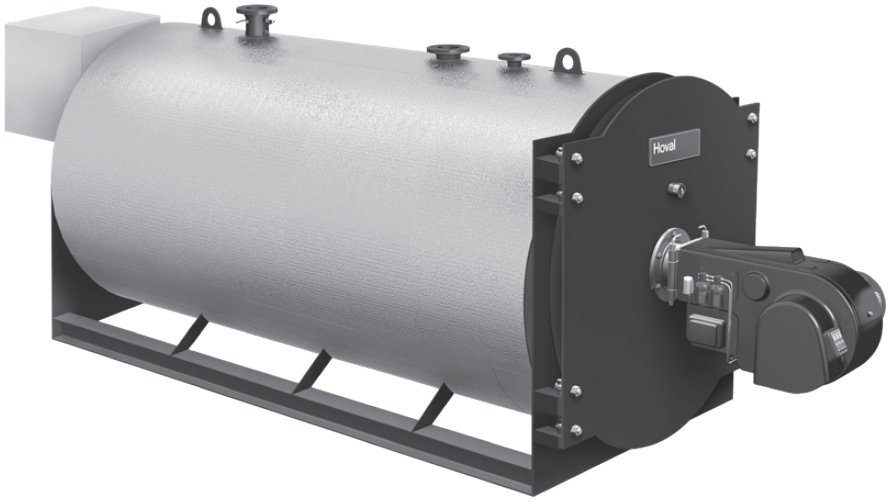
Technical information
Assembly instructions

Hoval

Oil/Gas condensing boiler

Max-3 condens (3000-5000), Max-3 condens E (3000-5000)



These instructions are applicable to the following types:

2-Max-3 condens	(3000)
2-Max-3 condens	(4000)
2-Max-3 condens	(5000)
2-Max-3 condens E	(3000)
2-Max-3 condens E	(4000)
2-Max-3 condens E	(5000)

Hoval products must be installed and commissioned by specialists only. These instructions are intended for service engineers. Electrical installation must be performed by a licensed electrical company.

1. Important notices

1.1 General safety instructions

The system may only be placed in operation if all the relevant standards and safety regulations have been complied with.

At least the following conditions must be satisfied for a trial operation:
- Safety valve installed (system sealed)
- Control in operation (connected to the power supply)
- Sensor for the safety temperature limiter mounted in the immersion sleeve
- System filled with water
- Expansion tank connected
- Flue gas outlet with flue gas line connected to flue gas system.
- An adequate supply of fresh air must be guaranteed.
- Burner preset
- Safety equipment of the system is compliant with EN 12828 (≦ 110 °C STB) or EN 12953-6 (> 111 °C to ≦ 120 °C STB).
- All piping on the boiler must be de-energised. Any voltage present due to length extensions must be absorbed through appropriate piping measures (expansion bends, compensators, spring supports, etc.) and must not affect the boiler resistance connection piece.

WARNING

The heat generator can only be de-energised by disconnection from the mains (e.g. all-pole switch).

WARNING

All electrical power supply circuits must be switched off before accessing the terminals.

1.2 Explanation of the symbols

1.2.1 Warnings

DANGER

... indicates a situation of immediate danger which will lead to serious or fatal injuries if not avoided.

WARNING

... indicates a situation of possible danger which can lead to serious or fatal injuries if not avoided.

CAUTION

... indicates a situation of possible danger which can lead to minor or slight injuries if not avoided.

NOTICE

... indicates a situation of possible danger which can lead to damage to property if not avoided.

1.2.2 Warning symbols

The following warning signs are combined for the warning notes with signal words CAUTION, WARNING and DANGER.

General warning symbols

Warning of electrical voltage

1.2.3 Information

Information:
Provides important information.

Provides important information.
Refers to standards and directives.

1.3 On delivery

Carry out a visual inspection immediately on receiving the boiler. If any damage is found, take the necessary steps as defined in the delivery contract. The respective risk carrier bears the cost of repairs.

1.4 Warranty

The warranty does not cover defects attributable to:

- Failure to comply with these instructions
- Failure to comply with the operating instructions
- Incorrect installation
- Impermissible modifications to the product
- Incorrect handling of the product
- Damage caused by the application of force
- Contaminated operating materials (gas, water, combustion air)
- Unsuitable chemical additives to the heating water
- Corrosion caused by not observing the required water quality
- Corrosion by halogen compounds (e.g. paints, adhesives, solvents)

1.5 Manuals

All instructions relevant to your system can be found in the Hoval system manual - please keep all manuals! In exceptional cases, the instructions can be found with the components!

Further sources of information:

- Hoval catalogue
- Standards, regulations

1.6 Regulations, official approvals

The standards and directives stated under chapter 1.6.1 to 1.6.3 must be taken into account during installation and operation of the system.

1.6.1 Germany §

- DIN EN 12831 Heating systems in buildings - Method for calculation of the design heat load.
- DIN EN 303 Heating boilers with forced draught burners.
- DIN EN 12828 Sheet 1 and 2
  Heating systems in buildings - design of water-based heating systems.
- DIN 4755 Oil-fired systems.
  Design, construction and safety engineering requirements.
- DIN 4756 Gas-fired systems; construction, execution, technical safety requirements, planning and execution.
- DIN 18160 House chimneys; requirements, planning and execution.
- TRD 702 Steam boiler plants with calorifiers of the group II.
- DIN EN 13384 Flue gas systems – Calculation methods in heat and flow engineering.
- TRD 721 Safety devices against excess pressures / safety valves / for steam boilers of Group II.
- VDI 2035 Prevention of damage by corrosion and the formation of scale in hot water heating systems.
- DIN 57 116 / VDI 0116 Electrical equipment for firing systems (VDE Regulation).
- For further standards applicable in Germany, see appendix N-430 020.

