of the sound insulation, we recommend a splitter flue gas silencer. This enables a sound level reduction of approx. 30 dB(A).

Only use flue gas silencers made from corrosion resistant stainless steel in condensing systems. Flue gas silencers should be selected according to the internal diameter of the flue gas connection on the boiler and according to the max. flue gas mass flow rate where applicable.

Stainless steel flue gas silencer with condensate drain

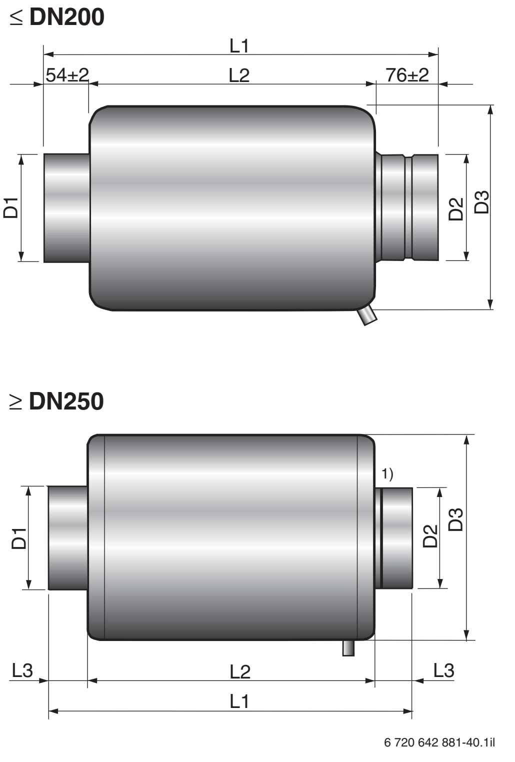


Fig. 55 Stainless steel flue gas silencer with condensate drain pipe for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers (dim. in mm)

[1)] Only with silencers for the flue: bead in the connector with additional pipe clip and gasket

Flue gas silencer		Unit	Type of flue gas silencer 150	180	200	250	300	350
Flue pipe connection		–	DN150	DN180	DN200	DN250	DN300	DN350
Measurements	L1	mm	467	600	600	834	984	1134
	L2	mm	337	470	470	700	850	1000
	L3	mm	–	–	–	67	67	67
	D1 internal	mm	150	180	200	250	300	350
	D2 external	mm	149.7	179.7	199.7	249.5	299.5	349.5
	D3	mm	252	302	302	450	500	550
Weight		kg	4.1	6.8	6.9	28.7	38.5	49.8
Insertion loss	63 Hz	dB	4.4	11.3	7.7	3.7	3.3	2.4
	125 Hz	dB	5.1	9.6	6.9	4.4	5.3	3.6
	250 Hz	dB	6.8	9.2	8.5	10.2	10.2	11.9
	500 Hz	dB	10.2	12.5	13.6	14.0	18.9	24.7
	1000 Hz	dB	14.7	18.6	19.9	19.3	23.6	23.3
	2000 Hz	dB	20.8	25.3	22.8	12.3	15.9	12.7

Table 38 Dimensions and specification for stainless steel flue gas silencers for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers

Splitter flue gas silencer

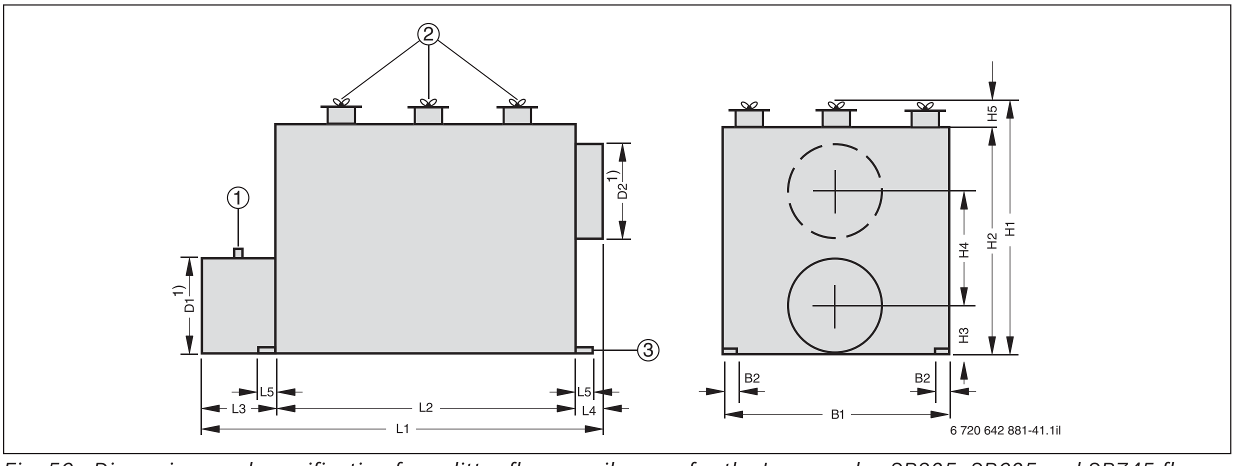


Fig. 56 Dimensions and specification for splitter flue gas silencers for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers

[1] Female connection for testing emissions

[2] Inspection apertures

[3] Steel plates for fastening

1) D1 and D2 depend on the diameter of the connection lines

Splitter flue gas silencer		Unit	Type of flue gas silencer 180	200	250	300	350	400
Flue pipe connection		–	DN150–180	DN180–200	DN200–250	DN250–300	DN300–350	DN350–400
Max. rated heating output		kW	150	250	500	800	1200	1750
Max. flue gas mass flow rate		kg/s	0.07	0.12	0.23	0.37	0.55	0.80
Measurements	L1	mm	854	954	1106	1156	1306	1406
	L2	mm	554	654	806	856	1006	1106
	L3	mm	200	200	200	200	200	200
	L4	mm	100	100	100	100	100	100
	L5	mm	75	75	75	75	75	75
	B1	mm	454	504	606	856	956	1106
	B2	mm	40	40	40	40	40	40
	H1	mm	535	580	680	930	1030	1180
	H2	mm	460	504	606	856	956	1106
	H3	mm	92	102	128	153	178	203
	H4	mm	220	250	300	500	550	650
	H5	mm	75	75	75	75	75	75
Material thickness		mm	2	2	3	3	3	3
Weight		kg	50	60	110	180	240	330
Pressure Drop		Pa	30	50	70	80	90	100

