Technical guide

Gas-fired condensing boiler

Logano plus

KB372

Buderus

Heatingsystems with a future.

Table of Contents

1 Gas condensing boiler with aluminium heat exchanger

1.1 Types and ratings

Fig. 1 Logano plus KB372 with Logamatic MC110 (left) and Logamatic 5000 (right)

The Logano plus KB372 is a gas condensing boiler. It is available in the boiler sizes 75, 100, 150, 200, 250 and 300 kW, as single boiler or as factory-prepared 2-boiler cascade, and can thus cover a performance range of 15.5 kW ... 600 kW.
The gas condensing boiler can be operated with the control system Logamatic EMS plus or Logamatic 5000.

The new Logano plus KB372 is the perfectly suited for exchanging existing boilers and thus for modernising a system. An integration in existing systems is first of all economically beneficial for planning. With its low weight and modular boiler concept, the boiler can be placed and installed in almost any location. Its low pressure drop and further advantageous characteristics allow for easy integration in complex heating systems.

The Logano plus KB372 is a boiler acc. to EN 15502, and is intended for heating of buildings and DHW heating. It can be operated with a maximum flow temperature of 95 °C and a temperature difference flow – return (ΔT) of 8 to 50 K. Combined with an especially low water-side pressure drop of < 50 mbar, it can be easily integrated in a system, in most cases, no separation of the system is necessary for integration.
Typical designs, such as e.g. an operating temperature 90/70 °C in old buildings can easily be achieved with the Logano plus KB372. Even though the effect of heating value is hardly used, the efficiency is, compared to a low-temperature boiler, higher by about 6 %. In order to make use of the full effect of heating value, heating surfaces should be designed to low operating temperature when modernising a building.

In addition, the Logano plus KB372 is available as left-hand and right-hand versions, this allows for optimum access for mechanical cleaning of the heat exchanger, independently of the existing installation conditions. Thanks to the left-hand and right-hand designs, combined with a variable flue gas routing, very high flexibility for planning and installation is possible.

1.2 Possible applications

The Logano plus KB372 gas condensing boiler is suitable for all heating systems compliant with DIN EN 12828. Preferred areas of application are central heating and DHW heating in larger rental housing complexes, office buildings, industrial sites and public institutions.

The gas condensing boiler can also be delivered as 2-boiler cascade with entirely factory-prepared pipework. As cascade solution, the Logano plus KB372 is suitable for larger systems.

The gas condensing boiler can be optimally operated with the control system Logamatic 5000. Thus, it is suitable for complex medium-sized and large heating systems in apartment building and for industrial systems. For simple systems, the design with Logamatic EMS plus control system is sufficient.

1.3 Benefits in brief

- Excellent price/performance ratio
- Simple system design without low loss header due to very low water-side pressure drop and high ΔT
- Inexpensive operation due to high efficiency and low power consumption
- Compact and light construction, consequently small installation space
- Easy transportation and easy and rapid installation; burner tested at factory at operating temperature, therefore ready for use.
- Extended application range through balanced flue operation, quiet burner and cascade operation
- Easy and quick maintenance/service through large cleaning apertures[1)] for boiler block and condensation pan – simple disassembly of burner
- Matching Buderus system technology, e.g. matching flue gas and ventilation air accessories for easy, rapid installation
- Logamatic EMS plus and Logamatic 5000 control systems for convenient operation of the boiler and system as well as easy monitoring via the Service Diagnostic System (SDS)
- Delivery of boiler with natural gas H. Simple conversion to natural gas L without additional accessories is possible.

1) Access optionally from right or left (must be specified with order)

1.4 Features and benefits

Advanced boiler concept
- Heat exchanger made from high grade aluminium-silicon sand casting
- Compact design and low weight
- Highly reduced water-side resistance for optimised and simple system technology
- With quiet modulating gas premix burner
- Low power consumption through variable speed fan
- Easy servicing due to combinable control systems and well-conceived overall boiler concept
- With digital boiler and burner control units
- Suitable for new installations and modernisation projects

Balanced flue
- Optional balanced flue operation possible (accessories)

High standard seasonal efficiency [to DIN] and economic viability
- An optimum heat exchanger made of cast aluminium and a well-conceived boiler concept with low water-side resistances lead to maximum system efficiency and low investment and power costs. The boiler can be integrated directly into the system.

Advanced burner technology
- Modulating operation with digital combustion management
- Very easy conversion to other gas types with only a few steps
- Modulation range
  - 75 kW: 22 ... 100 %
  - 100 kW: 17 ... 100 %
  - 150 kW: 16 ... 100 %
  - 200 kW: 18 ... 100 %
  - 250 kW: 17 ... 100 %
  - 300 kW: 17 ... 100 %

Matching system equipment
- Cascade solutions via control system Logamatic EMS plus and Logamatic 5000
- matching flue gas and air supply systems

Scope of delivery

The Logano plus KB372 is delivered with a control unit, which is assigned when ordering, in 3 packaging units.

Packaging unit	Component	Packaging
1 (boiler)	Floor standing boiler installed (with gas burner, without casing)	1 shrink-wrap package, on a pallet
	Adjustable foot	1 shrink-wrap package
	Conversion cover to L or LL-Gas Label for gas type conversion	1 shrink-wrap package
	Technical documents	1 shrink-wrap package
2 (separate)	Casing	2 boxes, on a pallet
3 (separate)	Control unit	1 carton

Table 1 Scope of delivery

2 Technical description

2.1 Logano plus KB372 gas condensing boiler

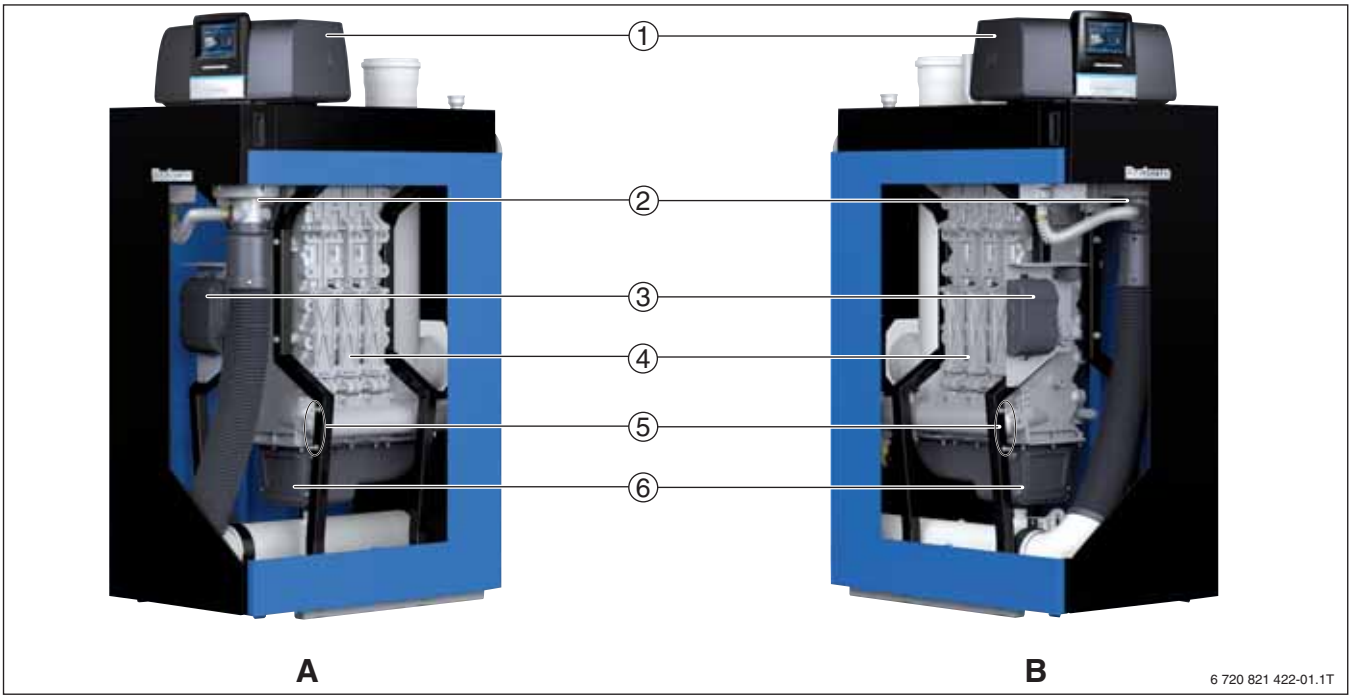


Fig. 2 Logano plus KB372 with Logamatic 5000

A Right-hand version
B Left-hand version

[1] Control system Logamatic 5000 or Logamatic EMS plus
[2] Variable speed combustion air fan
[3] Circuit breaker combustion automatic cutout SAFe
[4] High performance aluminium heat exchanger
[5] Maintenance position for modulating gas premix burner at 75°... 150 kW (integrated burner sled for 200 ... 300 kW)
[6] Large, well accessible inspection aperture in condensate pan

The Logano plus KB372 is a floor standing gas condensing boiler with a high grade aluminium-silicon heat exchanger. Its modulating gas premix burner, with a modulation range of up to 1:6, enables clean combustion and quiet operation. Optimum matching to the required heat output is achieved by the large modulation range. Optional balanced flue operation is possible via an additional accessories set RLU. Optimised heating surfaces and specific water routing aid the achievement of high standard seasonal efficiency and very low pressure drop on the water side.

The gas condensing boilers of the Logano plus KB372 product line are tested to DIN EN 677 and are CE-designated (CE-0085C S0098).

Thanks to the left-hand and right-hand designs, combined with a variable flue gas routing, very high flexibility for planning and installation is possible.

2.2 Delivery method

Rapid installation and easy, quick connection to the heating system is possible, since the Logano plus KB372 is delivered with mounted boiler and the burner is tested at factory at operating temperature.
The Logano plus KB372 is factory-preset to natural gas E (H gas, G20), a conversion to natural gas LL (L gas, G25) is easily possible on site with the conversion kit included in the delivery. The operation with LPG is possible with a conversion kit (accessory).

The factory-prepared cascade solution is delivered in modules. This consists of 2 boilers, a hydraulic connecting lead, including high-efficiency thermal insulation, and the standard kit flue gas cascade.

For optimum operational reliability and durability, the flue gas cascade is designed as a negative pressure flue gas cascade requiring no additional components (butterfly valves). A design for positive pressure can be achieved with the conversion kit for positive pressure operation (accessory).

2.3 Dimensions and specification Logano plus KB372 – single boiler

2.3.1 Dimensions – single boiler

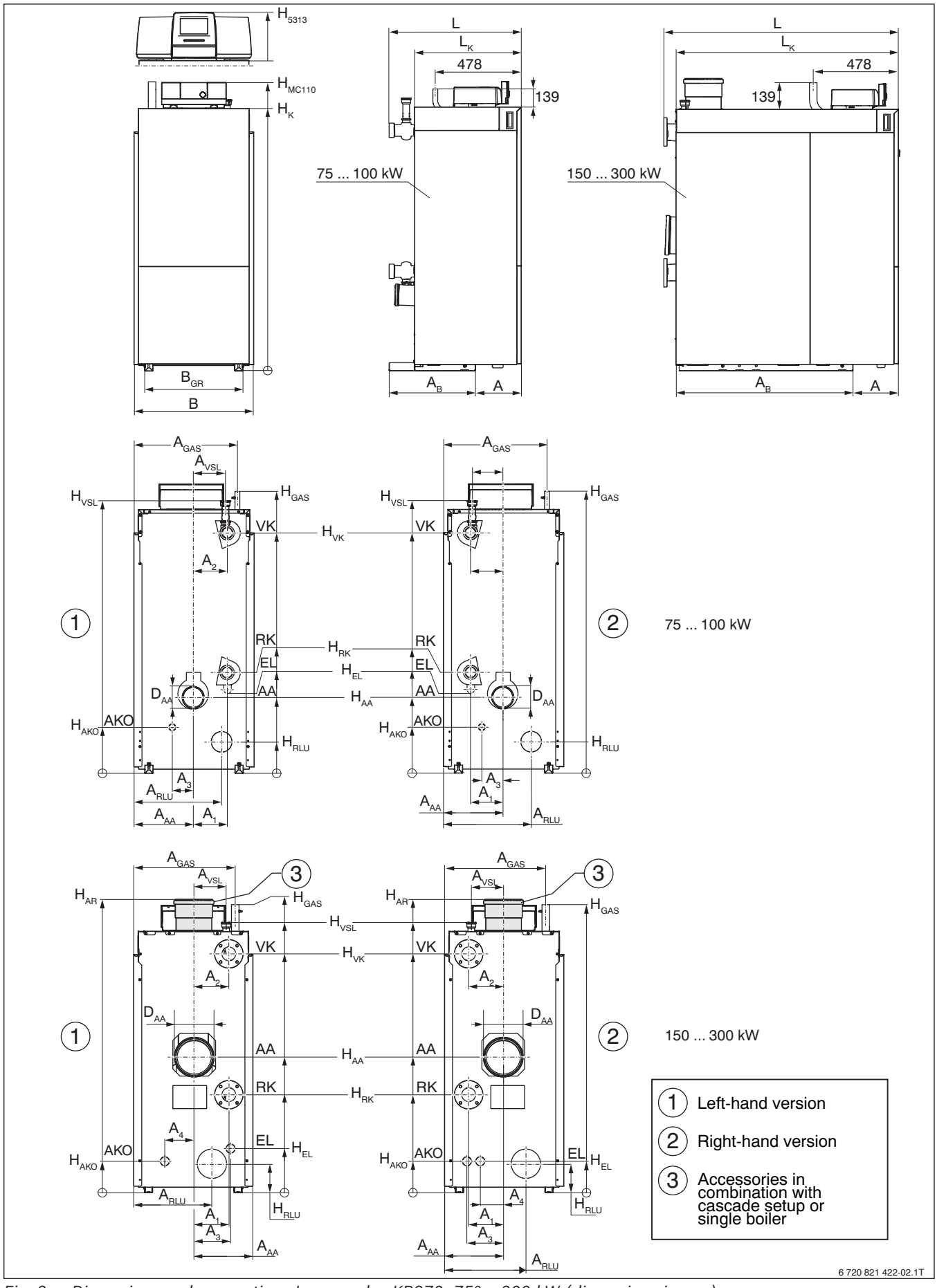


Fig. 3 Dimensions and connections Logano plus KB372, 75°... 300 kW (dimensions in mm)

[1] Left-hand version
[2] Right-hand version
[3] Accessories in combination with cascade setup

A Clearance
A_1 Boiler return clearance
A_2 Boiler flow clearance
A_3 Drain clearance
A_4 Condensate outlet clearance
A_{AA} Flue gas connection clearance
A_B Base frame width
A_{GAS} Clearance gas connection
A_{RLU} Combustion air connection clearance
A_{VSL} Safety pipe flow clearance
AA Flue gas outlet
AKO Condensate connection
B Width of boiler including casing
B_{GR} Base frame width
D_{AA} Inside Ø of flue gas outlet
EL Cold water inlet/drain

H_{5313} Control unit height Logamatic 5313
H_{MC110} Control unit height Logamatic MC110
H_{AA} Flue outlet height
H_{AKO} Condensate outlet height
H_{GAS} Gas connection height
H_{EL} Drain height
H_K Boiler height
H_{RK} Boiler return (low temperature return) height
H_{RLU} Combustion air connection height
H_{VK} Boiler flow height
H_{VSL} Flow safety pipe height
L Length of boiler including casing
L_K Boiler length
VK Boiler flow
VSL Safety valve and flow safety line connections (for open vented systems)

		Boiler size (output in kW)											
	Unit	75[1]	75[2]	100[1]	100[2]	150[1]	150[2]	200[1]	200[2]	250[1]	250[2]	300[1]	300[2]
Clearance A	mm	255	255	255	255	255	255	255	255	255	255	255	255
Dimension A_1	mm	520	150	520	150	534	135	534	135	534	135	534	135
Dimension A_2	mm	520	150	520	150	534	135	534	135	534	135	534	135
Dimension A_3	mm	515	155	515	155	520	183	520	126	520	126	520	126
Dimension A_4	mm	223	214	223	214	215	201	215	201	215	201	215	201
Dimension A_{AA}	mm	340	330	340	330	340	330	339	330	339	330	339	330
Dimension A_B	mm	480	480	480	480	695	695	977	977	977	977	977	977
Dimension A_{GAS}	mm	576	576	576	576	569	569	569	569	569	569	569	569
Dimension A_{RLU}	mm	500	500	500	500	475	475	475	475	475	475	475	475
Dimension A_{VSL}	mm	510	160	510	160	520	150	520	150	520	150	520	150
RLU connection	mm	110	110	110	110	110	110	160	160	160	160	160	160
Internal flue gas outlet Ø AA	mm	110	110	110	110	160	160	200	200	200	200	200	200
Condensate connection	inch (DN/mm)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)	¾ (DN20)
Connection Ø VSL	inch	R 1	R 1	R 1	R 1	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼
Connection Ø GAS	inch	R ¾	R ¾	R ¾	R ¾	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼	R 1 ¼
Connection VK and RK	Inch (DN/mm)	2"[3]	2"[3]	2"[3]	2"[3]	DN 50[4]	DN 50[4]	DN 65[4]	DN 65[4]	DN 65[4]	DN 65[4]	DN 65[4]	DN 65[4]
Width B	mm	670	670	670	670	670	670	670	670	670	670	670	670
Width B_{GR}	mm	550	550	550	550	550	550	550	550	550	550	550	550
Height $_{5313}$	mm	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710
Height$_{MC110}$	mm	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612	1612
Height H_K	mm	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470
Height H_{AA}	mm	424	424	424	424	700	700	763	763	763	763	763	763
Height H_{AKO}	mm	257	257	257	257	177	177	177	177	177	177	177	177
Height H_{EL}	mm	455	455	455	455	280	177	280	177	280	177	280	177
Height H_{RLU}	mm	176	176	176	176	163	163	163	163	163	163	163	163
Height H_{VK}	mm	1340	1340	1340	1340	1343	1343	1343	1343	1343	1343	1343	1343
Height H_{RK}	mm	554	554	554	554	552	552	552	552	552	552	552	552
Height H_{VSL}	mm	1502	1520	1502	1520	1520	1520	1520	1520	1520	1520	1520	1520
Height H_{GAS}	mm	1570	1570	1570	1570	1620	1620	1620	1620	1620	1620	1620	1620

Table 2 Measurements and connection dimensions

	Unit	Boiler size (output in kW)											
		75[1]	75[2]	100[1]	100[2]	150[1]	150[2]	200[1]	200[2]	250[1]	250[2]	300[1]	300[2]
Length L	mm	736	736	736	736	914	914	1317	1317	1317	1317	1317	1317
Length L_K	mm	594	594	594	594	845	845	1250	1250	1250	1250	1250	1250

Table 2 Measurements and connection dimensions

1) Left-hand version
2) Right-hand version
3) Female thread
4) PN6 standard flange (EN 1092)

2.3.2 Specification – single boiler

			Boiler size (output in kW)					
		Unit	75	100	150	200	250	300
Rated heat input [Qn (Hi)][1]	Max.	kW	70.8	95.1	142.9	189.9	237.9	285.7
	Min.	kW	15.8	15.8	23.8	34.5	39.6	47.6
Rated heat output [Pn 80/60] [1] at temperature pair 80/60 °C Mod. 1:6 (75 kW 1:4.5)	Max	kW	69.4	93.0	139.8	186.1	232.9	280.0
	Min.	kW	15.5	15.5	23.2	33.7	38.8	46.7
Rated heat output [Pn 50/30][1] at temperature pair 50/30 °C Mod. 1:6 (75 kW 1:4.5)	Max.	kW	75.0	100	150	200	250	300
	Min.	kW	17.2	17.2	25.7	37.3	42.9	51.4
Boiler efficiency, maximum output with temperature pair 80/60 °C		%	98.0	97.8	97.8	98.0	97.9	98.0
Boiler efficiency, maximum output with temperature pair 50/30 °C		%	105.9	105.2	105.0	105.3	105.1	105.0
Standard seasonal efficiency [to DIN] with heating curve 75/60 °C		%	106.9	106.5	106.5	106.6	106.4	106.4
Standard seasonal efficiency [to DIN] with heating curve 40/30 °C		%	109.3	109.1	109.5	109.5	109.4	109.4
Standby heat loss at excess temperature 30/50 °C		%	0.23/0.48	0.17/0.36	0.13/0.27	0.12/0.25	0.11/0.22	0.10/0.21
Heating circuit								
Boiler water capacity [V]		ltr	18.2	18.2	23.4	33.6	38.8	44.0
Pressure drop on the heating water side at Δ 15 K		mbar	27.8	49.5	53.5	46.5	46.1	43.4
Maximum flow temperature in heating/DHW mode (depending on installed control unit Logamatic 5000/Logamatic EMS plus)		°C	95/85	95/85	95/85	95/85	95/85	95/85
Safety limit/high limit safety cut-out [T_{max}][1]		°C	110	110	110	110	110	110
Maximum operating pressure [PMS][1]		bar	6	6	6	6	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50	50	50	50	50
	Partial load	K	59	59	59	59	59	59
Maximum permitted flow rate through the boiler[2]		l/h	8060	10750	16120	21500	26860	32230
Flue gas values								
Condensate accumulation rate for natural gas G20, 40/30 °C		l/h	8.2	9.6	13.6	20.2	24.1	29.2
Flue gas mass flow rate 80/60 °C	Full Load	g/s	32.5	43.1	63.6	84.1	110.2	129.4
	Partial load	g/s	7.1	7.1	10.6	14.4	17.3	22.2
Flue gas mass flow rate 50/30 °C	Full Load	g/s	31.8	42.1	62.7	82.3	106.9	125.7
	Partial load	g/s	6.8	6.8	10	12.7	16.3	20.8
Flue gas temperature 80/60 °C	Full Load	°C	64	68	67	65	67	68
	Partial load	°C	57	57	57	56	56	58
Flue gas temperature 50/30 °C	Full Load	°C	41	46	45	45	46	46
	Partial load	°C	30	31	30	30	31	30
CO_2 value, natural gas	Full Load	%	9.2	9.2	9.2	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2	9.2	9.2	9.2
Standard emission factor CO (EN15502)		mg/kWh	16	16	18	18	15	17
Standard emissions factor (EN15502) NO_x		mg/kWh	45	54	38	40	36	39

Table 3 Specification Logano plus KB372 – single boiler

		Unit	Boiler size (output in kW) 75	100	150	200	250	300
Standard emission factor (DIN4702-T8, for Germany) NO_x		mg/kWh	44	49	–	–	–	–
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150	150	150	150	150
Maximum pressure at boiler 2 (shut down), if boiler 1 is at full load (positive pressure cascade)		Pa	100	100	100	100	100	100
Flue system								
Temperature classification to be used for flue system in accordance with EN 1443			≥ T120	≥ T120	≥ T120	≥ T120	≥ T120	≥ T120
Pressure classification to be used for flue in accordance with EN 1443			H1, P1	H1, P1	H1, P1	H1, P1	H1, P1	H1, P1
Pressure classification to be used or connection piece in accordance with EN 1443		–	H1, P1 with additional mechanical impact stability up to 5000 Pa					
Condensate resistance classification to be used for flue system in accordance with EN 1443		–	W	W	W	W	W	W
Corrosion resistance classification to be used for flue system in accordance with EN 1443		–	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2
Soot combustion resistance classification to be used for flue system in accordance with EN 1443		–	G, O	G, O	G, O	G, O	G, O	G, O
Maximum permitted flue gas return flow under wind conditions		%	10	10	10	10	10	10
Maximum permitted combustion air temperature		°C	35	35	35	35	35	35
Design type (acc. to DVGW regulations)			Open flue operation: B_{23P} Balanced flue operation: C_{13}, C_{33}, C_{53}, C_{63}, C_{83}, C_{93}					
Electrical details								
IP rating		–	IPX0D	IPX0D	IPX0D	IPX0D	IPX0D	IPX0D
Supply voltage/frequency		V/Hz	230/50	230/50	230/50	230/50	230/50	230/50
Electric power consumption [P(el)][1]	Full Load	W	83	156	250	234	298	336
	Partial load	W	28	28	40	42	41	48
Protection against electrocution		–	Protection class 1					
Maximum permissible unit fuse protection (with Logamatic 5000)		A	10	10	10	10	10	10
Maximum permissible unit fuse protection (with Logamatic MC110)		A	6.3	6.3	6.3	6.3	6.3	6.3
Appliance dimensions and weight								
Handling dimensions width × depth × height		mm	670 × 481 × 1470		670 × 782 × 1470	670 × 994 × 1470		
Total weight		kg	124	124	180	210	240	272
Weight (excl. casing)		kg	100	100	128	154	173	194
Smallest shipping weight		kg	90	90	117	139	158	178

Table 3 Specification Logano plus KB372 – single boiler

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) Is to be ensured by means of system sizing, and it corresponds to a minimum differential between flow and return temperatures of 8 K.

2.3.3 Gas throughput

Boiler size [kW]	Gas throughput Natural gas E, H, Es (G20) Wobbe index 14.9 kWh/m³ 1) [m³/h]	Natural gas L (DE) Wobbe index 12.8 kWh/m³ [m³/h]
75	7.5	7.9
100	10.1	10.7
150	15.1	16.1
200	20.1	21.4
250	25.2	26.7
300	30.2	32.1

Table 4 Gas throughput (relative to 15 °C gas temperature and 1013 mbar air pressure)

1) Upper Wobbe index for 0 °C, 1013 mbar:

2.4 Dimensions and specification Logano plus KB372 – factory-prepared 2-boiler cascade

2.4.1 Dimensions and specification – factory-prepared 2-boiler cascade 2 × 75 and 2 × 100 kW with motor-controlled hydraulic butterfly valve

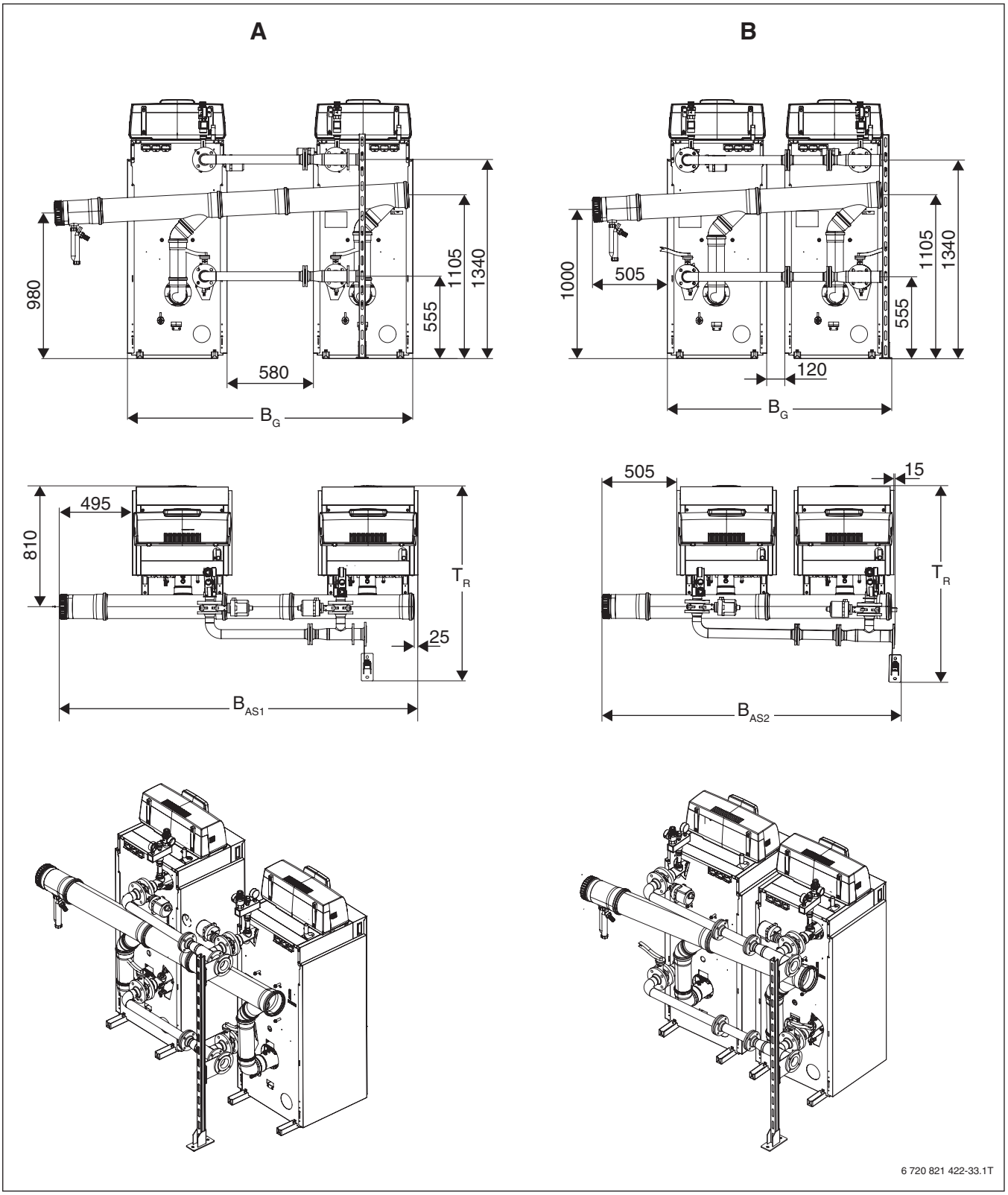


Fig. 4 Dimensions Logano plus KB372, 2 × 75 and 2 × 100 kW – factory-prepared 2-boiler-cascade with motor-controlled hydraulic butterfly valve; (dimensions in mm)

A Lane installation
B Installation side by side

		Unit	Boiler rating, 2-boiler cascade [kW]	
			2 × 75	2 × 100
Total output		kW	150	200
Rated heat input [Qn (Hi)][1)]	Max.	kW	141.6	190.2
	Min.	kW	15.8	15.8
Rated heat output [Pn 80/60][1)] at temperature pair 80/60 °CMod. 1:6	Max	kW	138.8	186
(75 kW 1:4.5)	Min.	kW	15.5	15.5
Rated heat output [Pn 50/30][1)] at temperature pair 50/30 °C	Max.	kW	150	200
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	17.2	17.2
Maximum flow temperature in heating/DHW mode (depending on installed control unit Logamatic 5000/Logamatic EMS plus)		°C	95/85	95/85
Safety limit/high limit safety cut-out [$T_{...}$]		°C	100	100
Maximum operating pressure [PMS][1)]		bar	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50
	Partial load	K	59	59
Maximum permitted flow rate through a boiler		l/h	8060	10750
Dimensions (→ Fig. 4, page 11)				
Height (upper edge flue system, upper edge pressure relief valve)	–	mm	1730[2)]	1730[2)]
Max. width with lane (width flue gas collector)	B_{AS1}	mm	2390	2390
Max. width without lane (width flue gas collector)	B_{AS2}	mm	1960	1960
Width of both boilers with lane	B_G	mm	1920	1920
Width of both boilers without lane	B_G	mm	1460	1460
Depth D without pumps (boiler front edge to outside edge flange cascade)	T_R	mm	1320	1320
Return, cascade Ø RC		–	DN 65	DN 65
Flow, cascade Ø FC		–	DN 65	DN 65
Internal flue gas outlet Ø AA (flue gas collector)		–	DN 160	DN 160
Distance flow/return cascade	A_{FL}/A_{RE}	mm	785	785
Flue gas values				
Condensate accumulation rate for natural gas G20, 40/30 °C		l/h	16.4	19.2
Flue gas mass flow rate 80/60 °C	Full Load	g/s	65	86.2
	Partial load	g/s	7.1	7.1
Flue gas mass flow rate 50/30 °C	Full Load	g/s	63.6	84.2
	Partial load	g/s	6.8	6.8
Flue gas temperature 80/60 °C	Full Load	°C	64	68
	Partial load	°C	57	57
Flue gas temperature 50/30 °C	Full Load	°C	41	46
	Partial load	°C	30	31
CO_2 value, natural gas	Full Load	%	9.2	9.2
	Partial load	%	9.2	9.2
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150

Table 5 Specification Logano plus KB372 – factory-prepared 2-boiler cascade

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) Upper edge safety assembly

2.4.2 Dimensions and specification – factory-prepared 2-boiler cascade 2 × 150°... 2 × 300 kW with motor-controlled hydraulic butterfly valve

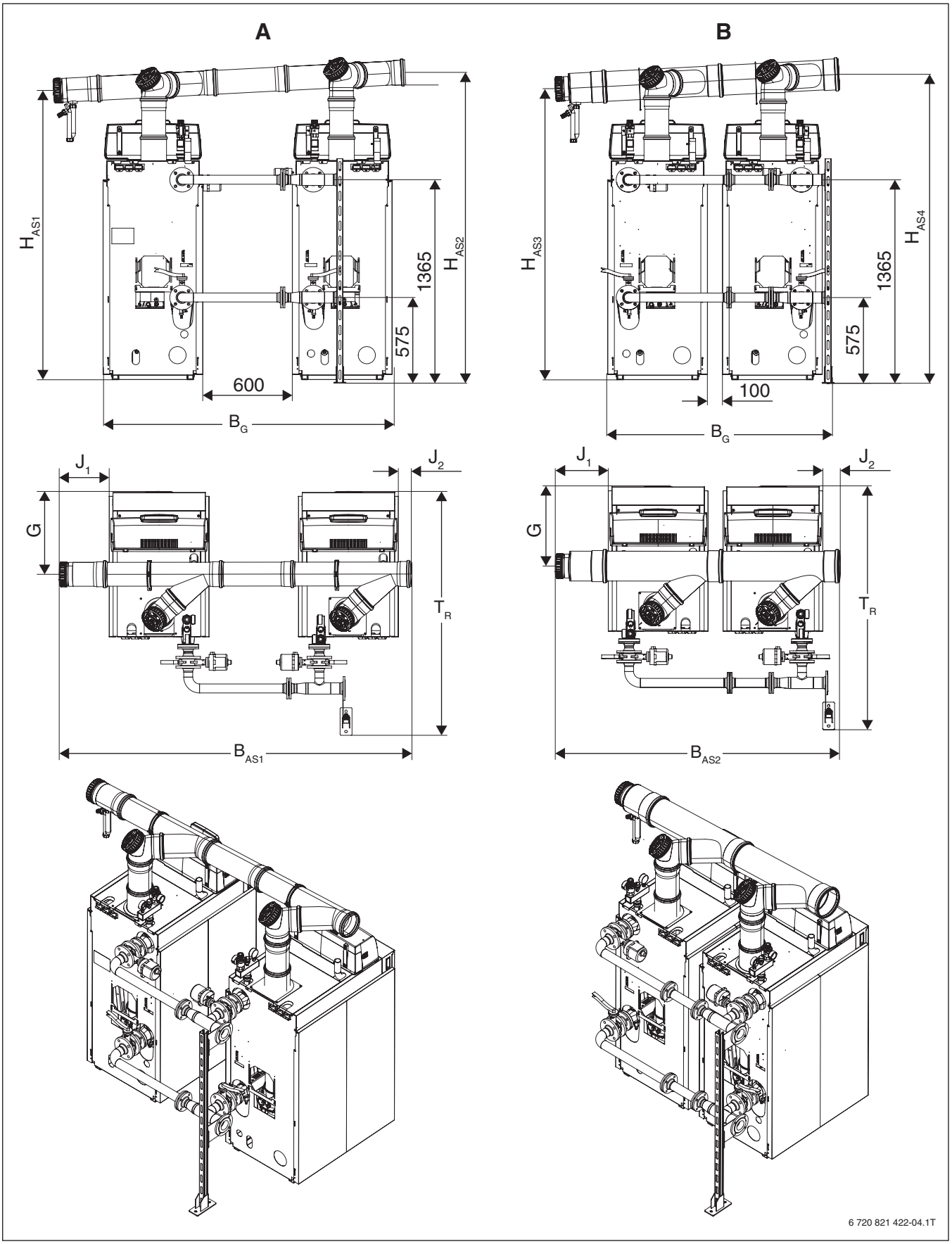


Fig. 5 Dimensions Logano plus KB372, 2 × 150 ... 2 × 300 kW – factory-prepared 2-boiler-cascade with motor-controlled hydraulic butterfly valve (dimensions in mm)

A Lane installation
B Installation side by side

		Unit	Boiler rating, 2-boiler cascade [kW]			
			2 × 150	2 × 200	2 × 250	2 × 300
Total output		kW	300	400	500	600
Rated heat input [Qn (Hi)][1)]	Max.	kW	285.8	379.8	475.8	571.4
	Min.	kW	23.8	34.5	39.6	47.6
Rated heat output [Pn 80/60][1)] at temperature pair 80/60 °C	Max	kW	279.6	372.2	465.8	560
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	23.2	33.7	38.8	46.6
Rated heat output [Pn 50/30][1)] at temperature pair 50/30 °C	Max.	kW	300	400	500	600
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	25.7	37.3	42.9	51.4
Maximum flow temperature in heating/DHW mode (depending on installed control unit Logamatic 5000/Logamatic EMS plus)		°C	95/85	95/85	95/85	95/85
Safety limit/high limit safety cut-out [$T_{...}$]		°C	100	100	100	100
Maximum operating pressure [PMS][1)]		bar	6	6	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50	50	50
	Partial load	K	59	59	59	59
Maximum permitted flow rate through a boiler		l/h	16120	21500	26860	32230
Dimensions (→ Fig. 5, page 13)						
Height (upper edge flue system, upper edge pressure relief valve)	–	mm	2182[2)]	2133[2)]	2133[2)]	2133[2)]
Max. width with lane (width flue gas collector)	B_{AS1}	mm	2392	2392	2392	2392
Max. width without lane (width flue gas collector)	B_{AS2}	mm	1912	2048	2048	2048
Width of both boilers with lane	B_G	mm	1938	1938	1938	1938
Width of both boilers without lane	B_G	mm	1443	1443	1443	1443
Depth D without pumps (boiler front edge to outside edge flange cascade)	T_R	mm	1635	1970	1970	1970
Return, cascade Ø RC		–	DN 65	DN 80	DN 80	DN 80
Flow, cascade Ø FC		–	DN 65	DN 80	DN 80	DN 80
Internal flue gas outlet Ø AA (flue gas collector)		–	DN 200	DN 250	DN 250	DN 250
Distance flow/return cascade	A_{FL}/A_{RE}	mm	790	792	792	792
Medium flue socket height 1	H_{AS1}	mm	1940	1900	1900	1900
	H_{AS3}	mm	1950	1925	1925	1925
Medium flue socket height 2	H_{AS2}	mm	2065	2030	2030	2030
	H_{AS4}	mm	2050	2030	2030	2030
Clearance boiler front to centre of flue gas collector	G	mm	530	570	570	570
Clearance flue gas collector end to boiler side wall	J_1	mm	345	165	165	165
	J_2	mm	110	425	425	425
Overall height cascade		mm	2175	2170	2170	2170
Flue gas values						
Condensate accumulation rate for natural gas G20, 40/30 °C		l/h	27.2	40.4	48.2	58.4
Flue gas mass flow rate 80/60 °C	Full Load	g/s	127.2	168.2	220.4	258.8
	Partial load	g/s	10.6	14.4	17.3	22.2
Flue gas mass flow rate 50/30 °C	Full Load	g/s	125.4	164.6	213.8	251.4
	Partial load	g/s	10	12.7	16.3	20.8
Flue gas temperature 80/60 °C	Full Load	°C	67	66	67	68
	Partial load	°C	57	56	56	58
Flue gas temperature 50/30 °C	Full Load	°C	45	45	46	46
	Partial load	°C	30	30	31	30
CO_2 value, natural gas	Full Load	%	9.2	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2	9.2
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150	150	150

Table 6 Specification Logano plus KB372 – factory-prepared 2-boiler cascade

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) Upper edge flue gas collector

With a 2-boiler cascade from 2 × 150 kW the top connection can be turned from back to front, so that the cascade collector line runs either over or behind the boiler.