1.6.2 Austria §

- ÖNorm 7550
- ÖNorm B 8130 Open water heating systems; safety devices.
- Norm B 8131 Closed water heating systems; safety, execution and testing requirements
- ÖNorm B 8133 Hot water production systems; technical safety requirements.
- ÖNorm B 8136 Heating systems, space requirements and other building requirements.
- ÖNorm M 7515 Calculations of dimensions of chimneys; terminology, calculation procedure.
- ÖNorm H 5171
- ÖVGW TR-gas (Austrian Gas and Water Confederation - Technical Guidelines)

1.6.3 Switzerland §

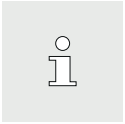
- VKF - Association of Cantonal Fire Insurers
- Fire prevention authority regulations.
- SVGW Swiss Association for Gas and Water.
- SWKI 91-1 Aeration and ventilation of the boiler room.
- SWKI BT 102-01 Water quality for building services systems.
- SWKI 93-1 Safety engineering installations for heating systems.
- KRW Corrosion caused by halogen compounds.
- KRW/VSO/FKR Plug-in electrical connections on boilers and burners

and further regulations and standards issued by CEN, CEN ELEC, DIN, VDE, DVGW, TRD and the legislative body.
The regulations of the local building authorities, insurance companies and chimney sweeps must also be taken into account. The regulations of the responsible gas supply company are to be complied with if using gas. Approval by the authorities may be required.

2. Installation

2.1 Setting up, levelling

No special foundation plate is required for erecting the boiler (sufficient supporting capacity for the boiler must be guaranteed) - for operating weight, see chapter 3.
If there are boiler rooms in the domestic domain, vibration dampers are to be mounted under the boiler plinth rails.



The distance from the wall behind the boiler must always be sufficient in order to gain access to the cleaning opening in the flue gas collector. It must be possible to swing open the boiler door with the burner.

Levelling
Align the top edge of the boiler water jacket (boiler longitudinal axis) exactly horizontal.

2.2 Syphon assembly information

When combusting hydrogenous fuels which cool down below their dew points, the water vapour in the flue gas condenses. This condensate must be diverted out of the calorific value heat exchanger or the flue gas system.

The amount of the resulting condensate depends on the water entry temperature in the heat exchanger, the excess air in the flue gas and the load of the heat generator.

The following standard values can be assumed for the resulting amount of condensation (at theoretical 100 % condensation and consideration of an average humidity):

Natural gas: approx. 0.8 l/m^3 gas
Oil-firing: approx. 0.9 l/litre oil

The flue gas condensate must be introduced into the public sewer network as prescribed. Neutralisation equipment might be needed - please contact the nearest Hoval branch.

In particular with oil-firing, the use and suitability of the neutralisation equipment must be taken into account.

A syphon must be installed directly at the discharge of the calorific value heat exchanger; it (including the connecting piping between the heat exchanger and syphon) is to be designed to be resistant to flue gas temperatures up to 240 °C and must be filled with water before the system is commissioned. The height of the syphon must correspond at least with the flue gas counterpressure of the heat exchanger (up to about 4 mbar) - start-up pressure shocks of the burner or possible additional counterpressure of the flue gas line must also be taken into account.

The connection cables of the drainage piping must be made of corrosion-resistant materials such as PVC or stainless steel.

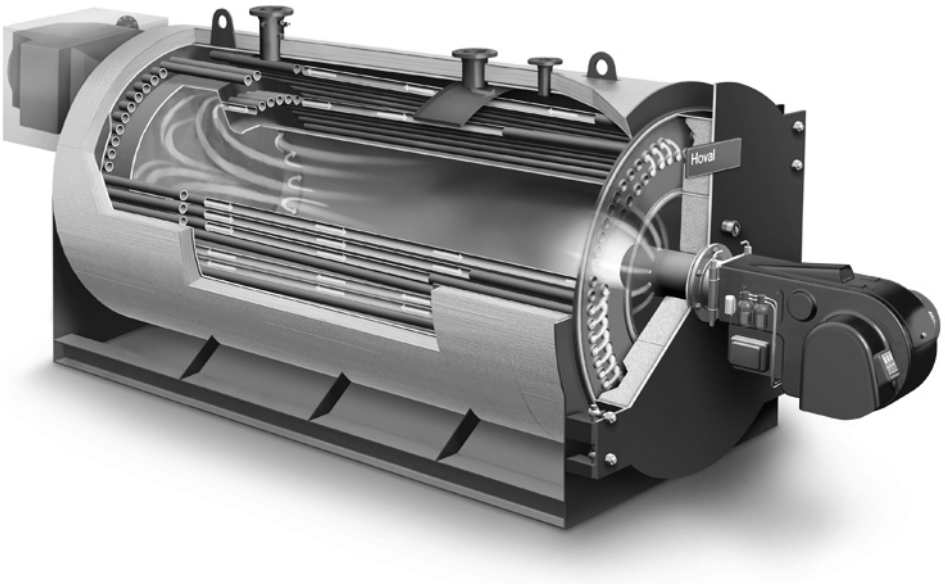
After a long system standstill, the water level of the syphon must be checked and refilled with water if necessary.