Table 39 Dimensions and specification for stainless steel splitter flue gas silencers for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers

Splitter flue gas silencer		Unit	Type of flue gas silencer 180	200	250	300	350	400
Attenuation	32 Hz	dB	4	5	7	9	9	9
	63 Hz	dB	7	8	10	10	10	10
	125 Hz	dB	14	15	18	24	25	25
	250 Hz	dB	25	28	28	29	29	29
	500 Hz	dB	> 30	>30	>30	>30	>30	>30
	1000 Hz	dB	> 30	>30	>30	>30	>30	>30

Table 39 Dimensions and specification for stainless steel splitter flue gas silencers for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers

9.7 Further accessories

9.7.1 Side control unit holder

For the Logano plus SB625 floor standing condensing boilers, a side control unit holder is available as an accessory for the Logamatic 4211, 4212, 4321 and 4322. For the Logano plus SB745, the side control unit holder and a cable conduit are included in the standard delivery. The side holder enables the control units to be operated more conveniently at eye level. It can be fitted on the right or left hand side (→ Fig. 57 and 58).

If the side control unit holder is used, order a longer burner cable (burner cable for stage 2) as additional equipment.

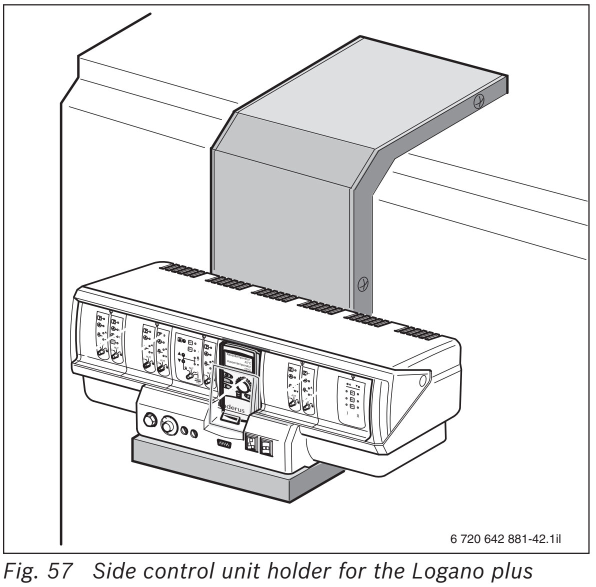


Fig. 57 Side control unit holder for the Logano plus SB625 floor standing condensing boiler

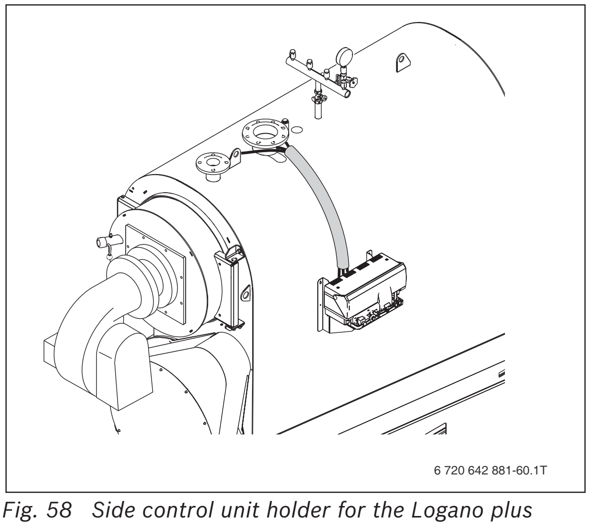


Fig. 58 Side control unit holder for the Logano plus SB745

9.7.2 Cleaning equipment set

The cleaning equipment set consists of a brush with a brush rod, and is used to clean the secondary heating surface and combustion chamber of the boiler.

In the standard version, the brush rod is a single piece and is of a suitable size for the boiler.

If access is awkward, shorter brush rods are available, e.g. 1 m long.

9.7.3 Gas leak protection

For the Logano plus SB625 VM floor standing gas condensing boiler, a gas leak protection device is included in the standard delivery of the Logatop VM4.0/5.0.

9.7.4 Thermally activated shut-off device (TAE)

For the SB625 VM floor standing gas condensing boilers, a thermally activated shut-off device (TAE) is available as an accessory and must be ordered separately. The Logano plus SB625 and SB745 Unit versions already include a TAE in the burner standard delivery.

A thermally activated shut-off device meets the requirements of the Technical Regulations for Gas Installations (DVGW-TRGI) [Germany] and the Combustion Order FeuVO [Germany], para. 4, section 6. The TAE seals the gas systems below sufficiently tightly for at least 60 minutes up to a temperature of 925 °C.

9.7.5 Flue pipe sealing collar

Buderus offers a suitable flue pipe sealing collar to provide a safe connection for positive pressure between the flue outlet of the Logano plus SB325, SB625 and SB745 floor standing condensing boilers and the flue connection pipe (→ Fig. 59).

The flue pipe sealing collar is easy to install and will prove robust. It provides a reliable seal, is resistant to condensate and is permanently suitable for flue gas temperatures up to 200 °C.