2.4.3 Dimensions and specifications – factory-prepared 2-boiler cascade 2 × 75 and 2 × 100 kW with pump and non-return valve with small pressure drop

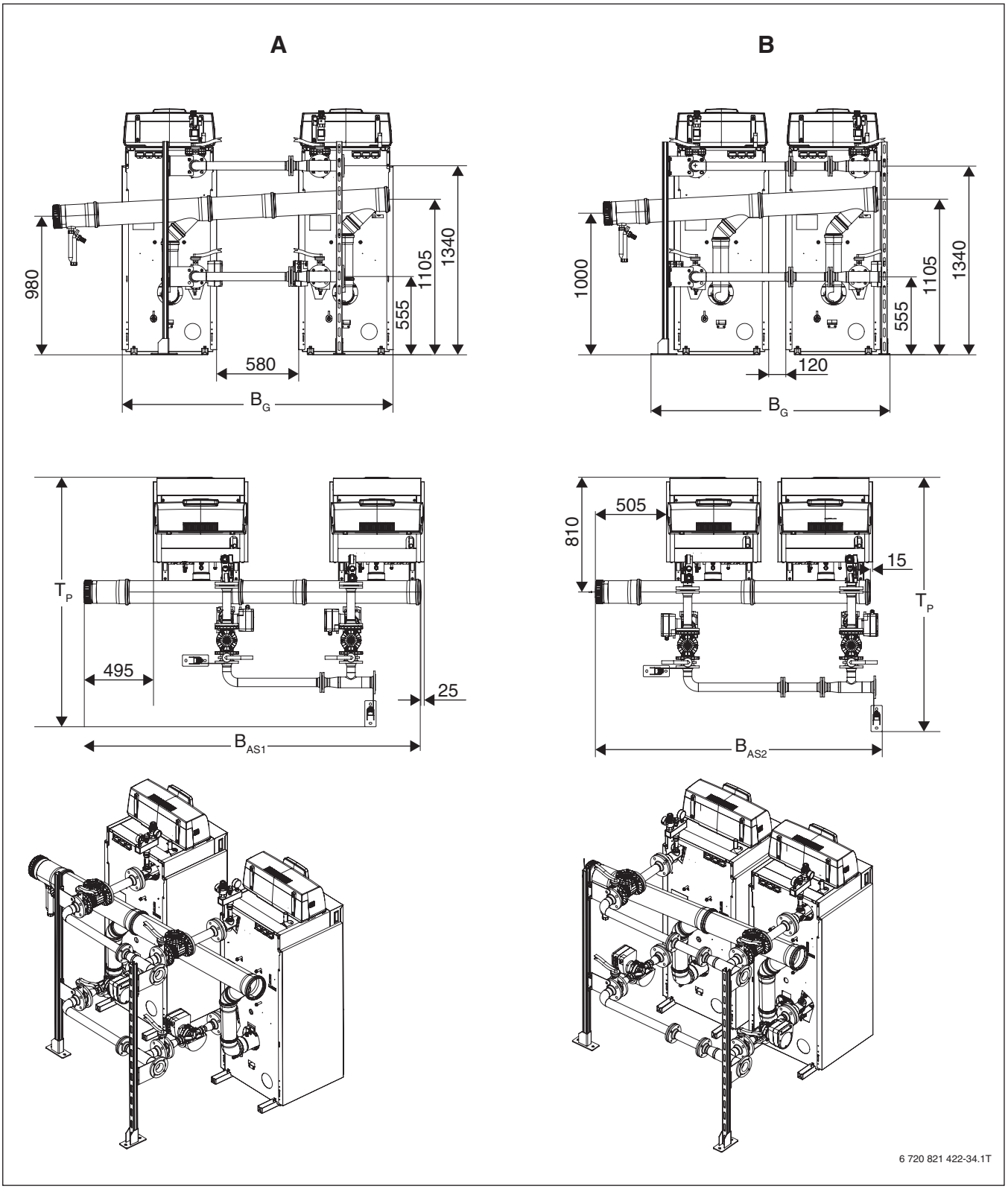


Fig. 6 Dimensions Logano plus KB372, 2 × 75 and 2 × 100 kW – factory-prepared 2-boiler cascade with pump and non-return valve with small pressure drop (dimensions in mm)

A Lane installation
B Installation side by side

		Unit	Boiler rating, 2-boiler cascade [kW]	
			2 × 75	2 × 100
Total output		kW	150	200
Rated heat input [Qn (Hi)][1)]	Max.	kW	141.6	190.2
	Min.	kW	15.8	15.8
Rated heat output [Pn 80/60][1)] at temperature pair 80/60 °C	Max	kW	138.8	186
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	15.5	15.5
Rated heat output [Pn 50/30][1)] at temperature pair 50/30 °C	Max.	kW	150	200
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	17.2	17.2
Maximum flow temperature in heating/DHW mode (depending on installed control unit Logamatic 5000/Logamatic EMS plus)		°C	95/85	95/85
Safety limit/high limit safety cut-out [$T_{...}$]		°C	100	100
Maximum operating pressure [PMS][1)]		bar	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50
	Partial load	K	59	59
Maximum permitted flow rate through a boiler		l/h	8060	10750
Dimensions (→ Fig. 6, page 15)				
Height (upper edge flue system, upper edge pressure relief valve)	–	mm	1730[2)]	1730[2)]
Max. width with lane (width flue gas collector)	B_{AS1}	mm	2390	2390
Max. width without lane (width flue gas collector)	B_{AS2}	mm	1960	1960
Width of both boilers with lane	B_G	mm	1920	1920
Width of both boilers without lane	B_G	mm	1460	1460
Depth D with pumps (boiler front edge to outside edge flange cascade)	T_P	mm	1800	1800
Return, cascade Ø RC		–	DN 65	DN 65
Flow, cascade Ø FC		–	DN 65	DN 65
Internal flue gas outlet Ø AA (flue gas collector)		–	DN 160	DN 160
Distance flow/return cascade	A_{FL}/A_{RE}	mm	785	785
Flue gas values				
Condensate accumulation rate for natural gas G20, 40/30 °C		l/h	16.4	19.2
Flue gas mass flow rate 80/60 °C	Full Load	g/s	65	86.2
	Partial load	g/s	7.1	7.1
Flue gas mass flow rate 50/30 °C	Full Load	g/s	63.6	84.2
	Partial load	g/s	6.8	6.8
Flue gas temperature 80/60 °C	Full Load	°C	64	68
	Partial load	°C	57	57
Flue gas temperature 50/30 °C	Full Load	°C	41	46
	Partial load	°C	30	31
CO_2 value, natural gas	Full Load	%	9.2	9.2
	Partial load	%	9.2	9.2
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150

Table 7 Specification Logano plus KB372 – factory-prepared 2-boiler cascade

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) Upper edge safety assembly

2.4.4 Dimensions and specification – factory-prepared 2-boiler cascade 2 × 150°... 2 × 300 kW with pump and non-return valve with small pressure drop

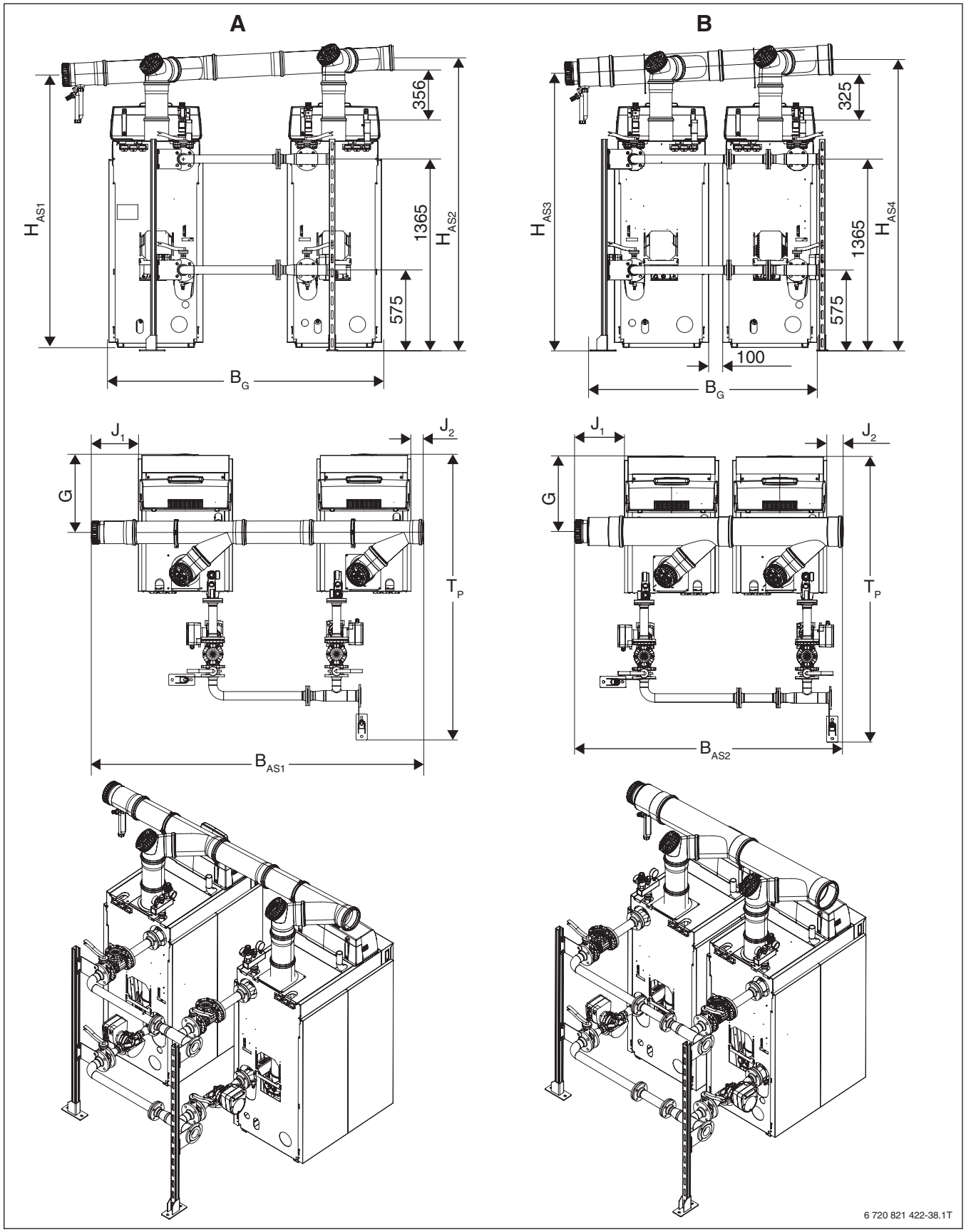


Fig. 7 Dimensions Logano plus KB372, 2 × 150 ... 2 × 300 kW – factory-prepared 2-boiler cascade with pump and non-return valve with small pressure drop (dimensions in mm)

A Lane installation
B Installation side by side

		Unit	Boiler rating, 2-boiler cascade [kW]			
			2 × 150	2 × 200	2 × 250	2 × 300
Total output		kW	300	400	500	600
Rated heat input [Qn (Hi)][1)]	Max.	kW	285.8	379.8	475.8	571.4
	Min.	kW	23.8	34.5	39.6	47.6
Rated heat output [Pn 80/60][1)] at temperature pair 80/60 °C	Max	kW	279.6	372.2	465.8	560
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	23.2	33.7	38.8	46.6
Rated heat output [Pn 50/30][1)] at temperature pair 50/30 °C	Max.	kW	300	400	500	600
Mod. 1:6 (75 kW 1:4.5)	Min.	kW	25.7	37.3	42.9	51.4
Maximum flow temperature in heating/DHW mode (depending on installed control unit Logamatic 5000/Logamatic EMS plus)		°C	95/85	95/85	95/85	95/85
Safety limit/high limit safety cut-out [$T_{...}$]		°C	100	100	100	100
Maximum operating pressure [PMS][1)]		bar	6	6	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50	50	50
	Partial load	K	59	59	59	59
Maximum permitted flow rate through a boiler		l/h	16120	21500	26860	32230
Dimensions (→ Fig. 7, page 17)						
Height (upper edge flue system, upper edge pressure relief valve)	–	mm	2182[2)]	2133[2)]	2133[2)]	2133[2)]
Max. width with lane (width flue gas collector)	B_{AS1}	mm	2392	2392	2392	2392
Max. width without lane (width flue gas collector)	B_{AS2}	mm	1912	2048	2048	2048
Width of both boilers with lane	B_G	mm	1938	1938	1938	1938
Width of both boilers without lane	B_G	mm	1443	1443	1443	1443
Depth D with pumps (boiler front edge to outside edge flange cascade)	T_P	mm	2035	2395	2395	2395
Return, cascade Ø RC		–	DN 65	DN 80	DN 80	DN 80
Flow, cascade Ø FC		–	DN 65	DN 80	DN 80	DN 80
Internal flue gas outlet Ø AA (flue gas collector)		–	DN 200	DN 250	DN 250	DN 250
Distance flow/return cascade	A_{FL}/A_{RE}	mm	790	792	792	792
Medium flue socket height 1	H_{AS1}	mm	1940	1925	1925	1925
	H_{AS3}	mm	1950	1900	1900	1900
Medium flue socket height 2	H_{AS2}	mm	2065	2030	2030	2030
	H_{AS4}	mm	2050	2030	2030	2030
Clearance boiler front to centre of flue gas collector	G	mm	530	570	570	570
Clearance flue gas collector end to boiler side wall	J_1	mm	355	170	170	170
	J_2	mm	425	425	425	425
Overall height cascade		mm	2160	2170	2170	2170
Flue gas values						
Condensate accumulation rate for natural gas G20, 40/30 °C		l/h	27.2	40.4	48.2	58.4
Flue gas mass flow rate 80/60 °C	Full Load	g/s	127.2	168.2	220.4	258.8
	Partial load	g/s	10.6	14.4	17.3	22.2
Flue gas mass flow rate 50/30 °C	Full Load	g/s	125.4	164.6	213.8	251.4
	Partial load	g/s	10	12.7	16.3	20.8
Flue gas temperature 80/60 °C	Full Load	°C	67	66	67	68
	Partial load	°C	57	56	56	58
Flue gas temperature 50/30 °C	Full Load	°C	45	45	46	46
	Partial load	°C	30	30	31	30
CO_2 value, natural gas	Full Load	%	9.2	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2	9.2
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150	150	150

Table 8 Specification Logano plus KB372 – factory-prepared 2-boiler cascade

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) Upper edge flue gas collector

With a 2-boiler cascade from 2 × 150 kW the top connection can be turned from back to front, so that the cascade collector line runs either over or behind the boiler.

2.5 Pressure drop on the water side

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

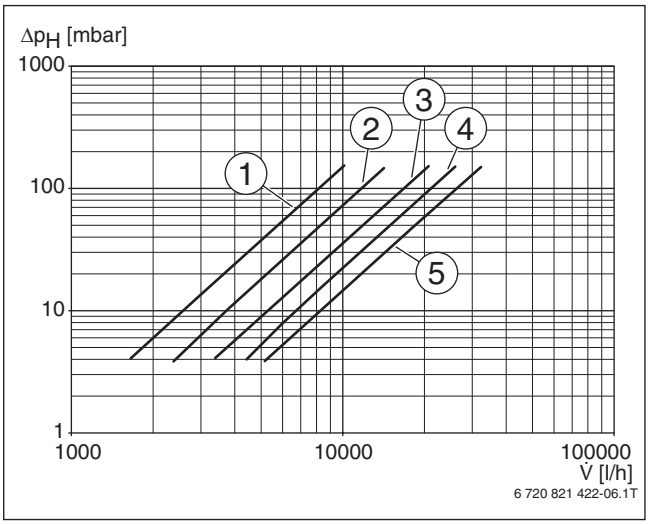


Fig. 8 Pressure drop on the water side without non-return valve; single boiler

Single boiler without check valve:

Δp_H Pressure drop
$\dot{V}$ Flow rate

[1] Logano plus KB372-75 and Logano plus KB372-100
[2] Logano plus KB372-150
[3] Logano plus KB372-200
[4] Logano plus KB372-250
[5] Logano plus KB372-300

2.6 Boiler efficiency

The boiler efficiency h_K identifies the ratio between heat output and heat input subject to the return temperature.

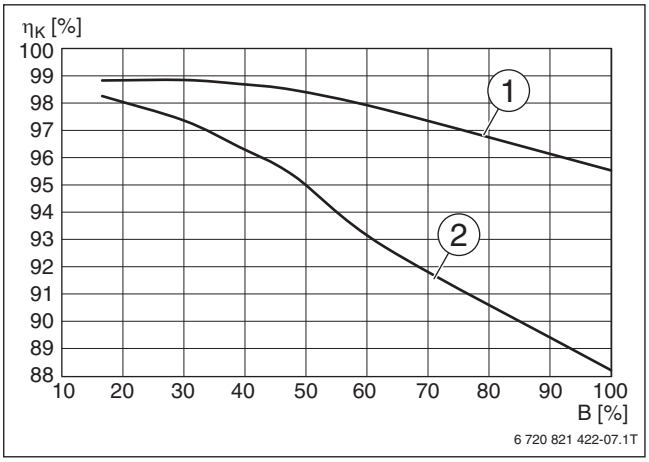


Fig. 9 Boiler efficiency subject to boiler efficiency

η_K Boiler efficiency
B Burner rating in %

[1] 40/30 °C
[2] 75/60 °C

2.7 Standby loss

The standby loss q_B is part of the rated heat input that is required to achieve 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 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.

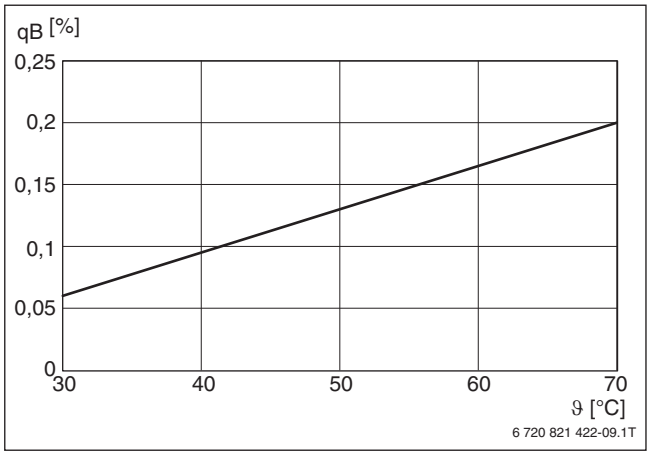


Fig. 10 Stand-by heat losses subject to boiler return temperature (average for this series of boilers)

q_B Standby loss
ϑ Boiler return temperature

2.8 Flue gas temperature

The flue gas temperature ϑ_A is the temperature captured inside the flue pipe – , specifically at the boiler flue outlet – . It is subject to the boiler return temperature.

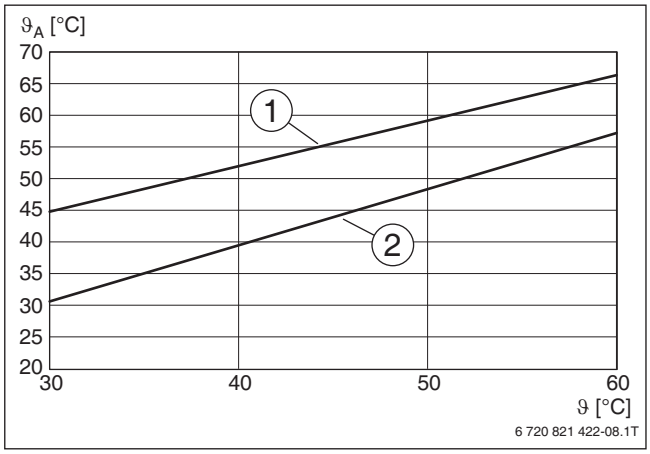


Fig. 11 Flue gas temperature subject to boiler return temperature

ϑ_A Flue gas temperature
ϑ Boiler return temperature

[1] Full Load
[2] Partial load

2.9 Conversion factor for other operating temperatures

In the tables containing the specifications of the gas condensing boilers Logano plus KB372, the rated output figures relate to operating temperatures 50/30 °C and 80/60 °C.

Take the conversion factor into consideration to calculate the rated output for deviating operating temperatures.

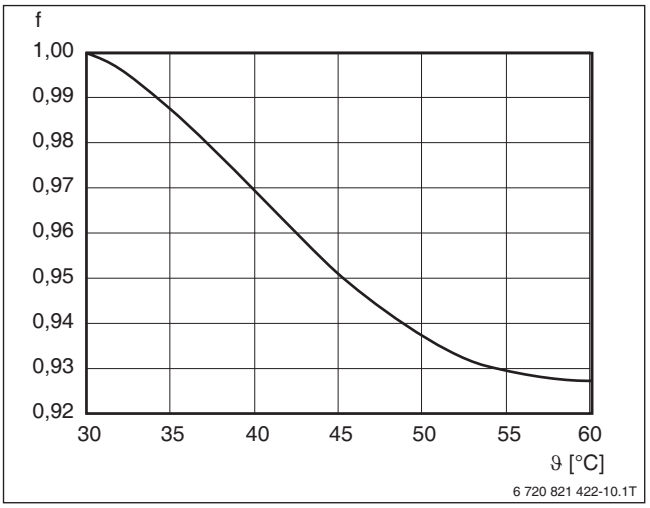


Fig. 12 Conversion factor for deviating design return temperatures (average of this series of boilers)

f Conversion factor
ϑ Return temperature

Example

For a Logano plus KB372 gas condensing boiler with a rated output of 100 kW at a system temperature of 50/30 °C, the rated output should be calculated at a system temperature of 80/60 °C.

At a return temperature of 60 °C, a conversion factor of 0.935 is obtained. The rated output is 93.5 kW at 80/60 °C.

2.10 Parameters for determining the system expenditure of energy value to DIN V 4701-10 or DIN 18599

Logano plus	$Q_{n\ 50/30}$ [kW]	$Q_{n\ 80/60}$ [kW]	$h_{100\ \%}$ [%]	$h_{30\ \%}$ [%]	$q_{B,70}$ [%]	$P_{HE\ 100\ \%}$ [W]	$P_{HE\ 30\ \%}$ [W]
KB372-75	75.0	69.4	98.0	108.4	0.48	83	28
KB372-100	100.0	93.0	97.8	108.1	0.36	156	28
KB372-150	150.0	139.8	97.8	107.6	0.27	250	40
KB372-200	200.0	186.1	98.0	108.2	0.25	234	42
KB372-250	250.0	232.9	97.9	108.4	0.22	298	41
KB372-300	300.0	280.0	98.0	108.0	0.21	363	48

Table 9 Parameters for determining the system expenditure of energy value

2.11 Transport clearance dimensions and installation room

2.11.1 Minimum handling dimensions

	Unit	Boiler size [kW]					
		75	100	150	200	250	300
Minimum depth	mm	481	481	782	994	994	994
Minimum width	mm	640	640	640	640	640	640
Minimum height	mm	1470	1470	1470	1470	1470	1470
Minimum weight	kg	90	90	117	139	158	178

Table 10 Minimum handling dimensions for single boiler Logano plus KB372

2.11.2 Wall clearances in the installation room

Installation individual boiler, right-hand version

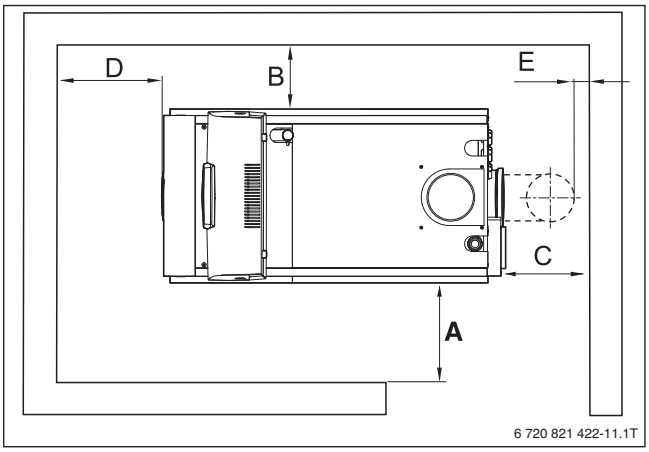


Fig. 13 Wall clearances Logano plus KB372 (right-hand version)

Installation individual boiler, left-hand version

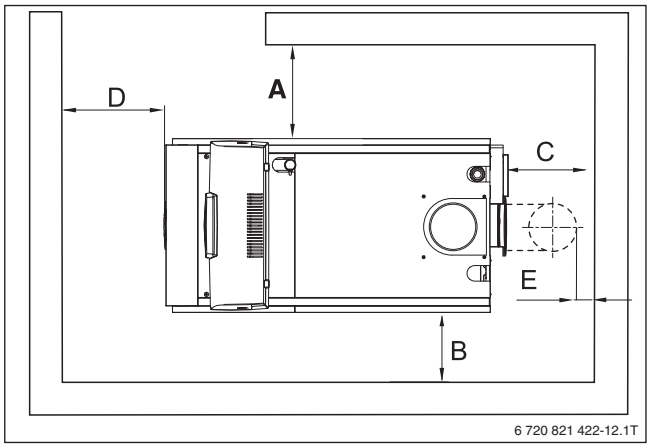


Fig. 15 Wall clearances Logano plus KB372 (left-hand version)

2-boiler installation right and left-hand version (on site), lane installation

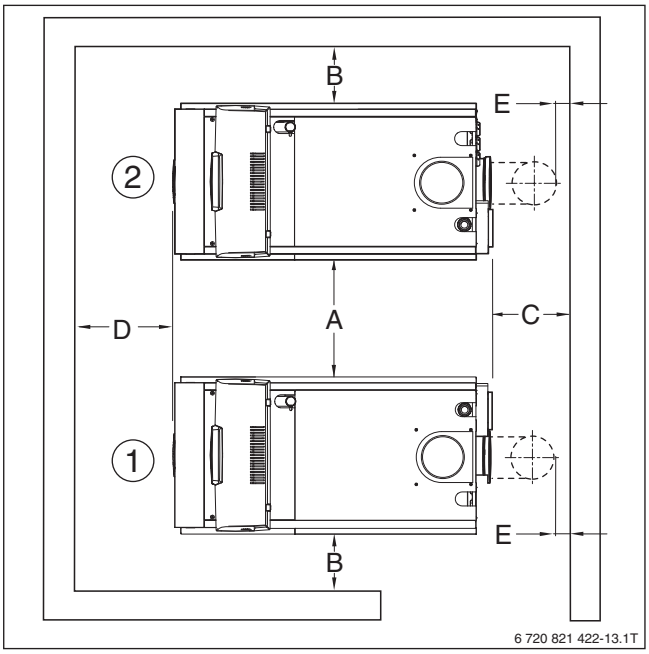


Fig. 14 Wall clearances Logano plus KB372 (2-boiler cascade, on site, lane installation)

[1] Left-hand version
[2] Right-hand version

2-boiler installation, side by side, left and right-hand version (on site)

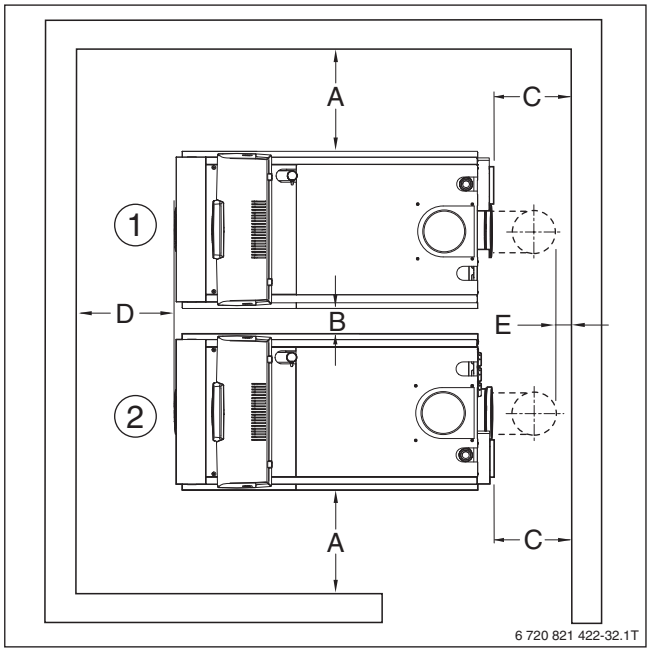


Fig. 16 Wall clearances Logano plus KB372 (2-boiler cascade, on-site installation, side by side)

[1] Left-hand version
[2] Right-hand version

2-boiler installation right and left-hand version (pre-assembly at factory), lane installation

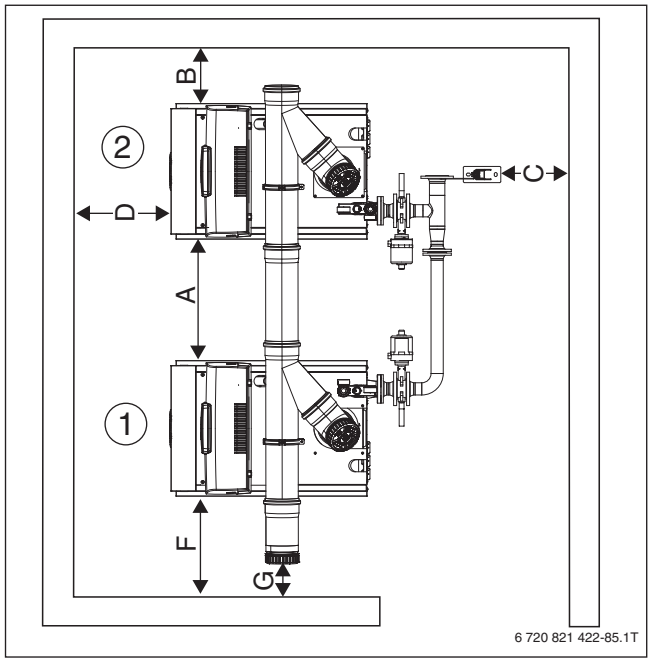


Fig. 17 Wall clearances Logano plus KB372 (factory-prepared 2-boiler cascade, lane installation)

[1] Left-hand version
[2] Right-hand version

2-boiler installation, side by side, left and right-hand version (pre-assembly at factory)

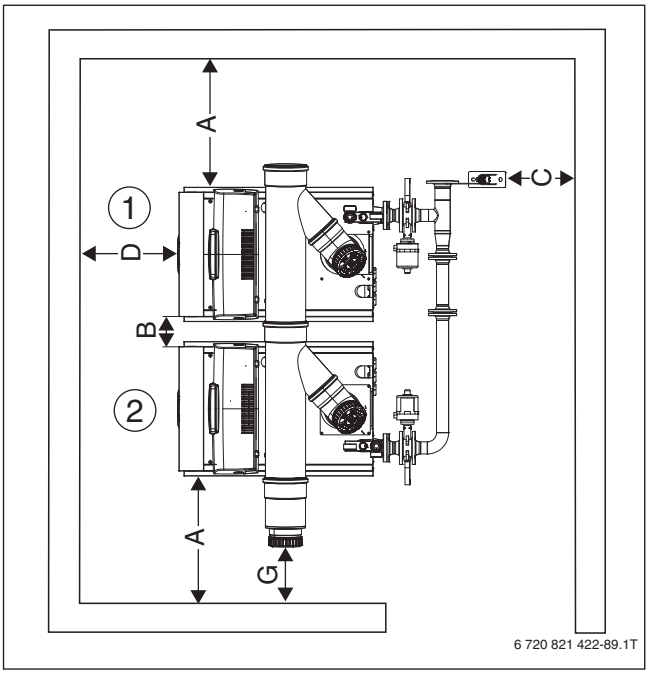


Fig. 18 Wall clearances Logano plus KB372 (factory-prepared 2-boiler cascade, installation side by side)

[1] Left-hand version
[2] Right-hand version

Dimension	Wall clearance	
	minimum [mm]	Recommended [mm]
A	600	1000
B	100	400
C[1)]	–	–
D	800	1000
E[1)]	150	400
F[2)]	500 ... 700	700 ... 900
G	200	400

Table 11 Recommended and minimum wall clearances

1) This clearance is subject to hydraulic and flue gas side versions.

2) This clearance is subject to the used cascade performance (→ chapter 2.4, page 11).

For installation of individual boilers of the versions 150 ... 300 kW the flue gas connection can be changed from back to top, depending on the spatial requirements.

2.12 Transport

2.12.1 Transporting the boiler with crane, forklift or pallet truck

The boiler may be transported to the place of installation by crane, forklift truck or pallet truck. Where possible, transport the boiler to the installation room in its shipping packaging to protect it from contamination.

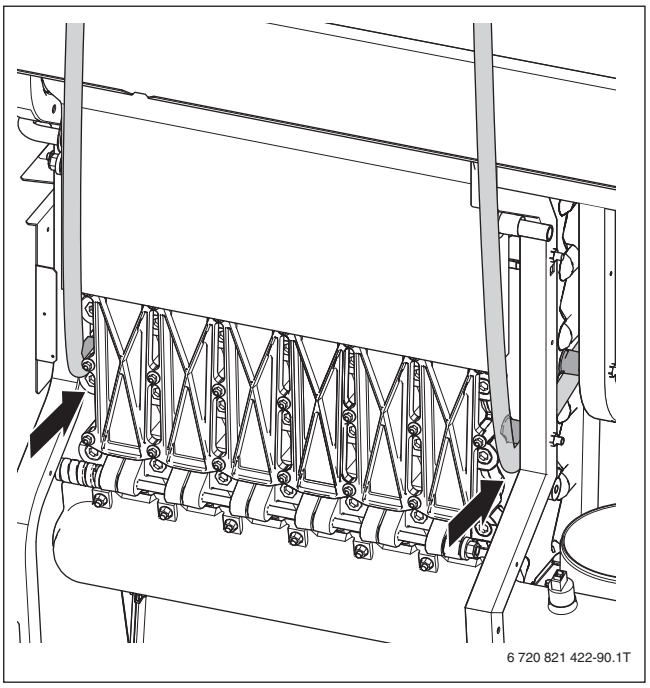


Fig. 19 Guide of crane lifting gear on the frame

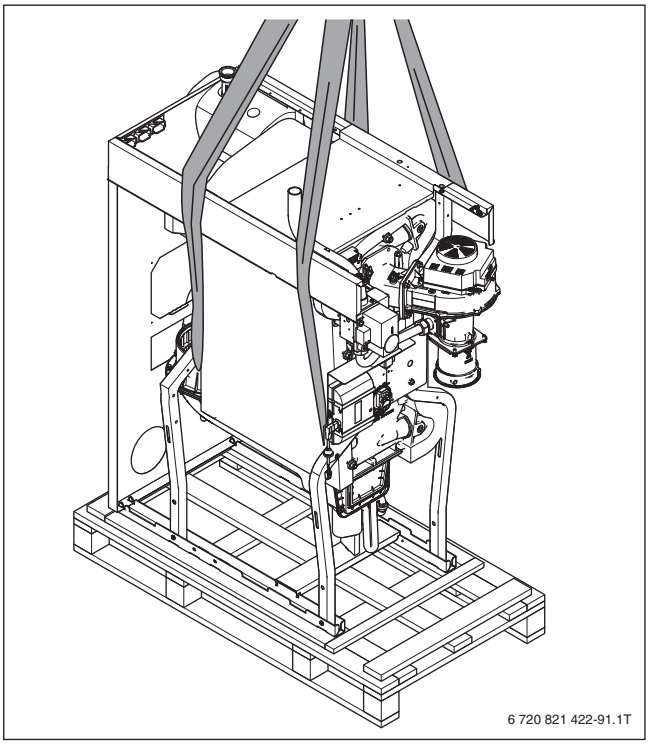


Fig. 20 Transporting the boiler by crane

2.12.2 Transporting the boiler on rollers

If the way to the installation room is plane, the boiler can be transported with customary transport rollers or furniture rollers.

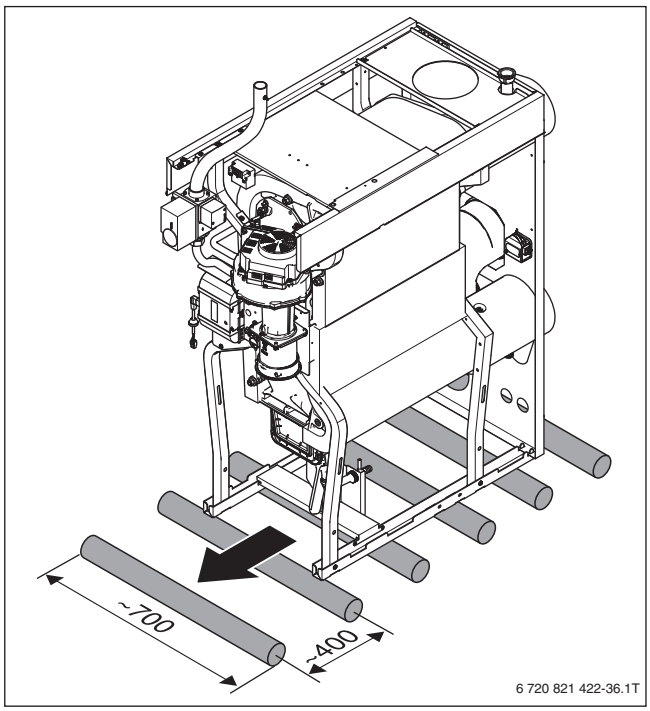


Fig. 21 Logano plus KB372 transport on rollers (dimensions in mm)

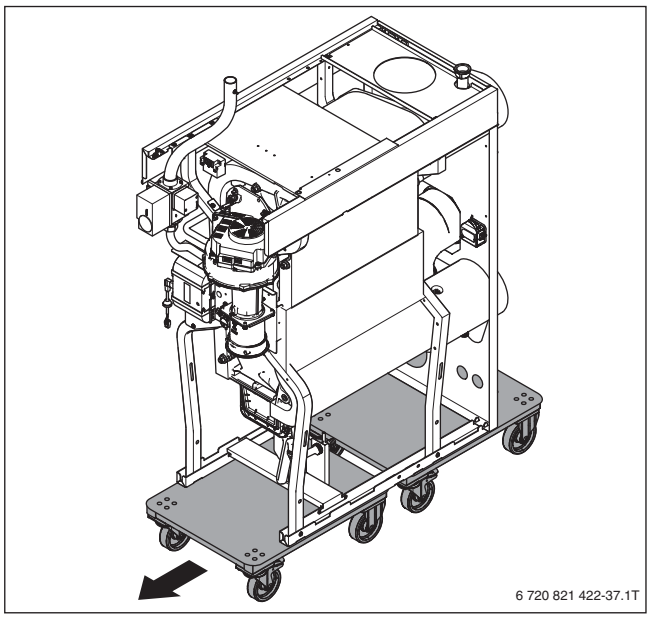


Fig. 22 Logano plus KB372 transport on furniture roller

To reduce the boiler weight and the size for transport, many parts can be quickly demounted, e.g. the burner and the mounting frame for the boiler jacket.

3 Gas burner

3.1 Burner and burner control unit

A modulating gas premix burner with clean combustion is used in the Logano plus KB372 gas condensing boiler. The gas burner comprises a fan, gas valve and a burner rod.