3. Technical information

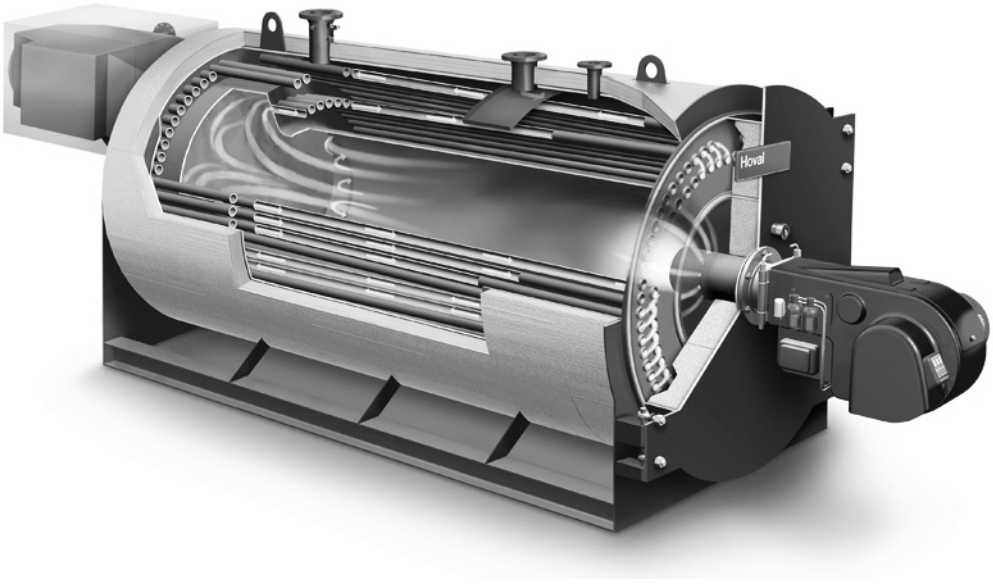
3.1 Description of the boiler

The Max-3 condens and Max-3 condens E condensing boiler is constructed in 3-compartment form. The heating gases flow from the cylindrical combustion chamber into the water-cooled reversing chamber and through the 2nd compartment into the front reversing chamber. The 3rd compartment consists of straight tubes through which the heating gases are conducted to the flue gas heat exchanger. In the flue gas heat exchanger, the heating gases are further cooled to increase the boiler efficiency. Depending on the operating conditions, the system can be cooled below the dew point, thereby using the calorific value.

Max-3 condens



Max-3 condens E



3.2 Technical data

3.2.1 Max-3 condens (3000-5000) for natural gas H

Type Fuel		(3000) Natural gas H	(4000) Natural gas H	(5000) Natural gas H
• Nominal heat output at 80/60 °C	kW	3750	5006	6285
• Nominal heat output at 80/30 °C	kW	3951	5283	6636
• Heat output range at 80/60 °C	kW	768-3750	976-5006	1185-6285
• Heat output range at 80/30 °C	kW	832-3951	1063-5283	1296-6636
• Combustion performance	kW	792-3942	1005-5256	1220-6615
• Boiler operating temperature max. [2]	°C	105	105	105
• Boiler operating temperature min.	°C	see table of operating conditions (below)		
• Boiler return temperature min. (directly in the boiler after the flue gas heat exchanger)	°C	see table of operating conditions (below)		
• Safety temperature limiter setting (water side) [3]	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (optional)	bar	10/16	10/16	-
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	95.1/85.7	95.3/85.8	95.0/85.6
• Boiler efficiency at 80/30 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	100.2/90.3	100.5/90.6	100.3/90.4
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	107.9/97.2	106.7/96.1	107.5/96.8
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV)	%	106.9/96.3	106.4/95.9	107.3/96.7
• Stand-by losses qB at 70 °C	Watts	2125	2349	2566
• Flue gas temperature at nominal output 80/60 °C	°C	128	126	132
• Combustion gas resistance at nominal output (natural gas H, 10.5 % CO_2), 500 m above sea level (tolerance ± 20 %)	mbar	16.5	17.2	16.4
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO_2)	kg/h	5820	7760	9767
• Flow resistance boiler [1]	z-value	0.001	0.001	0.0004
• Flue gas heat exchanger flow resistance	z-value	0.008	0.011	0.014
• Boiler water flow rate at 10 K	m³/h	321	429	539
• Boiler water flow rate at 20 K	m³/h	161	215	269
• Minimum flue gas heat exchanger flow rate at 60 °C return flow temperature	m³/h	3.2	4.4	6.1
• Minimum flue gas heat exchanger flow rate at 30 °C return flow temperature	m³/h	4.3	5.9	7.8
• Boiler water capacity (incl. flue gas heat exchanger)	Litre	6452	7172	7886
• Insulation thickness of boiler body and flue gas heat exchanger	mm	100	100	100
• Weight (incl. casing)				
- At operating / test pressure 6/9.6 bar	kg	7356	8714	-
- At operating / test pressure 10/16 bar	kg	8489	10012	12038
• Combustion chamber internal dimensions	mm	900	990	1070
• Combustion chamber length (with extension into the reversing chamber, half the length of the reversing chamber)		3436	3756	4006
• Combustion chamber volume	m³	2.186	2.891	3.602
• Dimensions		See dimensional drawing		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

[1] Flow resistance boiler in mbar = flow rate $(m^3/h)^2$ x z
[2] Limited by the boiler controller E13.4 TopTronic® E and T2.2 to 90 °C or by E13.5 TopTronic® E and T0.2 to 105 °C.
[3] Max. safety temperature for boiler controller E13.4 TopTronic® E and T2.2: 110 °C or E13.5 TopTronic® E and T0.2: 120 °C.

Operating conditions:

Fuel		EL low-sulphur fuel oil	Natural gas H
Boiler operating temperature min.	°C	65	75
Boiler return temperature min. [1]	°C	55	65
Return temperature control [1]		Yes	Yes