- Versions: DN150/180/200/250/300/350

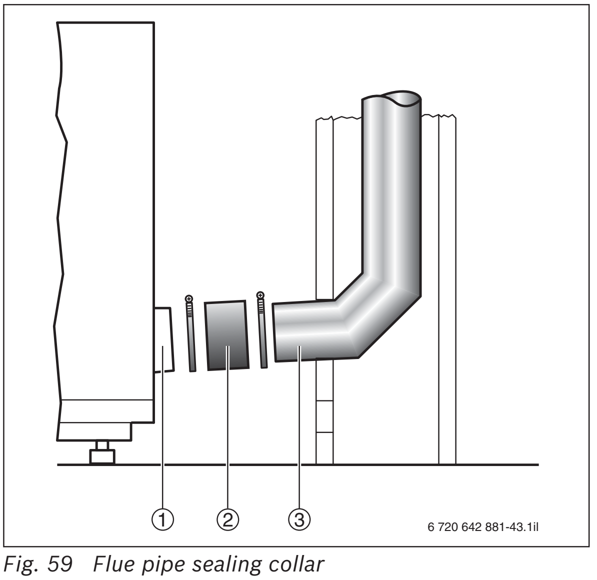


Fig. 59 Flue pipe sealing collar

[1] Boiler flue outlet

[2] Flue pipe sealing collar

[3] Flue connection pipe or flue gas silencer

10 Flue system

10.1 Requirements

10.1.1 Standards, regulations and directives

Flues must be resistant to moisture, flue gas and corrosive condensate.

The following are the applicable technical rules and regulations in this context:

- The relevant Building Regulations and Fire Regulations.
- DIN 15417 and 15034 Floor standing residential conventional boilers; floor standing condensing boilers for gaseous fuels.
- DIN EN 13384-1 Calculating chimney dimensions
- DIN 18160-1, 18160-2, 18160-5 and 18160-6 Domestic chimneys.

10.1.2 General notes

Implementing the following recommendations concerning the installation of flue systems should guarantee trouble-free operation of the combustion system. Failure to observe these requirements can result in substantial operating problems during combustion and may even result in explosions.

These are frequently acoustic disturbances, compromised combustion stability or excessive vibrations on components or their assemblies. Low NOx combustion systems are to be viewed as being more sensitive to operating faults on account of their combustion control. Therefore, engineer and implement the flue system with particular care.

The flue system consists of a connection piece between the heat source and the vertical flue system itself (chimney).

When sizing and implementing the flue system, comply with the following requirements:

- Size flue systems in accordance with the respective national and local regulations and applicable standards.
- When selecting the material for the flue system, take into account the composition and temperatures of the flue gas to prevent damage and contamination of the system components that are in contact with flue gas.
- Only flue systems, which are approved for a flue gas temperature of at least 120 °C, may be used.
- Route the flue gas as directly as possible to the chimney considering the best possible flow characteristics (e.g. short, rising, and with the fewest possible bends). Provide a separate chimney flue for each boiler. Take the thermal expansion of the system into account.
- Implement deflections in the connection pieces as favourably as possible where flow is concerned by using bends or deflector plates. Connection pieces with several deflections should be avoided, as they would have a detrimental effect on air-borne and structure-borne noise as well as the start-up pressure hammer. Prevent sharp-edged joints between rectangular connection flanges and the connection

pipe. As with any reductions/expansions that may be required, the angle of the joint should not exceed 30°.
- Where possible, connection pieces should be joined to the chimney in such a way as to optimise the flow and provide an incline (at an angle less than 45°). Any terminal pieces at the chimney outlets must ensure the free discharge of flue gas into the open air.
- Any condensate must be able to drain freely over the entire length and be treated and drained off in accordance with local regulations.
- Provide inspection apertures in accordance with local regulations, if necessary after discussion with the local authorising body (e.g. flue gas inspector).
- The chimney must be separated from the boiler (e.g. with compensators) to prevent the transfer of structure-borne noise.
- If a flue gas damper is installed in the flue system, integrate an “OPEN” limit switch into the boiler control system for safety reasons. Combustion must only be able to start when the feedback from the limit switch confirms that the flue gas damper is fully open. A temperature drop inside the boiler is possible on account of the time it takes the actuator to move the damper into position. Set the “CLOSE” limit position at the flue gas damper in such a way that it never closes fully. This prevents damage to the fitted burner through heat build up.
- The pressure at the flue gas connector of the boiler must not exceed a negative pressure of 15 Pa in order to prevent problems with the combustion (start behaviour).

As a basis for calculation and for sizing the flue system, apply the details in table 40 to table 42 on page 83 ff. The requirements for the flue system and flue gas routing can be derived from the results of the calculation and must be discussed with the local flue gas inspector prior to constructing the heating system.

10.1.3 Material requirements

- The flue material must be resistant to the flue gas temperatures that can occur. It must be resistant against moisture and acidic condensate. Stainless steel and plastic flues are suitable.
- Flues are categorised according to the maximum flue gas temperature for which they are suitable (80 °C, 120 °C, 160 °C and 200 °C). The flue gas temperature can be below 40 °C. Moisture-resistant chimneys must therefore also be suitable for temperatures below 40 °C. All suitable flues must be approved by the “Deutsches Institut für Bautechnik” in Berlin.
- Generally, protection should be provided by a high limit safety cut-out when a heat source is combined with a flue designed for low flue gas temperatures. This requirement can be disregarded as it has been verified that the maximum permissible flue gas temperature of 120 °C for category B flues is not exceeded for the Logano plus SB325, SB625 and SB745 floor standing condensing boilers.
- Positive pressure is likely to occur inside the flue system since condensing boilers operate with positive pressure. If the flue system is routed through occupied rooms, install it in a chimney shaft with secondary ventilation along the entire length. The chimney shaft must be compliant with relevant local fire regulations (→ page 65).
- With chimneys that are not designed for positive pressure, the draught must not be more than 0 Pa at the chimney inlet.

10.1.4 Plastic flue system

Flue systems matched to the floor standing gas condensing boilers are available for positive pressure operation up to DN315. These flue systems are made from polypropylene (PP). They have building regulation approval [Germany] for flue gas temperatures up to 120 °C. All systems are supplied ready to plug in; no welding is required.
Special boiler connection pieces are available to connect to the boiler.