Features

- Emissions, NO_x 36 ... 54 mg/kWh and CO 14.8 ... 18.3 mg/kWh, standard emission factors acc. to EN 15502-1
- Suitable for natural gas E, LL and LPG 3P
- Easy conversion to other natural gas types possible
- Modulation range: 17 ... 100 %

Burner control unit

- SAFe burner control unit
- Burner control and monitoring
- Safety functions for boiler operation
- Setting of parameters and fault codes are issued via the Logamatic EMS plus control system or Logamatic 5000
- Display and calling up operating, service and fault displays via the Service Diagnosis System (SDS)
- Optional connection for third-party control units (e.g. DDC) via function module with 0 ... 10 V input (accessory)
- Boiler control subject to output or temperature via function module with 0-10 V input

3.2 Burner function

The maximum ΔT between flow and return temperature at rated output is 50 K.

From $\Delta T > 50$ K, the burner modulates the boiler output down to the lowest output when no heat is being drawn off. The boiler shuts down only when the ΔT continues to increase and exceeds 59 K. Consequently the Logano plus KB372 operates the major part of the annual heating work independently of the temperature difference.

3.3 VPS valve testing system

For a maximum safety level, all sizes of the Logano plus KB372 series are equipped with a valve test system. At every burner start, the valve test system checks the tightness of both solenoid valve in the air/gas ratio control valve.

Gas connection for boiler with valve test system

The VPS system also detects minor leakages on the solenoid valves that are often caused by dust particles or shavings from the gas line. To achieve a high availability of the boiler and to avoid change of components, a gas filter has to be inserted in the gas line in accordance with EN 3386. The pressure drop of the gas filter should be < 1 mbar to minimise the influence on the overall pressure drop in the gas line, so that there is still a sufficient reserve for the remaining gas line (maximum pressure drop in the gas line 300 Pa = 3 mbar in acc. with TRGI 2008). The gas filter has to have a pore width of $\leq$ 50 micrometers.

3.4 Structure-borne noise transmission via the gas line

The product is equipped with a quiet burner, low in structure-borne noise. With special system requirements, the structure-borne sound transmission can be reduced via an expansion joint.

4 Regulations and operating conditions

4.1 Extracts from regulations

The Logano plus KB372 gas condensing boilers meet the requirements according to EN 15502, EC Efficiency Directive, Gas Equipment Directive and EMC/Low Voltage Directive.

Observe the following regarding creation and operation of the system:

- Standard building regulations
- Statutory regulations
- Country-specific regulations

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

approval

The installation may need to be notified to and approved by the relevant gas supply utility.

We recommend clarifying the match between boiler and flue system with the relevant bodies at the planning stage.

Notify the relevant issuing authority prior to commissioning. It may be necessary to obtain a permit for the flue system and the introduction of condensate into the public sewer system at regional level.

Inspection/maintenance

Keep the system in good order and clean it regularly. Check the entire system annually for correct function.

Regular inspection and, if required, maintenance are prerequisites for safe and economical operation.

We recommend you sign a contract covering an annual inspection and maintenance.

4.2 Fuels

The Logano plus KB372 gas condensing boilers are suitable for natural gas E, LL or LPG 3P.

The gas quality must comply with the requirements of the DVGW Code of Practice G 260 [Germany]. Industrial gases containing sulphur are unsuitable for the gas burner.

The supply pressure must lie within the range specified for each gas type. The supply pressure is the gas connection pressure at the gas connection of the boiler.

Gas type	Supply pressure		
	p_{min} [mbar]	p_{rated} [mbar]	p_{max} [mbar]
Natural gas E	17	20	25
Natural gas LL	17	20	25
G31 (LPG)	25	37	45

Table 12 Supply pressures for different gas types

If the supply pressure for the gas type used exceeds the value in the table, install an additional gas pressure regulator upstream of the boiler.

The specified supply pressure must be ensured across the boiler's entire modulation range. If necessary, an additional pressure regulator must be provided. In the case of multi-boiler or multi-consumer systems, the supply pressure range for single boilers must be ensured in each operating condition of the multi-boiler or multi-consumer system. If necessary, supply each boiler or consumer via a separate pressure regulator.

Gas pressure regulator for operation with natural gas

If the supply pressure of the gas used exceeds 25 mbar, use a gas pressure governor FRS ... (accessory). The gas pressure governor has to be selected in accordance with the boiler size and the existing connection pressure (→ Table 13).

Connections pressure regulator FRS ...:

- FRS 503: RP ⅜
- FRS 505: RP ½
- FRS 507: RP ¾

	Unit	Boiler size [kW]					
		75	100	150	200	250	300
Modulation range	–	1:4.5	1:6	1:6	1:6	1:6	1:6
Minimum load	kW	16.7	16.7	25.0	33.3	41.7	50.0
Supply pressure							
up to 50	mbar	FRS 505	FRS 505	FRS 505	FRS 507	FRS 507	FRS 507
50 ... 100	mbar	FRS 503	FRS 503	FRS 503	FRS 505	FRS 507	FRS 507
100 ... 150	mbar	FRS 503	FRS 503	FRS 503	FRS 505	FRS 505	FRS 507
150 ... 200	mbar	FRS 503	FRS 503	FRS 503	FRS 503	FRS 505	FRS 505
200 ... 250	mbar	FRS 503	FRS 503	FRS 503	FRS 503	FRS 503	FRS 505
250 ... 300	mbar	FRS 503	FRS 503	FRS 503	FRS 503	FRS 503	FRS 505

Table 13 Dimensioning table gas pressure governor FRS ... for Logano plus KB372

4.3 Operation conditions

Operation conditions	Unit	Boiler size [kW]					
		75	100	150	200	250	300
ΔT_{max} – full load	K	50	50	50	50	50	50
ΔT_{max} – partial load	K	59	59	59	59	59	59
Maximum flow rate	l/h	8060	10750	16120	21500	26860	32230
Maximum boiler temperature[1)]	°C	95[2)]/85[3)]	95[2)]/85[3)]	95[2)]/85[3)]	95[2)]/85[3)]	95[2)]/85[3)]	95[2)]/85[3)]

Table 14 Logano plus KB372 operating conditions

1) For use with low loss header, the maximum flow temperature can also be smaller than the maximum boiler temperature (→ Table 29, page 77).

2) In conjunction with a Logamatic 5000 controller

3) In conjunction with a Logamatic MC110 controller

4.4 Combustion air

Where combustion air is concerned, ensure that it is clean, free dust and contains no halogenated hydrocarbons. Otherwise there would be a risk of damage to the combustion chamber and gas to water heat exchangers. Halogenated hydrocarbons are highly corrosive. These can be contained in spray cans, thinners, cleaning & degreasing agents and 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 combustion air supply in the installation room.

The Logano plus KB372 gas condensing boiler is prepared for balanced flue operation. Balanced flue operation is possible via the connection set. This is also necessary, for example, if the combustion air could be contaminated.

For the balanced flue operation and when drawing combustion air in via an existing chimney shaft, observe the following:

If combustion air is drawn in through an existing chimney duct, if oil combustion equipment or combustion equipment for solid fuel were previously connected or if high dust loads must be expected on account of poor pointing, it will generally be necessary to clean the chimney prior to installing the flue system. If dust loads or residues from oil or solid fuel combustion equipment can still be expected after cleaning, install a separate ventilation air line inside the chimney shaft or seek an alternative solution.

4.5 Combustion air supply

The conditions of installation rooms and the siting of gas appliances must comply with country-specific regulations.

For open flue combustion equipment with a total rated output in excess of 50 kW, the combustion air supply is deemed to be ensured if an aperture to the outside with a clear opening of at least 150 cm^2 (plus 2 cm^2 for every kilowatt output above 50 kW rated output) is provided.

The required cross-section may be split over up to 2 combustion air lines and must offer the equivalent flow rate.

Fundamental requirements

- Combustion air vents and lines must never be closed or covered unless there is special safety equipment that ensures the combustion equipment can only be operated if the flow cross-section is unobstructed.
- The required cross-section must not be restricted by a lock or grille.
- An adequate supply of combustion air must be verified, but also other solutions are possible.

4.6 Water quality

As perfectly pure water is not available for heat transfer, it is important to pay attention to water quality. Unsuitable water quality can damage heating systems due to scale formation and corrosion.

Fill the system with clean mains water only that meets the requirements below.

To protect the unit from lime deposit damage during its service life and ensure trouble-free, economic operation, the overall quantity of substances that cause hardness must be limited in the fill and make-up water of the heating zone.

To check the permissible water quantities based on water quality, either use the following calculation methods or consult the graphs.

Refer to worksheet K8 of the currently valid Buderus catalogue for further guidance on water quality requirements of all boilers.

Checking the maximum quantity of fill water based on water quality

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

At delivery, the boiler is equiped with the “water quality operator's log”. Warranty claims for the boilers will only be considered, provided the requirements for the water quality have been met, and the operator’s log has been maintained. A water meter has to be provided for determining fill and top-up water.

Use the following formula to calculate the maximum amount of water that may be introduced without treatment:

$$V_{max} = 0{,}0235 \times \frac{\dot{Q}}{Ca(HCO_3)_2}$$

F. 1 Calculation of the maximum amount of water that may be introduced without treatment

$Ca(HCO_3)_2$	Concentration Calcium bicarbonate in mol/m^3
$\dot{Q}$	Boiler output in kW
V_{max}	Maximum volume of fill and top-up water over the entire service life of the boiler in m^3

Information about the calcium hydrogen carbonate ($Ca(HCO_3)_2$) concentration of the mains water can be obtained from your water supply utility. If the water analysis does not include this information, the calcium hydrogen carbonate concentration can be determined from the carbonate hardness and the calcium hardness, as follows:

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 600 kW. The analysis values for carbonate hardness and calcium hardness are quoted in the former unit of measurement °dH.

Carbonate hardness: 15.7 °dH
Calcium hardness: 11.9 °dH

The following results from the carbonate hardness:
$Ca(HCO_3)_2$ = 15.7 °dH × 0.179 = 2.8 mol/m^3

The following results from the calcium hardness:
$Ca(HCO_3)_2$ = 11.9 °dH × 0.179 = 2.13 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}.

$$V_{max} = 0{,}0235 \times \frac{600\ kW}{2{,}13\ mol/m^3} = 6,6\ m^3$$

Limit curves

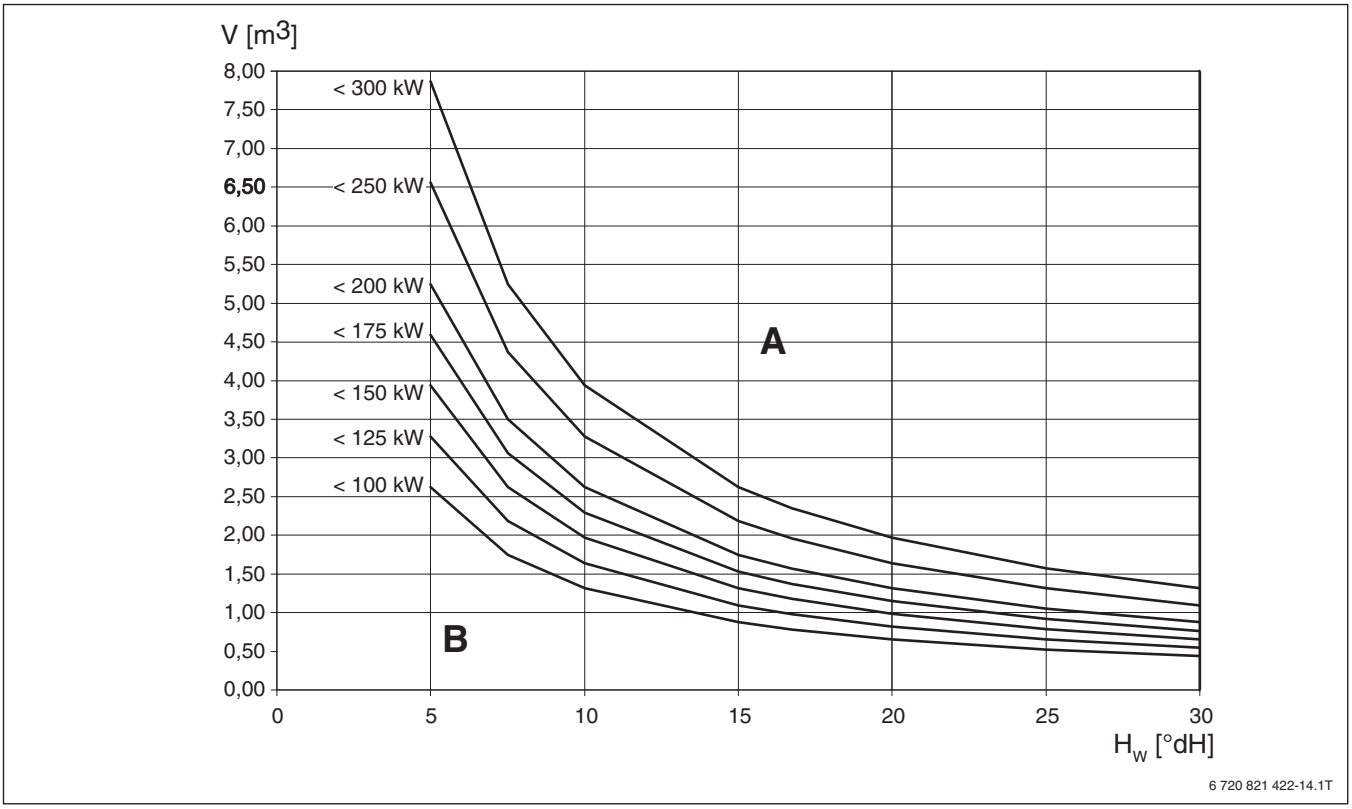


Fig. 23 Limit curves for water treatment – single boiler

A Above the curve: use fully demineralised fill water with a conductivity of ≤ 10 µS/cm
B Below the curves, fill with untreated tap water that meets the requirements of the Drinking Water Order [Germany]
H_W Water hardness in °dH
V Water volume over the service life of the boiler

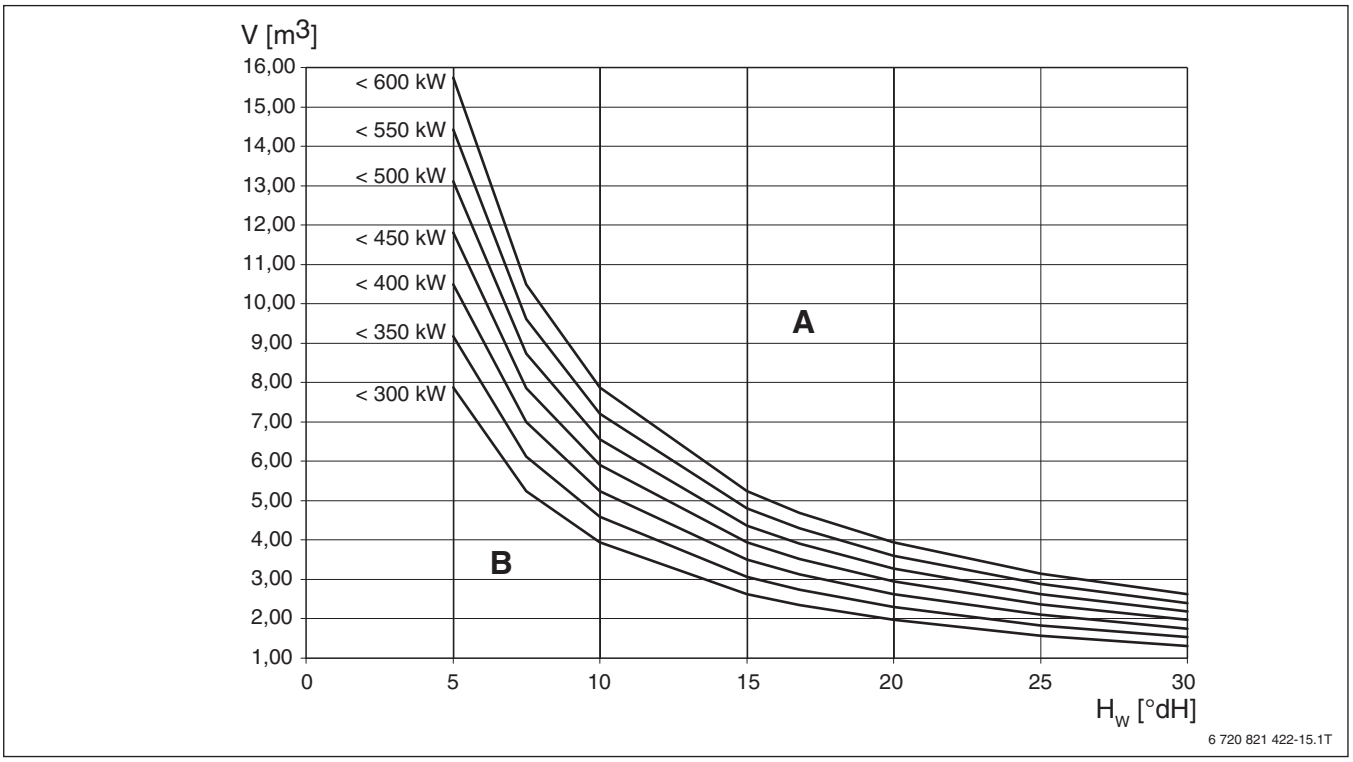


Fig. 24 Limit curves for water treatment – factory-prepared 2-boiler cascade

A Above the curve: use fully demineralised fill water with a conductivity of ≤ 10 µS/cm
B Below the curves, fill with untreated tap water that meets the requirements of the Drinking Water Order [Germany]
H_W Water hardness in °dH
V Water volume over the service life of the boiler

Water treatment measures

There are two methods for treating the fill and top-up water for Logano plus KB372 gas condensing boilers:

- Use of fully demineralised fill water with a conductivity of ≤ 10 µS/cm:
  Full desalination of the fill and top-up water removes not only the hardness constituents (Ca, Mg) but also all other minerals, to significantly reduce the conductivity of the fill and top-up water. The likelihood of corrosion forming shrinks as the conductivity of the heating water drops. Operation with a low salt content will at the same time reduce corrosion in the heating system. For filling the system with fully demineralised water, the Buderus offers complete demineralisation and refill cartridges as well as a comprehensive range of accessories. For further suitable offers for rent or services for water treatment, see → in the currently valid Buderus catalogue.

Additional protection against corrosion

In most cases, corrosion plays only a minor role in DHW heating systems. A precondition of this is however, that the system is a corrosion-inhibiting sealed system, i.e. one that prevents a continuous ingress of oxygen. Continuous introduction of oxygen leads to corrosion and can thus cause rusting and rust sludge formation. 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 oxygen permeation is generally pressure maintenance and in particular the function, correct sizing and correct setting (pre-charge pressure) of the expansion vessel. Check the pre-charge pressure and function annually. If continuous ingress of oxygen can not be prevented (e.g. due to plastic pipes that are not diffusion-proof), or if the system can not be constructed as a sealed system, it is necessary to introduce anti-corrosion measures, such as for example the addition of approved chemical additives or system separation by means of a heat exchanger. Heat sources with aluminium heat exchangers may only be operated in corrosion-inhibiting sealed systems. Open systems must be converted to sealed systems. In the case of oxygen-permeable systems (e.g. due to plastic pipes that are not oxygen-tight), system separation must be installed for heat sources with aluminum heat exchangers.

If necessary, the existing system should be thoroughly purged. The pH value of untreated heating water should be between 8.2 and 10 for heat sources that made of ferrous materials, and at maximum 9, for heat sources that made of aluminium. Please observe that the pH value in the heating water can increase in the months after commissioning due to the so-called self-alkalisation effect. We recommend checking the pH value after several months of heating system operation (see also VDI 2035 T2).

With low-salt operation (conductivity < 100mS/cm in the heating water) and in systems that are closed from a corrosion standpoint, a pH value of up to [3] 7 is acceptable. To identify a system that is not closed from a corrosion standpoint, the heating water can be sampled on site. If the sampled water is clear and without discolouration, it can be assumed for all practical intents and purposes, that a system is closed from a corrosion standpoint. If the sampled heating water has an intense brown discolouration, it can be assumed that the system is not closed from a corrosion standpoint. The reason for this as a general rule is oxygen permeation.

In the case of heat sources made from ferrous materials, the water can be alkalised if necessary by the addition of for example trisodium phosphate.
With aluminium heat exchangers no chemicals may be added. If additives or antifreeze (where approved by Buderus) are used in the DHW heating system, the manufacturer's instructions for the additive or antifreeze must be observed. This applies particularly to the concentration in the fill water, to regular checks of the heating water and the required corrective measures. In the case of all other additives, an assurance must also be obtained from the additive manufacturer, that it is suitable and effective for all the materials installed in the heating system, and a copy of this assurance should be kept permanently with the operator's log.

Installation in existing heating systems/dirt traps

If the gas condensing boiler is installed in an existing heating system, impurities may build up in the boiler, leading to local overheating, corrosion and noise.

In addition, we recommend the installation of a dirt separator. The dirt separator must be installed in an easily accessible position between the boiler and the lowest point of the heating system. Especially with the use of high-efficiency pumps, a dirt separator is recommended, so that no ferrous particles accumulate on the permanent magnet of the pump.

Before connecting the new heat exchanger, purge the entire heating system. It is especially important to flush the heating system if the aluminium boiler is installed in existing heating systems in which additives or water treatment measures have been in use that are unsuitable for aluminium boilers (e.g. softened water or trisodium phosphate for alkalising). Draining and flushing the existing heating system before installing the new boiler removes harmful additives and incorrect water treatment measures and prevents damage to the boiler.

Estimate of system capacity

Especially with older systems, the water capacity of the entire system is often not known. The following graph gives an estimate of the system capacity.

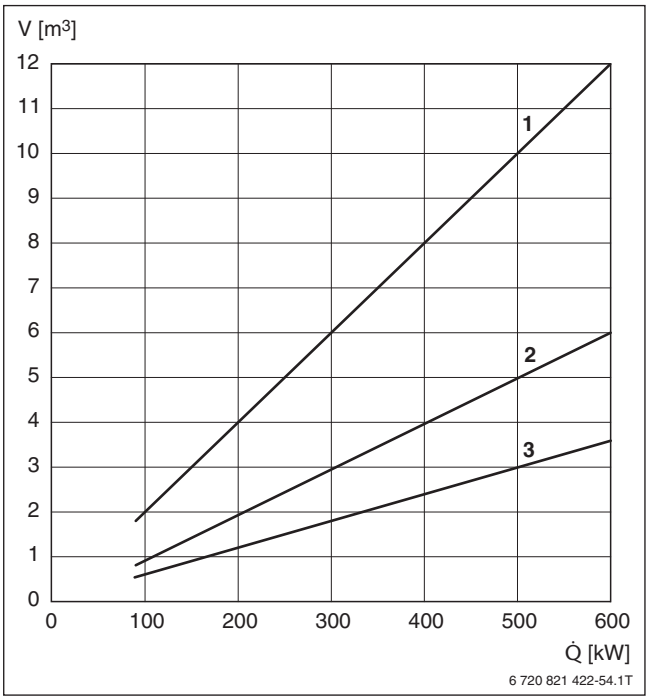


Fig. 25 Estimated water content of the system with known system output

Q̇ Total system output
V Water Content
1 Steel/cast iron radiators with pipes sized for gravity circulation and underfloor heating (20 l/kW)
2 Panel radiator (10 l/kW)
3 Convectors (6 l/kW)

4.7 Siting combustion equipment

Subject to the regulations of the relevant country, gas combustion equipment with a total rated 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.

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 fuel storage.

Open flue combustion equipment must not be installed:

- in stairwells, except in residential buildings with no more than 2 apartments
- in generally accessible hallways that serve as escape routes **and**
- 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 extractors must be prevented by safety equipment
- The flue gas routing will be monitored by appropriate safety equipment **or**
- Flue gas is routed via the extractor system or it is ensured that such systems cannot create dangerous negative pressure.

Further information regarding the siting and installation of gas combustion equipment can be found in country-specific regulations, and these must be observed.

4.8 Sound insulation

The quiet gas premix burner of the Logano plus KB372 creates only low noise emissions compared to conventional pressure-jet gas burners. This generally makes additional sound insulation measures to ensure airborne noise inside the installation room superfluous. The transmission of structure-borne noise is largely prevented by the standard adjustable feet supplied. Nevertheless, pumps and other system components can cause structure-borne noise. Where required, this can be addressed by the use of compensators and other measures designed to reduce the transmission of structure-borne noise. Further on-site measures can be implemented if the aforementioned measures are inadequate and more stringent requirements for noise protection apply.

4.9 Anti Freeze

The antifreeze Antifrogen N is approved for use in the Logano plus KB372 series. If an antifreeze agent is used, it must be mixed with demineralised water. Observe and heed the following manufacturer's information when using Antifrogen N:

- Concentration ranges stipulated by the manufacturer
- Regular inspections
- Any necessary corrective measures

When pumping liquids with viscosities that differ from that of water, the hydraulic performance of pumps and the pipework will also be different. For further details on sizing pumps, see the technical guides published by the pump manufacturers.

5 Heating controls

5.1 Controllers

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

The Logano plus KB372 can be used with the following control units from the Logamatic EMS plus and Logamatic 5000 control systems.

For more detailed information, see the technical guides concerning the “Modular control system Logamatic EMS plus” and “Modular control system Logamatic 5000”.

5.2 Logamatic EMS plus

5.2.1 Master controller Logamatic MC110

Fig. 26 Control unit Logamatic MC110 with programming unit Logamatic RC310

[1] Appliance fuse 6.3 A
[2] Programming unit Logamatic RC310

The master controller Logamatic MC110 always contains a basic controller BC110.

The basic controller BC110 contains the basic functions chimney sweep mode/emergency operation/status indicator via the light elements and the connection socket for the service key. For proper commissioning and operation, a programming unit is required. The master controller must always contain a clamped programming unit Logamatic RC310 or Logamatic BC30 E[1)].

Functions of the **Logamatic MC110** master controller

- Mount for system programming unit Logamatic RC310 or Logamatic BC30 E
- Installation space for positioning of 2 function modules
- Communication interface with SAFe safety burner control unit
- Power supply for boiler with SAFe and function modules installed in MC110
- Burner control by determining the boiler setpoint using existing demands
- Activation of heating pump in heating circuit 1
- Control of DHW heating by monitoring the DHW temperature via a temperature sensor and activating the cylinder primary pump or the 3-way diverter valve
- Control of a circulating pump
- Connection option for external heat demand via switching connection or 0 ... 10 V (temperature or output)
- Operation and remote control of system via smartphone, e.g. for operating of system via EasyControl App with additional module web KM200
- Connection option for second solenoid valve
- External interlock of EMS boiler by a second heat source in systems with 2 chimneys
- Connection option, contact, central fault message
- External heat detection: Shutdown of boiler circulation pump at sufficient temperature on differential sensor (if existing)

1) Only in special cases, Logamatic BC30 E can be used as programming unit interface (e.g. 0 ... 10 V with higher-level system control or process heat)

5.2.2 Programming unit Logamatic RC310

Fig. 27 Logamatic RC310 controls

[1] **Auto** key – Activate automatic mode with time program
[2] **Menu** key – open main menu
[3] **man** key – manual operation (activate heating/heat reduction continually or for settable duration of up to 48 h)
[4] **Info** key - display information on current system status or explanatory help text for parameter currently displayed.
[5] **fav** key - favourites functions (direct access to frequently used functions)
[6] **Back** key - navigate in menu; back to previous operating page or display
[7] Selector - turn: navigate in menu or change selected value; press:
select value or confirm change

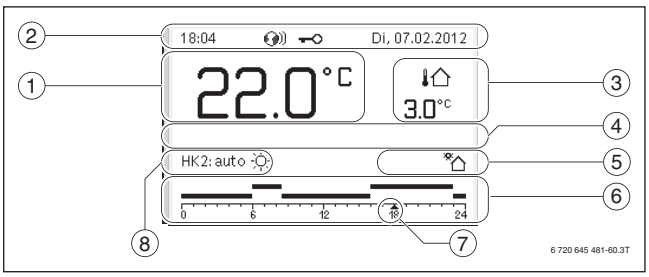


Fig. 28 Example of standard display of system programming unit Logamatic RC310

[1] Value display (here: Actual room temperature 22 °C)
[2] Information line (date and time)
[3] Outside Temperature
[4] Text information (e.g. fault display)
[5] Infographic
(here: solar system runs / child safety lock active)
[6] Time program
[7] Time marker (current time)
[8] Operation mode

With the programming unit Logamatic RC310, a heating circuit without mixer and DHW heating can be controlled. When combined with MM100 heating circuit modules, up to 4 heating circuits with or without mixer can be controlled. A differential sensor can also be connected to the MM100 heating circuit module.

A heating circuit module is only required for the first circuit in the following cases:

- if the heating circuit is to be equipped **with** a mixer **or**
- if the function differential sensor is required (if a low loss header or system separation is installed)

A heating circuit module is always required for the other circuits (2 ... 4).

A solar DHW heating or central heating backup for up to 3 solar consumers can be controlled in combination with the SM... solar modules.

The room temperature is controlled either via room temperature-dependent control, weather-compensated control or weather-compensated control with room temperature hook-up. Alternatively, a MM100 heating circuit can also be operated with constant flow temperature.

For room temperature-dependent control or for room temperature hook-up:

▶ Install the Logamatic RC310 programming unit in reference room.

If the Logamatic RC310 programming unit is not installed in the reference room, a RC200 or RC100 can be added to each heating circuit.

2 freely adjustable time programs are available for each heating circuit. Each time program has 6 switching times per day and optionally 2 or more room temperature levels or a temperature profile, so it can be individually adapted to the lifestyle of the occupant.

An individual time channel is available for DHW heating and control of a DHW circulation pump. In addition, the basic functions for the DHW systems include variable adjustable thermal disinfection, daily heat-up to 60 °C (DVGW Code of Practice 551, can be used when controlling DHW heating via a separate MM100 module) and DHW once-only charging. A second cylinder primary pump and a second DHW circulation pump each with a separate time program can be implemented via an additional MM100 module.

All of the heating system's important information, such as fault displays, room temperature, time and day of the week, can be recorded by the Logamatic RC310 programming unit and shown “in plain text” on the illuminated, graphics-enabled LC display (→ Fig. 28, page 33).

Using selector keys (→Fig. 27, [1] and [3], page 33), the heating mode can be set to “automatic mode” or “manual mode”.

The Logamatic RC310 programming unit is equipped with several special functions, such as a “holiday function” with 5 pre-setable holiday periods for the entire heating system, or for each individual heating circuit in combination with the MM100 modules. In addition, several service functions can be used, e.g. “Monitor function”, “Function check”, “Fault monitoring”, “Fault indication”, “Scanning the heating curve”.

5.2.3 Logamatic BC30 E basic controller

Fig. 29 Logamatic BC30 E basic controller

The Logamatic BC30 E basic controller is the basic programming unit used for the Logamatic EMS plus control system. It is available as accessory in case the Logamatic RC310 programming unit is installed in a living space. The Logamatic BC30 E contains all elements for operation of the heating system with the Logamatic EMS plus control system.

Functions and controls on the Logamatic BC30 E basic controller

- Hot water setting via the menu **HOT WATER**; Call up the menu with DHW key (→ Fig. 30, [1])
  - Starting / stopping DHW mode
  - Setting of hot water set temperature
- Setting of heating via the menu **HEATING**; Call up of menu with heat key (→ Fig. 30, [2])
  - Starting / stopping heating mode
  - Setting for maximum flow temperature
- Manual operation e.g. for flue gas test; press flue gas inspector key longer than 3 seconds (→ Fig. 30, [3])
  - Setting of heat output
- Status display and fault diagnosis in an LC display (→ Fig. 30, [6])
  - Display boiler temperature
  - Status of heating and DHW mode
  - Display of operating pressure
  - If necessary, fault code display
- Emergency operation: Chimney sweep button to be pressed for more than 8 seconds (→ Fig. 30, [3])
  - Manual setting for maximum flow temperature
- Cleaning operation: Press DHW longer
  - Fade-out of keys for 15 seconds for cleaning glas surface
- Access to service menu using sub-menus
  - Information
  - Settings
  - Limit values
  - Function check
  - Emergency mode
  - Reset
  - Display

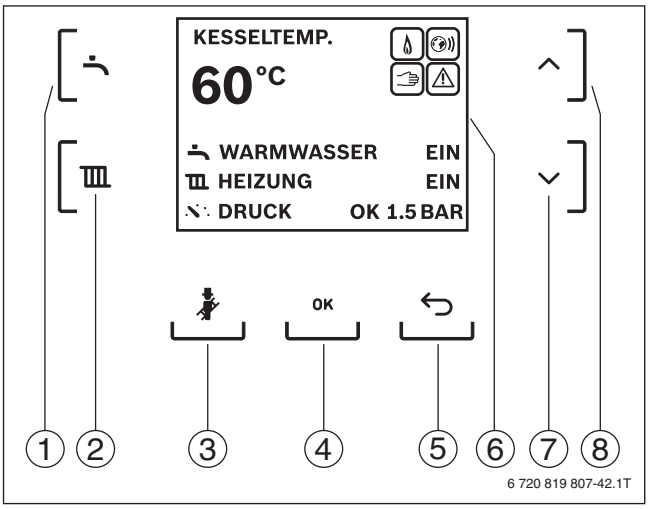


Fig. 30 Display and indicators of basic controller Logamatic BC30 E

[1] DHW key
[2] Central heating key
[3] Chimney sweep button
[4] OK button
[5] Back button
[6] Display (standard display)
[7] Arrow key Ú
[8] Arrow key Ù

5.2.4 Structure control system Logamatic EMS plus

Fig. 31 provides an overview of the modules and operator control units of the Logamatic EMS plus control system.

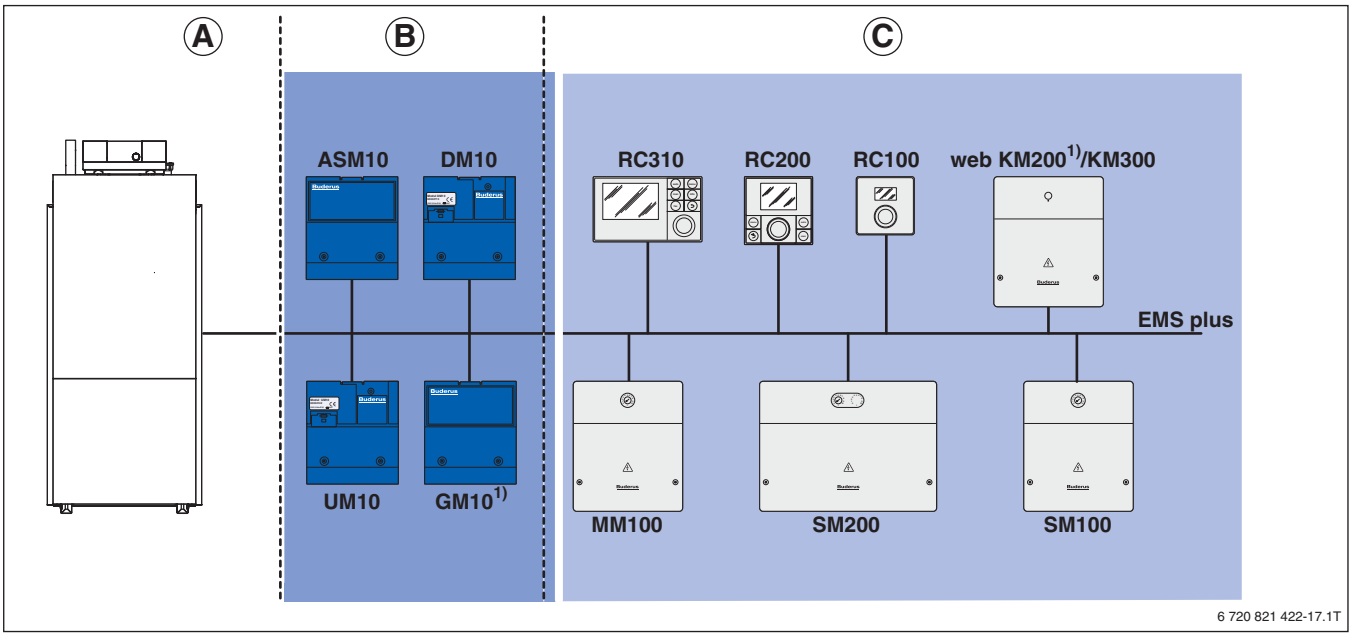


Fig. 31 Structure modular control system Logamatic EMS plus

[A] Heat source with BUS interface EMS or EMS plus
[B] Boiler-specific modules
[C] Programming units and system-side modules

ASM10	Connection module for extending EMS BUS
DM10	Module for motor-driven hydraulic butterfly valve
GM10	Second gas valve[1]
web KM200[1]/ KM300	Interface between heating system and network
MM100	heating circuit module
RC100	Basic room temperature-dependent controller for EMS boiler
RC200	Programming unit for EMS boiler
RC310	System programming unit for EMS boiler
SM100	Solar module for solar systems for DHW heating
SM200	Solar module for complex solar DHW heating systems and central heating backup
UM10	Diverter module

1) The functions of the module GM10 are already contained in the standard equipment Logamatic MC110 (exception gas pressure switch function).

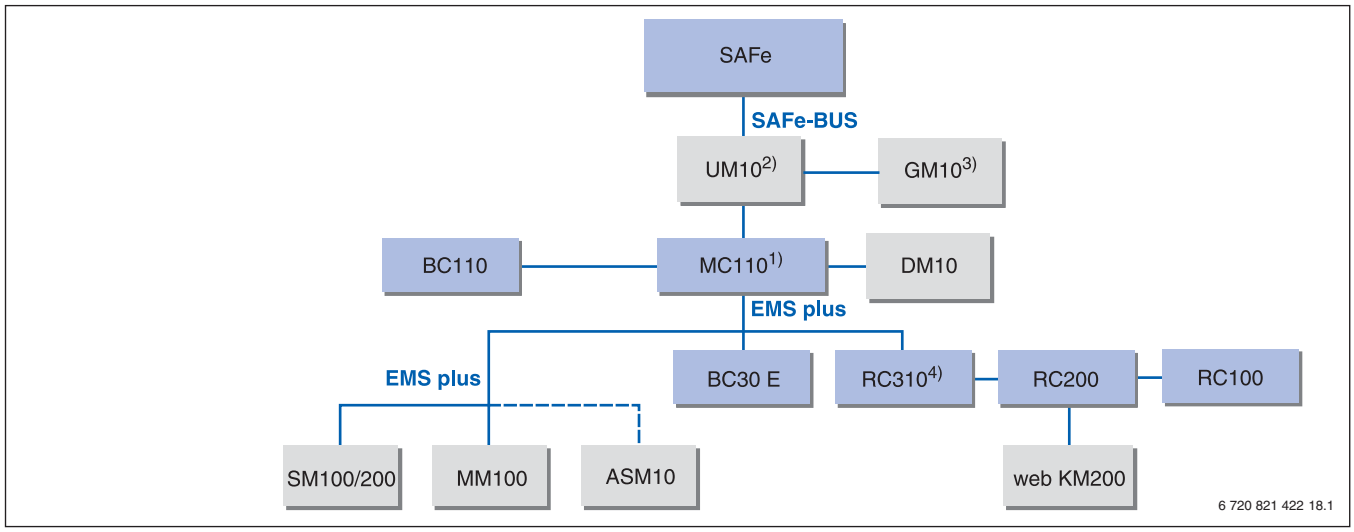


Fig. 32 BUS configuration and schematic diagram with SAFe for Logano plus KB372

ASM10	Connection module
BC110	Basic controller
BC30 E	Programming unit
DM10	Module for motor-driven hydraulic butterfly valve
EMS plus	Bus connection
GM10	Second gas valve
MC110	Master controller
MM...	heating circuit module
RC...	Programming unit
SAFe	SAFe
SAFe-BUS	SAFe BUS connection
SM...	Solar module
UM10	Diverter module
web KM200	Interface between heating system and network

1) Functionalities central fault message (EM10) and second gas solenoid valve (GM10) already included.