[1] Before entering boiler return

3.2.2 Max-3 condens (3000-5000) for EL low-sulphur fuel oil (sulphur content < 50 mg/kg)

Type Fuel		(3000) EL fuel oil low-sulphur	(4000) EL fuel oil low-sulphur	(5000) EL fuel oil low-sulphur
• Nominal heat output at 80/60 °C	kW	3750	5006	6285
• Nominal heat output at 80/30 °C	kW	3877	5181	6502
• Heat output range at 80/60 °C	kW	768-3750	976-5006	1185-6285
• Heat output range at 80/30 °C	kW	815-3877	1039-5181	1265-6502
• Combustion performance	kW	792-3942	1005-5256	1220-6615
• Boiler operating temperature max. [2]	°C	105	105	105
• Boiler operating temperature min.	°C	see table of operating conditions (below)		
• Boiler return temperature min. (directly in the boiler after the flue gas heat exchanger)	°C	see table of operating conditions (below)		
• Safety temperature limiter setting (water side) [3]	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (optional)	bar	10/16	10/16	-
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	95.1/89.7	95.3/89.9	95.0/89.6
• Boiler efficiency at 80/30 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	98.4/92.8	98.6/93.0	98.3/92.7
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	102.2/96.4	102.0/96.2	102.8/97.0
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV)	%	101.2/95.5	101.7/95.9	102.6/96.8
• Stand-by losses qB at 70°C	Watts	2125	2349	2566
• Flue gas temperature at nominal output 80/60 °C	°C	128	126	132
• Combustion gas resistance at nominal output (natural gas H, 12.5 % CO_2), 500 m above sea level (tolerance ± 20 %)	mbar	16.5	17.2	16.4
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO_2)	kg/h	6120	8160	10200
• Flow resistance boiler [1]	z-value	0.001	0.001	0.0004
• Flue gas heat exchanger flow resistance	z-value	0.008	0.011	0.014
• Water flow rate at 10 K	m³/h	321	429	539
• Water flow rate at 20 K	m³/h	161	215	269
• Minimum flue gas heat exchanger flow rate at 60 °C return flow temperature	m³/h	3.2	4.4	6.1
• Minimum flue gas heat exchanger flow rate at 30 °C return flow temperature	m³/h	3.4	4.7	6.1
• Boiler water capacity (incl. flue gas heat exchanger)	Litre	6452	7172	7886
• Insulation thickness of boiler body and flue gas heat exchanger	mm	100	100	100
• Weight (incl. casing)				
- At operating / test pressure 6/9.6 bar	kg	7356	8714	-
- At operating / test pressure 10/16 bar	kg	8489	10012	12038
• Combustion chamber internal dimensions	mm	900	990	1070
• Combustion chamber length (with extension into the reversing chamber, half the length of the reversing chamber)		3436	3756	4006
• Combustion chamber volume	m³	2.186	2.891	3.602
• Dimensions		See dimensional drawing		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

[1] Flow resistance boiler in mbar = flow rate $(m^3/h)^2$ x z
[2] Limited by the boiler controller E13.4 TopTronic® E and T2.2 to 90 °C or by E13.5 TopTronic® E and T0.2 to 105 °C.
[3] Max. safety temperature for boiler controller E13.4 TopTronic® E and T2.2: 110 °C or E13.5 TopTronic® E and T0.2: 120 °C.

Operating conditions:

Fuel		EL low-sulphur fuel oil	Natural gas H
Boiler operating temperature min.	°C	65	75
Boiler return temperature min. [1]	°C	55	65
Return temperature control [1]		Yes	Yes

[1] Before entering boiler return

3.2.3 Max-3 condens E (3000-5000) for natural gas H

Type Fuel		(3000) Natural gas H	(4000) Natural gas H	(5000) Natural gas H
• Nominal heat output at 80/60 °C	kW	3162	4215	5305
• Nominal heat output at 80/30 °C	kW	3412	4546	5732
• Heat output range at 80/60 °C	kW	774-3162	982-4215	1195-5305
• Heat output range at 80/30 °C	kW	862-3412	1099-4546	1345-5732
• Combustion performance	kW	794-3255	1007-4340	1225-5465
• Boiler operating temperature max. [2]	°C	105	105	105
• Boiler operating temperature min.	°C	see table of operating conditions (below)		
• Boiler return temperature min. (directly in the boiler after the flue gas heat exchanger)	°C	see table of operating conditions (below)		
• Safety temperature limiter setting (water side) [3]	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (optional)	bar	10/16	10/16	-
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	97.1/87.5	97.1/87.5	97.1/87.5
• Boiler efficiency at 80/30 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	104.8/94.4	104.7/94.4	104.9/94.5
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	108.4/97.7	108.2/97.5	109.0/98.2
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV)	%	107.4/96.8	107.9/97.2	108.8/98.0
• Stand-by losses qB at 70°C	Watts	2166	2383	2620
• Flue gas temperature at nominal output 80/60 °C	°C	82	83	83
• Combustion gas resistance at nominal output (natural gas H, 10.5 % CO_2), 500 m above sea level (tolerance ± 20 %)	mbar	12.2	13.4	12.0
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO_2)	kg/h	4806	6408	8069
• Flow resistance boiler [1]	z-value	0.001	0.001	0.0004
• Flue gas heat exchanger flow resistance	z-value	0.01	0.016	0.018
• Boiler water flow rate at 10 K	m³/h	271	361	455
• Boiler water flow rate at 20 K	m³/h	136	181	227
• Minimum flue gas heat exchanger flow rate at 60 °C return flow temperature	m³/h	3.5	4.6	6.5
• Minimum flue gas heat exchanger flow rate at 30 °C return flow temperature	m³/h	5.0	6.7	9.0
• Boiler water capacity (incl. flue gas heat exchanger)	Litre	6525	7260	8030
• Insulation thickness of boiler body and flue gas heat exchanger	mm	100	100	100
• Weight (incl. casing)				
- At operating / test pressure 6/9.6 bar	kg	7668	9265	-
- At operating / test pressure 10/16 bar	kg	8801	10563	12905
• Combustion chamber internal dimensions	mm	900	990	1070
• Combustion chamber length (with extension into the reversing chamber, half the length of the reversing chamber)		3436	3756	4006
• Combustion chamber volume	m³	2.186	2.891	3.602
• Dimensions		See dimensional drawing		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

[1] Flow resistance boiler in mbar = flow rate $(m^3/h)^2$ x z
[2] Limited by the boiler controller T0.2 to 105 °C.
[3] Max. safety temperature for boiler controller T0.2: 120 °C.