Legal requirements

When designing a flue system, consult the responsible flue gas inspector. This inspector must approve the flue system.

Approval

The products in the flue system meet the requirements of EN 14471 and, even if the installation is different from the system certification, can be used in accordance with national usage regulations and the product specifications on the CE certificate 0036 CPD 9169 003.

The flue is suitable for:
- Positive/negative pressure
- Gas, standard/low sulphur fuel oil EL and fuel oil EL A Bio
- Maximum permissible flue gas temperature 120 °C
- Designation categories
  Single wall: EN 14471 T120 H1 O W2 O20 I D L
  Concentric: EN 14471 T120 H1 O W2 O00 E D L0

Chimney shaft requirements

Inside buildings, flue systems must be run through a chimney shaft (not required in adequately ventilated installation rooms). This must be made from non-combustible rigid material.

Required fire resistance time:
- 90 minutes (fire resistance category F90)
- 30 minutes (fire resistance category F30, in single storey buildings).

Any existing chimney that has been in use before must be cleaned professionally and thoroughly prior to running the flue into it. This applies particularly to chimneys that are operated in conjunction with combustion equipment for solid fuel.

Minimum chimney shaft dimensions

Flue pipe internal diameter	Minimum chimney shaft dimensions	
	Round chimney shaft [mm]	Rectangular chimney shaft [mm]
DN110	Ø 160	140 × 140
DN125	Ø 180	180 × 180
DN160	Ø 200	200 × 200
DN200	Ø 250	250 × 250
DN250	Ø 330	310 × 310
DN315	Ø 400	380 × 380

Table 40 Minimum chimney shaft dimensions for the available plastic flue systems

Sizing the plastic flue system

Tables 41 and 42 facilitate the sizing of the plastic flue system for the general conditions described. If the general conditions differ, a detailed calculation is possible.

Sizing plastic flue systems – flue in shaft

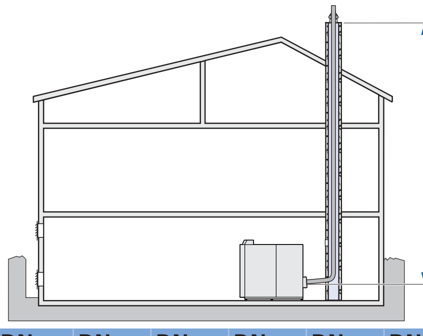
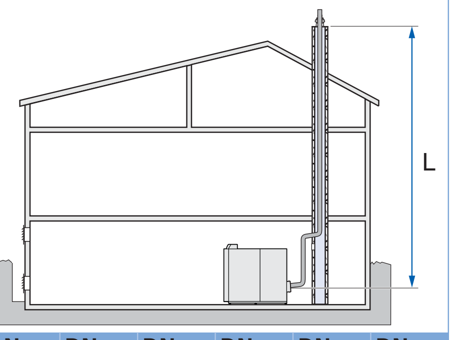
Floor standing condensing boiler		Maximum permissible effective height of the flue L in m											
		Version 1[1]						Version 2[2]					
													
Logano plus[3]	**Boiler size**	**DN 110**	**DN 125**	**DN 160**	**DN 200**	**DN 250**	**DN 315**	**DN 110**	**DN 125**	**DN 160**	**DN 200**	**DN 250**	**DN 315**
SB325 BE[4]	**50**	18	36	–	–	–	–	11	31	–	–	–	–
	70	18	40	–	–	–	–	11	33	–	–	–	–
SB325	**50**	50	–	–	–	–	–	50	–	–	–	–	–
	70	31	50	–	–	–	–	27	50	–	–	–	–
	90	14	38	50	–	–	–	10	34	50	–	–	–
	115	5	19	50	–	–	–	–	14	50	–	–	–
SB625	**145**	–	7	50	–	–	–	–	–	50	–	–	–
SB625 VM	**185**	–	–	39	50	–	–	–	–	33	50	–	–
	240	–	–	16	50	–	–	–	–	9	50	–	–
	310	–	–	–	50	–	–	–	–	–	50	–	–
	400	–	–	–	20	50	–	–	–	–	10	50	–
	510	–	–	–	–	50	–	–	–	–	–	50	–
	640	–	–	–	–	34	–	–	–	–	–	20	–

Table 41 Internal diameter and effective height of flues in a chimney shaft according to the requirements of DIN EN 13384-1 ("–" means that requirements to DIN EN 13384-1 are not met)

1) Basis for calculation:
- Total length of the connection piece ≤ 1.0 m
- Effective height of the connection line ≤ 0.1 m

2) Basis for calculation:
- Total length of the connection piece ≤ 2.5 m
- Effective height of the connection line ≤ 1.5 m

3) Plastic flue systems for Logano plus SB745 on request

4) Unit version with Logatop BE-A oil burner from Buderus

Sizing plastic flue systems – flue without shaft

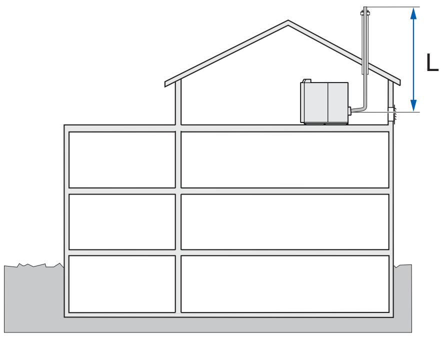
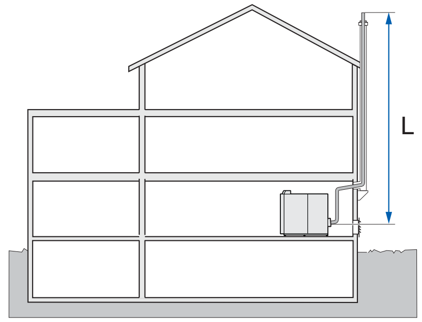
Floor standing condensing boiler		Maximum permissible effective height of the flue L in m									
		Version 3[1] Attic heating					Version 4[2] Facade system				
											