2) Reserve

3) Optional for function “gas pressure switch”

4) If Logamatic RC310 is used as remote control, the Logamatic BC30 E has to be used in the boiler controller

5.3 Logamatic 5000

5.3.1 Control unit Logamatic 5313 for Buderus boiler with burner control unit SAFe

Fig. 33 Logamatic 5313 control unit

[1] Programming unit/BCT controller module with capacitive 7" touch display
[2] Empty module slots with guide rails for module installation
[3] Integratable mounting rail (accessory) for additional components, e.g. relay
[4] 3-colour LED strip for status display (blue: “system OK”, yellow: “manual operation”, red: “fault”)
[5] Reset button
[6] Chimney sweep button
[7] Button for emergency operation
[8] USB connection for service purposes (behind the flap)
[9] Circuit breaker (on the side) for separate protection of boiler/burner and system components
[10] ON/OFF switch (on the side)
[11] Central module ZM5313

The standard Logamatic 5313 digital control unit can be used to activate 1-boiler systems with Buderus boilers and burner control unit SAFe.

As standard, the unit includes the functions DHW heating (cylinder system) and optional heating circuit control unit (one heating circuit with mixing valve) or boiler circuit control (boiler circulation pump and boiler mixing valve). In order to adapt it optimally to the heating system, the Logamatic 5313 control unit can be extended by up to 4 function modules. The control unit Logamatic 5313 can control for example up to 4 boilers in combination with the function module FM-CM. Using the FM-AM function module, an alternative heat source (e.g. CHP module or biomass boiler) can be integrated into the control system Logamatic 5000. If not enough module slots are available, the control can also be combined with one or several Logamatic 5310 expansion control units in the CBC-BUS network.

Boiler control

In the service menu of the control unit, for Logano plus KB372 as boiler type “SAFe (for activation via SAFe-BUS)” has to be set.

The correct settings in combination with the appropriate plumbing configuration guarantee Logamatic 5313 that the required boiler operating conditions are maintained.

Heating circuit control and DHW heating with Logamatic 5313 control unit

- Weather-compensated control of one heating circuit with actuator (mixing valve) and heating pump Alternative:Activation of a boiler circuit with boiler mixing valve and boiler circulation pump
- Option of connecting a separate remote control for room temperature hook-up of each heating circuit
- Adjustable, automatic switching between summer/ winter modes separately for each heating circuit
- Individual time-based adjustable DHW heating via cylinder primary pump (cylinder system), daily monitoring, thermal disinfection and activation of a DHW circulation pump
- Choice of DHW priority or operation in parallel with the heating circuits depending on the boiler and system configuration

Multi-boiler systems

Fitting the FM-CM function module to the Logamatic 5313 control unit enables up to 4 boilers to be controlled according to a strategy. In this case the EMS gas heat source is connected directly to the function module. The boilers equipped with third party burners or burner control unit SAFe each require a Logamatic 5311 or Logamatic 5313 control unit.

Special functions for single and multi-boiler systems

- Separate boiler curve can be adjusted with third party control of the consumers
- Control of a boiler circuit pump for systems with depressurised distributor or low-loss header
- Modulating activation of a boiler circulation pump via a 0 ... 10-V- or PWM signal
- Application of a potential-free signal for an external fault display or for switching between gas and oil operation in the case of dual fuel burners
- On/off or 0 ... 10 V input for external set value hook-up as set temperature value or output specification (heat requirement) with third party heating circuit control units

Special functions for multi-boiler systems in combination with the strategy moduleFM-CM

- Parallel or series operation specifiable
- Automatic sequence reversal, either daily, based on hours run, based on outside temperature or by electrically isolated switch
- Freely configurable load limitation subject to the outside temperature or via a floating input
- Definable boiler sequences
- Isolation of lag boilers taking account of automatic sequence reversal
- Definable run-on period for boiler circulation pumps for utilisation of residual heat from lag boilers
- Output 0 ... 10 V or 0 ... 20 mA output for externally signalling temperature requirement (heat requirement) to master controller (DDC)
- Indication of status of individual boilers
- Electrically isolated output for central fault messaging
- Electrically isolated input for application of an external heat meter signal

Scope of delivery

- Digital controller Logamatic 5313 with programming unit/controller module BCT with integrated 7" touch display and central module ZM5313
- FA outside temperature sensor
- Boiler water temperature sensor FK
- FZ additional temperature sensor, e.g. for low loss header or as heating circuit flow temperature sensor

5.3.2 Logamatic 5313 control unit specifications

Logamatic 5313	Unit	
Operating voltage	V AC	230 ± 10 %
Frequency	Hz	50 ± 4 %
Power consumption	VA	5
SR heating/boiler circuit mixing valve Maximum switching current Activation Recommended servomotor running time	 A V s	 5 230; 3-point step controller (PI characteristic) 120 (adjustable 6 ... 600)
Heating circuit / boiler circulation pump PK Maximum switching current	 A	 5
Cylinder primary pump PS Maximum switching current	 A	 5
DHW circulation pump PZ Maximum switching current	 A	 5
FZ auxiliary temperature sensor[1], temperature sensor	mm	Ø 9
FB DHW temperature sensor[1], temperature sensor	mm	Ø 9
DHW temperature sensorTW1 at TWE via 3-way diverter valve, temperature sensor	mm	Ø 6 (only connection to BC 10/25/30 of a wall-mounted indoor unit)
FA outside temperature sensor[1]		Temperature sensor
BFU remote control [1]		BUS communication
Input external fault display ES		Potential-free input[2]
Modulating boiler circulation pump PK Mod		PWM or 0 ... 10 V signal
Output for actual burner output U_{BR}		0 ... 10 V signal
External heat demand WA		Potential-free input[2] or 0 ... 10 V signal
External interlock EV		Potential-free input[2]
Dimensions (H × W × D)	mm	274 × 652 × 253

Table 15 Logamatic 5313 control unit specifications

1) Max. cable length 100 m (screened upwards of 50 m)

2) Switch load 5 V DC / 10 mA

5.3.3 Wiring diagram for Logamatic 5313 control unit

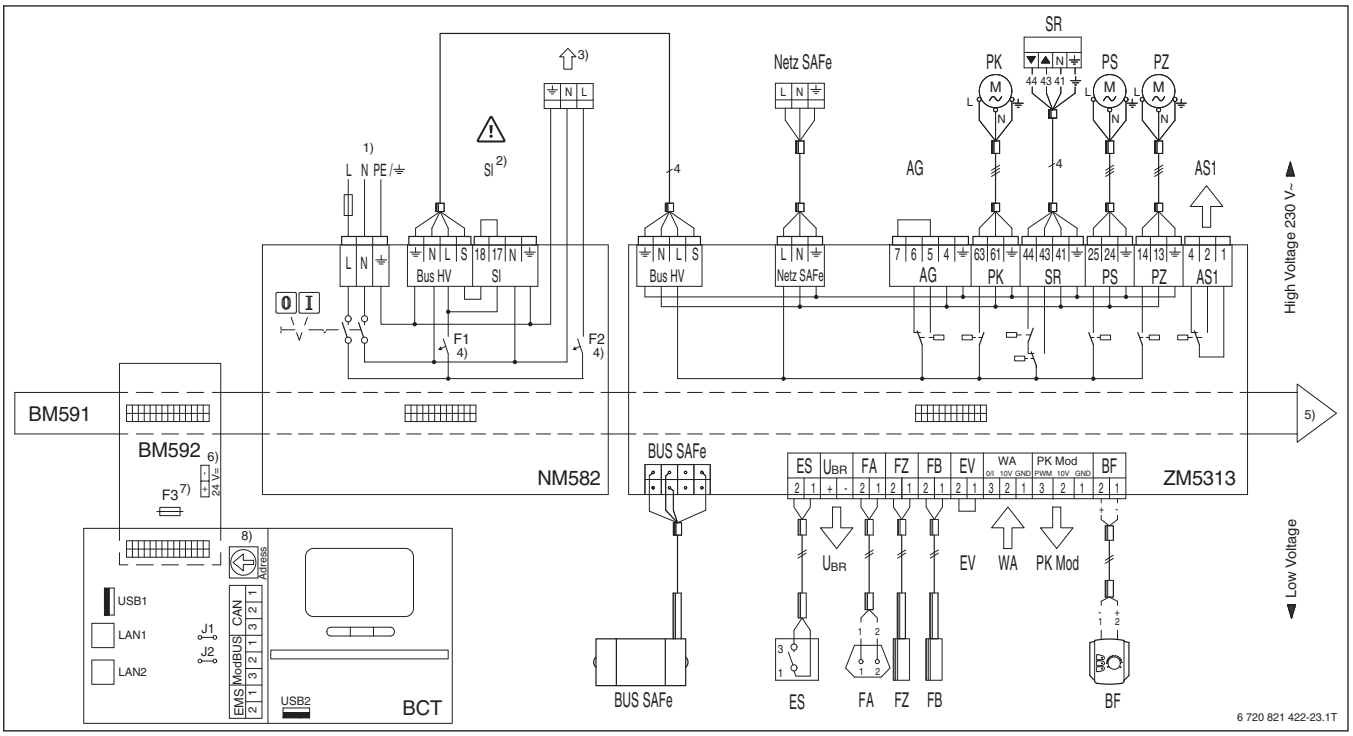


Fig. 34 Wiring diagram for Logamatic 5313 control unit

Handling terminals:

High-Voltage	Control voltage 230 V~ 1.5 mm^2/AWG 14, max. 5 A
Low-Voltage	Extra-low voltage 0.4 ... 0.75 mm^2/AWG 18

Central unit:

Bus HV	Central module power supply
BUS SAFe	SAFe bus lead, connection to burner control unit
CAN	ECOCAN-BUS
EMS	Connection for EMS boiler
F1	Circuit breaker (automatic cut-out) 10 A
F2	Circuit breaker (automatic cut-out) 10 A
F3	Fuse 5 × 20, 250 mAT
J1	Jumper for activating the ECOCAN-BUS terminating resistance
J2	Jumper for activating the RS485 Modbus terminating resistance
LAN1	Network connection 1
LAN2	Network connection 2
Modbus	Modular RS485 BUS-connection
Netz SAFe	Power supply for SAFe burner control unit
SI	Safety features or FM-SI
USB1	USB connection at rear of HMI
USB2	USB connection at front of HMI

General legend:

AG Flue gas damper, remove the jumper when connecting

AS1 Volt-free output for external central fault message
1- foot contact
2- N/O contact
4 - N/C contact

BF Remote control

ES External fault input (potential-free) or input for fuel changeover, 2-fuel burner
5 V DC / 10 mA

EV External interlock, remove jumper during connection

FA Outside temperature sensor

FB DHW temperature sensor

FK Boiler water temperature sensor

FZ Auxiliary temperature sensor

PC0 Pump in wall-mounted indoor unit (depending on the controller in the wall-mounted indoor unit)

PK Boiler circulation pump, max. 5 A

PK Mod Output for modulating boiler circulation pump

PS DHW cylinder primary pump, maximum 5 A

PW2 DHW circulation pump (depending on the controller in the wall-mounted indoor unit)

PZ DHW circulation pump, maximum 5 A

SAFe Burner control unit

SR Mixing valve control

TW1 Hot water temperature sensor (depending on the controller in the wall-mounted indoor unit)

U_{BR} Output for actual burner output

VW1 Diverter valve (depending on the controller in the wall-mounted indoor unit)

WA Connection for external heat demand

1) Mains 230 V ~ 50 Hz max. permitted fuse protection 20 AT on site, at least 2.5 mm^2/AWG 10 (terminals max. 2.5 mm^2/AWG 10)

2) **Caution:** If you are connecting an additional safety module
FM-SI or safety equipment, remove the jumper.

3) Mains supply for further modules

4) Circuit breaker (automatic cut-out) 10 A
F1: Central module fuse protection (ZMxxxx), mains module (NMxxx) and HMI
F2: Fuse protection for other modules, slot 1 ... 4
The total current per phase (F1, F2) must not exceed 10 A. It is mandatory that this value is observed. In order to avoid damage to the units, check the value when commissioning.

5) Internal BUS in the control unit

6) Power supply for FM-RM components (slot C), 24 V=, max. 250 mA

7) F3 Fuse 5 × 20, 250 mAT

8) Setting of control unit address

5.3.4 CBC-BUS

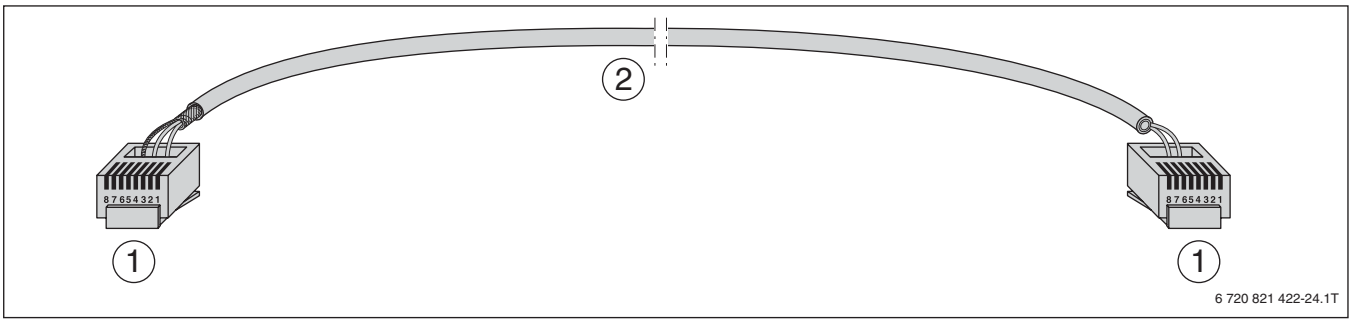


Fig. 35 BUS connection between control units of the Logamatic 5000 system

[1] RJ45 plug
[2] LAN cable (Cat.6 recommended). Permissible cable length: max. 100 metres between 2 control units Longer lengths can be achieved using repeaters.

Examples of combining Logamatic 5000 system digital control units using CBC-BUS

For internal communication between several control units Logamatic 5000 via CBC, both interfaces LAN1 and LAN2 can be used. External communication (e. g. router for connection to the Internet or GLT via Modbus TCP/IP) occurs always via the interface LAN1, that has to be configured correspondingly in the control unit menu.

Floor standing 1 boiler system with digital burner control unit SAFe

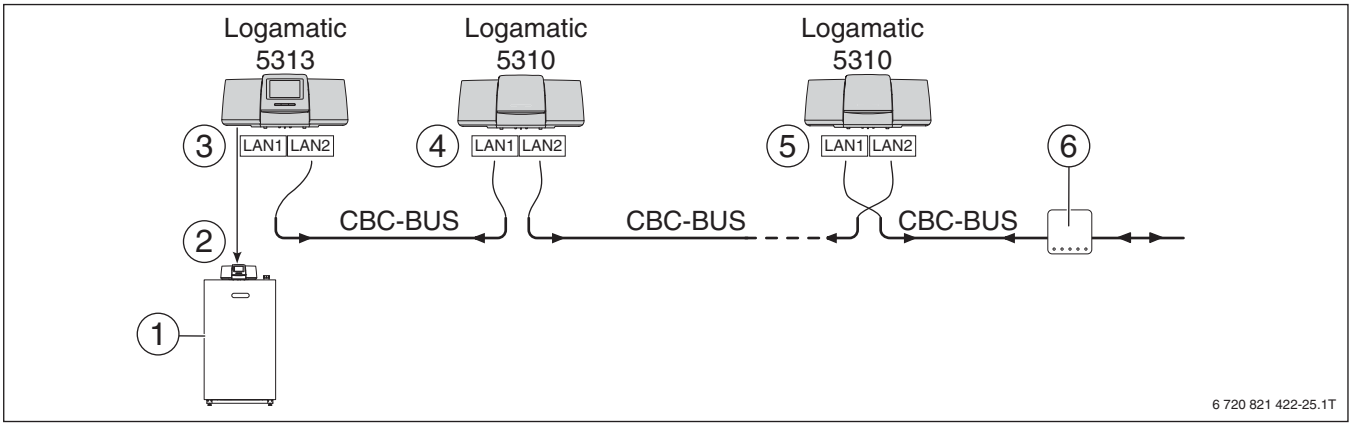


Fig. 36 Example combination of Logamatic 5000 system controllers for a floor standing 1-boiler system, with digital burner control unit SAFe, showing assignment of boiler and addresses on CBC-BUS network

[1] Boiler with burner control unit SAFe
[2] Direct burner control via SAFe-BUS (connection to ZM5313)
[3] Address 0
[4] Address 1
[5] Address maximum 15
[6] Router (connection always to LAN1)

Address 0 (master)

Logamatic 5313

- Boiler controller with outside-temperature sensor for heating circuit function (1 heating circuit with mixing valve or alternatively boiler circuit with mixing valve) and DHW heating (cylinder system)
- 4 spare slots for function expansion modules

Address 1 ... 15 (choice and assignment unrestricted)

Logamatic 5310

- Function extension as sub-station with feed pump (activation via FM-MM or FM-MW or master control unit)
- 4 spare slots for function expansion modules

5.3.5 Logamatic 5000 – overview

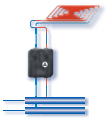
Logamatic 5313

Basic functions of control units that are capable of modular expansion for single and multi-boiler systems and for substations and stand-alone controllers

Boiler circuit with pump and/or mixing valve (only alternative to heating circuit)

Modulating activation of high-efficiency boiler circulation pumps according to requirements (0 ... 10 V)

1 DHW cylinder with circulation



1 heating circuit (with/without mixer, only alternative to boiler circuit)

Heat requirement via 0 ... 10 V and central fault message

Ethernet (IP) and also MOD-BUS TCP/IP and MOD-BUS RTU-interface

Monitoring and programming of main menu via Internet

Modular expansion of control units 5311 and 5313 with

FM-SI

- Integration of up to 5 external safety devices, e.g. low water indicator, pressure limiters and safety temperature limiters
- Straightforward fault evaluation/detection of triggered safety component
- Max. 1 module per control unit

FM-MM

- 2 heating circuits with/without mixer
- Option of connecting a BFU remote control in each case
- One input respectively, e.g. for connection of a pump fault
- One input respectively for external demand
- Max. 4 modules per control unit

FM-MW

- 1 heating circuit with/without mixer
- 1 DHW circuit with DHW circulation pump
- One input respectively, e.g. for connection of a pump fault
- Input for external heating circuit request and input for activation of thermal disinfection
- Max. 1 module per control unit
- Connection via BFU remote control

FM-AM

- Integration of an alternative heat source, e.g. a CHP module, a gas heat pump and/or a buffer cylinder
- Requirement of an "automatic" alternative heat source via volt-free contact
- Direct communication to Buderus Loganova CHP modules via MOD-BUS
- Max. 1 module per control unit

FM-CM

- Integration of up to 4 conventional heat sources in the heating system
- Any boiler combinations
- Parameterisable load limitation and sequence reversal of
- Integration of a strategy buffer cylinder
- Max. 4 modules per control unit

FM-WX

- 1 DHW circuit with DHW circulation pump either as cylinder/cylinder charging or freshwater system
- Modulating activation of cylinder primary pumps via PWM/0 ... 10 V signal
- Temperature-differential controlled DHW circulation pump via PWM/0 ... 10 V signal
- Activation of a mixing valve for primary circuit control
- Anti-scaling function with adjustable protection temperature

FM-MX

- 1 heating circuit with/without mixer
- Heating circuit pump modulated via PWM/0 ... 10 V signal
- Data exchange with heating circuit pump
- Option of connecting a BFU remote control
- Input for e.g. connecting external fault
- Input for external demand
- Max. 4 modules per control unit

BFU remote control

- Simple user-friendly operation of a heating circuit
- Operating mode changeover with day/night/automatic keys
- Rotary selector for adjusting room temperature
- Integrated or external room temperature sensor
- Fault display via LED

Logamatic 5310

- Control unit for expansion with 4 additional function modules or for use as substation without user interface
- Bus communication with additional control units Logamatic 5000

Telecontrol technology

- Expansion of standard tele-control functions to allow access to the service menu, data recording, user management and control centre function
- Required accessories: Integrable Gateway and portal usage (subject to charge)

Logamatic 5314

Basic functions of control units for lag boilers and for higher-level activation (GLT)

Boiler circuit with pump and/or mixing valve

Modulating activation of high-efficiency boiler circulation pumps according to requirements (0 ... 10 V)

Connection of up to 4 external safety components

Activation of stages or modulating burners

Heat requirement via contact or 0 ... 10 V and confirmation of current output via 0 ... 10 V

Central fault message and contact with external interlock

MOD-BUS TCP/IP and MOD-BUS RTU interface

6 720 821 422-19.1T

Fig. 37 Overview Logamatic 5000

Hydraulic layout example

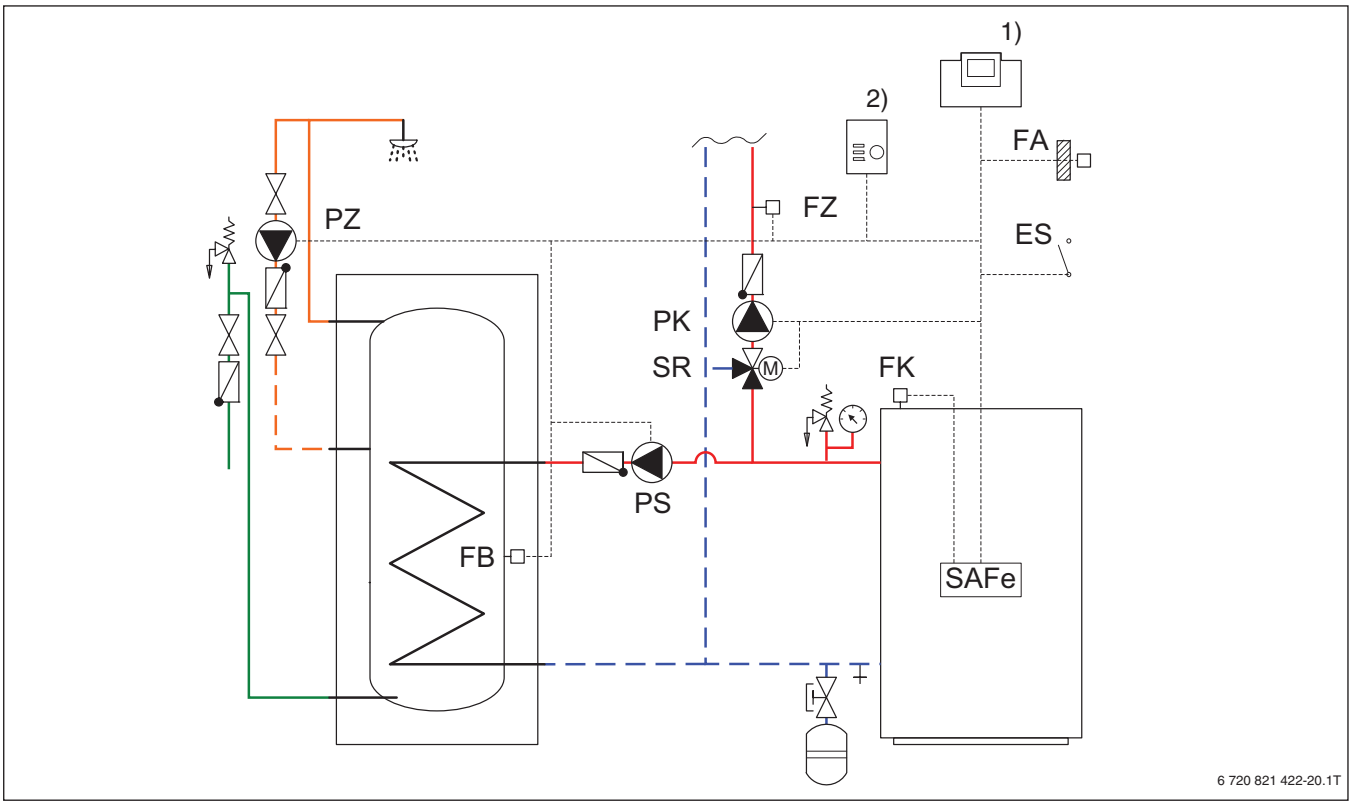


Fig. 38 System example Logamatic 5313 (abbreviations → Tab. 17, page 49)

1) Logamatic 5313 control unit
2) Remote control

5.4 Connectivity

5.4.1 Buderus Portal Control Center Commercial and Control Center CommercialPlus

Serial operation via Internet with Control Center Commercial and professional remote control Control Center CommercialPlus as extension.

		Control Center Commercial (free of charge) via IP inside (serial)	Control Center CommercialPlus (at extra charge) via Gateway (accessory)
Monitoring: Parameters	Main menu	Yes	Yes
	Service level	No	Yes
Diagnosis: Fault displays	Last 20	Yes	Yes
Parameter: Settings	Main menu	Yes	Yes
	Service level	No	Yes
Data record		No	Yes
User management		No	Yes
Control centre function		No	Yes
Availability/Accessibility		Middle	High
Costs	Investment	Free of charge	Gateway
	Appliance operation	Free of charge	Annual fee per system

Table 16 Scope of functions Control Center Commercial and Control Center CommercialPlus

Control Center Commercial

Using the Buderus Portal Control Center Commercial, the system user can control the heating system via the Internet. The control units Logamatic 5311 and Logamatic 5313 have a serial IP interface that allows connection to the Internet.

The following functions are available free of charge in the Control Center Commercial:

- Overview over all user systems
- 1:1 display of touch screen in browser for intuitive remote operation
- Monitoring of main menu
- Setting parameters in main menu
- Display of last operating and fault indications
- Automatic forwarding of fault displays via email

Control Center CommercialPlus

The fee-based Buderus Portal Control Center CommercialPlus provides further functions:

- Overview of system with status display
- Full setting of parameters including service menu
- Data record
- User management
- Control centre function
- etc.

For using additional functions, a gateway (separate accessory) is necessary.

5.4.2 Service interface for PC connection

The control units Logamatic 5311 and Logamatic 5313 can be connected to a PC. In doing so, the set commissioning parameters can be printed out for example. In addition, control can be operated very conveniently via PC. This can make sense, e.g. if a controller is in a position which is difficult to access (top of the boiler with pressure-jet burner in front of boiler) or if the PC is not the heating room.

As PC or service interface, the Buderus has a special USB to IP adapter. The USB interface is in front at the programming unit/controller module BCT behind the flap. The PC is connected to the RJ45 socket of the adapter.

No special software is required, the touch display is shown in the browser for intuitive 1:1 operation.

In the browser address bar, the following address has to be entered: **cbc.bosch**

Fig. 39 Adapter USB to IP (RJ45)

6 DHW heating

6.1 Systems

The Logano plus KB372 gas condensing boiler can also be used for DHW heating. The Buderus Logalux DHW cylinders that are matched to the boiler output can be used. These are available as vertical and horizontal versions in different sizes with 300 l to 6000 l capacity. Subject to application, they are equipped with an internal indirect coil or external heat exchanger. The cylinders can be used singly or in combination with other cylinders. With the primary store system, different cylinder sizes and different heat exchanger sets can be combined.

So system solutions are available for any demand and many applications. Primary store systems offer high levels of efficiency if the external DHW heat exchanger is sized correctly with low return temperatures.

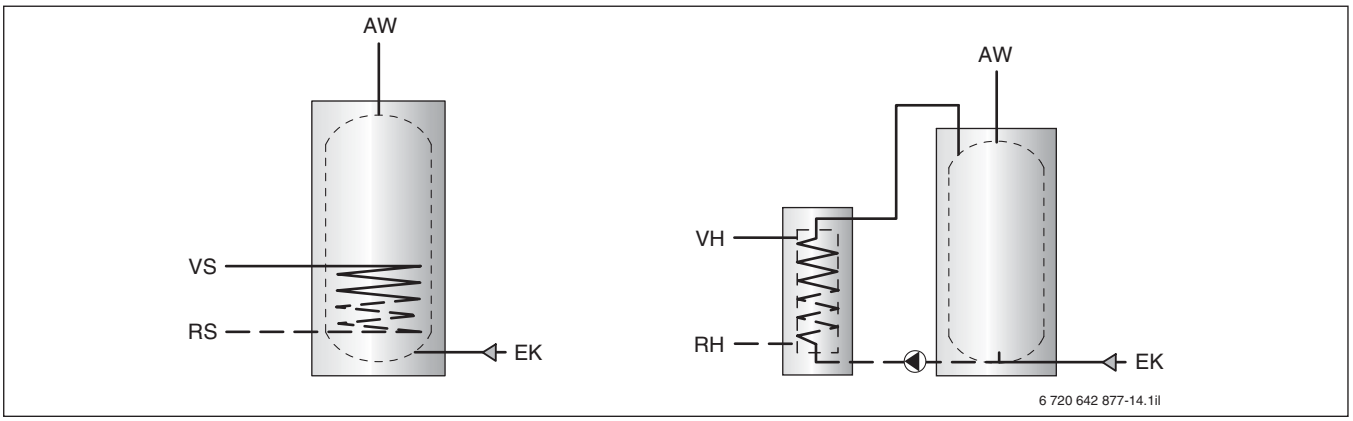


Fig. 40 Systems for DHW heating

AW DHW outlet
EK Cold water inlet
RH Return heating water (to boiler)
RS Cylinder return
VH Flow heating water (from boiler)
VS Cylinder flow

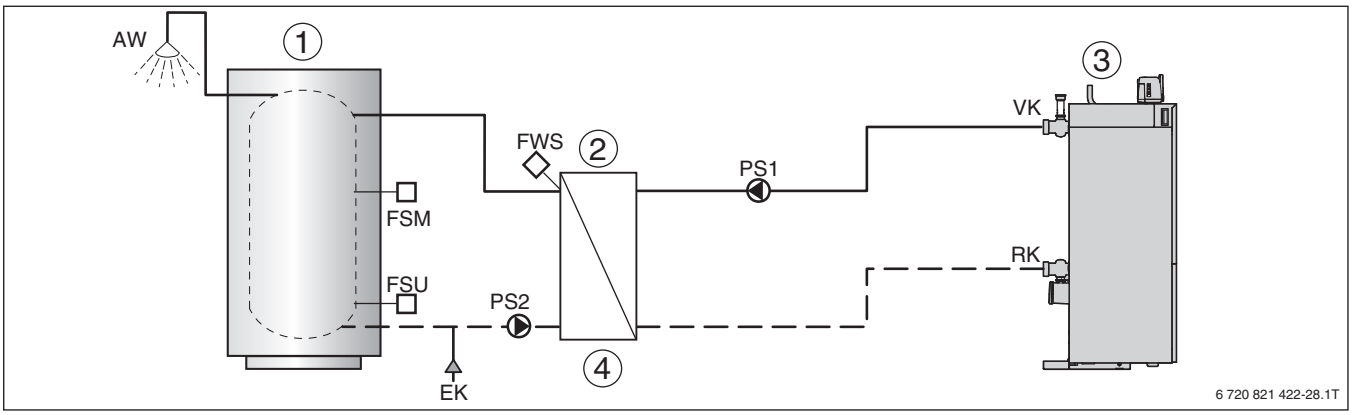


Fig. 41 Primary store system for DHW heating

AW DHW outlet
EK Cold water inlet
FSM DHW temperature sensor, cylinder middle
FSU DHW temperature sensor, cylinder bottom
FWS DHW temperature sensor, heat exchanger, secondary side
PS1 Cylinder primary pump (primary circuit pump – constant speed, mixing valve setting)
PS2 Cylinder primary pump (secondary side)
RK Return
VK Flow

[1] DHW cylinder for external heat exchanger
[2] External DHW heat exchanger
[3] Logano plus KB372
[4] At installation, the performance of the DHW primary store system LSP/LAP should as minimum 35 % correspond to the maximum performance of the boiler, to guarantee an optimum operation of the Logano plus KB372.

6.2 Information regarding the selection of DHW cylinders

The DHW cylinder has to be designed according to the building's requirements. You can use Logasoft DIWA for planning. For design, is should be observed that the internal indirect coil of the DHW cylinder must have a constant output of at least 35 % of the rated output of the Logano plus KB372 gas condensing boiler. For the smallest boiler size, this results in a size of ≥ 300 l (SU300) for the DHW cylinder. With smaller cylinders, in many cases the constant output of the indirect coil would be inadequate.

6.3 DHW control

The DHW temperature is adjusted and controlled either by a boiler control unit from the Logamatic EMS plus control system (e.g. SM200 function module for primary store systems), or by a control unit for DHW heating. The control unit for DHW heating is matched to the heating circuit control unit and offers many application options.

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

7 System examples

7.1 Information regarding all system schematics

The examples in this section indicate possible ways regarding the hydraulic connection of Logano plus KB372 condensing boilers. For detailed information regarding the number, equipment 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. Each system example is a non-binding recommendation for a certain version of the heating system. Practical implementation is subject to currently applicable technical rules. Information regarding further options for system layout and planning aids are available from the staff in Buderus subsidiaries.

7.1.1 Heating pumps

Heating 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 3 stages to the pump rate required by the operation. Flow water should not be mixed into the return so that the highest possible efficiency can be achieved. Suited for this purpose is e.g. the installation of an pressure relief valve, a low loss header or a differential, pressure-controlled heating pump.

7.1.2 Dirt traps

Deposits in heating systems 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 dirt separator.

Dirt traps retain contaminants and thereby prevent 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.

7.1.3 Control

The operating temperatures should be controlled with a Logamatic control unit by Buderus 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. The number and design of the controllable heating circuits depends on which control unit is chosen and the corresponding equipment. The control and electrical connection of 3-phase pumps must be provided by the customer. For more detailed information,→ see the technical guides to the control units.

7.1.4 DHW heating

If DHW temperature control with a Logamatic control unit is designed accordingly, special functions can be used, such as the actuation of a DHW circulation pump or thermal disinfection to prevent the growth of legionella.

7.1.5 Safety equipment in accordance with DIN EN 12828

The Logano plus KB372 is fitted with a pressure sensor, that functions as low water indicator acc. to EN 12828. In addition, the pressure sensor indicates a reduced water pressure via the interface at the burner control unit SAFe. This ensures a high availability.

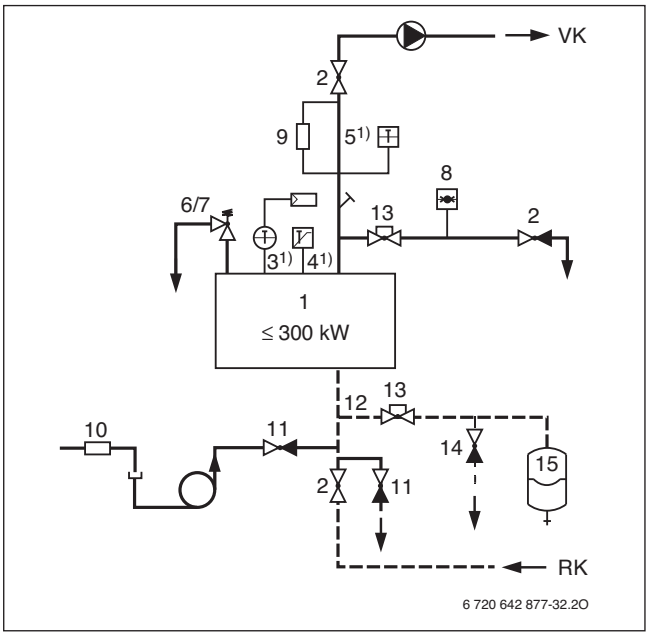


Fig. 42 Safety equipment to DIN EN 12828 for boilers ≤ 300 kW, operating temperature ≤ 105 °C

RK Return
VK Flow
1 heat source
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 pressure relief valve HFS 2.5 bar
8 Pressure gauge
9 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
10 Non-return component
11 Boiler drain & fill valve (KFE)
12 Safety pipe
13 Shut-off valve with lockout against unintentional closure, e.g. by sealed cap valve
14 Drain upstream of the expansion vessel
15 Expansion vessel (DIN EN 13831)

1) At a shutdown temperature (STB) of 100 °C, the maximum flow temperature would be 95 °C[1)]/ 85 °C[2)]

7.1.6 Boiler safety set

For the Logano plus KB372 2 factory-prepared boiler safety sets are available that can be turned in position according to system situation.

The set contains the following:
- Pressure gauge
- Safety valve R 1 (for boiler size 75 kW ... 100 kW)
- Safety valve R 1¼ (for boiler size 150 kW ... 300 kW)
- Automatic air vent valve
- Insulation, black

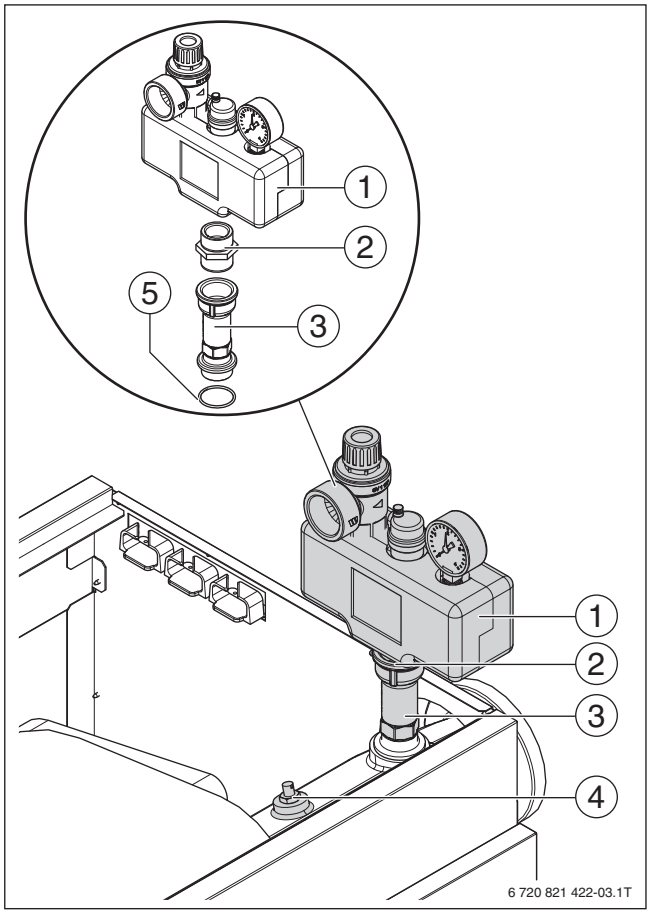


Fig. 43 Boiler safety set 3 bar (Depiction: Boiler structure right)

[1] Manifold with taps and thermal insulation
[2] Double nipple
[3] Extension
[4] Flow temperature sensor
[5] O ring

1) In conjunction with a Logamatic 5000 controller
2) In conjunction with a Logamatic MC110 controller

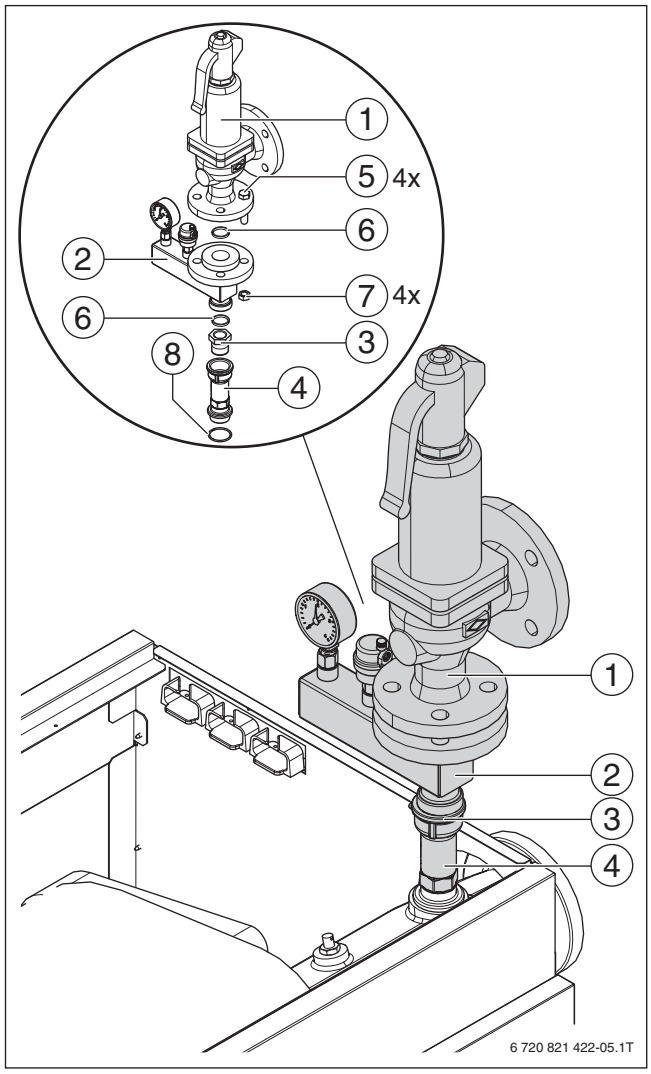


Fig. 44 Boiler safety set 4 ... 6 bar (Depiction: Boiler structure right)

[1] Pressure relief valve 4 ... 6 bar
[2] Manifold with taps and flange
[3] Screw fitting
[4] Double nipple
[5] Hexagon bolts
[6] Flat gasket
[7] Hexagon nuts
[8] O ring

7.1.7 Expansion vessel (EV)

To safeguard individual boilers, a EV can be connected to the ¾" inch connection on the return, in accordance with EN 12828. An additional EV to protect the system should be installed on site in the system return. The design (volume and pre-charge pressure) is effected with regard to accepted technical rules.