Operating conditions:

Fuel		EL low-sulphur fuel oil EL eco fuel oil	Natural gas H
Boiler operating temperature min.	°C	65	75
Boiler return temperature min. [1]	°C	55	65
Return temperature control [1]		Yes	Yes

[1] Before entering boiler return

3.2.4 Max-3 condens E (3000-5000) for EL eco fuel oil

Type Fuel		(3000) EL low-sulphur fuel oil/EL eco fuel oil	(4000)	(5000)
• Nominal heat output at 80/60 °C	kW	3162	4215	5305
• Nominal heat output at 80/30 °C	kW	3325	4431	5578
• Heat output range at 80/60 °C	kW	774-3162	982-4215	1195-5305
• Heat output range at 80/30 °C	kW	838-3325	1064-4431	1295-5578
• Combustion performance	kW	794-3255	1007-4340	1225-5465
• Boiler operating temperature max. [2]	°C	105	105	105
• Boiler operating temperature min.	°C	see table of operating conditions (below)		
• Boiler return temperature min. (directly in the boiler after the flue gas heat exchanger)	°C	see table of operating conditions (below)		
• Safety temperature limiter setting (water side) [3]	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (optional)	bar	10/16	10/16	-
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	97.1/91.6	97.1/91.6	97.1/91.6
• Boiler efficiency at 80/30 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV)	%	102.2/96.4	102.1/96.3	102.1/96.3
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	103.4/97.5	103.2/97.4	104.0/98.1
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV)	%	102.4/96.6	102.9/97.1	103.8/97.9
• Stand-by losses qB at 70°C	Watts	2166	2383	2620
• Flue gas temperature at nominal output 80/ 60 °C	°C	81	82	81
• Combustion gas resistance at nominal output (natural gas H, 12.5 % CO_2), 500 m above sea level (tolerance ± 20 %)	mbar	12.2	13.4	12.0
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO_2)	kg/h	5105	6807	8508
• Flow resistance boiler [1]	z-value	0.001	0.001	0.0004
• Flue gas heat exchanger flow resistance	z-value	0.01	0.016	0.018
• Water flow rate at 10 K	m³/h	271	361	455
• Water flow rate at 20 K	m³/h	136	181	227
• Minimum flue gas heat exchanger flow rate at 60 °C return flow temperature	m³/h	3.5	4.6	6.5
• Minimum flue gas heat exchanger flow rate at 30 °C return flow temperature	m³/h	4.0	5.3	7.1
• Boiler water capacity (incl. flue gas heat exchanger)	Litre	6525	7260	8030
• Insulation thickness of boiler body and flue gas heat exchanger	mm	100	100	100
• Weight (incl. casing)				
- At operating / test pressure 6/9.6 bar	kg	7668	9265	-
- At operating / test pressure 10/16 bar	kg	8801	10563	12905
• Combustion chamber internal dimensions	mm	900	990	1070
• Combustion chamber length (with extension into the reversing chamber, half the length of the reversing chamber)		3436	3756	4006
• Combustion chamber volume	m³	2.186	2.891	3.602
• Dimensions		See dimensional drawing		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

[1] Flow resistance boiler in mbar = flow rate $(m^3/h)^2$ x z
[2] Limited by the boiler controller T0.2 to 105 °C.
[3] Max. safety temperature for boiler controller T0.2: 120 °C.

Operating conditions:

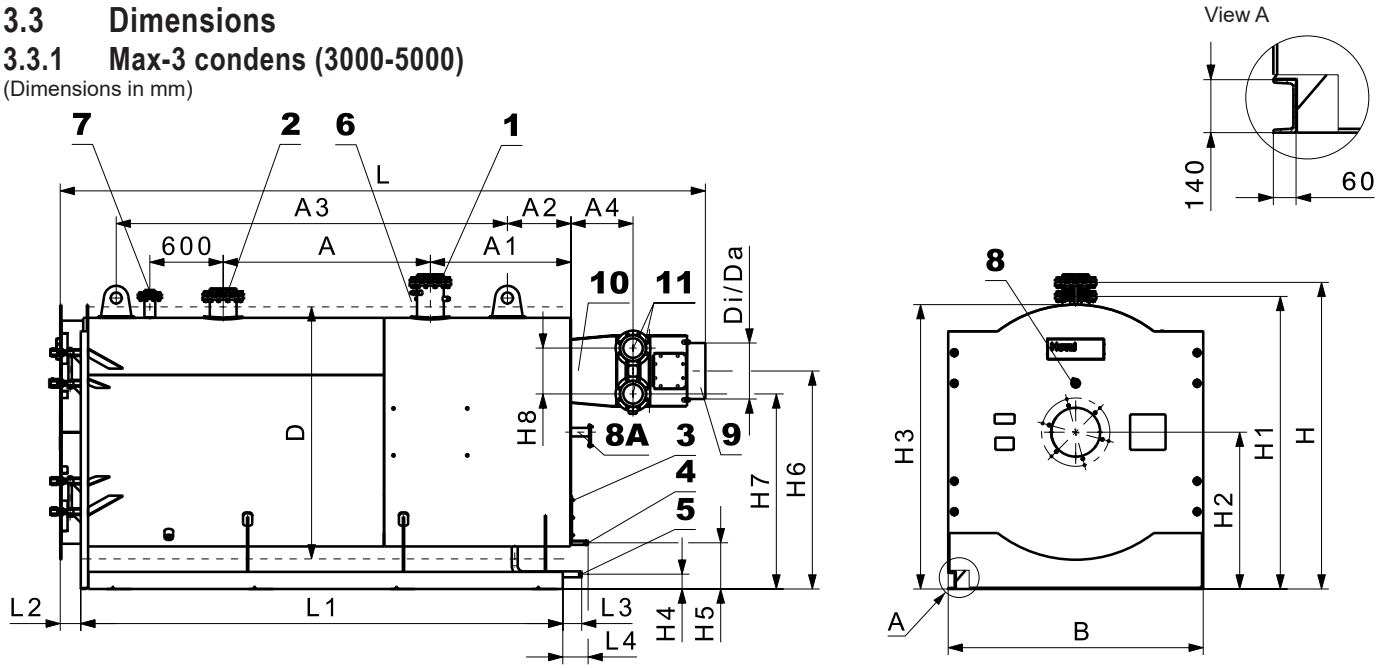
Fuel		EL low-sulphur fuel oil EL eco fuel oil	Natural gas H
Boiler operating temperature min.	°C	65	75
Boiler return temperature min. [1]	°C	55	65
Return temperature control [1]		Yes	Yes