Logano plus[3]	**Boiler size**	**DN 110**	**DN 125**	**DN 160**	**DN 200**	**DN 250**	**DN 110**	**DN 125**	**DN 160**	**DN 200**	**DN 250**
SB325 BE-A[4]	**50**	18	36	–	–	–	11	31	–	–	–
	70	18	40	–	–	–	11	33	–	–	–
SB325	**50**	50	–	–	–	–	41	–	–	–	–
	70	31	50	–	–	–	31	50	–	–	–
	90	14	38	50	–	–	11	42	50	–	–
	115	5	19	50	–	–	–	16	50	–	–
SB625	**145**	–	7	50	–	–	–	–	50	–	–
SB625 VM	**185**	–	–	39	50	–	–	–	40	50	–
	240	–	–	16	50	–	–	–	9	50	–
	310	–	–	–	50	–	–	–	–	50	–
	400	–	–	–	20	50	–	–	–	10	50
	510	–	–	–	–	50	–	–	–	–	50
	640	–	–	–	–	34	–	–	–	–	23

Table 42 Internal diameter and effective height of flues without a chimney shaft according to the requirements of DIN EN 13384-1 ("–" means that requirements to DIN EN 13384-1 are not met)

1) Basis for calculation:
- Total length of the connection piece ≤ 1.0 m

2) Basis for calculation:
- Total length of the connection piece ≤ 2.5 m
- Effective height of the connection line ≤ 1.5 m

3) Plastic flue systems for Logano plus SB745 on request

4) Unit version with Logatop BE-A oil burner from Buderus

11 Condensate drain

11.1 Condensate

11.1.1 Creation

When fuels containing hydrogen are burned, water vapour condenses in the condensing heat exchanger and flue system. The volume of condensate created per kilowatt hour is determined by the ratio of carbon to hydrogen in the fuel. The condensate volume depends on the return temperature, the amount of excess air during combustion and the loading of the heat source.

11.1.2 Condensate line

Route the condensate from condensing boilers correctly into the public sewage system. It is crucial to determine whether the condensate must be neutralised prior to induction into the sewer system. This is subject to the boiler output (→ tab. 43). In Germany, the Code of Practice DWA-A 251 of the Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e.V (DWA) applies for the calculation of the condensate accumulation rate per annum. This Code of Practice lists a specific amount of condensate as an empirical value of no more than 0.14 kg/kWh for gas and 0.08 kg/kWh for fuel oil.

$$V_K = Q_F \cdot m_K \cdot b_{VH}$$

F. 4 Precise calculation of the volume of condensate created per year

b_{VH} Hours of full utilisation (to VDI 2067) in h/a

m_K Specific condensate volume in kg/kWh (assumed density ρ = 1 kg/l)

$\dot{Q}_F$ Rated heat input of the heat source in kW

$\dot{V}_K$ Condensate flow rate in l/a

It is advisable to gather relevant information about local regulations for routing condensate into the sewer system well before installation takes place. The local water supply utility is the responsible body for questions concerning waste water.

Boiler output	**Neutralisation for natural gas and low sulphur fuel oil EL**
≤ 25 kW	no[1]
> 25 to ≤ 200 kW	no[1,2]
> 200 kW	yes

Table 43 Neutralising obligation for floor standing condensing boilers

1) Condensate neutralisation is required when draining the domestic waste water into a small treatment plant in accordance with DIN 4261-1, and for buildings and properties with drain lines which do not meet the material requirements of the Code of Practice DWA-A 251.

2) Condensate neutralisation is required for buildings where the requirement of adequate admixing with domestic waste water (at a ratio of 1:20) is not met.

11.2 Neutralising systems for gas

11.2.1 Installation

If the condensate needs to be neutralised, neutralising system NE 0.1, NE 1.1 or NE 2.0 can be used. Install these between the condensate drain pipe from the floor standing gas condensing boiler and the connection to the public sewage system. Site the neutralising system behind or adjacent to the floor standing gas condensing boiler. To enable the condensate to drain freely, install the neutralising system at the same height as the floor standing gas condensing boiler. As an alternative, it can also be installed at a lower height.

Design the condensate hose in accordance with DWA Code of Practice A 251 using suitable materials, e.g. polypropylene plastic.

Dimensions and connections	**Unit**	**Neutralising system**		
		NE 0.1	**NE 1.1**	**NE 2.0[1]**
Width	mm	300	405	545
Depth	mm	400	605	840
Height	mm	220	234	275
Inlet	–	DN19[2]	DN20	DN40/DN20[3]
				161
Height	mm	43	180	
Sequence	–	DN19[2]	DN20	DN20
Height	mm	102	180	92
Drain	–	–	–	DN20

Table 44 Dimensions and connections of NE 0.1, NE 1.1 and NE 2.0

1) Weight in operating condition approx. 60 kg

2) With union nut G1"

3) Option for hose connection

11.2.2 Equipment level

Neutralising system NE 0.1

- Plastic enclosure with a chamber to hold the neutralising granulate
- Drainage option to further route the condensate downstream of the NE 0.1 must be ensured.

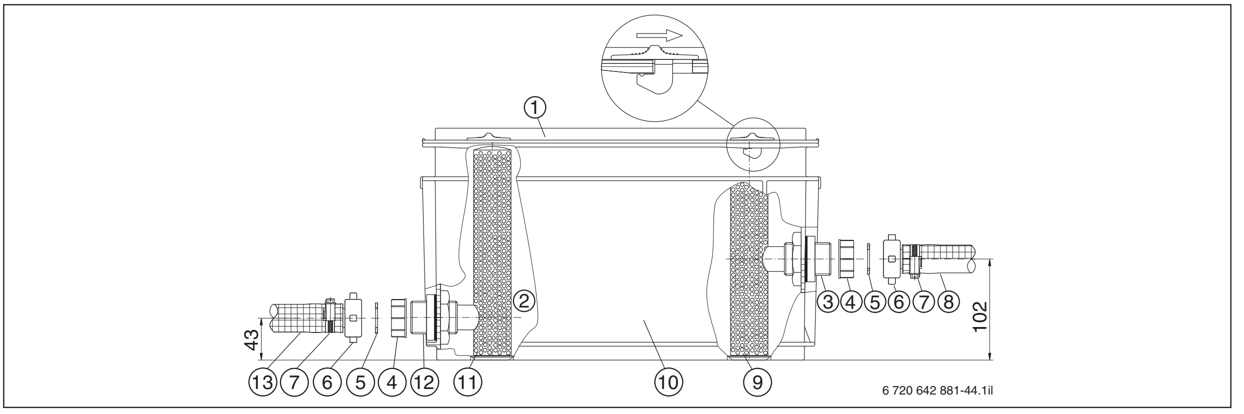


Fig. 60 Neutralising system NE 0.1 (dim. in mm)