7.2 Abbreviations

Abbreviation	Name
BC30 E	Basic controller
CHP Loganova	Combined heat and power unit
C-BHKW	Control CHP
DDC	External control unit
FA	Outside temperature sensor
FAR	Sensor system return
FB	DHW temperature sensor
FK	Boiler water temperature sensor
FM-AM	Function module
FM-MM	Function module
FM-MW	Function module
FPM	Sensor buffer tank center
FPO	Sensor buffer tank top
FPU	Sensor buffer tank bottom
FS../3	Freshwater station
FV/FZ	Flow temperature sensor
FW	DHW temperature sensor
FWV	Heat source flow sensor
GB...	Floor standing condensing boiler
HDU...	Heating Interface Unit
HK...	Heating circuit
(I)MC110	Control unit of Logamatic EMS plus series
MC400	Cascade module
KB...	Floor standing condensing boiler Logano plus
MC1	Boiler water temperature controller
MM100	heating circuit module
MS100	Module freshwater station
PC0/PC1/PH	Heating circuit pump
PK	Boiler circulation pump
PR... E/P...	Buffer storage tanks
PS	Cylinder primary pump
PS1	Cylinder primary pump, heating circuit
PS4	Cylinder primary pump, DHW circuit
PS5	DHW circulation pump
PW1	Cylinder primary pump
PW2/PZ	DHW circulation pump
R5313	Control unit of Logamatic 5000 series
RC310	Programming unit
RWT	Heat exchanger return
SB105	Floor standing condensing boiler
SC300	Control of freshwater station
SF.../SH...	DHW cylinderLogalux
SH	Heating circuit mixing valve
SR	Boiler circuit mixing valve
SLP	Primary store system
SM200	Solar module
SU...	DHW cylinderLogalux
SWE	Mixing valve for integrating heat source or buffer cylinder
T0/FZ	Strategy sensor
T1	Outside temperature sensor
TC1	Flow temperature sensor
TS1	Collector temperature sensor/ sensor primary store system
TS2	Cylinder temperature sensor, bottom
TS3	Cylinder temperature sensor, top
TW1	DHW temperature sensor
TWH	Boiler water temperature controller
VC1	Heating circuit mixing valve
WT...	Heat Exchanger

Table 17 Abbreviations

Table 17 Abbreviations

7.3 System examples

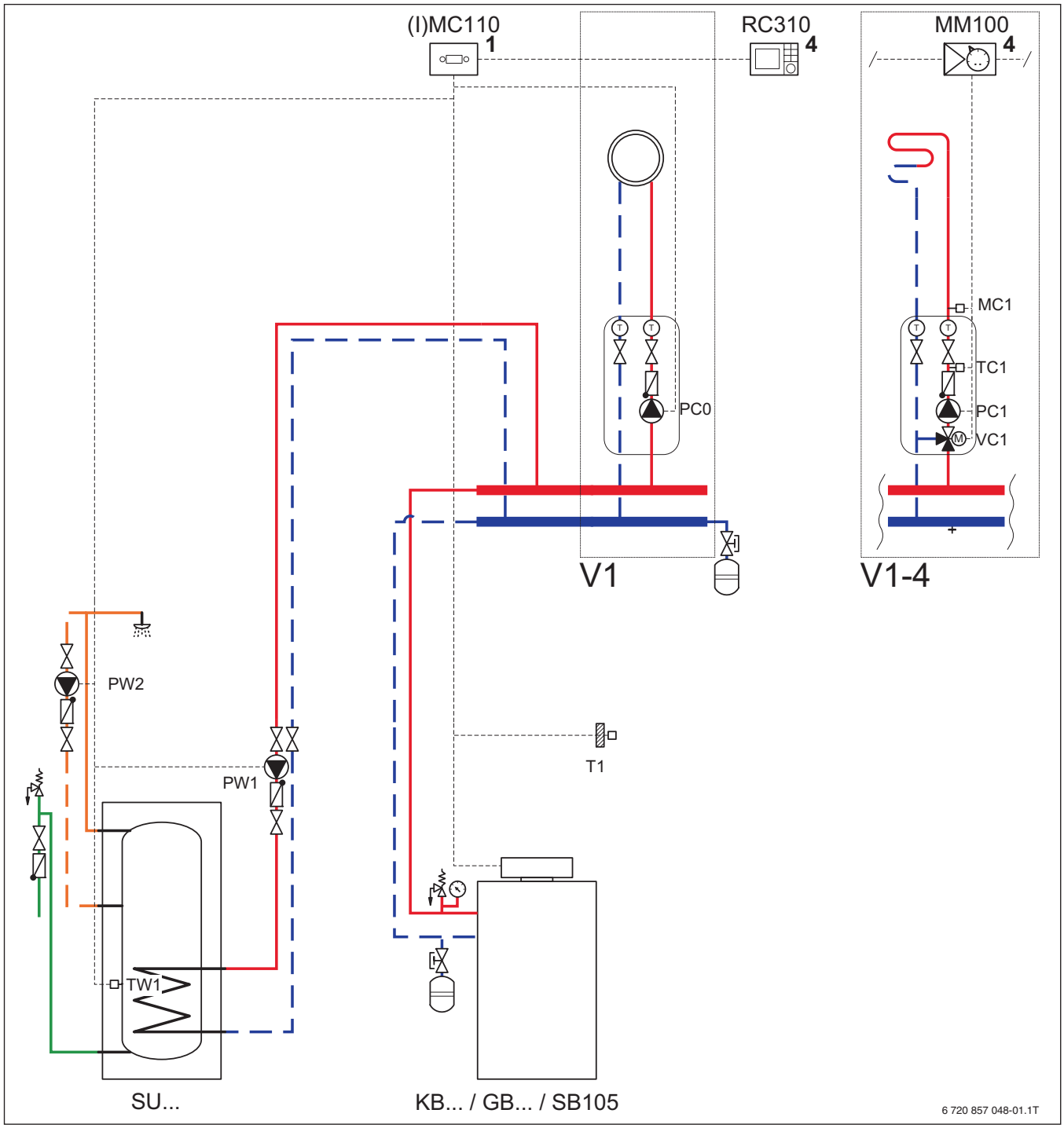


Fig. 45 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, DHW cylinder Logalux SU... and heating circuit without mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
4 On the heat source or on the wall

The circuit diagram is only a schematic illustration!

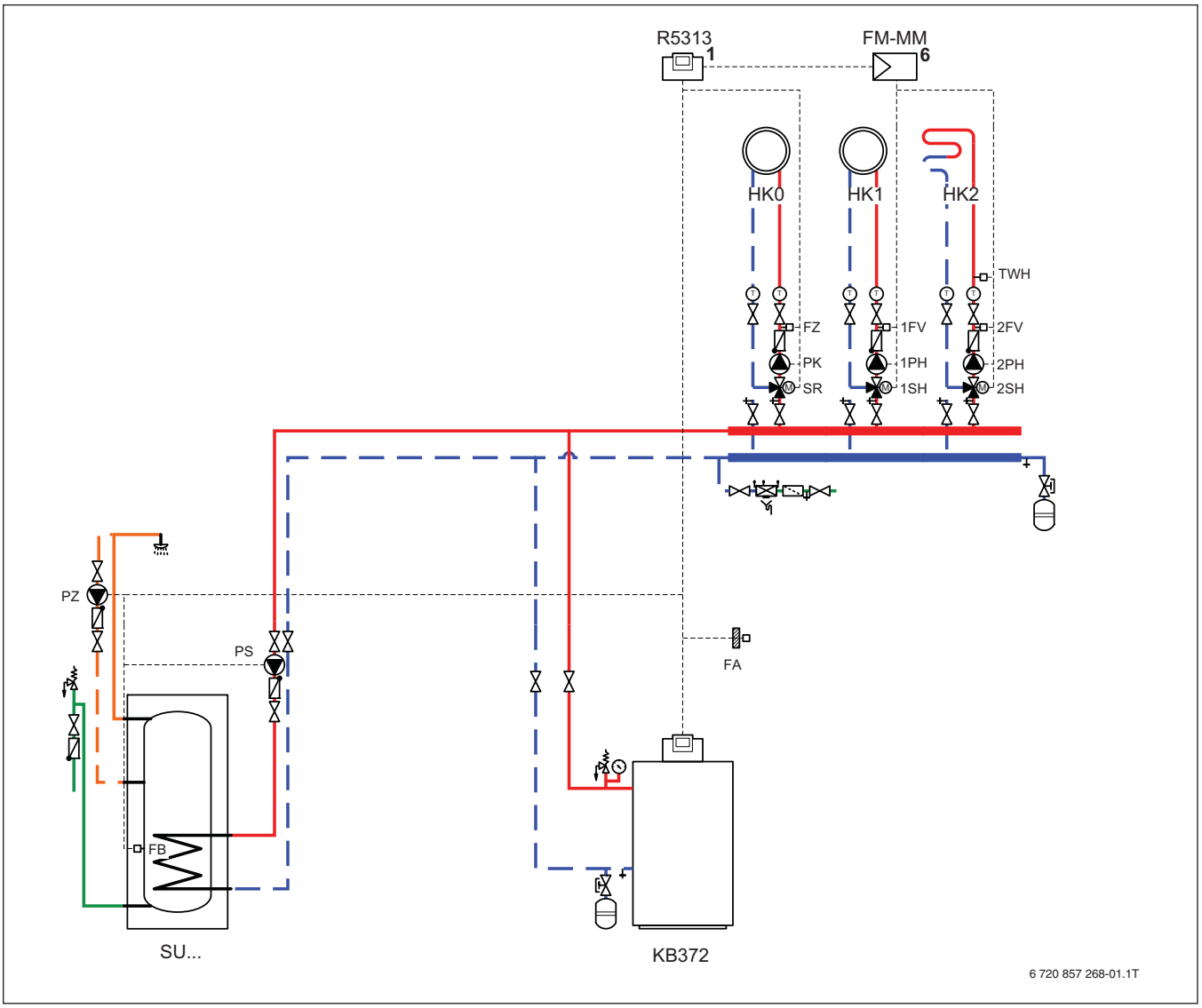


Fig. 46 System example: Logano plus KB372 with Logamatic 5313, DHW cylinder Logalux SU... and 3 heating circuit with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
6 In control unit

The circuit diagram is only a schematic illustration!

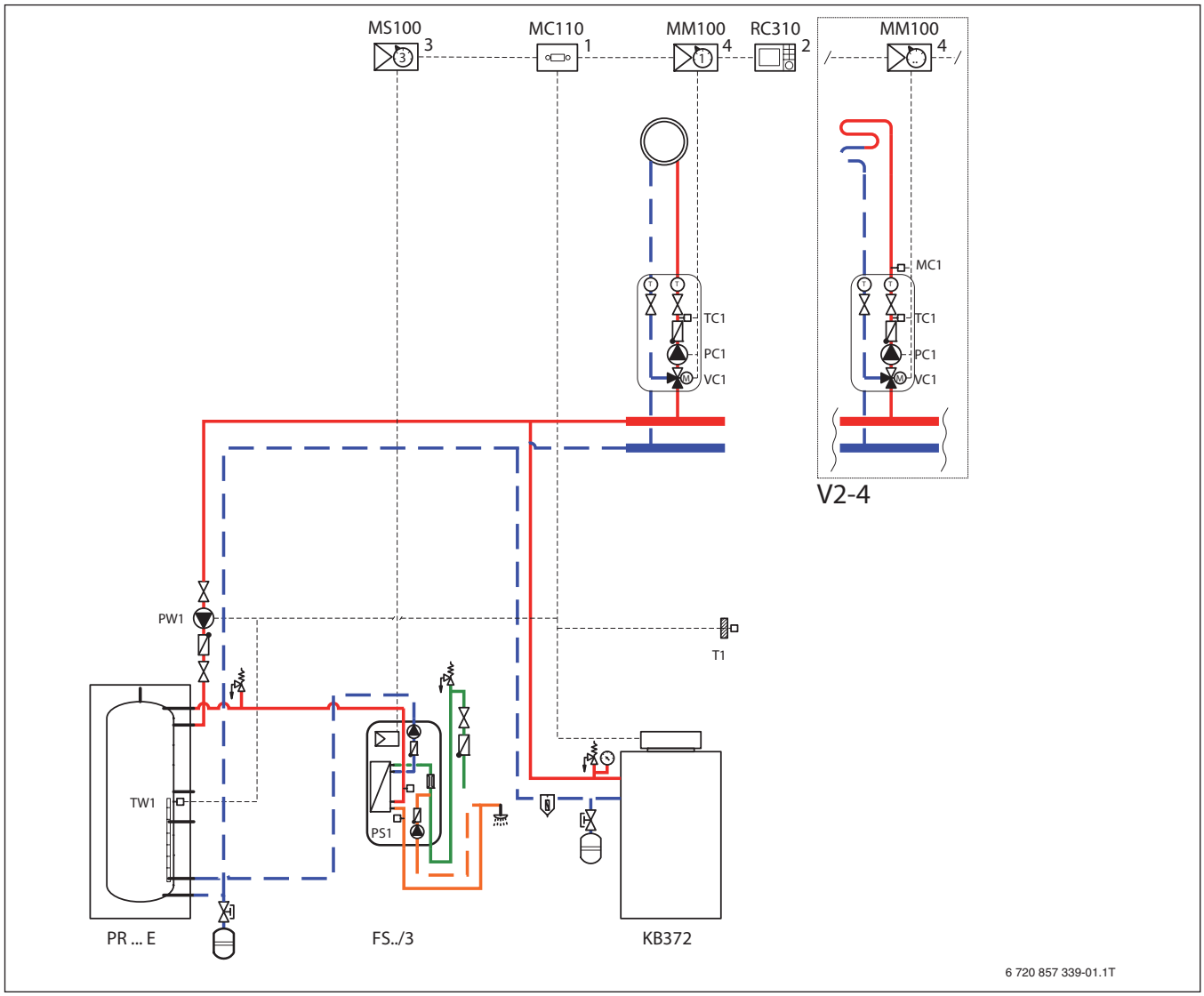


Fig. 47 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, freshwater station FS../3, buffer storage tank Logalux PR... and heating circuit with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
2 On the heat source or on the wall
3 In the station
4 On the wall

The circuit diagram is only a schematic illustration!

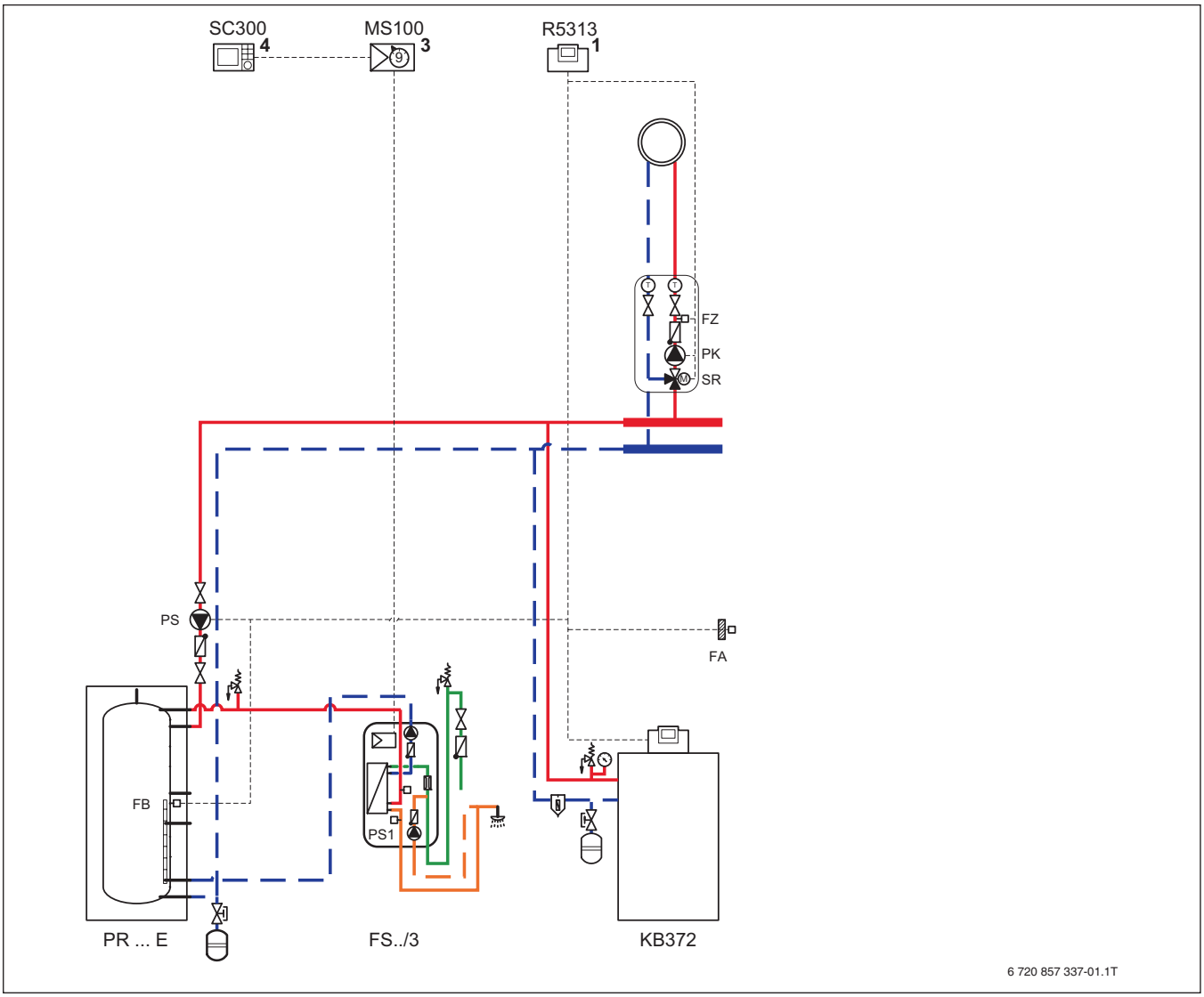


Fig. 48 System example: Logano plus KB372 with Logamatic 5313, FS../3, freshwater station SC300, buffer storage tank Logalux PR... and heating circuit with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
3 In the station
4 In the station

The circuit diagram is only a schematic illustration!

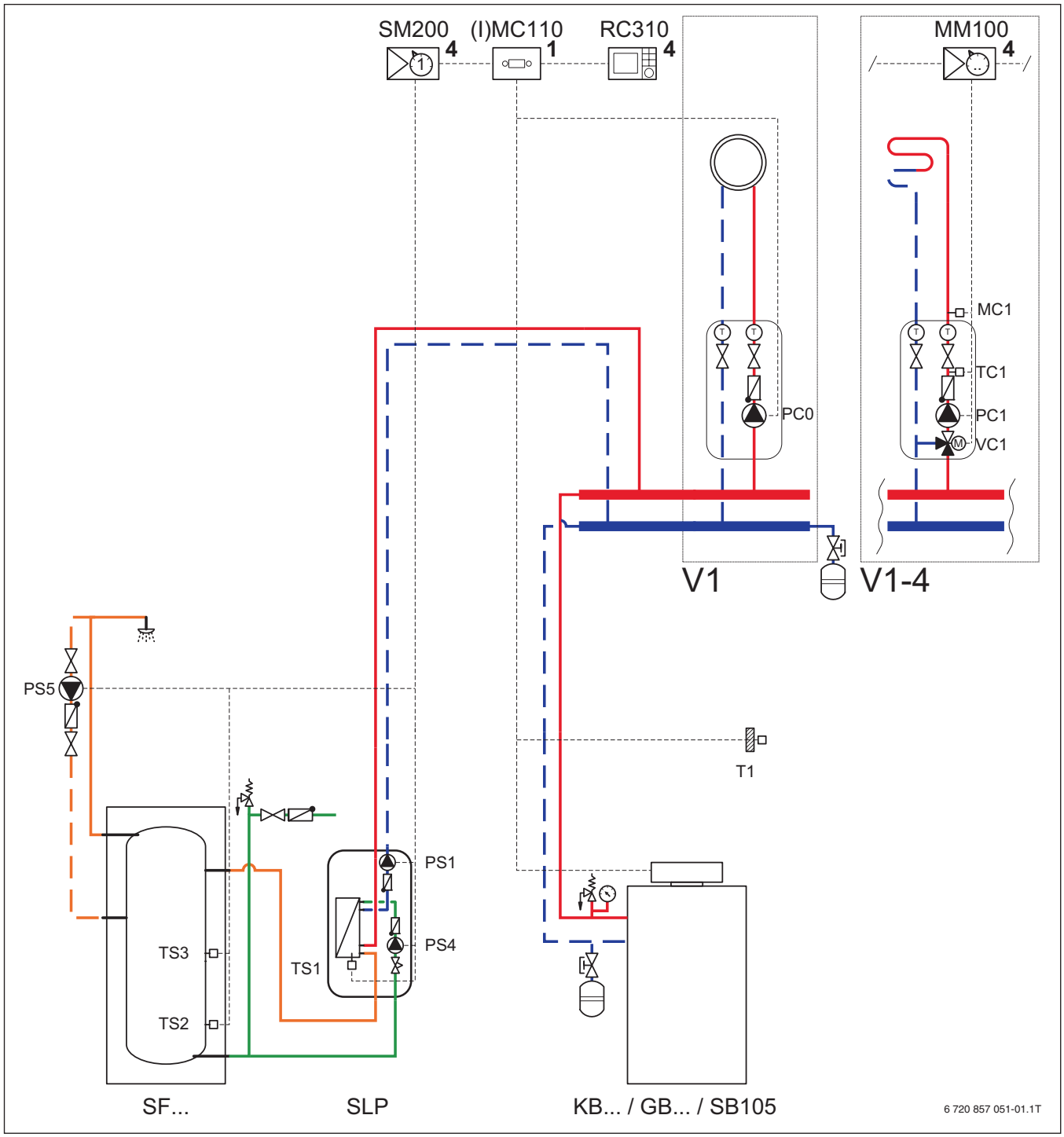


Fig. 49 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, fresh water station FS../3, DHW cylinder Logalux SF..., primary store system SLP and heating circuit without mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
4 On the heat source or on the wall

The circuit diagram is only a schematic illustration!

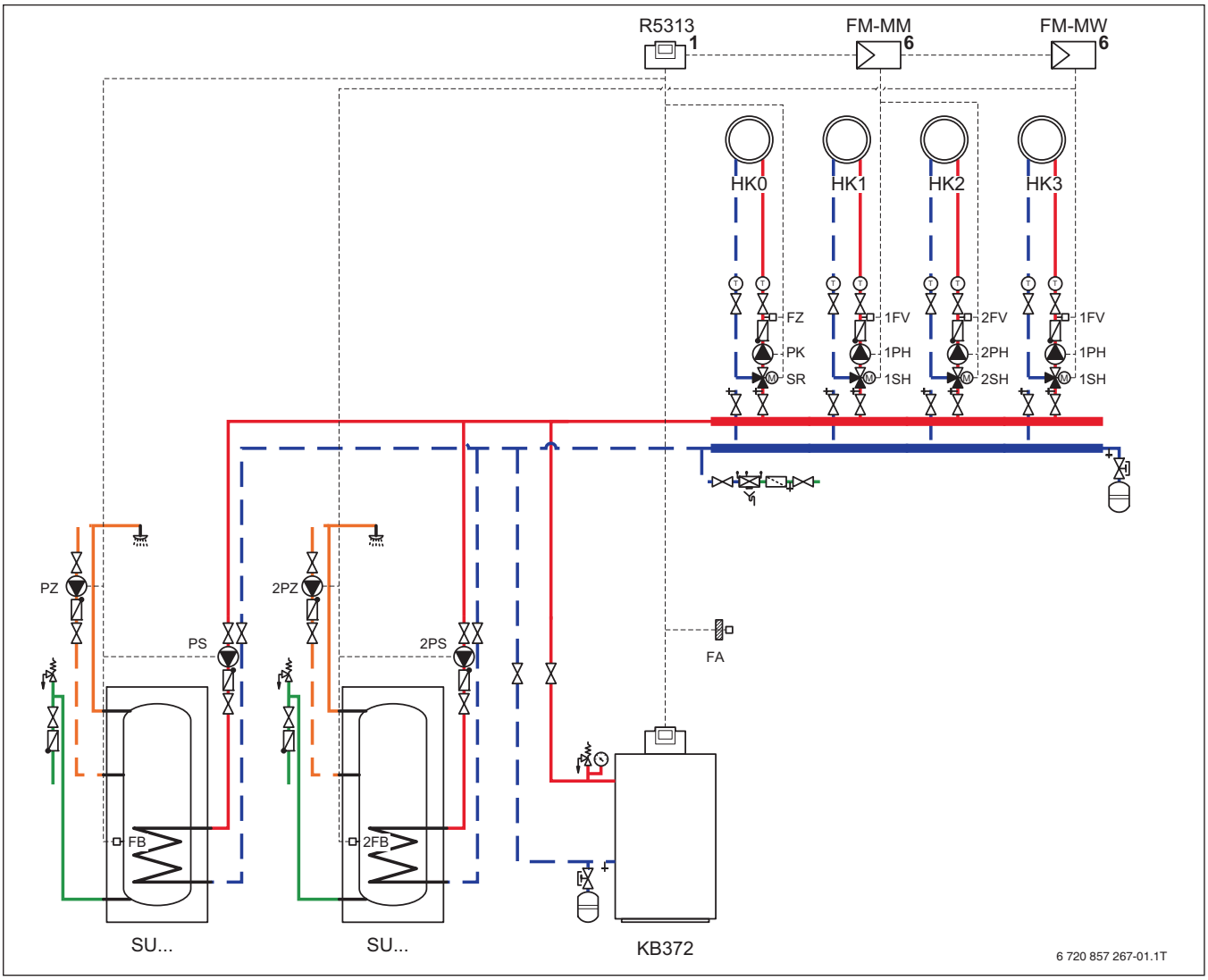


Fig. 50 System example: Logano plus KB372 with Logamatic 5313, 2 DHW cylinders Logalux SU... and 4 heating circuits with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
6 In control unit

The circuit diagram is only a schematic illustration!

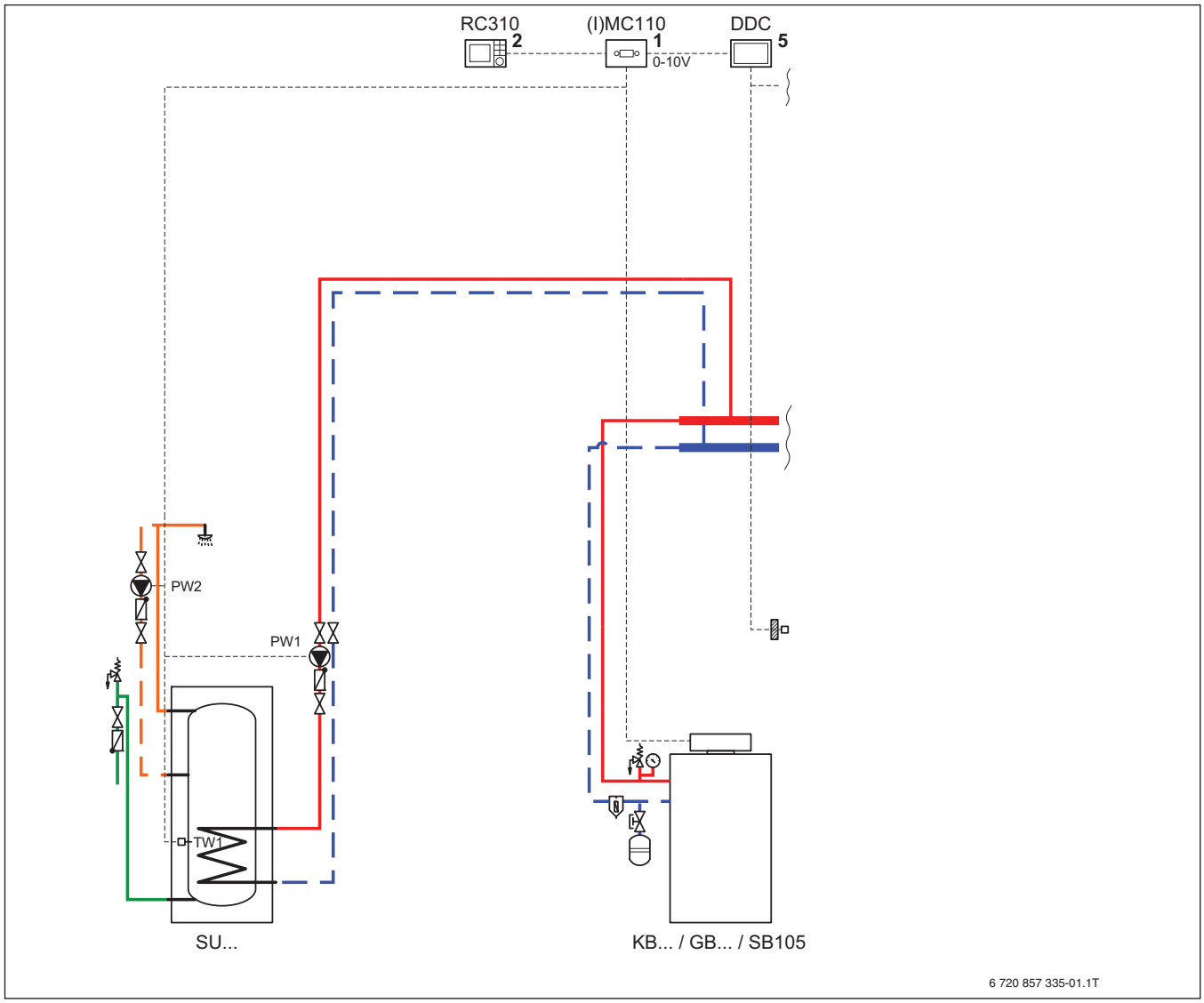


Fig. 51 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, DHW cylinder Logalux SU... and external control (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
2 On the heat source or on the wall
5 External control unit

The circuit diagram is only a schematic illustration!

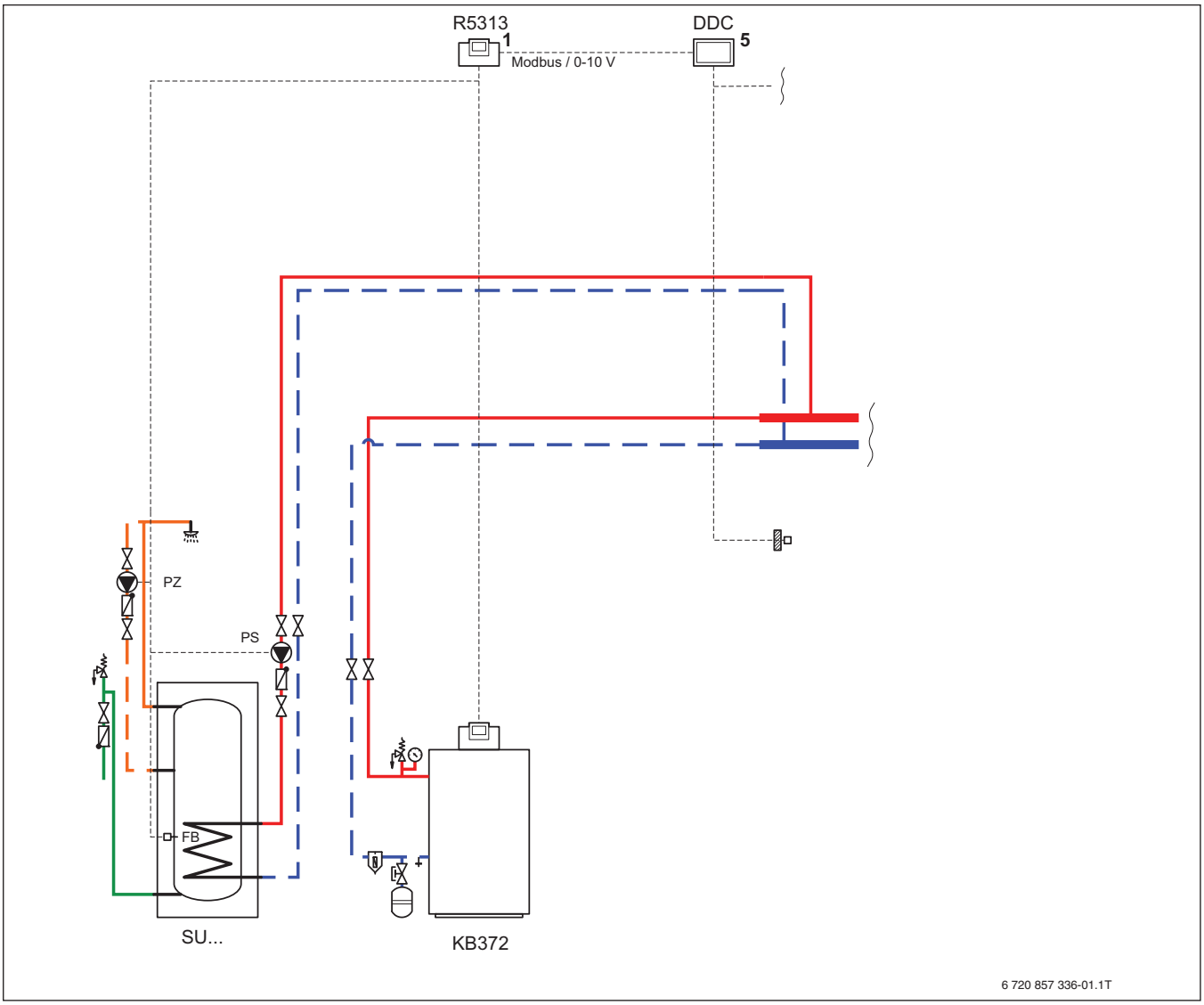


Fig. 52 System example: Logano plus KB372 with Logamatic 5313, DHW cylinder Logalux SU... and external control (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
6 External control unit

The circuit diagram is only a schematic illustration!

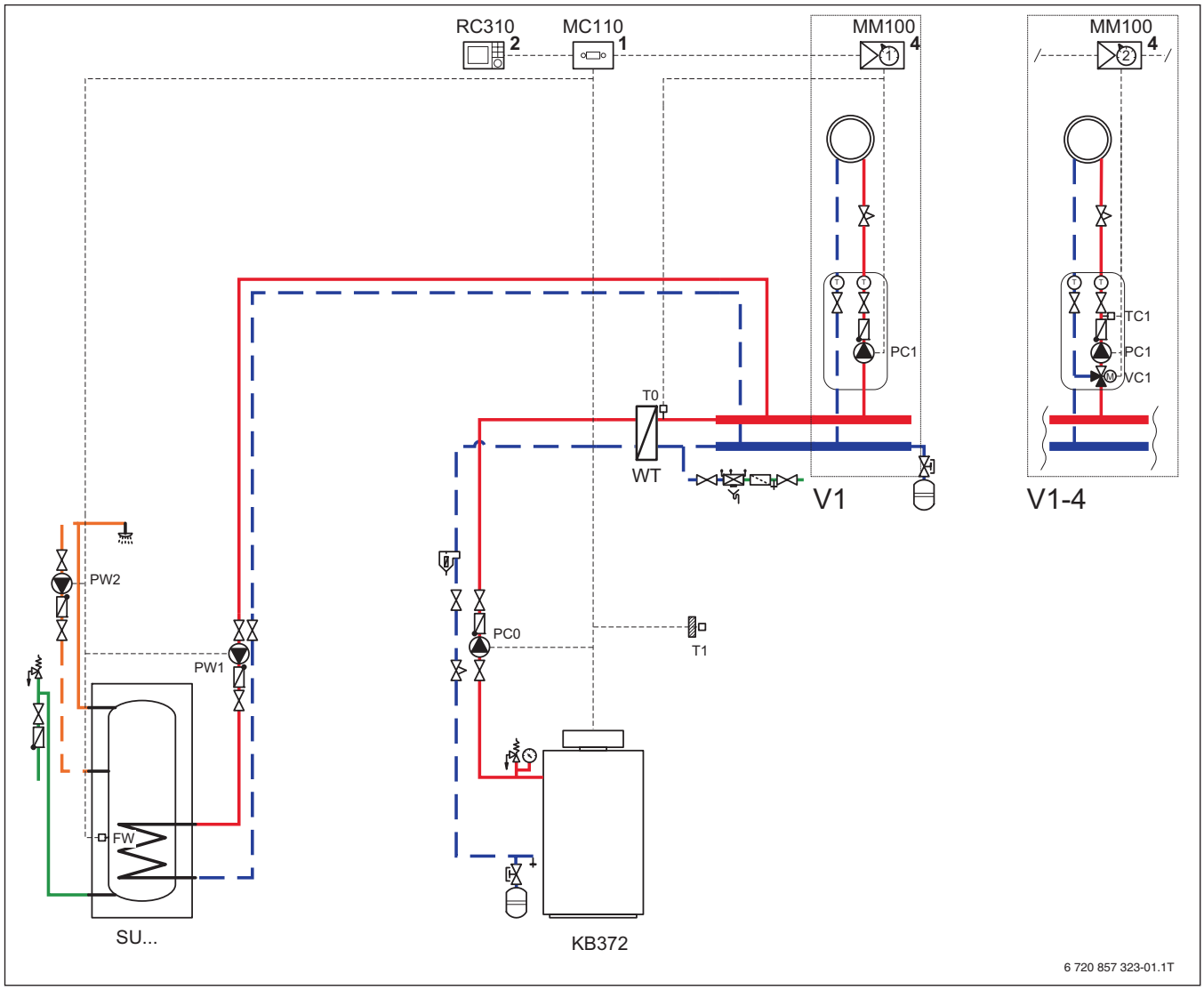


Fig. 53 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, DHW cylinder Logalux SU..., system separation with heat exchanger and heating circuit without mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
2 On the heat source or on the wall
4 On the heat source or on the wall

Operation of boiler circulation pump constant.

The circuit diagram is only a schematic illustration!