[1] Before entering boiler return

3.3 Dimensions

3.3.1 Max-3 condens (3000-5000)

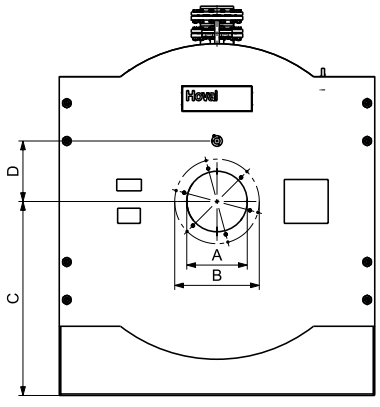
(Dimensions in mm)



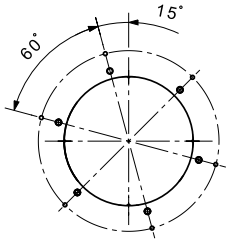
1	Boiler supply PN 16	(3000,4000)	DN 200	7	Safety valve fitting PN 16	(3000,4000)	DN 80
		(5000)	DN 250			(5000)	DN 100
2	Boiler return PN 16	(3000,4000)	DN 200	8	Sight glass		
		(5000)	DN 250	8A	Sight glass (optional)		
3	Cleaning opening			9	Smoke gas outlet		
4	Flue gas collector cleaning connection / drainage			10	Exhaust gas heat exchanger		
5	Drainage PN 16	R 1½″		11	Flue gas heat exchanger	(3000,4000)	DN 150
6	5 immersion sleeves	R ¾″ x 120 supply boiler			connections PN 16	(5000)	DN 200

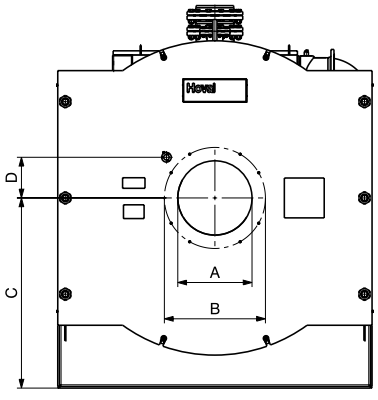
Type	B	L	H	H1	H2	D	Di/Da	H3	H4	H5	H6	H7	H8	L1	L2	L3	L4	A	A1	A2	A3	A4
(3000)	2086	5277	2508	2393	1283	2070	450/458	2326	120	378	1783	1596	375	3943	168	155	207	1695	1150	520	3200	507
(4000)	2186	5597	2608	2493	1333	2170	500/508	2426	120	378	1896	1643	450	4263	168	155	207	2015	1150	640	3400	507
(5000)	2286	5964	2708	2593	1383	2270	550/558	2526	120	378	1983	1723	525	4511	282	155	207	2265	1155	550	3750	507