[1] Cover
[2] Fill chamber with neutralising granulate (10 kg)
[3] Drain connector G1"
[4] Protective cap
[5] Flat gasket d 30 × 19 × 2 mm
[6] Hose ferrule DN19 with union nut G1"
[7] Hose clip d 20-32 mm
[8] Drain hose DN19, 1.0 m long
[9] Filter pipe
[10] Neutralising box with lid
[11] Filter pipe
[12] Inlet connector G1"
[13] Inlet hose DN19, 1.5 m long

Neutralising system NE 1.1

- Plastic enclosure with one chamber for the neutralising granulate and a collection area for the neutralised condensate
- Level-controlled condensate pump (head approx. 2 m)

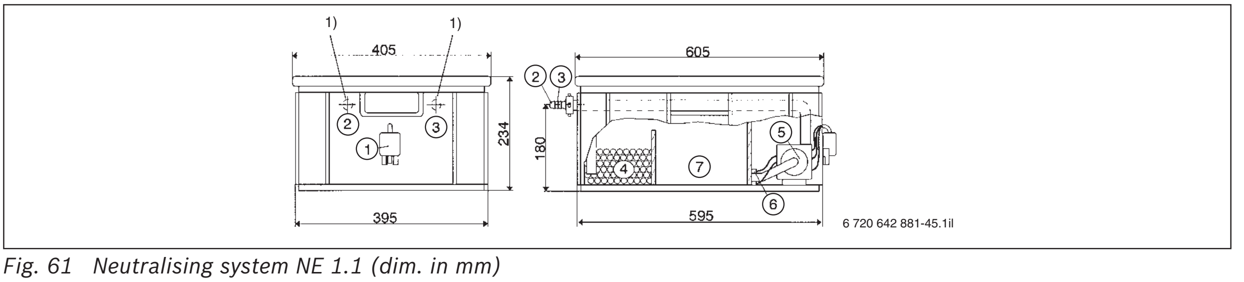


Fig. 61 Neutralising system NE 1.1 (dim. in mm)

[1] Connection plug
[2] Condensate inlet
[3] Condensate drain
[4] Neutralising granulate
[5] Condensate pump
[6] Pressure switch for starting and stopping the condensate pump plus additional pressure switch for switching off the burner if the maximum level has been exceeded
[7] Condensate collection area
1) DN20 (¾ " threaded hose fitting)

Neutralising system NE 2.0

- Plastic enclosure with separate chambers for the neutralising agent and the neutralised condensate
- Level-controlled condensate pump (head approx. 2 m), can be extended with a pressure raising module (head approx. 4.5 m)
- Integral control PCB for monitoring and service functions:
  - Burner safety shutdown in conjunction with Logamatic control units from Buderus
  - Overflow protection
  - Display for changing the neutralising granulate

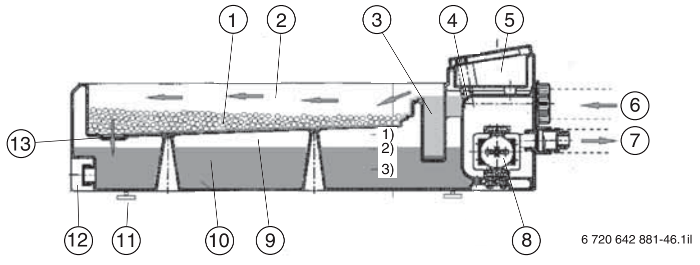


Fig. 62 Neutralising system NE 2.0

[1] Neutralising granulate
[2] Granulate tray
[3] Sludge chamber
[4] Level electrodes
[5] Control unit
[6] Condensate inlet
[7] Condensate drain
[8] Condensate pump
[9] Condensate collection area
[10] Neutralised condensate
[11] Foot bolts
[12] Drain
[13] Drain hole
1) alarm
2) maximum
3) minimum

11.2.3 Neutralising agent

Fill the neutralising system with neutralising granulate (→ tab. 45). Through contact between the condensate and the neutralising agent, the condensate pH value will be raised to between 6.5 and 10. At this pH value, the neutralised condensate can be introduced into the domestic waste water system. How long one filling of granulate remains effective depends on the amount of condensate and the neutralising system. Replace the spent neutralising granulate when the pH value of the neutralised condensate falls below 6.5.

Floor standing gas condensing boiler Logano plus	Boiler size	Neutralising system Type	Fill volume [kg]
SB325	**50–115**	NE 0.1	10
		NE 1.1 1)	9
SB625	**145–640**	NE 0.1 1)	10
		NE 1.1 1)	9
		NE 2.0 2)	7.5
SB745	**800**	NE 0.1	10
		NE 1.1	9
		NE 2.0 2)	11.5
	1000–1200	2 x NE 0.1 1)	10
		2 × NE 1.1	9 of each
		NE 2.0	11.5 17.5 3)

Table 45 Fill volumes of neutralising systems for the Logano plus SB325, SB625 and SB745 floor standing gas condensing boilers

1) Without self-monitoring
2) With self-monitoring
3) For rated heating output > 1000 kW

Neutralising system NE 0.1

Check the pH value at least twice a year. The granulate filling usually lasts for one year.