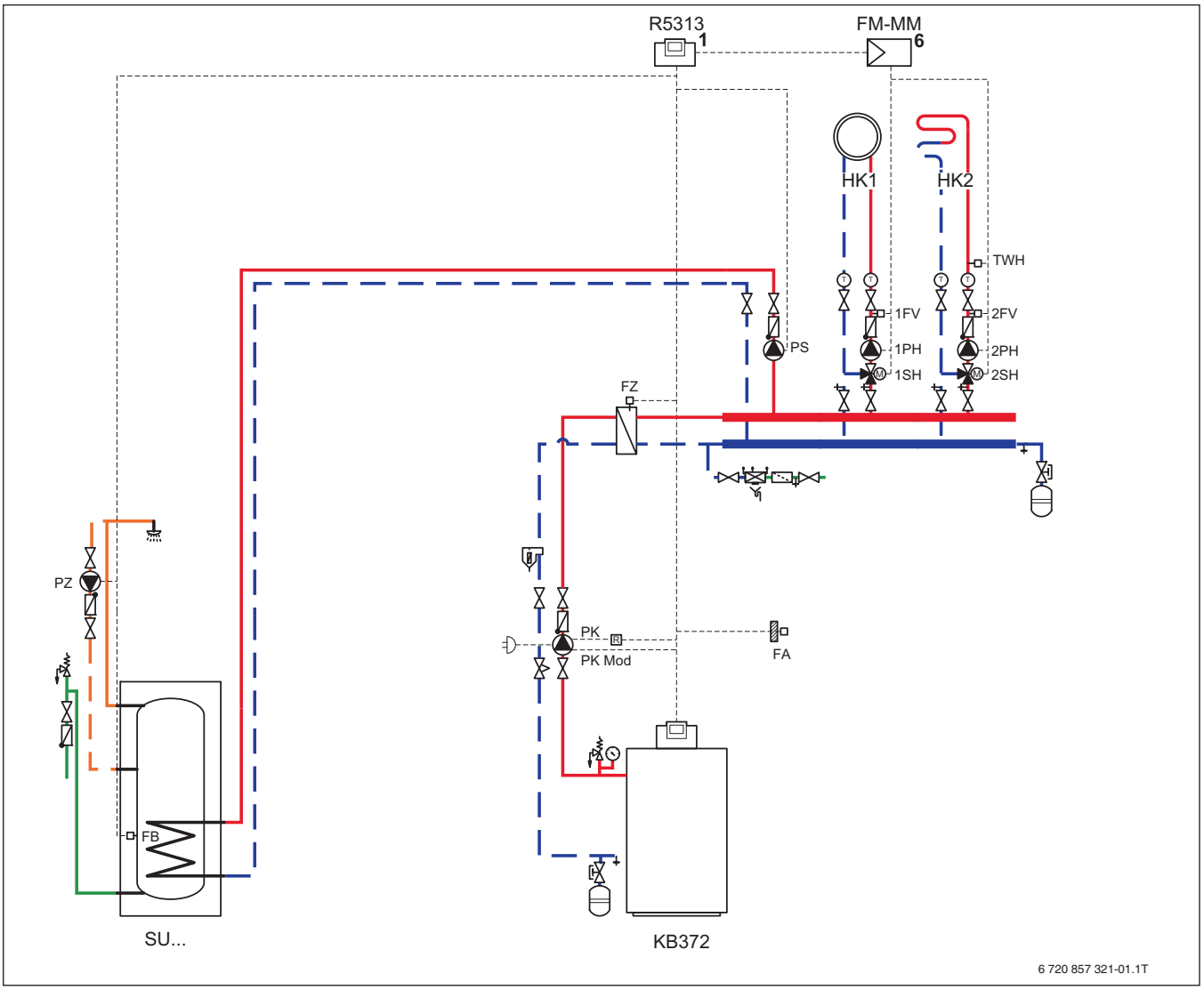


Fig. 54 System example: Logano plus KB372 with Logamatic 5313, DHW cylinder Logalux SU..., system separation with heat exchanger and 2 heating circuits with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
6 In control unit

The circuit diagram is only a schematic illustration!

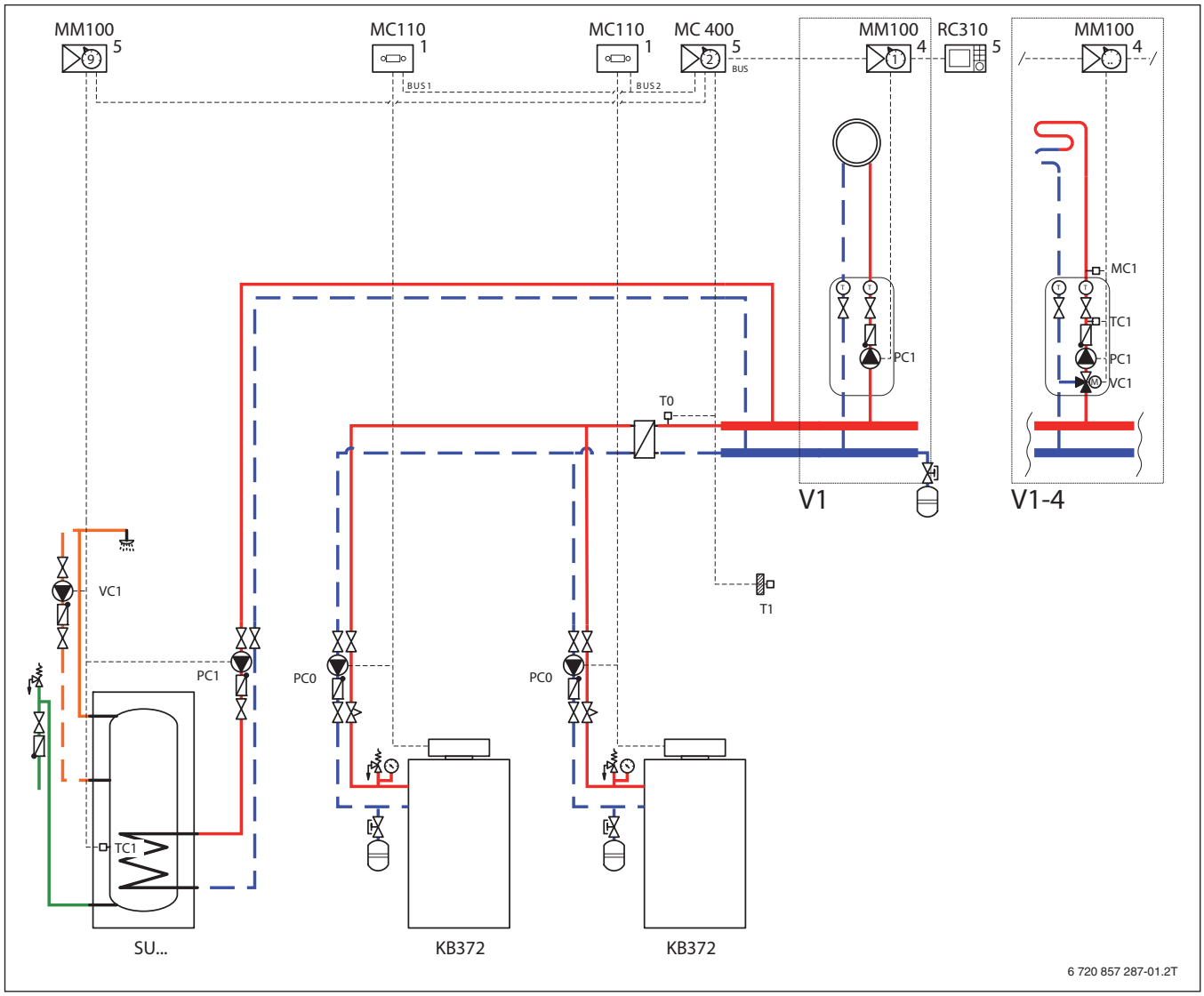


Fig. 55 System example: 2 × Logano plus KB372 only as factory cascade design with Logamatic MC110, Logamatic RC310, DHW cylinder Logalux SU..., system separation with heat exchanger and heating circuit without mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
4 On the heat source or on the wall
5 On the wall

Operation of boiler circulation pump constant.

The circuit diagram is only a schematic illustration!

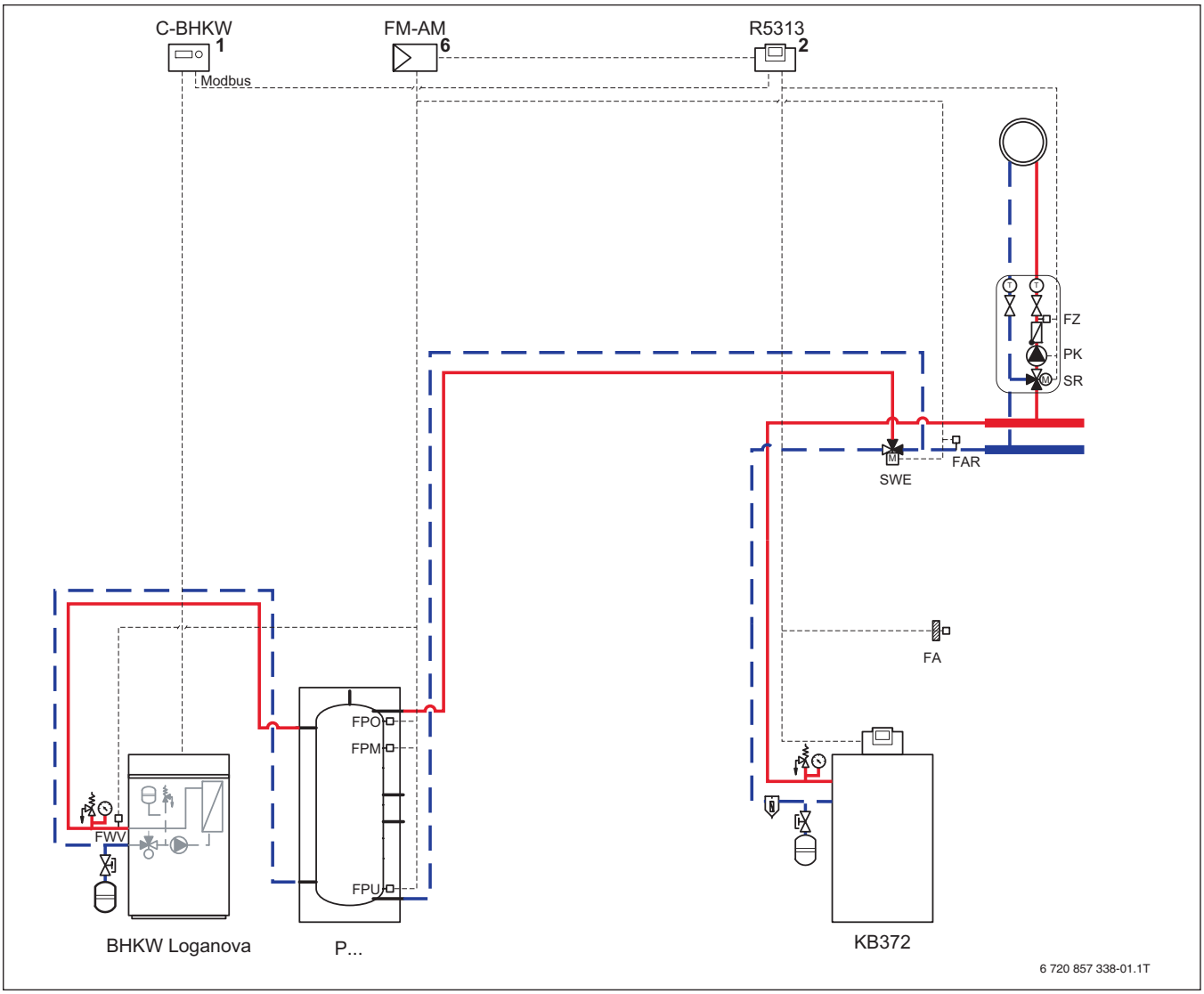


Fig. 56 System example: Logano plus KB372 with Logamatic 5313 with function module FM-AM for regenerative connection of heat source BHKW Loganova via ModBus and a heating circuit with mixer (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
2 On the heat appliance
6 In control unit

The circuit diagram is only a schematic illustration!

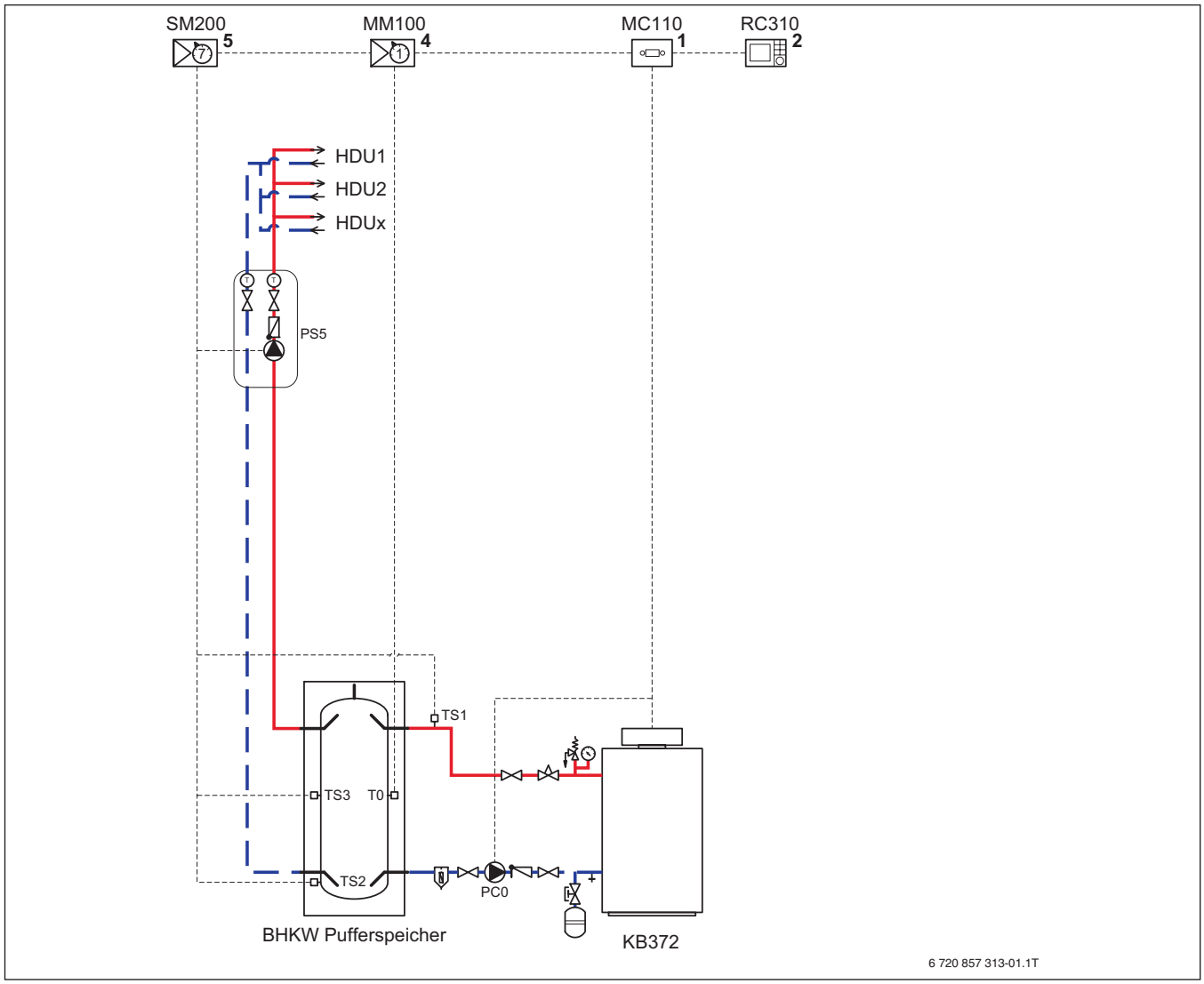


Fig. 57 System example: Logano plus KB372 with Logamatic MC110, Logamatic RC310, buffer storage tank with heating circuit without mixer for heat supply of heat interface unit WS170 (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
2 On the heat source or on the wall
4 On the heat source or on the wall
5 On the wall

Operation of boiler circulation pump constant.

The circuit diagram is only a schematic illustration!

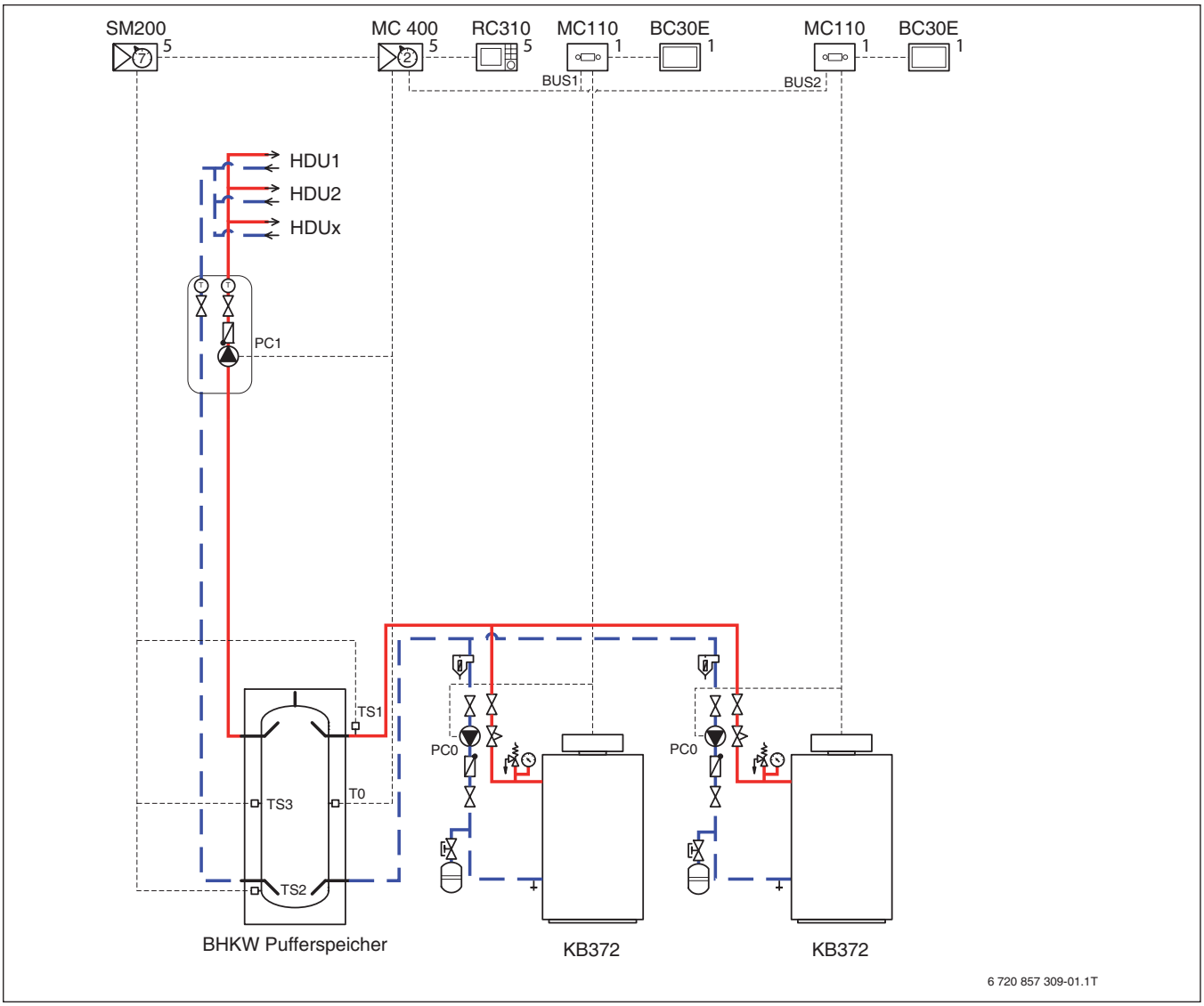


Fig. 58 System example: 2 × Logano plus KB372 only as factory cascade design with Logamatic MC110, Logamatic RC310, buffer storage tank with heating circuit without mixer for heat supply of heat interface unit WS170 (abbreviations → Tab. 17, page 49)

Module position:

1 On the heat appliance
5 On the wall

Operation of boiler circulation pump constant.

The circuit diagram is only a schematic illustration!

8 Flue system

8.1 Requirements

Standards, regulations and directives

Flues must be resistant to moisture, flue gas and corrosive condensate. They must comply with the applicable technical rules and local regulations.

General notes

- Use only flues that conform to building regulations.
- Observe the requirements in the approval notice.
- Design the ventilated cross-section between the chimney shaft and the flue so it can be inspected.
- Install flues so they can be replaced.
- Provide secondary ventilation for flues that operate with positive pressure.
- In the case of a circular flue in a rectangular chimney shaft, ensure a clearance between flue and shaft walls of at least 2 cm; in the case of a circular flue in a circular shaft, ensure at least 3 cm.
- The flue system is sized in accordance with DIN EN 13384-1 for single connections and to DIN EN 13384-2 for multiple connections.
- The horizontally installed part of flue has to be installed with 3° slope (= 5,2 % or 5.2 cm per meter) in direction of flue gas flow. To prevent unintentional dismounting of socket (f) connections, the flue system has to be bolstered and secured correspondingly with a clearance of maximum 1 meter before and after each elbow.
- The wind protectors for the combustion air supply and the flue gas routing must not be installed on opposite walls of the building.

Material requirements

The flue material must be resistant to the flue gas temperatures that can occur. It must be resistant to 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 exhaust gas temperature can lie below 40 °C. Moisture-resistant chimneys must therefore also be suitable for temperatures below 40 °C.

The flue system is to be carried out in accordance with either pressure classification (EN 1443) H1 or pressure classification (EN 1443) P1 with additional mechanical impact stability up to 5000 Pa.

Class	Leakage rate [$l \times s^{-1} \times m^{-2}$]	Rated pressure [Pa]	Mode of operation
P1	0.006	200	Positive pressure/ negative pressure[a, c]
H1	0.006	5000	Positive pressure/ negative pressure[b]

Table 18

a Positive pressure to maximum 200 Pa
b Positive pressure to maximum 5000 Pa
c Usage only with additional mechanical impact stability up to 5000 Pa in the connection piece

In case of use of a single-wall Logafix system, the requirement of mechanical impact stability of up to 5000 Pa is fulfilled when corresponding clamp fittings are used.

In case of use of a double-wall Logafix system, the requirement of mechanical impact stability of up to 5000 Pa is fulfilled because the required clamp fittings are already contained in the scope of delivery.

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 ignored as the boiler and burner control units of the Logano plus KB372 gas condensing boiler incorporate the function of a flue gas temperature limiter. This prevents the maximum permissible flue gas temperature of 120 °C for category B flues being exceeded.

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, it must be installed in a chimney shaft as rear-ventilated system along the entire length. The chimney shaft must be compliant with relevant local fire regulations.

The boiler must not be connected to any combined flue system with motorised combustion systems (e.g. combined heat and power unit).

8.2 Plastic flue system

Flue systems matched to gas condensing boilers are available for positive pressure operation DN 110, DN 125, DN 160, DN 200 and DN 250. These flue systems are made from translucent polypropylene. 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.

With flue cascades, drain off any condensate created in the flue system between the boiler and the flue. Only with single boiler, condensate may flow into the appliance. The connectors offered by Buderus have suitable connectors for connection to the boiler siphon using the hose supplied.

Sample calculations for single and two-boiler systems for open flue operation are shown on the following pages. As there are many different installation options for flue cascades and balanced flue operation, these must be agreed upon for each individual project with the flue manufacturer and dimensioned acc. to DIN EN 13384.

Legal regulations

Agree the planning details for a flue system with the responsible body.

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 rating:

- 90 minutes (fire resistance rating F90)
- 30 minutes (fire resistance category F30, for low 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.

chimney shaft cross-section

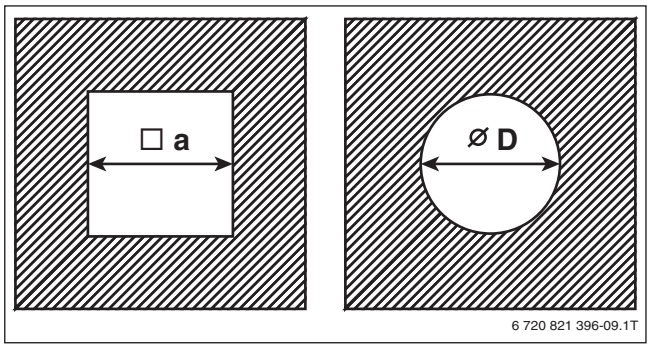


Fig. 59 Rectangular and round cross-section

Flue	Minimum chimney shaft dimensions	
	Round chimney shaft	Rectangular chimney shaft
Nominal values	[mm]	[mm]
DN 110	Ø 170	150 × 150
DN 125	Ø 185	166 × 166
DN 160	Ø 220	205 × 205
DN 200	Ø 260	240 × 240
DN 250	Ø 310	293 × 293

Table 19 Minimum chimney shaft dimensions for the available plastic flue systems (acc. to DIN 18160), open flue operation

8.3 Flue gas parameters Logano plus KB372 – Single boilers

			Boiler size [kW]					
		Unit	75	100	150	200	250	300
Rated heat input [Qn (Hi)]	Full Load	kW	70.8	95.1	142.9	189.9	237.9	285.7
	Partial load	kW	15.8	15.8	23.8	34.5	39.6	47.6
Operating temperature 50/30 °C								
Rated output	Full Load	kW	75	100	150	200	250	300
	Partial load	kW	17.2	17.2	25.7	37.3	42.9	51.4
Flue gas mass flow rate	Full Load	g/s	31.8	42.1	62.7	82.3	106.9	125.7
	Partial load	g/s	6.8	6.8	10	12.7	16.3	20.8
Operating temperature 80/60 °C								
Rated output	Full Load	kW	69.4	93	139.8	186.1	232.9	280
	Partial load	kW	15.5	15.5	23.2	33.7	38.8	46.7
Flue gas mass flow rate	Full Load	g/s	32.5	43.1	63.6	84.1	110.2	129.4
	Partial load	g/s	7.1	7.1	10.6	14.4	17.3	22.2
Flue gas values								
flue outlet		–	DN 110	DN 110	DN 160	DN 200	DN 200	DN 200
Nominal flue gas mass flow rate	Full Load	g/s	32.9	43.86	65.78	89.3	109.64	131.56
	Partial load	g/s	5.6	7.45	11.18	14.91	18.63	22.36
CO_2 content natural gas E/LL	Full Load	%	9.2	9.2	9.2	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2	9.2	9.2	9.2
CO_2 content LPG	Full Load	%	Available from 2018					
	Partial load	%						
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150	150	150	150	150

Table 20 Flue gas parameters Logano plus KB372 – Single boilers

8.4 Flue gas parameters Logano plus KB372 – factory-prepared 2-boiler casade

			Boiler size [kW]					
		Unit	2 × 75	2 × 100	2 × 150	2 × 200	2 × 250	2 × 300
Total output 2-boiler cascade		kW	150	200	300	400	500	600
Rated heat input [Qn (Hi)]	Full Load	kW	141.6	190.1	285.9	379.9	475.7	571.4
	Partial load	kW	15.8	15.8	23.8	34.5	39.6	47.6
Operating temperature 50/30 °C								
Rated output	Full Load	kW	150	200	300	400	500	600
	Partial load	kW	17.2	17.2	25.7	37.3	42.9	51.4
Flue gas mass flow rate	Full Load	g/s	63.5	84.2	125.4	164.6	213.8	251.5
	Partial load	g/s	6.76	6.8	10	12.74	16.29	20.84
Operating temperature 80/60 °C								
Rated output	Full Load	kW	138.8	186	279.6	372.27	465.8	560
	Partial load	kW	15.5	15.5	23.2	33.7	38.8	46.6
Flue gas mass flow rate	Full Load	g/s	65	86.2	127.22	168.2	220.48	258.76
	Partial load	g/s	7.11	7.1	10.59	14.41	17.25	22.17
Flue gas values								
flue outlet		–	DN 110	DN 110	DN 160	DN 200	DN 200	DN 200
CO_2 content natural gas E/LL	Full Load	%	9.2	9.2	9.2	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2	9.2	9.2	9.2
CO_2 content LPG	Full Load	%	Available from 2018					
	Partial load	%						
Fan for residual pressure differential (flue gas and combustion air system)		Pa	150	150	150	150	150	150
Maximum pressure at boiler 2 (shut down), if boiler 1 is at full load (positive pressure cascade)		Pa	50	50	50	50	50	50

Table 21 Flue gas parameters Logano plus KB372 – factory-prepared 2-boiler casade

8.5 Sizing plastic flue systems (open flue)

When sizing the flue system, carry out a calculation of the system based on the intended flue routing during the engineering stage.

The flues must not exceed a specific length to ensure the flue gases are reliably discharged into the open air. This length can be calculated in accordance with EN 13384 based on the specifications for the single boiler from the technical documentation. Please observe national, regional, and local guidelines and regulations. For assistance, the following standard flue gas routing systems with Centrotherm Systemabgasanlage PP Starr have been calculated for the operating temperature 80/60. If the system used and flue gas routing matches the setup described and the specifications, the calculation can be omitted.

Internal (nominal) diameter and effective height of flues according to the requirements of DIN EN 13381-1

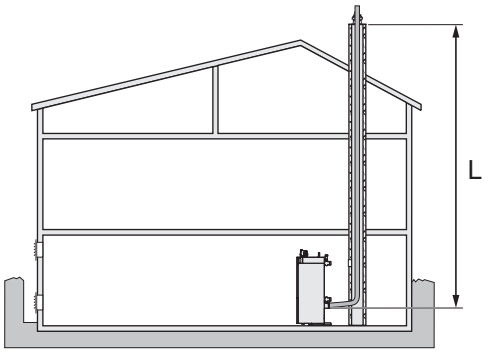
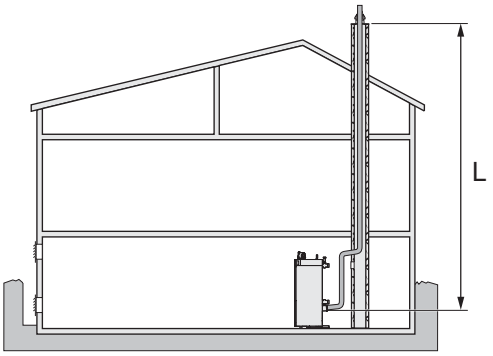
		Maximum permissible effective height of the flue L [m]									
		Flue in a chimney shaft Variant 1[1]					Variant 2[2]				
											
Logano plus KB372	Boiler size	DN 110[3]	DN 125[3]	DN 160[3]	DN 200[3]	DN 250[3]	DN 110[3]	DN 125[3]	DN 160[3]	DN 200[3]	DN 250[3]
Single boiler	75	50	–	–	–	–	50	–	–	–	–
	100	36	–	–	–	–	32	50	–	–	–
	150	9	30	50	–	–	6	26	50	–	–
	200	–	11	50	–	–	–	8	50	–	–
	250	–	–	40	50	–	–	–	35	50	–
	300	–	–	24	50	–	–	–	20	50	–
Factory-preassembled	2 × 75	–	–	2 ... 50	–	–	–	–	3 ... 50	–	–
2-boiler	2 × 100	–	–	6 ... 27	2 ... 50	–	–	–	9 ... 20	2 ... 50	–
Cascade	2 × 150	–	–	–	3 ... 50	–	–	–	–	3 ... 50	–
	2 × 200	–	–	–	8 ... 47	2 ... 50	–	–	–	10 ... 39	2 ... 50
	2 × 250	–	–	–	–	3 ... 50	–	–	–	–	3 ... 50
	2 × 300	–	–	–	–	3 ... 50	–	–	–	–	4 ... 50

Table 22 Internal (nominal) diameter and effective height of flues according to the requirements of DIN EN 13381-1

1) Basis for calculation: overall length of the connection piece ≤ 1.5 m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account by the scope of delivery. The specified length takes the support bend into account.

2) Basis for calculation: overall length of the connection piece ≤ 2.5 m; effective height of the connection line ≤ 1.5 m;2 x 87 bend; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account by the scope of delivery. The specified length takes the support bend into account. °

3) With conical adapter directly at flue gas connection of boiler if required

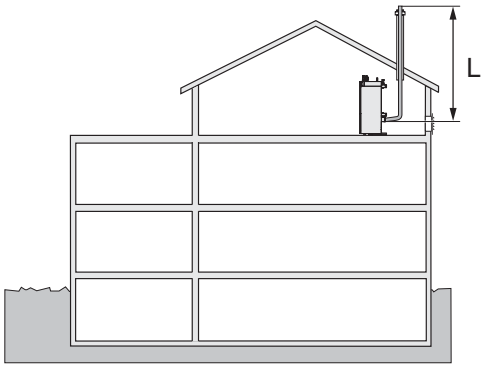
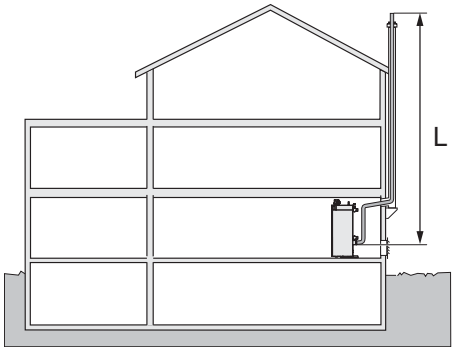
		Maximum permissible effective height of the flue L [m] Flue without chimney shaft Variant 3[1] Roof-top control system					Variant 4[2] Facade system				
											
Logano plus KB372	Boiler size	DN 110[3]	DN 125[3]	DN 160[3]	DN 200[3]	DN 250[3]	DN 110[3]	DN 125[3]	DN 160[3]	DN 200[3]	DN 250[3]
Single boiler	75	50	–	–	–	–	50	–	–	–	–
	100	36	–	–	–	–	33	50	–	–	–
	150	9	30	50	–	–	6	27	50	–	–
	200	–	11	50	–	–	–	8	50	–	–
	250	–	–	40	50	–	–	–	37	50	–
	300	–	–	24	50	–	–	–	20	50	–
Factory-preassembled	2 × 75	–	–	2 ... 50	–	–	–	–	3 ... 50	–	–
2-boiler	2 × 100	–	–	6 ... 27	2 ... 50	–	–	–	6 ... 45	2 ... 50	–
Cascade	2 × 150	–	–	–	3 ... 50	–	–	–	–	3 ... 50	–
	2 × 200	–	–	–	8 ... 47	2 ... 50	–	–	–	9 ... 50	2 ... 50
	2 × 250	–	–	–	–	3 ... 50	–	–	–	–	3 ... 50
	2 × 300	–	–	–	–	3 ... 50	–	–	–	–	4 ... 50

Table 23 Internal (nominal) diameter and effective height of flues according to the requirements of DIN EN 13381-1

1) Basis for calculation: overall length of the connection piece ≤ 1.5 m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account by the scope of delivery. The specified length takes the support bend into account.

2) Basis for calculation: overall length of the connection piece ≤ 2.5 m; effective height of the connection line ≤ 1.5 m;2 x 87 bend; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account by the scope of delivery. The specified length takes the support bend into account.°

3) With conical adapter directly at flue gas connection of boiler if required

9 Flue systems for open flue operation

9.1 General information for open flue operation

9.1.1 Regulations

In accordance with the DVGW-TRGI 2008 technical rules [Germany] governing gas installations, the contracted installer must seek the agreement of the responsible flue gas inspector prior to commencing work on the flue system or notify the flue gas inspector of the installation in writing. Observe the relevant national and regional regulations in this regard. It is recommended to ask the flue gas inspector to confirm his participation in writing.

Gas fireplaces must be connected to the flue gas system on the same story on which they are set up.

The following are important standards, provisions, regulations and directives concerning the sizing and implementation of flue systems:

- EN 15502
- DIN EN 13384-1 and DIN EN 13384-2
- DIN 18160-1and DIN 18160-5
- Technical Rules for Gas Installations DVGW-TRGI 2008
- Landesbauordnung (LBO) [Germany]
- Muster-Feuerungsverordnung (MuFeuVO) [Germany]
- Combustion Order (FeuVO, Feuerungsverordnung) of the respective Federal State [Germany]

9.1.2 General requirements of the installation room

Observe all building regulations and the technical rules for gas installations applicable to installation rooms (DVGW-TRGI 2008 [Germany]). The installation room must be frost-proof.

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

Halogenated hydrocarbons 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 washers, dryers, chemical cleaners or paint shops.

Safety clearances towards combustible building materials

- Inflammable and explosive materials and liquids must not be stored or used in the vicinity of the gas condensing boiler.
- At rated output, the maximum surface temperature of the balanced flue systems and appliances is less than 85 °C. No special measures or safety clearances to protect flammable materials and furniture are therefore required.
- Allow for minimum clearances for maintenance purposes in accordance with the installation instructions of the Logano plus KB372 condensing boiler.

5000 Pa is fulfilled because the required clamp fittings

installation room for rated output > 100 kW

In accordance with the Muster-Feuerungsverordnung MuFeuVO [Germany], for gas combustion equipment with a total rated output > 100 kW, a separate installation room is required. Variations may apply in other countries.

For open flue operation, this installation room must meet the following requirements:

- A vent towards the outside must be provided in the installation room of at least 150 cm^2 plus 2 cm^2 for every kilowatt in excess of 50 kW total rated output. This cross-section can be split over 2 vents. Accordingly, the Logano plus KB372-100 requires a combustion air vent to the outside with a clear cross-section of 1 × 250 cm^2 or 2 × 125 cm^2.
- The installation room must not be used for other purposes, except the following:
  - for the introduction of domestic services
  - for the installation of further combustion equipment, heat pumps, CHP modules, permanently fixed internal combustion engines **or**
  - For the storage of fuels
- The installation room must not have any opening to other rooms except doorways.
- The doors to the installation room must be tight and self-closing.
- All combustion equipment must be able to be shut down via an emergency stop switch outside the installation room.

9.1.3 balanced flue system

Buderus sets

The flue that is part of the Buderus construction set is made from plastic and is designed in pressure class (DIN V 18160) H1. It is installed as a complete pipe system or as a connection piece between the gas condensing boiler and a moisture-resistant chimney.

The flue system is to be carried out in accordance with either pressure classification (EN 1443) H1 or pressure classification (EN 1443) P1 with additional mechanical impact stability up to 5000 Pa.

Class	Leakage rate [I x s^{-1} x m^{-2}]	Rated pressure [Pa]	Mode of operation
P1	0.006	200	Positive pressure/ negative pressure[a, c]
H1	0.006	5000	Positive pressure/ negative pressure[b]

Table 24

a Positive pressure to maximum 200 Pa
b Positive pressure to maximum 5000 Pa
c Usage only with additional mechanical impact stability up to 5000 Pa in the connection piece

In case of use of a single-wall Logafix system, the requirement of mechanical impact stability of up to 5000 Pa is fulfilled when corresponding clamp fittings are used.

In case of use of a double-wall Logafix system, the requirement of mechanical impact stability of up to

are already contained in the scope of delivery.

Combustion air supply

In open flue mode, the fan of the gas condensing boiler draws the required combustion air from the installation room.

Condensate drain from the flue

With single boilers, the condensate from the flue is routed directly into the stench trap (siphon) of the gas condensing boiler via the condensation pan. With flue gas cascades, it has to be made sure that the condensate is drained off between the boiler and the flue via a siphon.

With flues, that are not provided by Buderus, it has to be made sure that the condensate is drained off between the boiler and the flue via a siphon.

The condensate from the gas condensing boiler and the flue or the moisture-resistant flue must be correctly neutralised and drained off if required. Special engineering information regarding draining the condensate → page 87.