Burner connection dimensions

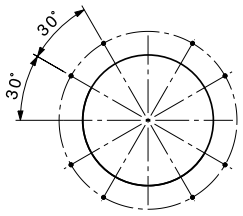


Screw connection flange
Max-3 condens (3000,4000)
6x M16

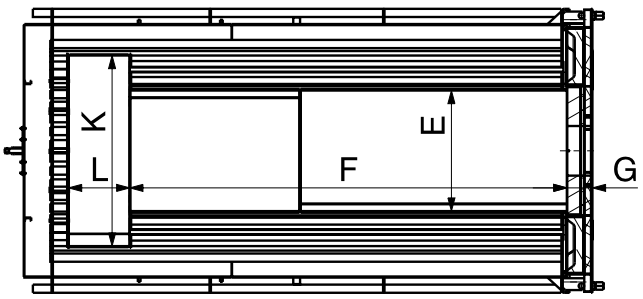




Screw connection flange
Max-3 condens (5000)
8x M16



Firing system dimensions

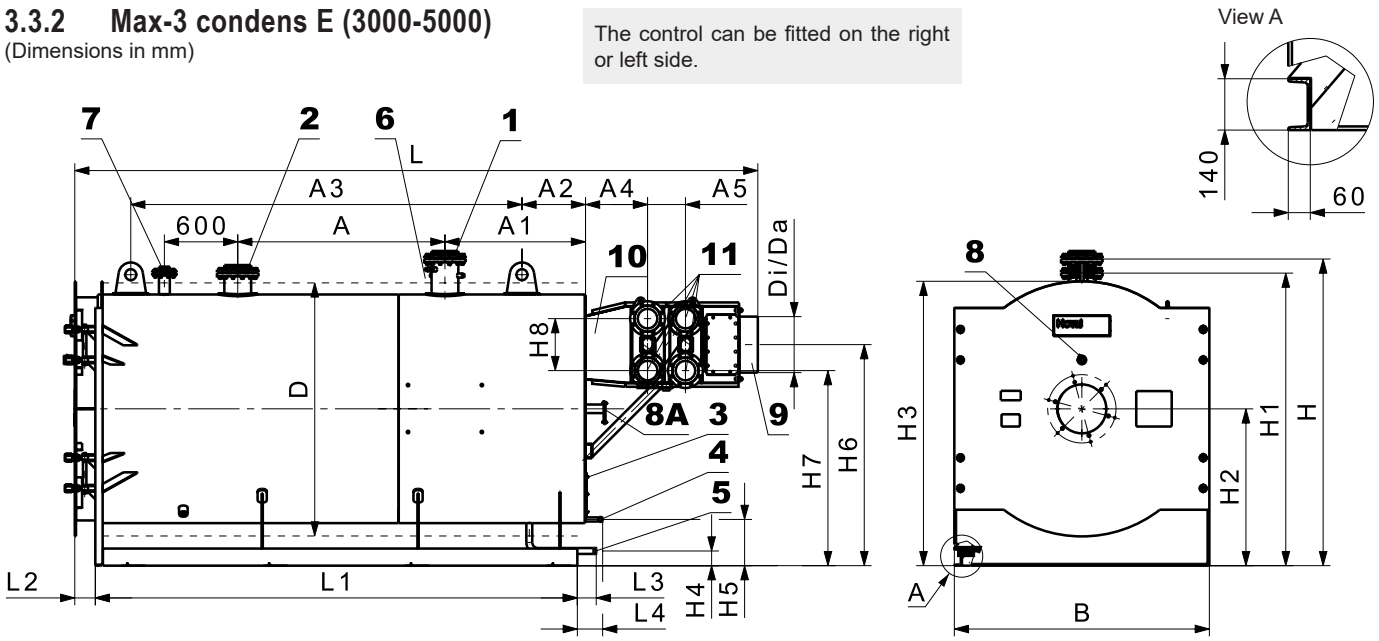


Type	A	B	C	D	E	F	G	K	L
(3000)	400	450	1283	400	900	3211	188	1410	450
(4000)	400	450	1333	400	990	3531	188	1510	450
(5000)	540	735	1383	296	1070	3781	305	1600	450

3.3.2 Max-3 condens E (3000-5000)

(Dimensions in mm)

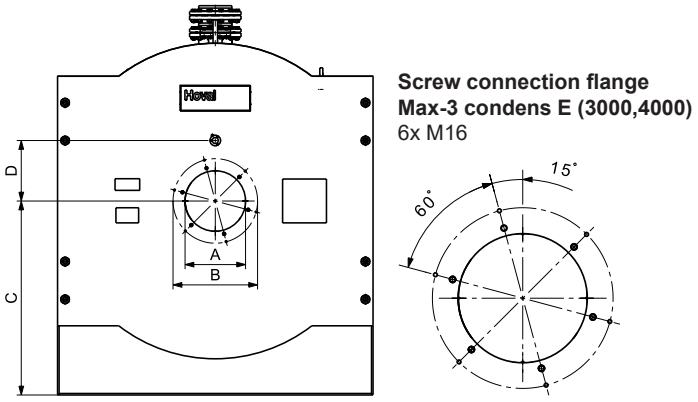
The control can be fitted on the right or left side.



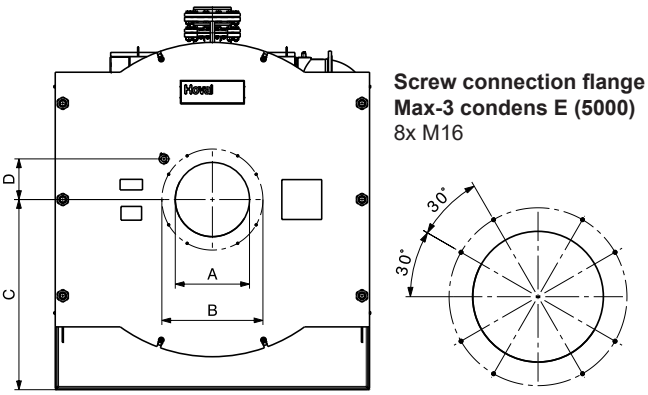
1	Boiler supply PN 16	(3000,4000)	DN 200	7	Safety valve fitting PN 16	(3000,4000)	DN 80
		(5000)	DN 250			(5000)	DN 100
2	Boiler return PN 16	(3000,4000)	DN 200	8	Sight glass		
		(5000)	DN 250	8A	Sight glass (optional)		
3	Cleaning opening			9	Smoke gas outlet		
4	Flue gas collector cleaning connection / drainage			10	Exhaust gas heat exchanger		
5	Drainage PN 16	R 1½"		11	Exhaust gas heat exchanger	(3000,4000)	DN 150
6	5 immersion sleeves	R ¾" x 120 supply boiler			connections PN 16	(5000)	DN 200

Type	B	L	H	H1	H2	D	Di/Da	H3	H4	H5	H6	H7	H8	L1	L2	L3	L4	A	A1	A2	A3	A4	A5
(3000)	2086	5587	2508	2393	1283	2070	450/458	2326	120	378	1808	1596	425	3943	168	155	207	1695	1150	520	3200	507	310
(4000)	2186	5907	2608	2493	1333	2170	500/508	2426	120	378	1896	1643	505	4263	168	155	207	2015	1150	640	3400	507	310
(5000)	2286	6269	2708	2593	1383	2270	550/558	2526	120	378	2008	1723	570	4511	282	155	207	2265	1155	550	3750	507	310

Burner connection dimensions

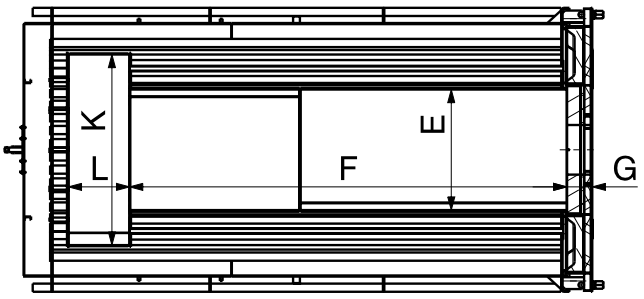


Screw connection flange
Max-3 condens E (3000,4000)
6x M16



Screw connection flange
Max-3 condens E (5000)
8x M16

Firing system dimensions



Type	A	B	C	D	E	F	G	K	L
(3000)	400	450	1283	400	900	3211	188	1410	450
(4000)	400	450	1333	400	990	3531	188	1510	450
(5000)	530	735	1383	296	1070	3781	305	1600	450

4. Installation

4.1 Boiler room requirements

The valid building supervisory regulations for the installation location are applicable for the construction requirements for boiler rooms and their aeration and ventilation. In Germany, the firing regulations for the individual states are to be complied with.