Neutralising system NE 1.1

Check the pH value at least twice a year. The granulate filling usually lasts for one year.

Neutralising system NE 2.0

A self-monitoring device is integrated in neutralising system NE 2.0. When the “granulate change” indicator lights up, the granulate must be replaced within one month.

11.2.4 Pump output graph

The head of the condensate pump is determined by the volume of condensate. The graph in Fig. 63 shows the head of neutralising systems NE 1.1 and NE 2.0 subject to the pump rate. If the pressure raising module is used for neutralising system NE 2.0, the heads are added together, as two pumps with the same characteristics are connected downstream of one another.

When calculating the actual pump head, take the pipework pressure loss on the pressure side into consideration.

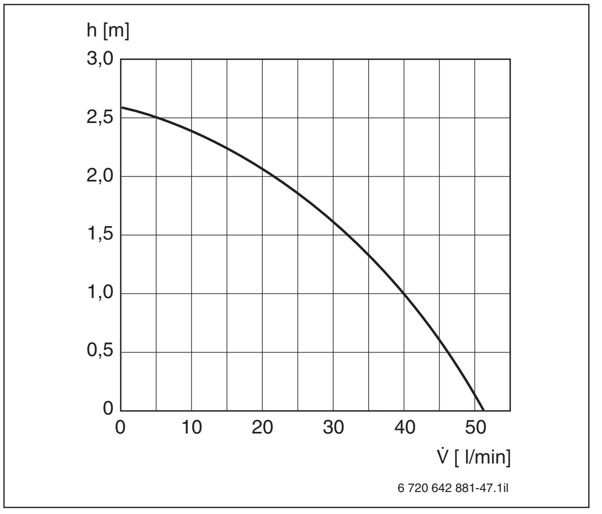


Fig. 63 Pump output graph for neutralising systems NE 1.1 and NE 2.0

[h] Residual head
[V̇] Flow rate

11.3 Neutralising systems for fuel oil

11.3.1 Installation

If the condensate needs to be neutralised, neutralising system RNA-E1, RNA-E2 or RNA-E3 can be used. Install these between the condensate drain pipe from the floor standing oil condensing boiler and the connection to the public sewage system.

Site the neutralising system behind or adjacent to the floor standing oil condensing boiler. To enable the condensate to drain freely, install the neutralising system at the same height as the floor standing oil condensing boiler. As an alternative, it can also be installed at a lower height.

Design the condensate hose in accordance with DWA Code of Practice A 251 using suitable materials, e.g. polypropylene plastic.

11.3.2 Equipment level

Neutralising system RNA-E1

- Liquid neutralisation with two pumps
- Two chambers positioned one above the other, and an external canister containing the neutralising liquid

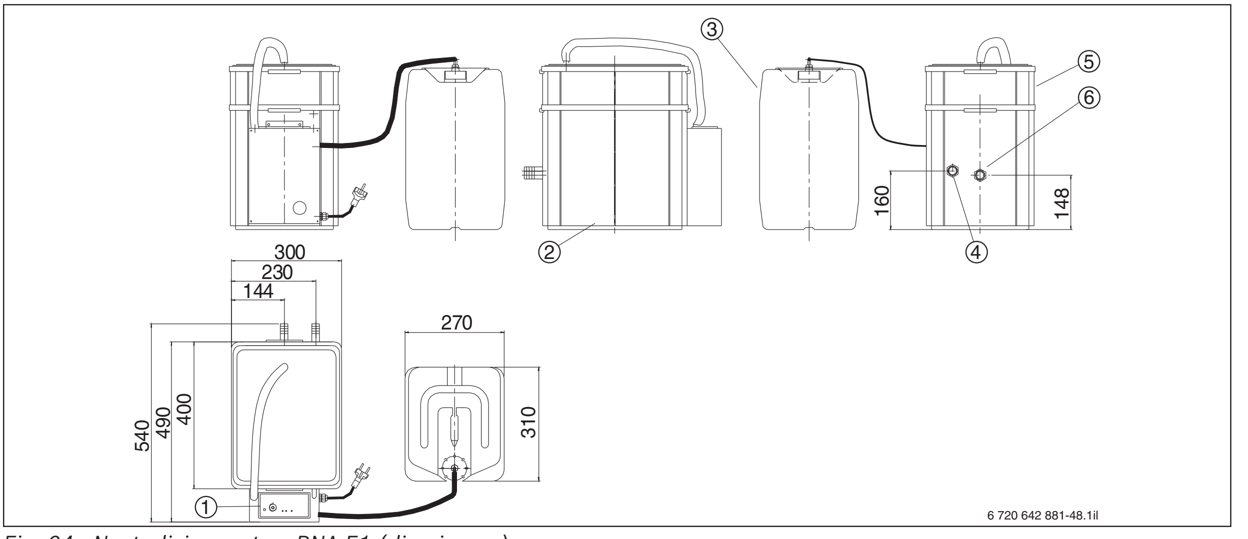


Fig. 64 Neutralising system RNA-E1 (dim. in mm)

[1] Control unit
[2] Basic container
[3] Canister (30 l) with pH raiser
[4] Condensate inlet Da 25
[5] Filter container
[6] Condensate outlet Da 25

Neutralising system RNA-E2

- Liquid neutralisation with two pumps
- Two chambers positioned one above the other, and an external canister containing the neutralising liquid