9.1.4 Ventilation and inspection apertures

According to DIN 18160-1 and DIN 18160-5, flue systems for open flue operation must be able to be inspected and; if required, cleaned easily and safely. For this, allow for inspection apertures (→ fig. 60 and fig. 61).

When arranging the inspection apertures, comply with the requirements of DIN 18160-5 as well as all locally applicable building regulations. For this we recommend contacting your local flue gas inspector.

The inspection apertures are shown for illustration purposes only. For more detailed installation information, see DIN 18160-5.

The air grille cross-sections are calculated according to one of the following formulae:

$$A = 150\ cm^2 + (P_{Kessel} - 50\ kW) \times 2\ cm^2$$

$$A = 2 \times 75\ cm^2 + 2 \times (P_{Kessel} - 50\ kW) \times 1\ cm^2$$

F. 2 Calculating the cross-sections (A) of the air grilles

A Cross-section, air grille
P_{Kessel} Boiler output

Single boiler Boiler size [kW]	A_{min}/cm^2	
75	150	2 × 75
100	250	2 × 125
150	350	2 × 175
200	450	2 × 225
250	550	2 × 275
300	650	2 × 325

Table 25 Cross-sections of ventilation aperture for single boiler

Single boiler Boiler size [kW]	A_{min}/cm^2	
2 × 75	350	2 × 175
2 × 100	450	2 × 225
2 × 150	650	2 × 325
2 × 200	850	2 × 425
2 × 250	1050	2 × 525
2 × 300	1250	2 × 625

Table 26 Cross-sections of ventilation aperture for 2-boiler cascade

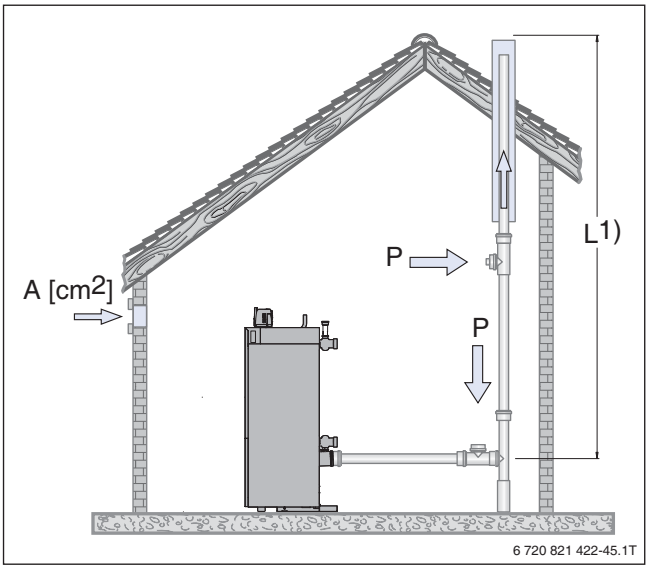


Fig. 60 Example with the inspection aperture located in a horizontal flue without diversions in the installation room (schematic representation)

A Supply air (→ F. 2)
P Inspection aperture
1) Maximum permissible effective height of the flue in m (→ table 22, page 67 and table 22, page 67)

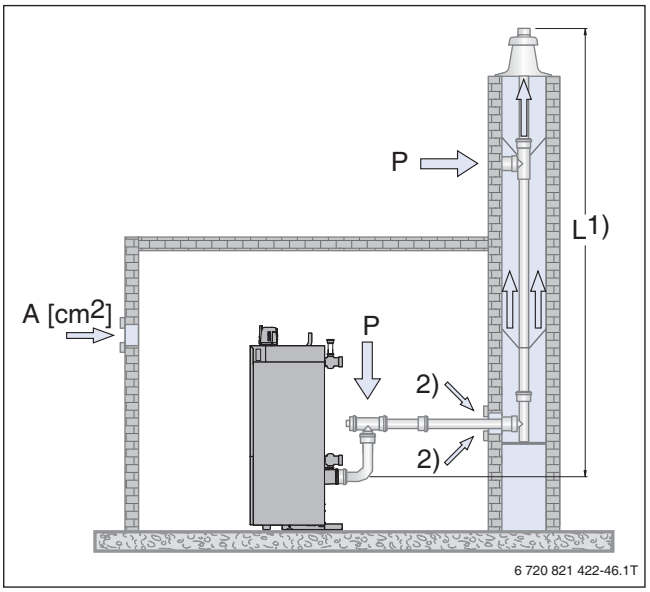


Fig. 61 Example with the inspection aperture located in a horizontal flue with diversions in the installation room (schematic representation)

A Supply air (→ F. 2)
P Inspection aperture
1) Maximum permissible effective height of the flue in m (→ table 22, page 67 and table 23, page 68)
2) Secondary ventilation

9.2 Open flue system, flue inside a rear-ventilated chimney shaft

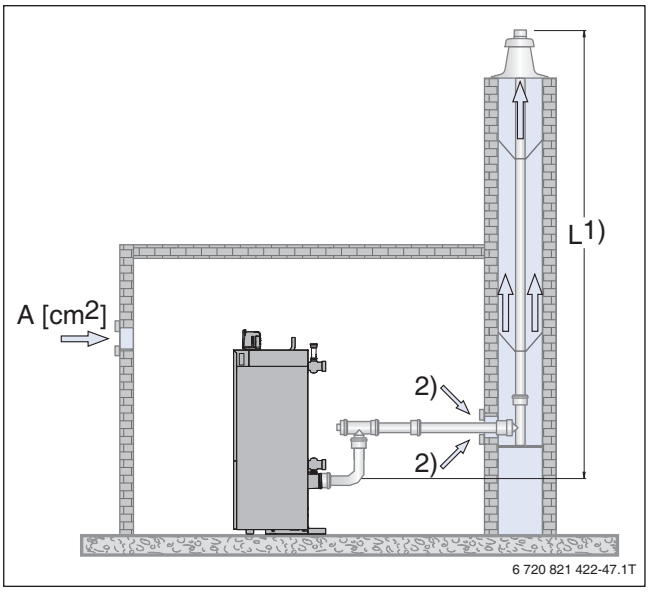


Fig. 62 Example with the flue system located in a horizontal flue with diversions in the installation room (→ F. 2, page 70) (schematic representation)

A Supply air (→ F. 2, page 70)
1) Maximum permissible effective height of the flue in m (→ table 22, page 67 and table 23, page 68)
2) Secondary ventilation

9.3 Flue system, open flue, external wall

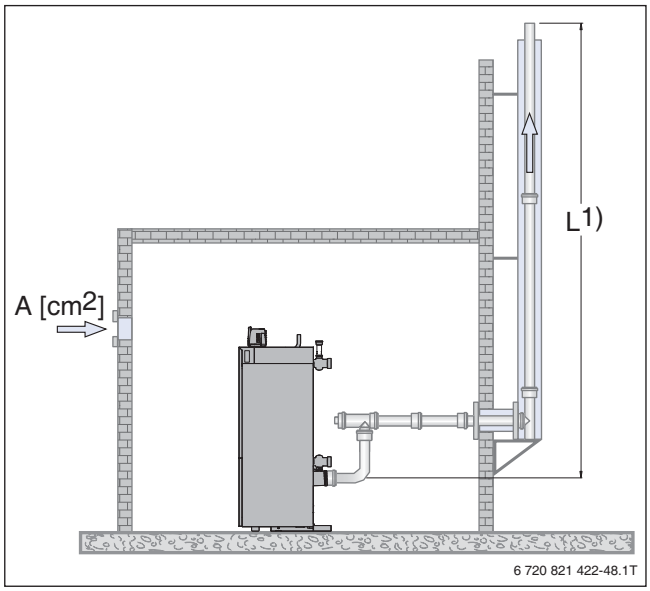


Fig. 63 Example with the flue system located in a horizontal flue with diversions in the installation room (→ F. 2, page 70) (schematic representation)

A Supply air (→ F. 2, page 70)
1) Maximum permissible effective height of the flue in m (→ table 22, page 67 and table 23, page 68)

9.4 Flue system, open flue, attic centre without chimney shaft

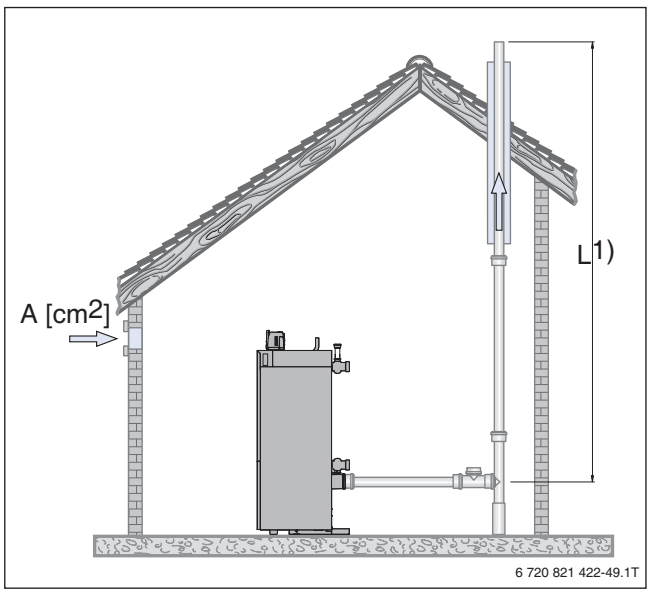


Fig. 64 Example with the flue system located in a horizontal flue without diversions in the installation room (→ F. 2, page 70) (schematic representation)

A Supply air (→ F. 2, page 70)
1) Maximum permissible effective height of the flue in m (→ table 22, page 67 and table 23, page 68)

10 Flue gas systems for open-flue mode

10.1 General information for balanced flue operation

10.1.1 Regulations

In accordance with the DVGW-TRGI 2008 technical rules [Germany] governing gas installations, the contracted installer must seek the agreement of the responsible flue gas inspector prior to commencing work on the flue system or notify the flue gas inspector of the installation in writing. Observe the relevant national and regional regulations in this regard. It is recommended to ask the flue gas inspector to confirm his participation in writing.

Gas combustion equipment must be connected to the flue system on the same floor on which it is installed.

The following are important standards, provisions, regulations and directives concerning the sizing and implementation of flue systems:

- EN 15502
- DIN EN 13384-1 and DIN EN 13384-2
- DIN 18160-1and DIN 18160-5
- Technical Rules for Gas Installations DVGW-TRGI 2008 [Germany]
- Landesbauordnung (LBO) [Germany]
- Muster-Feuerungsverordnung (MuFeuVO) [Germany]
- Combustion Order (FeuVO, Feuerungsverordnung) of the respective Federal State [Germany]

10.1.2 General requirements of the installation room

Observe all building regulations and the technical rules for gas installations applicable to installation rooms (DVGW-TRGI 2008 [Germany]). The installation room must be frost-proof.

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

Halogenated hydrocarbons 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 washers, dryers, chemical cleaners or paint shops.

Safety clearances towards combustible building materials

- Minimum safety clearances towards combustible building materials are not required.
- Inflammable and explosive materials and liquids must not be stored or used in the vicinity of the gas condensing boiler.
- At rated output, the maximum surface temperature of the balanced flue systems and appliances is less than 85 °C. No special measures or safety clearances to protect flammable materials and furniture are therefore required.
- Allow for minimum clearances for maintenance purposes in accordance with the installation instructions of the Logano plus KB372 condensing boiler.

installation room for rated output > 100 kW

In accordance with the Muster-Feuerungsverordnung MuFeuVO [Germany], for gas combustion equipment with a total rated output > 100 kW, a separate installation room is required. Variations may apply in other countries.

For balanced flue operation, this installation room must meet the following requirements:

- The installation room must be able to be vented or ventilation apertures to the outside must be installed with 1 x 150 cm^2 or 2 x 75 cm^2 clear cross-section. In addition to this, country-specific and local regulations must be observed.
- The installation room must not be used for other purposes, except the following:
  - for the introduction of domestic services
  - for the installation of further combustion equipment, heat pumps, CHP modules, permanently fixed internal combustion engines **or**
  - for the storage of fuels.
- The installation room must not have any opening to other rooms except doorways.
- The doors to the installation room must be tight and self-closing.
- All combustion equipment must be able to be shut down via an emergency stop switch outside the installation room.

10.1.3 balanced flue system

Buderus sets

In balanced flue operation, the fan draws in the required combustion air from the outside into the gas condensing boiler. The ventilation air and flue lines are routed in parallel.

The balanced flue sets are not certified as systems.

The flue system is to be carried out in accordance with either pressure classification (EN 1443) H1 or pressure classification (EN 1443) P1 with additional mechanical impact stability up to 5000 Pa.

Class	Leakage rate [l x s^{-1} x m^{-2}]	Rated pressure [Pa]	Mode of operation
P1	0.006	200	Positive pressure/ negative pressure[a, c]
H1	0.006	5000	Positive pressure/ negative pressure[b]

Table 27

a Positive pressure to maximum 200 Pa
b Positive pressure to maximum 5000 Pa
c Usage only with additional mechanical impact stability up to 5000 Pa in the connection piece

In case of use of a single-wall Logafix system, the requirement of mechanical impact stability of up to 5000 Pa is fulfilled when corresponding clamp fittings are used.

In case of use of a double-wall Logafix system, the requirement of mechanical impact stability of up to 5000 Pa is fulfilled because the required clamp fittings are already contained in the scope of delivery.

A calculation to DIN EN 13384 is required. This can be performed by Buderus.

For this, the following details are required:

- Boiler type
- Horizontal length of the flue and number of diversions
- Horizontal length of the ventilation air line and number of diversions
- Vertical length of the flue and number of diversions
- Chimney shaft size and material

Existing chimney shaft

Generally, a chimney sweep should clean the chimney prior to installing the flue with the Buderus set GA-K if one or more of the following applies:

- the combustion air is taken in via an existing chimney shaft
- Oil or solid fuel combustion equipment has been connected to the chimney **or**
- Dust loads due to unstable chimney pointing are to be expected.

Condensate drain from the flue

The flue provides a condensate drain integrated into the connector. The condensate from the flue is routed directly into the stench trap (siphon) of the gas condensing boiler.

With flues, that are not provided by Buderus, it has to be made sure that the condensate is drained off between the boiler and the flue via a siphon.

The condensate from the gas condensing boiler or the moisture-resistant flue must be correctly neutralised and drained off if required. Special planning notices for condensate drain → page 87.

10.1.4 Ventilation and inspection apertures

According to DIN 18160-1 and DIN 18160-5, flue systems for balanced flue operation must be able to be inspected and cleaned easily and safely if required. For this, allow for inspection apertures (→ Fig. 65).

When arranging the inspection apertures, comply with the requirements of DIN 18160-5 as well as all locally applicable building regulations. For this we recommend contacting your local flue gas inspector.

The inspection apertures are shown for illustration purposes only. For more detailed installation information, see DIN 18160-5.

The air grille cross-sections are calculated according to one of the following formulae:

$$A = 150\ cm^2$$

$$A = 2 \times 75\ cm^2$$

F. 3 Calculating the cross-sections (A) of the air grilles

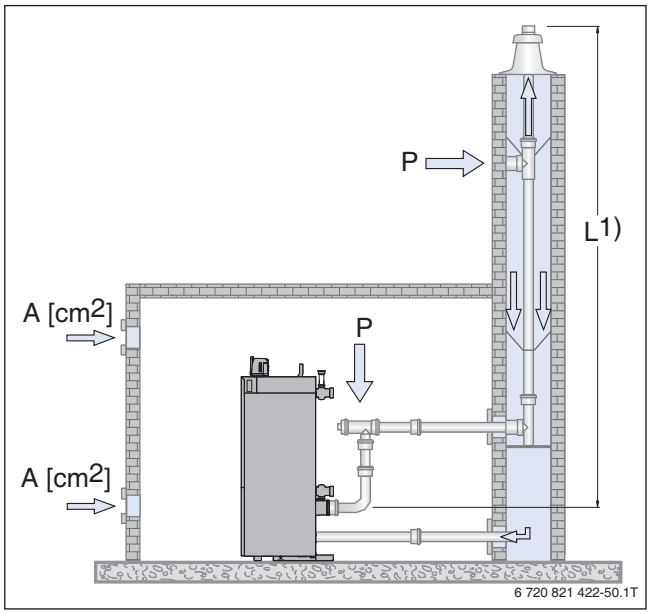


Fig. 65 Example with the inspection aperture located in a horizontal flue with diversions in the installation room (schematic representation)

A Ventilation (→ F. 3, page 73)
P Inspection aperture
1) Maximum permissible effective height of the flue in m; calculation according to DIN EN 13384

10.2 Balanced flue system, chimney shaft solution in counter-current

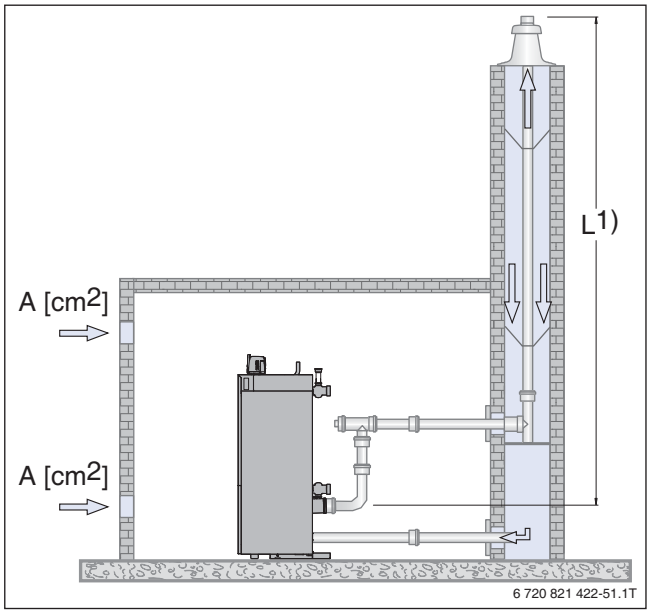


Fig. 66 Example with the flue system located in a horizontal flue with diversions in the installation room (schematic representation)

A Ventilation (→ F. 3, page 73)
1) Maximum permissible effective height of the flue in m; calculation according to DIN EN 13384

10.3 Balanced flue system, chimney shaft solution with two separate pipes

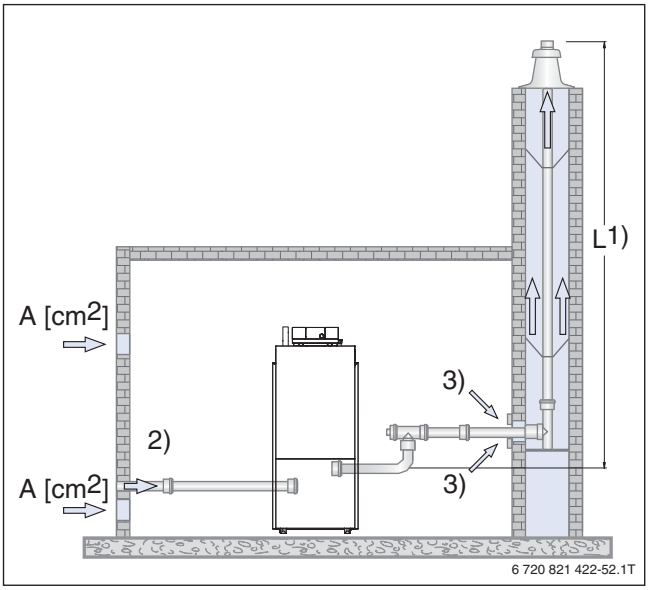


Fig. 67 Example with the flue system located in a horizontal flue with diversions in the installation room (schematic representation)

A Ventilation (→ F. 3, page 73)
1) Maximum permissible effective height of the flue in m; calculation according to DIN EN 13384
2) Supply air
3) Secondary ventilation

11 Hydraulic connection kits

Buderus offers pre-assembled accessory components to enable assembly on the hydraulic and flue gas sides of compact cascade solutions with 2 boilers.

11.1 Hydraulic cascade

Extensive accessories are offered for assembling the 2-boiler cascade.

11.1.1 Cascade flue header assembly with motor-controlled hydraulic butterfly valve

The flue header assembly contains:
- Flue header (flow and return)
- Motor-driven hydraulic butterfly valve in flow line
- Shut-off valves in return line
- Thermal insulation
- Support brackets

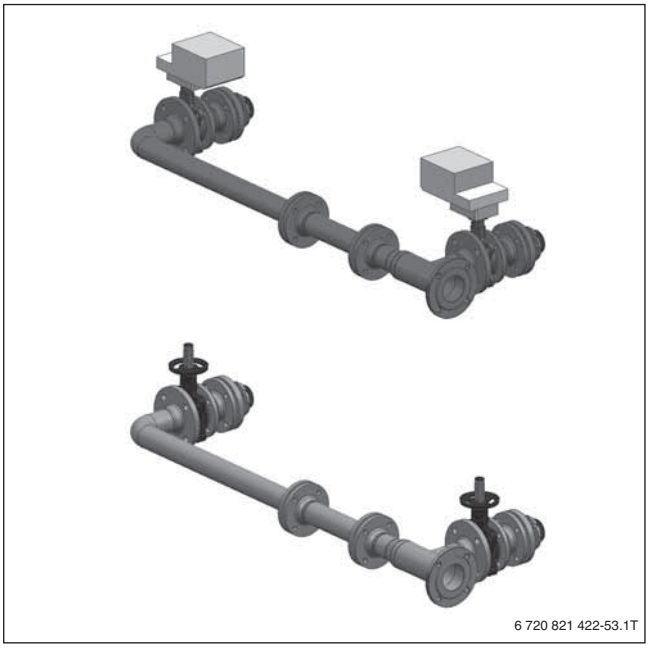


Fig. 68 Flue header assembly with motor-controlled hydraulic butterfly valve

11.1.2 Cascade flue header assembly with pump groups

The flue header assembly contains:
- Flue header (flow and return)
- 2 pump assemblies
- 2 non-return valves
- 4 butterfly valves
- Thermal insulation
- Support brackets

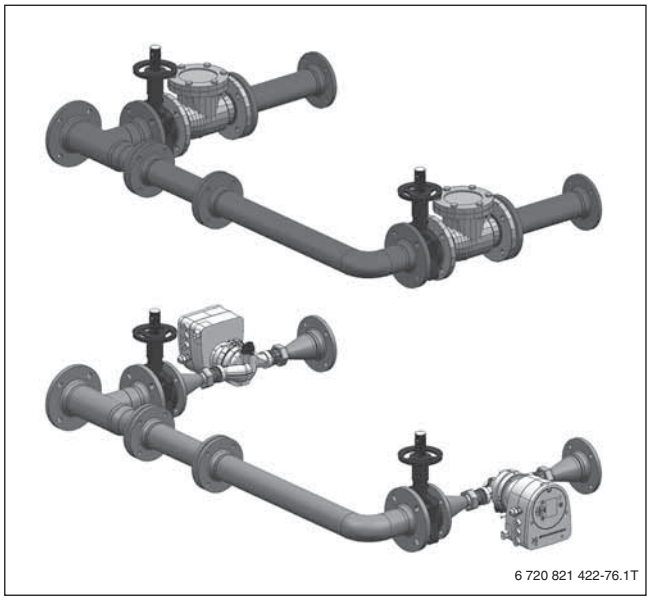


Fig. 69 Flue header assembly with pump groups

11.1.3 Cascade heat exchanger assembly for connection to flue header

The cascade heat exchanger assembly contains:
- Heat exchanger by Sondex with system-side connection: male thread DN 50
- Thermal insulation
- Stand

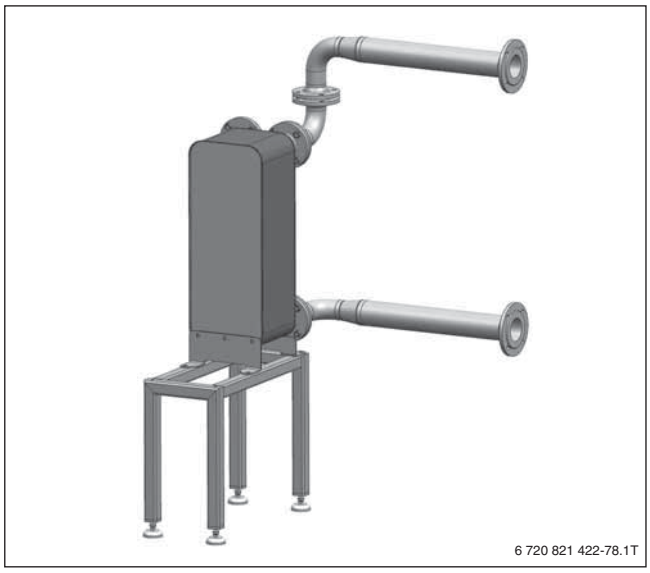


Fig. 70 Cascade heat exchanger assembly

The heat exchangers are designed for the following temperatures:

- Primary 85 °C / 65 °C – secondary 75 °C / 60 °C
- Primary 65 °C / 45 °C – secondary 55 °C / 40 °C
- Primary 55 °C / 35 °C – secondary 40 °C / 30 °C

Heat exchanger, type Sondex	Performance [kW]	Boiler output [kW]	Max. pressure drop, primary [mbar]	Primary flow rate [l/h]	Maximum pressure drop, secondary at ΔT=15 K [mbar]	Secondary flow rate [l/h]
SL70-BR44-50-TL	75	–	110	3310	180	4400
SL70-BR44-80-TL	100	–	80	4410	130	5870
SL70-BR44-120-TL	150	2 × 75	90	6620	160	8800
SL140-BR30-50-TL	200	2 × 100	80	8830	130	11730
SL140-BR30-60-TL	250	–	90	11040	150	14670
SL140-BR30-70-TL	300	2 × 150	90	13240	160	17600
SL 140-BR30-90-TL	400	2 × 200	100	17660	170	23470
SL 140-BR30-110-TL	500	2 × 250	110	22070	190	29340
SL 140-BR30-140-TL	600	2 × 300	110	26490	180	35200

Table 28 Specifications of heat exchanger assembly

In the Buderus catalogue “heating accessories”, you can find additional heat exchangers that are suitable for system separation in 1-boiler systems. The connection to a boiler is effected on site.

11.1.4 Low loss header assembly for connection to flue header

The low loss header assembly contains:

- Low loss header with system-side connections DN 150/PN 6
- Air vent
- Drain
- Thermal insulation
- Stand

The low loss header assembly can be fitted optionally on the right or left-hand side of the flue header.

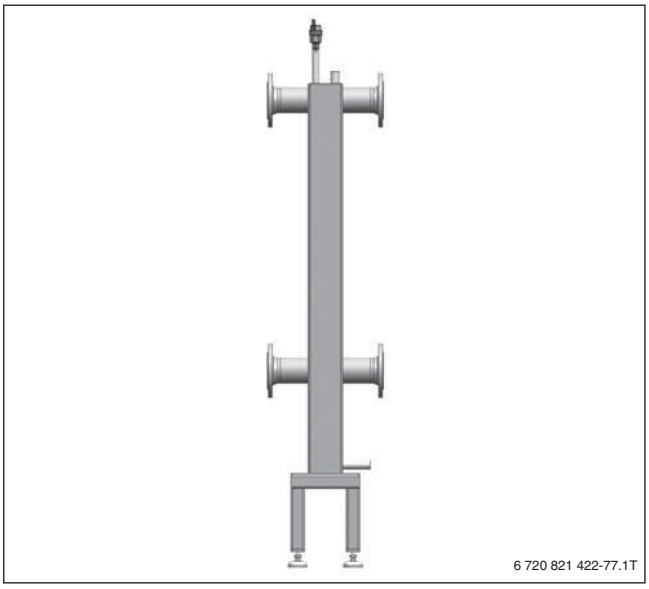


Fig. 71 Cascade low loss header assembly

Subject to the amount of water on the primary and secondary sides, a lower flow temperature than that supplied by the boiler itself can be provided if a low loss header is installed (→ Fig. 72).

This applies if the amount of water on the secondary side is greater than that on the primary side, which is frequently exploited by gas condensing boilers to avoid the return temperature being raised. This leads to a reduction of the maximum possible flow temperature. Take this into account when sizing the boiler. Notices → Table 29 (exemplary flow temperature of 85 °C).

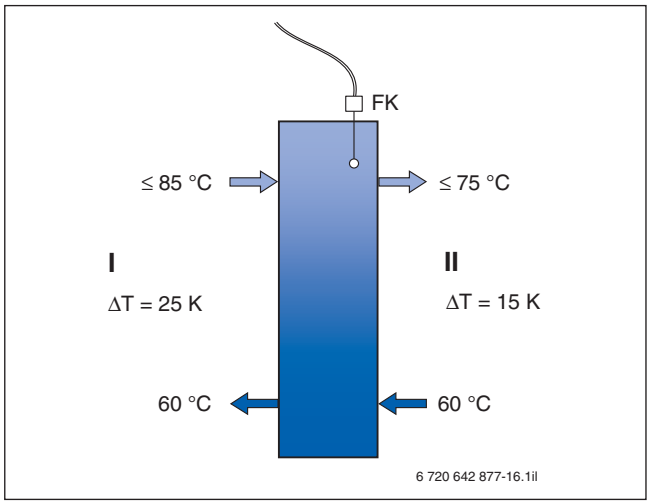


Fig. 72 Use of a low-loss header

FK Differential sensor
I Primary side
II Secondary side

The maximum flow temperature drops through mixing to a lower temperature level in the low loss header!

Boiler flow temperature [°C]	ΔT on primary side of low loss header [K]	ΔT on secondary side of low loss header [K]	Maximum flow temperature for heating system [°C]
85	25	10	70
85	25	15	75
85	25	20	80
85	25	25	85
85	20	10	75
85	20	15	80
85	20	20	85
85	15	10	80
85	15	15	85
85	10	10	85

Table 29 Maximum possible flow temperature of heating system when using a low loss header at a boiler flow temperature of 85 °C

11.1.5 Dimensions of factory-prepared 2-boiler cascade

Hydraulic pipework with motor-controlled hydraulic butterfly valve

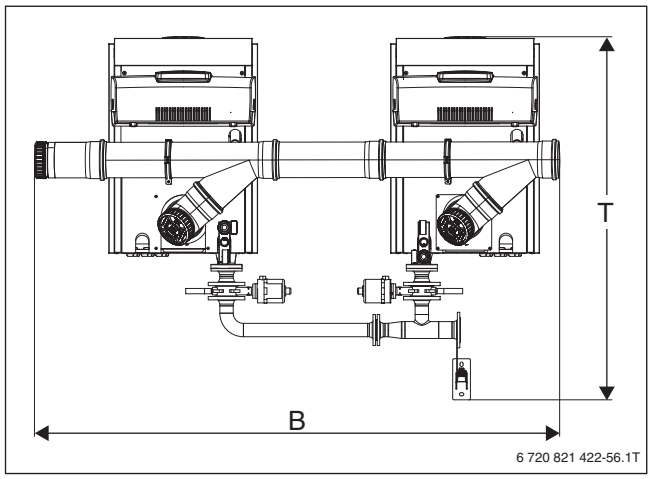


Fig. 73 2-boiler cascade, lane installation (dimensions → Table 30, page 79)

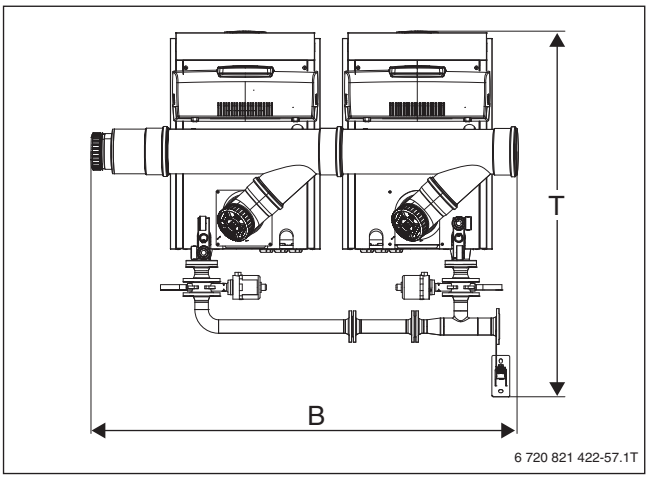


Fig. 74 2-boiler cascade, installation side-by-side (dimensions → Table 30, page 79)

Hydraulic pipework with pumps

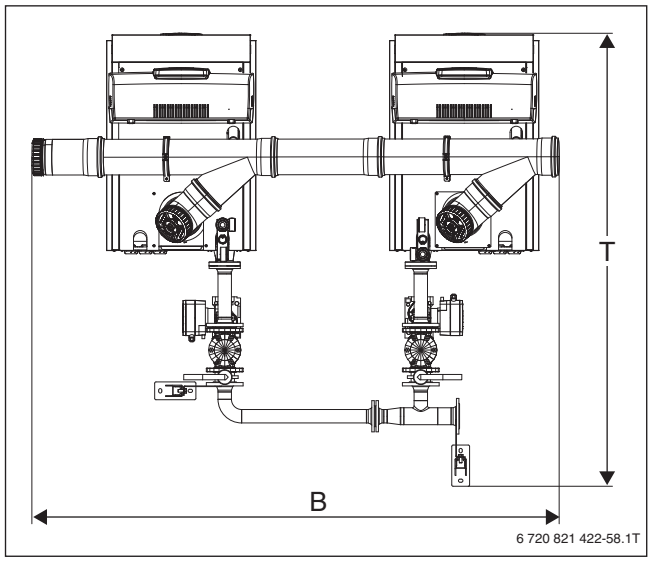


Fig. 75 2-boiler cascade, lane installation (dimensions → Table 30, page 79)

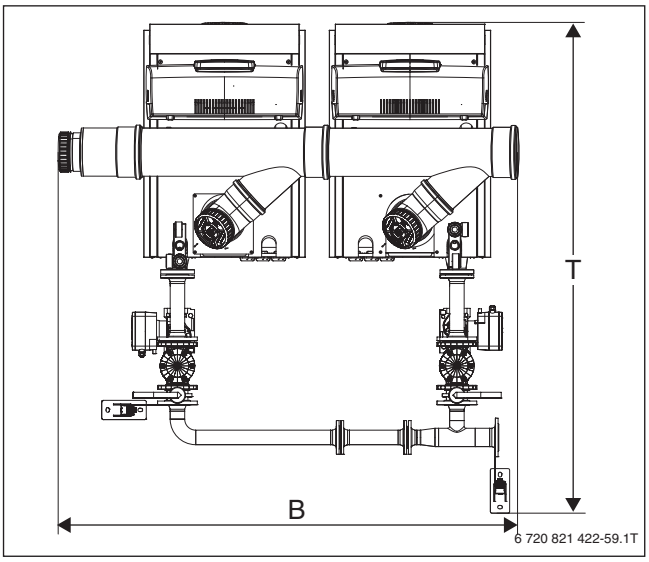


Fig. 76 2-boiler cascade, installation side-by-side (dimensions → Table 30, page 79)

Hydraulic pipework with pumps and heat exchanger assembly

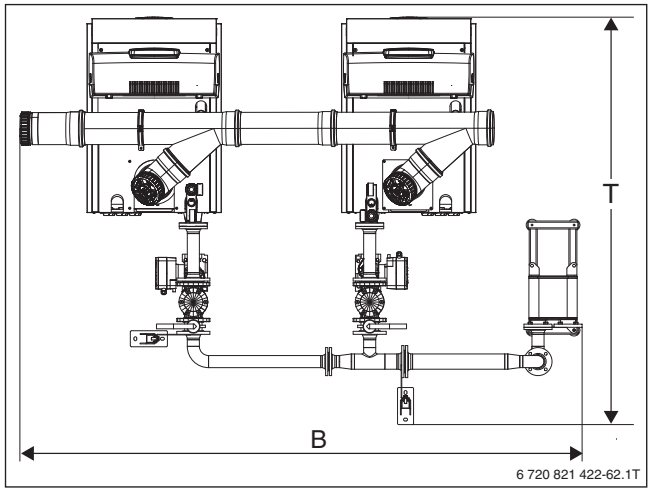


Fig. 77 2-boiler cascade, lane installation (dimensions → Table 30, page 79)

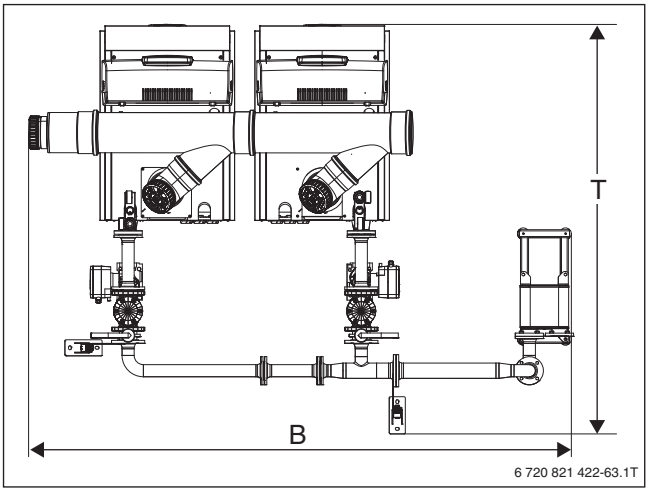


Fig. 78 2-boiler cascade, installation side-by-side (dimensions → Table 30, page 79)

Hydraulic pipework with pumps and low loss header assembly

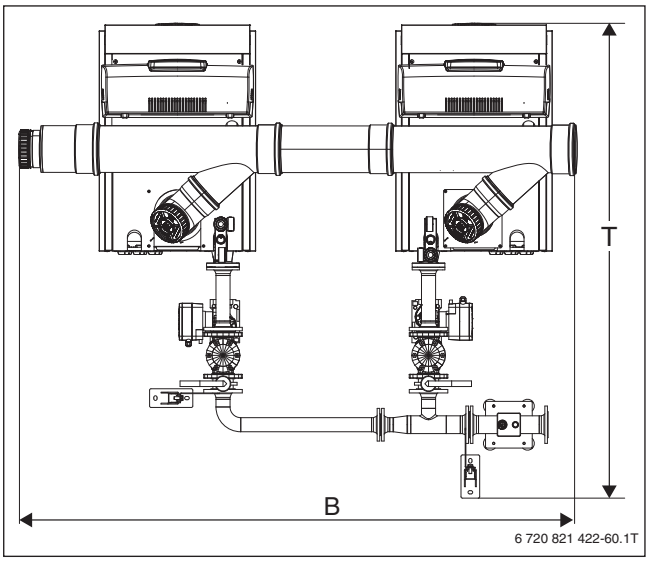


Fig. 79 2-boiler cascade, lane installation (dimensions → Table 30, page 79)

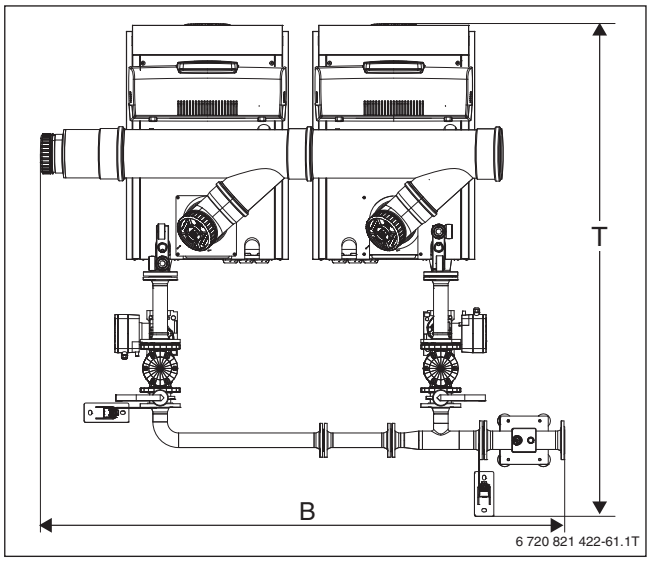


Fig. 80 2-boiler cascade, installation side-by-side (dimensions → Table 30, page 79)

Dimension	Unit	Boiler rating, 2-boiler cascade [kW]											
		2 × 75		2 × 100		2 × 150		2 × 200		2 × 250		2 × 300	
		Lane	Side-by-side	Lane	Side-by-side	Lane	Side-by-side	Lane	Side-by-side	Lane	Side-by-side	Lane	Side-by-side
Hydraulic pipework with motor-controlled hydraulic butterfly valve													
Width B	mm	2412	2014	2412	2014	2367	1907	2528	2051	2528	2051	2528	2051
Depth T	mm	1312	1323	1312	1323	1636	1636	1967	1968	1967	1968	1967	1968
Footprint	m^2	3.2	2.7	3.2	2.7	3.9	3.1	5.0	4.0	5.0	4.0	5.0	4.0
Hydraulic pipework with pumps													
Width B	mm	2384	2033	2384	2033	2367	1907	2528	2074	2528	2074	2528	2087
Depth T	mm	1768	1802	1768	1802	2033	2037	2392	2393	2451	2451	2448	2448
Footprint	m^2	4.2	3.7	4.2	3.7	4.8	3.9	6.0	5.0	6.2	5.1	6.2	5.1
Hydraulic pipework with pumps and heat exchanger assembly													
Width B	mm	2949	2866	2949	2866	2806	2700	2620	2576	2628	2576	2628	2572
Depth T	mm	1768	1802	1768	1802	2033	2037	2392	2393	2451	2451	2448	2448
Footprint	m^2	5.2	5.2	5.2	5.2	5.7	5.5	6.3	6.2	6.4	6.3	6.4	6.3
Hydraulic pipework with pumps and low loss header assembly													
Width B	mm	2441	2365	2441	2365	2377	2167	2528	2110	2528	2110	2528	2110
Depth T	mm	1768	1802	1768	1802	2033	2037	2392	2393	2451	2451	2448	2448
Footprint	m^2	4.3	4.2	4.3	4.3	4.8	4.4	6.0	5.0	6.2	5.2	6.2	5.2

Table 30 Dimensions of factory-prepared 2-boiler cascade without maintenance clearance

11.1.6 Heat exchanger assembly for 2-boiler cascade

Heat exchanger assembly for 2-boiler cascade 2 × 75 or 2 × 100 kW

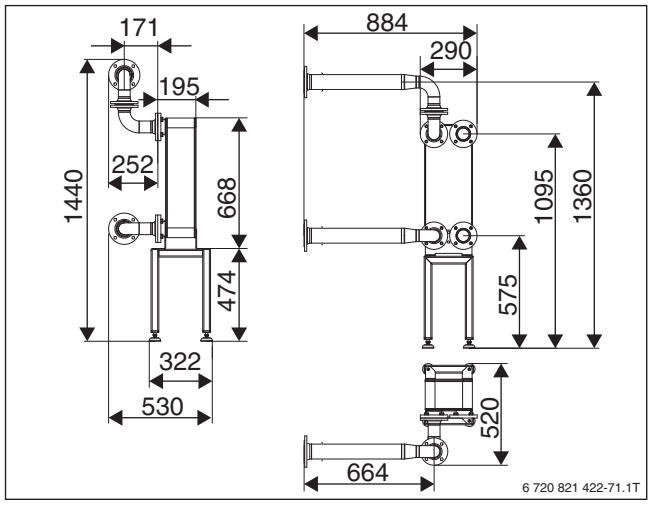


Fig. 81 Heat exchanger assembly for 2-boiler cascade 2 × 75 or 2 × 100 kW

Heat exchanger assembly for 2-boiler cascade 2 × 150 kW

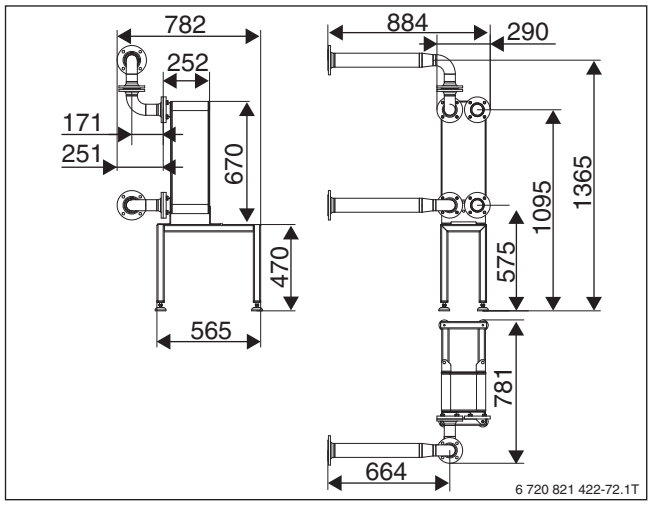


Fig. 82 Heat exchanger assembly for 2-boiler cascade 2 × 150 kW

Heat exchanger assembly for 2-boiler cascade 2 × 200 kW

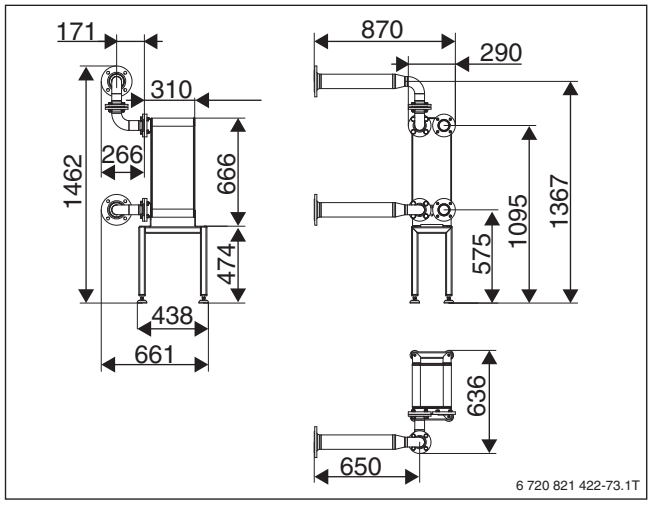


Fig. 83 Heat exchanger assembly for 2-boiler cascade 2 × 200 kW

Heat exchanger assembly for 2-boiler cascade 2 × 250 kW

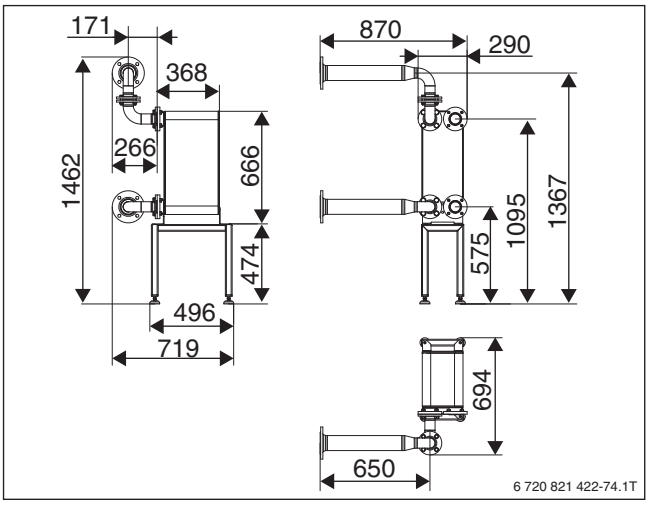


Fig. 84 Heat exchanger assembly for 2-boiler cascade 2 × 250 kW

Heat exchanger assembly for 2-boiler cascade 2 × 300 kW

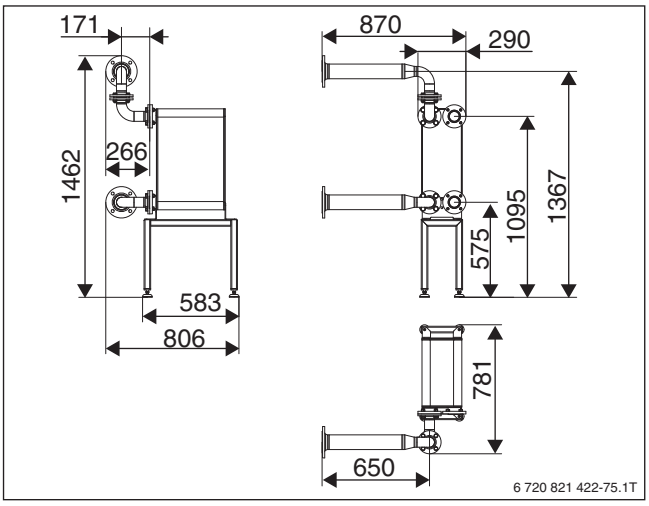


Fig. 85 Heat exchanger assembly for 2-boiler cascade 2 × 300 kW

11.1.7 Low loss header assembly for 2 boiler cascade

Low loss header assembly for 2 boiler cascade 2 × 75 or 2 × 100 kW

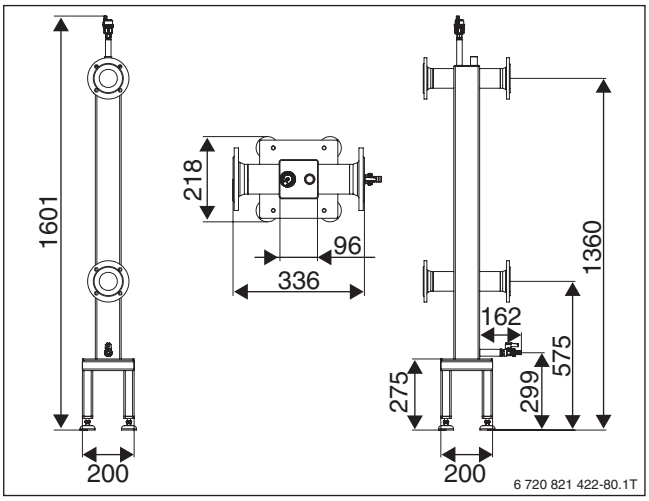


Fig. 86 Low loss header assembly for 2 boiler cascade 2 × 75 or 2 × 100 kW

Low loss header assembly for 2 boiler cascade 2 × 150 kW

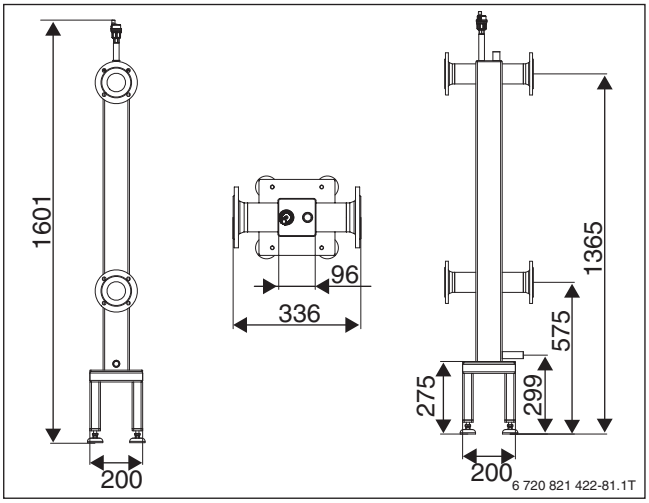


Fig. 87 Low loss header assembly for 2 boiler cascade 2 × 150 kW

Low loss header assembly for 2 boiler cascade 2 × 200 kW, 2 × 250 kW or 2 × 300 kW

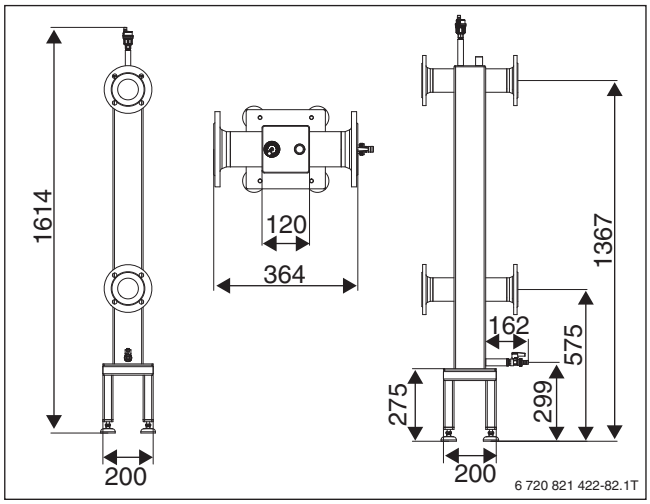


Fig. 88 Low loss header assembly for 2 boiler cascade 2 × 200 kW, 2 × 250 kW or 2 × 300 kW

11.2 Cascade on flue gas side

Extensive accessories are offered for assembling the 2-boiler cascade on the flue gas side:

- Standard kit, flue gas cascade
- Construction set, flue gas cascade, chimney shaft
- Construction set, flue gas cascade, external wall

Standard kit, flue gas cascade at negative pressure for the connection of 2 × Logano plus KB372 to a flue with internal diameters DN 160 ... DN 250

The standard kit contains a horizontal collector and components for connecting 2 boilers to the collector.

The horizontal collector consists of:

- 2 flue headers with 45° outlet
- Connection piece
- Condensate drain with siphon
- 2 fastening clamps (flue gas collector)
- Inspection opening with cover
- Gaskets
- Hose set for connection of condensate pipes

The boiler connection consists of:

- 2 87° inspection bends (design 160/160)
- 2 adaptors
- 2 compensatory elements
- 2 boiler connection elbows 87° (design 110/160)
- 2 45° elbows (design 110/160)

Condensate from flue has to be drained off directly to the neutralising system via the siphon in the flue gas collector.

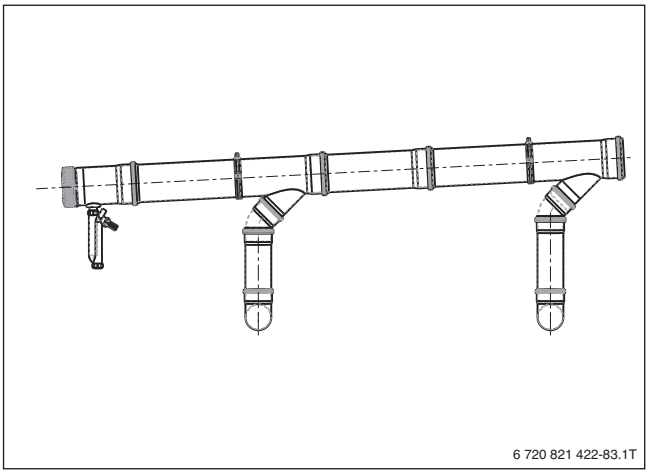


Fig. 89 Cascade collecting line for Logano plus KB372, 2 × 75 kW and 2 × 100 kW

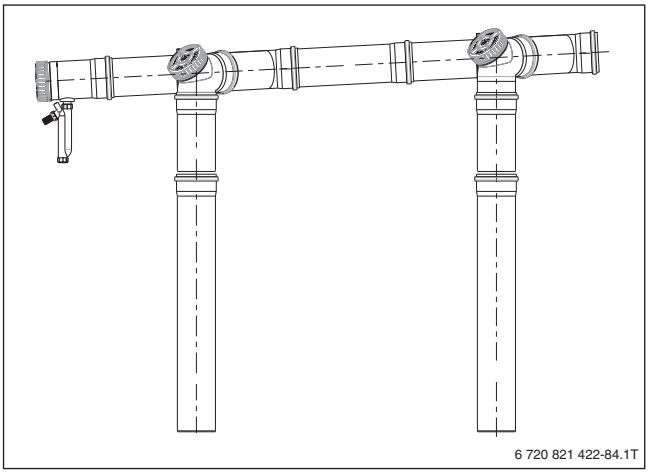


Fig. 90 Cascade collecting line for Logano plus KB372, 2 × 150 kW ... 2 × 300 kW

	Boiler size [kW]	Boiler connection	Cascade collecting line		
			DN 160	DN 200	DN 250
Factory-prepared 2-boiler flue cascade	2 × 75	DN 110	x	–	–
Negative pressure	2 × 100	DN 110	x	–	–
	2 × 150	DN 160	–	x	–
	2 × 200	DN 200	–	–	x
	2 × 250	DN 200	–	–	x
	2 × 300	DN 200	–	–	x
Factory-prepared 2-boiler flue cascade	2 × 75	DN 110	x	–	–
Positive pressure[1)]	2 × 100	DN 110	x	–	–
	2 × 150	DN 160	x	x	–
	2 × 200	DN 200	–	x	x
	2 × 250	DN 200	–	x	x
	2 × 300	DN 200	–	–	x

Table 31 Assignment of cascade collecting line

1) Available from 2018

x Compliant
– Non compliant

12 Accessories

12.1 Selected individual components

The depicted dimensions without tolerances are nominal dimensions for information and can deviate due to manufacturing reasons.

Set flue gas connection top

For boiler sizes 150 ... 300 kW, the flue gas connection can be converted to the top. This connector pipe runs inside the casing.

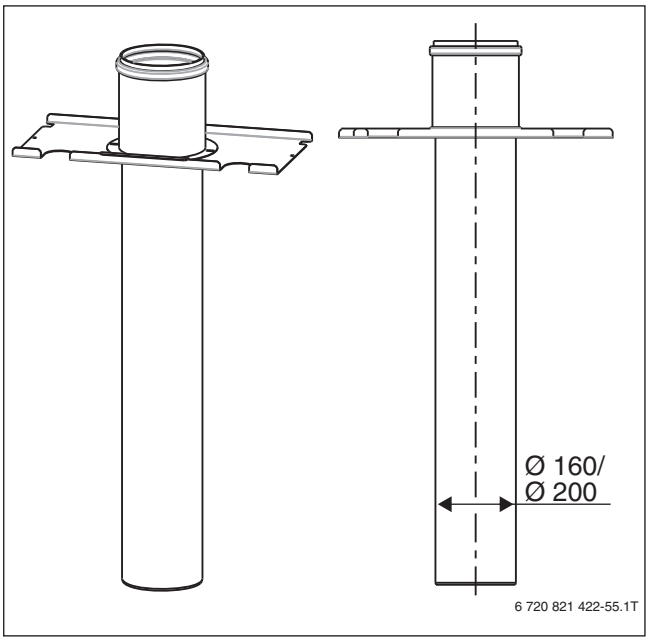


Fig. 91 Set flue gas connection top, Ø 160/Ø 200

Set air filter insert

Available from 2018. Data was not available before printing this document.

Set balanced flue operation[1)]

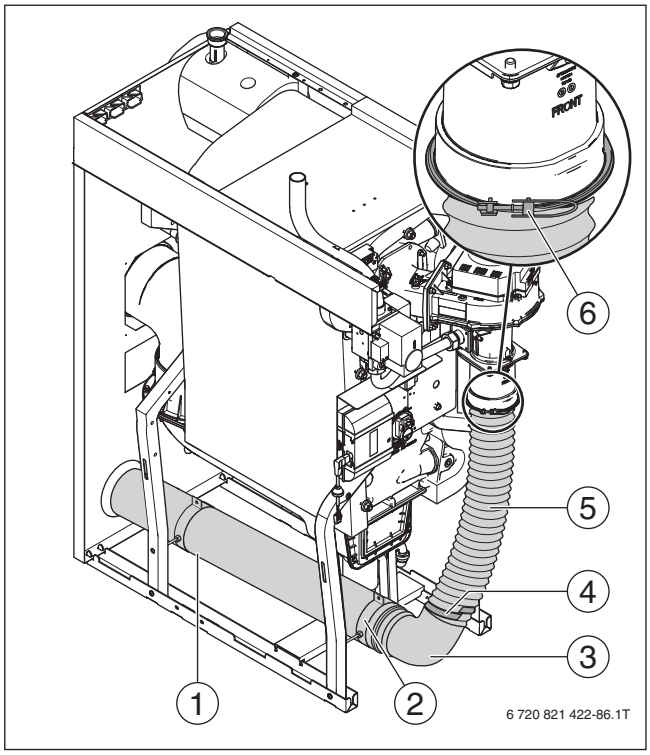


Fig. 92 Accessory set for open flue mode

[1] Combustion air pipe (DN 110 for 75 ... 150 kW; DN 160 for 200 ... 300 kW)
[2] Pipe clip (2 ×)
[3] Elbow
[4] Pipe clip
[5] Combustion air hose
[6] Adaptor with hinged pipe clip

Concentric boiler connector for Logano plus KB372, 75 kW and 100 kW[1)]

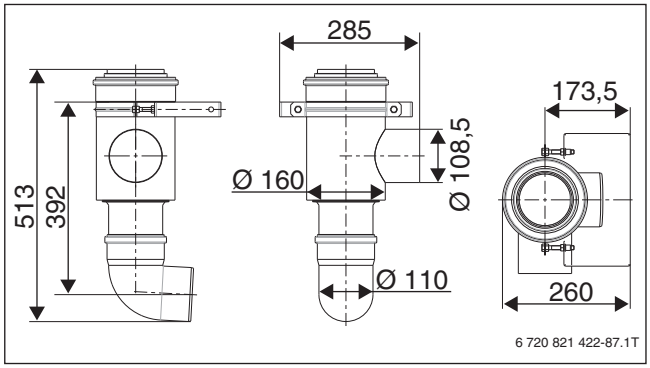


Fig. 93 Concentric boiler connector for Logano plus KB372, 75 kW and 100 kW

1) Available from 2018

Non-return valve flange design PN 16

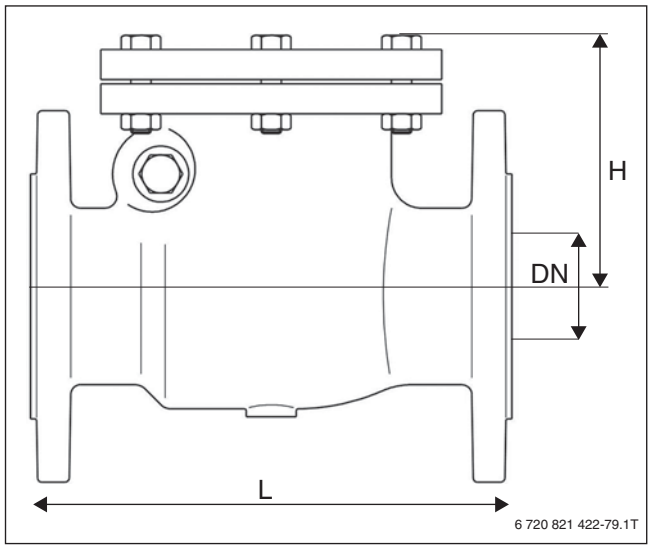


Fig. 94 Non-return valve (Dimensions → Tab. 32)

Non-return valve, grey cast iron:
- Flange connection on both sides PN 16
- Casing and cover made of grey cast iron
- Valve seat made of brass
- Gaskets free of asbestos
- Round flanges acc. to DIN EN 1092-2, PN 16 (bolt circle diameter corresponds also to BS 4504, PN 16)

The non-return valves can also be installed in pipeworks in horizontal or vertical installation position. With vertical flow, the installation is only admissible if the non-return valve can be opened to the top. With horizontal flow rate, the valve suspension must show to the top.

	Unit	
Height H DN 50 DN 65	 mm mm	 125 130
Length L DN 50 DN 65	 mm mm	 200 240
Max. flow velocity	m/s	3
Material	–	Grey cast iron
k_{vs} DN 50 DN 65	 – –	 132 326
Internal diameter	–	DN 65
Max. operating pressure	bar	16
Min. operating temperature	°C	– 10
Max. operating temperature	°C	120

Table 32 Non-return valve, flange design

12.2 Connectors for optional measurement port

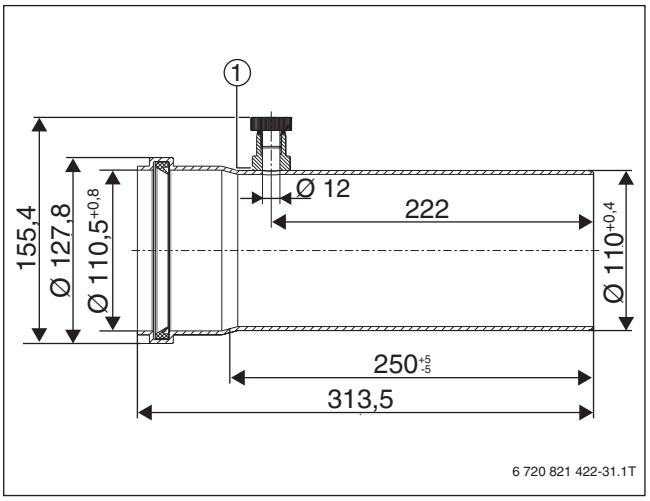


Fig. 95 Connector DN 110 (dimensions in mm)

[1] Weld seam

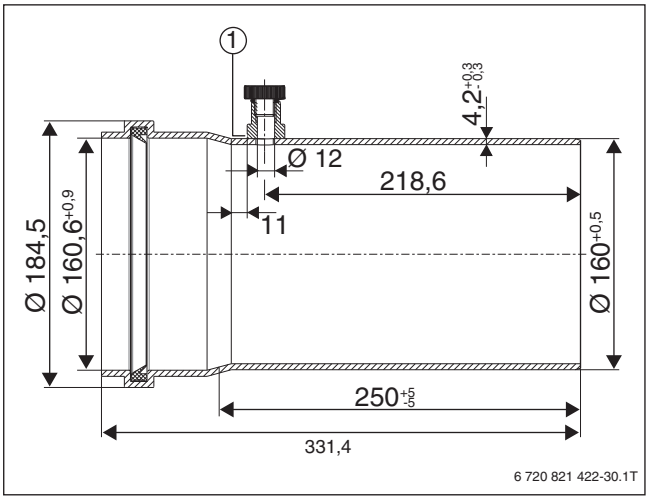


Fig. 96 Connector DN 160 (dimensions in mm)

[1] Weld seam

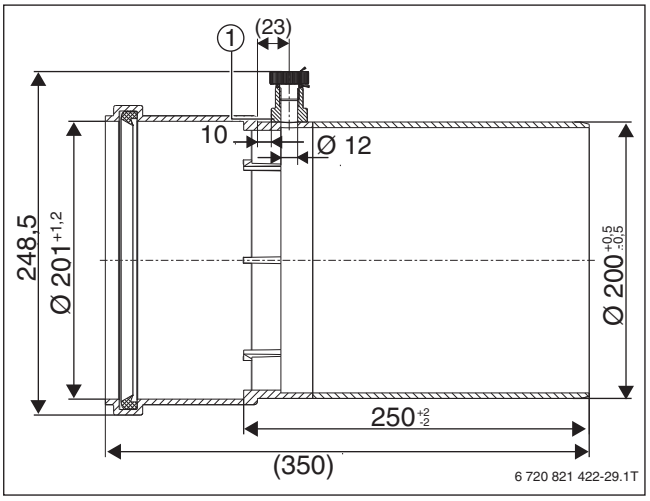
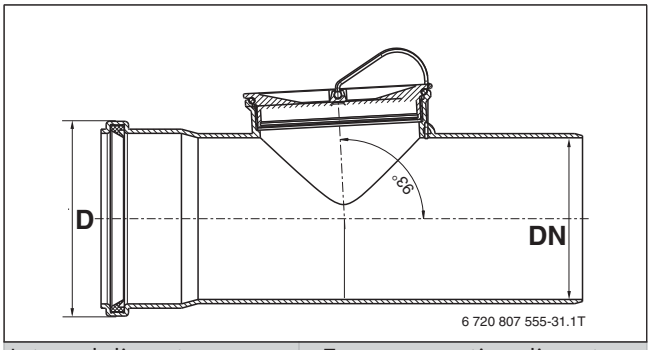


Fig. 97 Connector DN 200

[1] Weld seam



Internal diameter	Fem. connection diameter [DN]
110	128
125	145
160	184
200	220
250	270

Table 33 Flue pipe fem. connection dimension

12.3 Adaptors

The depicted dimensions without tolerances are nominal dimensions for information and can deviate due to manufacturing reasons.

12.3.1 For 2" female threads to flange DN 50/PN 6

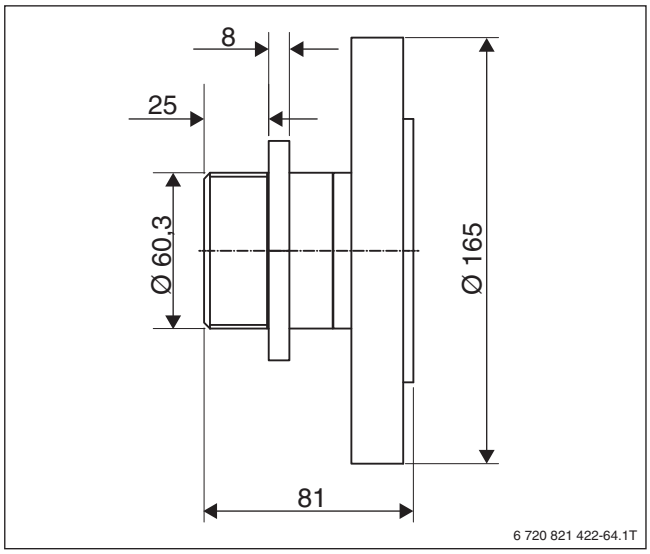


Fig. 98 Adaptor for 2" female threads to flange DN 50/PN 6

12.3.2 For HE pumps

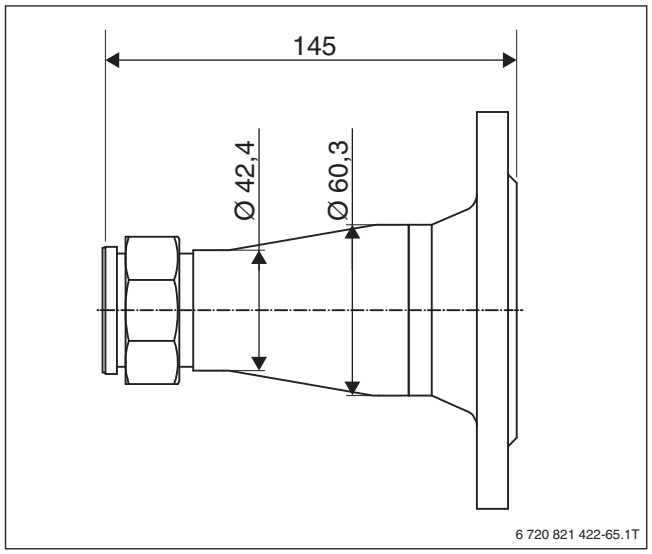


Fig. 99 Adaptor DN 50/PN 6 – G 1 ½ " (dimensions in mm)

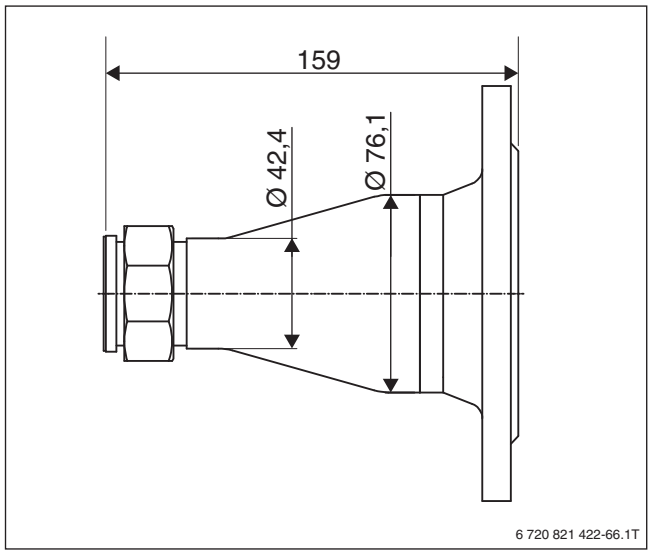


Fig. 100 Adaptor DN 65/PN 6 – G 1 ½ " (dimensions in mm)

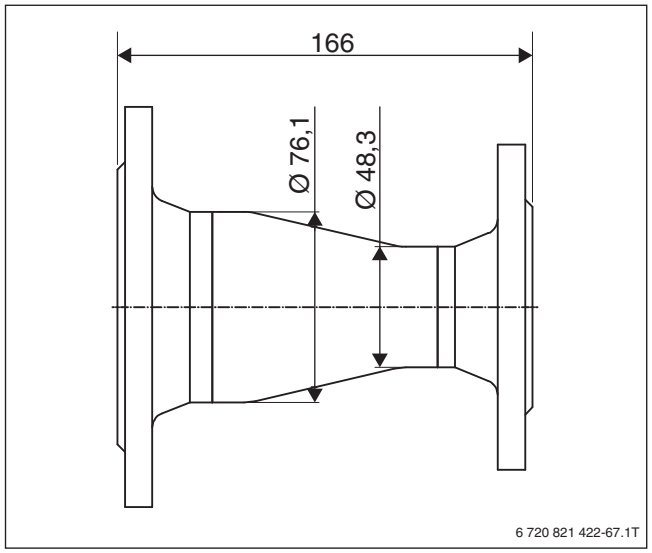


Fig. 101 Adaptor DN 65/PN 6 – DN 40/PN 6 (dimensions in mm)

12.3.3 For non-return valve

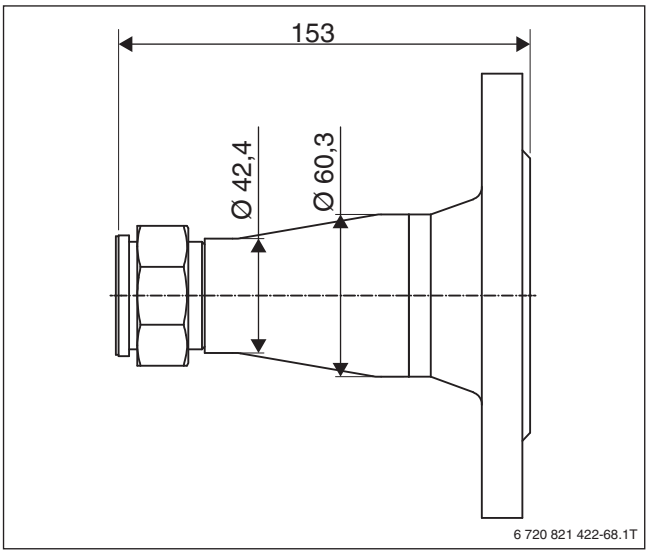


Fig. 102 Adaptor DN 50/PN 16 – G 1 ½ " (dimensions in mm)

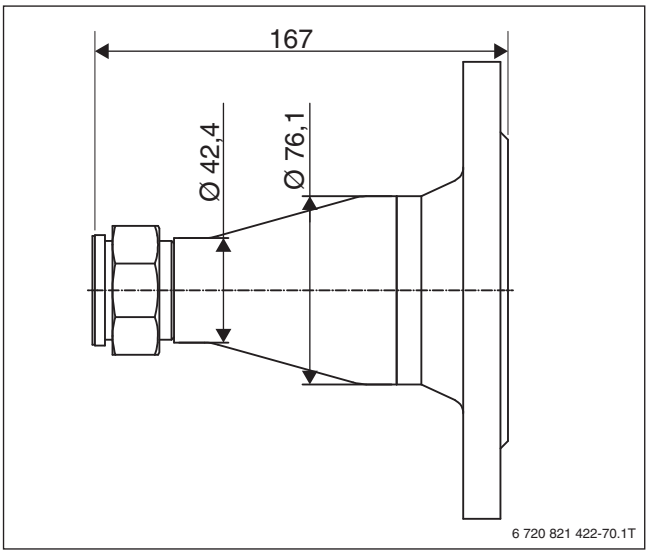


Fig. 103 Adaptor DN 65/PN 16 – G 1 ½ " (dimensions in mm)

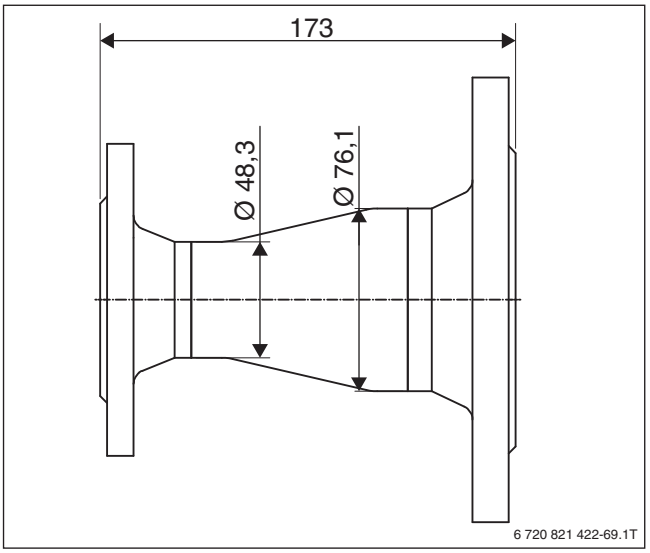


Fig. 104 Adaptor DN 65/PN 16 – DN 40/PN 6 (dimensions in mm)

13 Neutralisation

13.1 Condensate

Route the condensate from gas condensing boilers into the public sewer system in accordance with local regulations. 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. For calculating the annual amount of condensate produced, experience indicates that a specific amount of condensate of up to 0.14 kg/kWh can be assumed.

It is advisable to gather relevant information about local regulations for routing condensate into the sewer system well before installation takes place.

$$\dot{V}_K = \dot{Q}_F \times m_K \times b_{VH}$$

F. 4 Precise calculation of the annual condensate accumulation rate

b_{VH} Boiler hours in full use (full load) in h/a
m_K Specific amount of condensate in kg/kWh (assumed density = 1 kg/l)
$\dot{Q}_F$ Rated heat input of the heat source in kW
$\dot{V}_K$ Condensate flow rate in l/h

13.2 Neutralising system

If the condensate must be neutralised, neutralising systems NE 0.1, NE 1.1 and NE 2.0 may be used. Install these between the condensate outlet from the gas condensing boiler and the connection to the public sewage system. Place the neutralising system behind or adjacent to the floor standing gas condensing boiler.

Design the condensate hose using suitable materials, e.g. polypropylene plastic.

Fill the neutralising system with neutralising agent. 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 to be treated and the neutralising system. Replace the spent neutralising agent when the pH value of the neutralised condensate falls below 6.5.

13.2.1 Equipment

Neutralising system NE 0.1

- Plastic enclosure with separate chambers for the neutralising granulate and a backup area the neutralised condensate
- Check the pH level of the neutralised condensate at least 2 × annually.

Neutralising system NE 1.1

- Plastic enclosure with separate chambers for the neutralising granulate and a backup area the neutralised condensate
- Level-controlled condensate pump (head approx. 2 m)
- Check the pH level of the neutralised condensate at least 2 × annually.

Neutralising system NE 2.0

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

14 Further accessories

14.1 Services

Buderus offers setup optimisation for the gas burner, boiler and the control unit parameters as part of the commissioning service. Commissioning requires a natural gas connection, and adequate heat transfer must be ensured.

In addition, there is the option of supplying a mobile water treatment plant to fully desalinate the fill water for the system in accordance with Buderus requirements.

Please contact your local sales office if required.

14.2 Cleaning tool

A special cleaning tool is available for the Logano plus KB372.

This cleaning tool can be used to back up other cleaning methods when there are resistant deposits inside the boiler.

Generally, the system is cleaned by flushing with tap water and blowing compressed air through the heat exchanger and burner. In the case of severe contamination, cleaning agents approved by Buderus can be used. Check with Buderus for details.

14.3 Supply air connection elbow

A connection bend for balanced flue mode made from translucent PP is available for the Logano plus KB372.

The connection bend DN 110 has an angle of 90° and a measurement port.

Adaptors are available for larger dimensions.

The dimensions of the supply air line must be calculated.

Keyword index

Notes

Notes

Bosch Thermotechnik GmbH
Buderus Deutschland
35573 Wetzlar

www.buderus.de
info@buderus.de

Buderus

Heatingsystems with a future.

6 720 886 361 (2018/04)