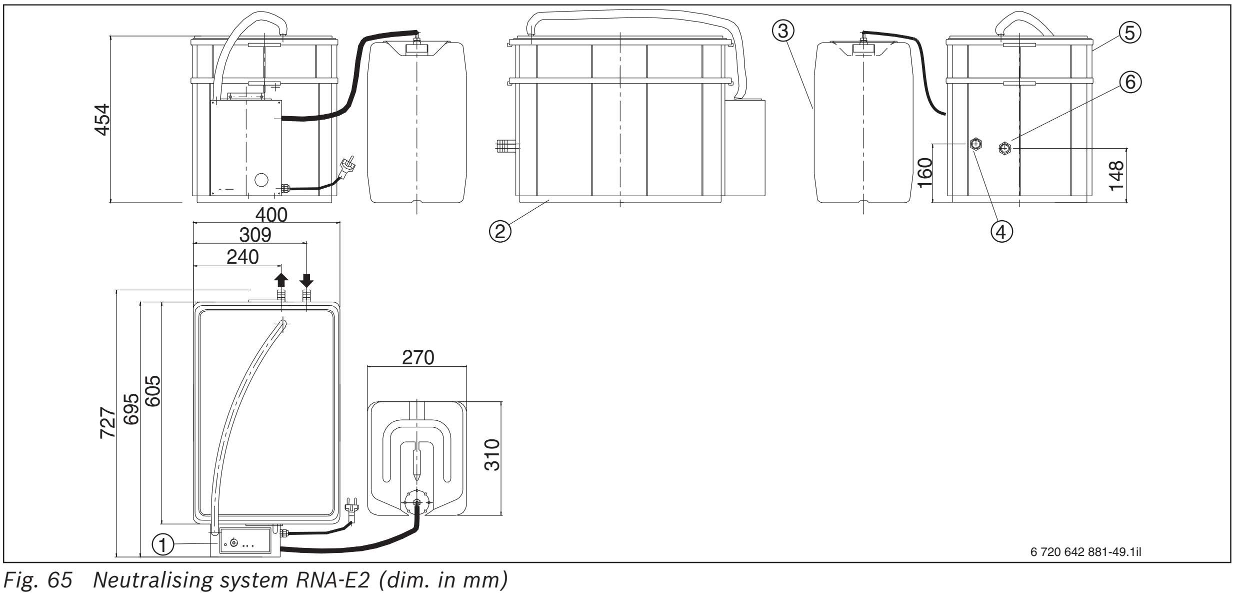


Fig. 65 Neutralising system RNA-E2 (dim. in mm)

[1] Control unit
[2] Basic container
[3] Canister (30 l) with pH raiser
[4] Condensate inlet Da 25
[5] Filter container
[6] Condensate outlet Da 25

Neutralising system RNA-E3

- Liquid neutralisation with two pumps
- Two chambers positioned one above the other, and an external canister containing the neutralising liquid

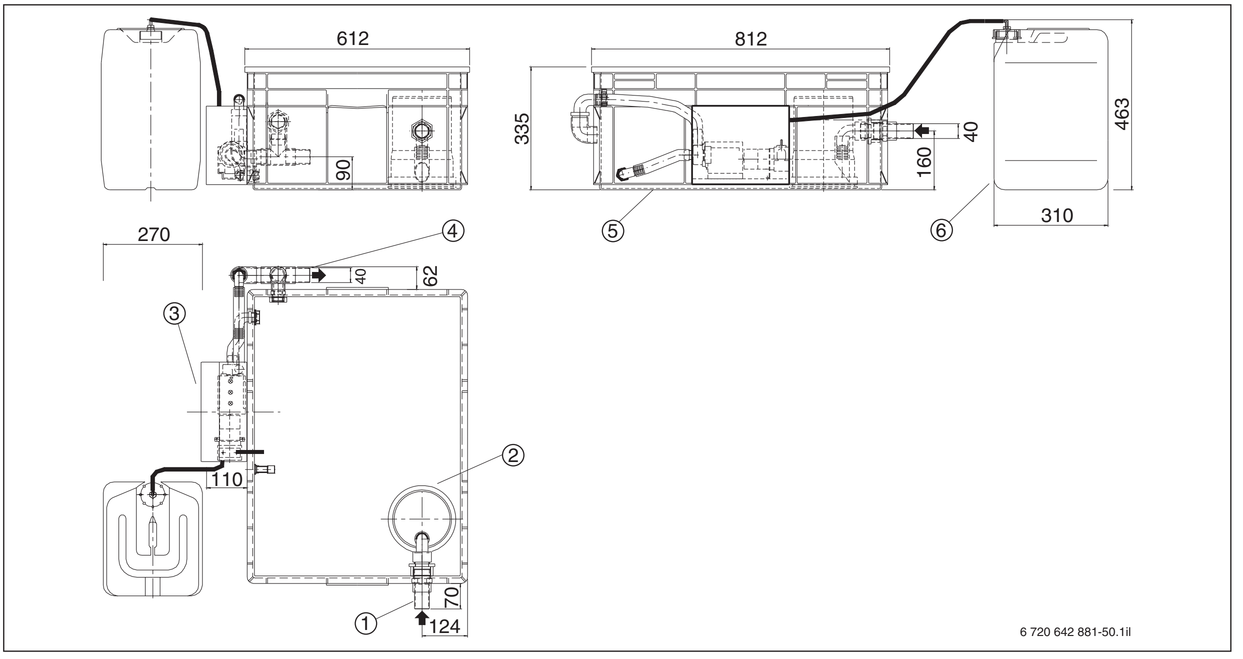


Fig. 66 Neutralising system RNA-E3 (dim. in mm)

[1] Condensate inlet Da 40
[2] Siphon
[3] Control unit
[4] Condensate outlet Da 40
[5] Basic container
[6] Canister (30 l) with pH raiser

11.3.3 Allocation of neutralising systems

Floor standing oil condensing boiler Logano plus	Boiler size	Neutralising system Type
SB325	50–115	RNA-E1
SB625	145–400	RNA-E1
	510–640	RNA-E2
SB745	800–1000	RNA-E2
	1000–1200	RNA-E3

Table 46 Allocation of neutralising systems for the Logano plus SB325, SB625 and SB745 floor standing oil condensing boilers

Keyword index

Notes

Notes

6 720 808 856 (2013/08)
Subject to technical modifications.

Bosch Thermotechnik GmbH
Sophienstrasse 30-32
D-35576 Wetzlar
www.buderus.com

Buderus