Make sure there is an adequate supply of fresh air to the boiler room
to ensure that the combustion air supply necessary for all the firing systems operated there can flow in without hindrance and that no oxygen deficiency occurs for the operating personnel.

Binding values for the size of supply air openings are not generally specified in the relevant regulations; it is merely required that no negative pressure in excess of 3 N/m^2 occurs. With rectangular apertures the side ratio is not to exceed 1.5 : 1 and an appropriate supplement is to be made with grilles to ensure that the free cross-section reaches the above values.

4.2 Flue gas connection and dimensioning

To guarantee economical and fault-free operation, boiler and flue gas system must be mutually adapted to create a functional unit.

! **NOTICE**

If the flue gas temperature is under 160 °C, the flue gas lines must be watertight, acid-resistant and overpressure-tight.

! **NOTICE**

Horizontal connecting pipes must be installed with an inclination of at least 50 mm per metre of their length installed in the direction of the boiler to allow free return of condensation water towards the boiler. The whole flue gas system must be installed so that condensate can never collect at any point.

Renovation or flue gas line cross-section adjustment can be necessary with existing flue gas systems, according to the instructions of a specialist.

The function of the flue gas system, i.e. the production of the necessary delivery pressure is basically dependent on:

a. The type (nature) of the flue gas system (thermal insulation, interior surface roughness, sealing etc.)
b. The connection of the boiler to the flue gas system according to specifications
c. The correct size of the flue gas system

Flue gas systems according to EN 13384, part 2, execution types I and II are appropriate for modern firing systems (advice from the specialist is necessary). Pay attention to the flue gas temperature at nominal output; see flue gas output diagram.

! **NOTICE**

Normally only one heat generator may be connected to the flue gas system!

Where a transition element is necessary from the boiler flue gas pipe to the chimney inlet, this should be executed as a slender cone.

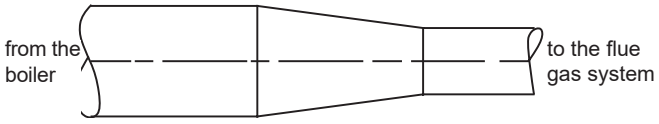


Figure 01

4.3 Installing burner Max-3 condens and Max-3 condens E (3000-5000)

For burner connection dimensions, see chapter “3.3 Dimensions”, page 11.

1. Mount the burner to the boiler flange with the seal and screws.

CAUTION

Failure to observe the guidelines and standards for the installation of burners can result in damage to property and personal injury.

- On installing, comply with the guidelines and instructions for fitting the burner to the heat producer.
- Only burners tested according to EN 267 or EN 676 may be used.

2. Insulate the space between the burner pipe and the hinged flange.
3. For gas and dual-fuel burners:
   If the weight of the burner (including attachments) > 90 kg and the distance of the centre of gravity of the burner to the door > 60 cm, support the burner housing weight directly with a strut to the floor.

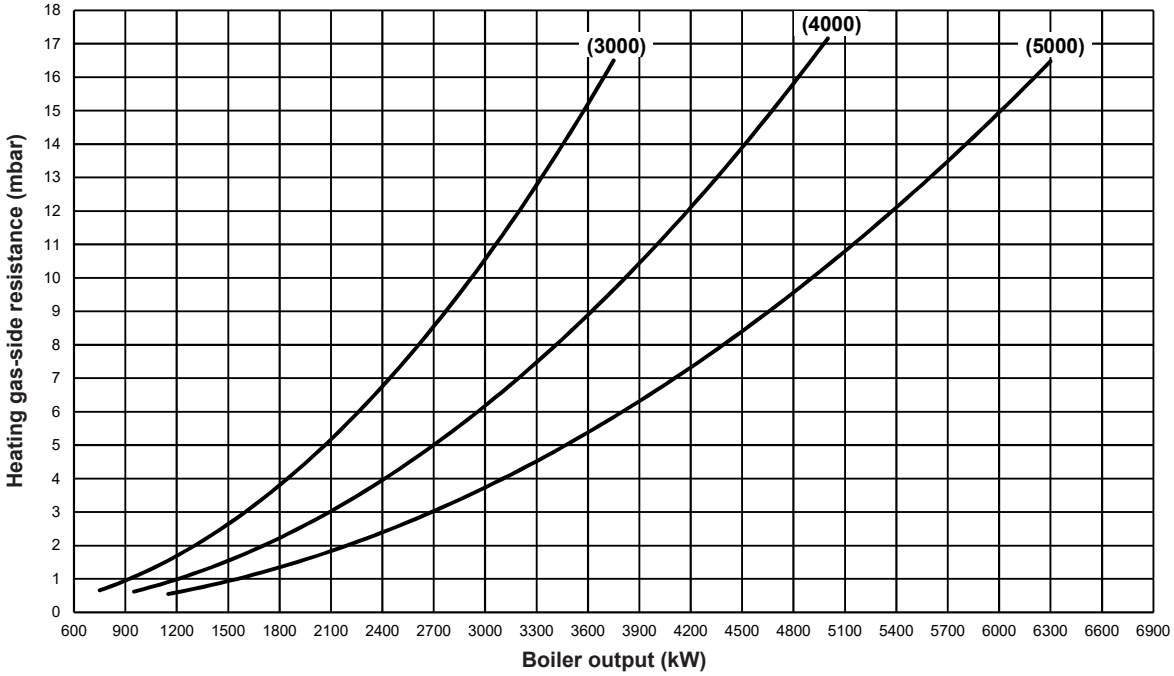
Noise damping

- Gas pipelines are to be installed so that no vibrations can be transferred to the building.
- The burner can be covered with a noise-damping hood.
- It is recommended to incorporate a noise damper downstream of the boiler in the flue gas pipe.

Emissions

In order to comply with the Swiss Clean Air Act (LRV), make sure that the maximum permissible furnace heat release (dimensions including reversing chamber) of the respective boiler manufacturer is not exceeded. In certain situations, this can lead to a reduction in boiler performance and must be taken into account without fail when dimensioning the system.

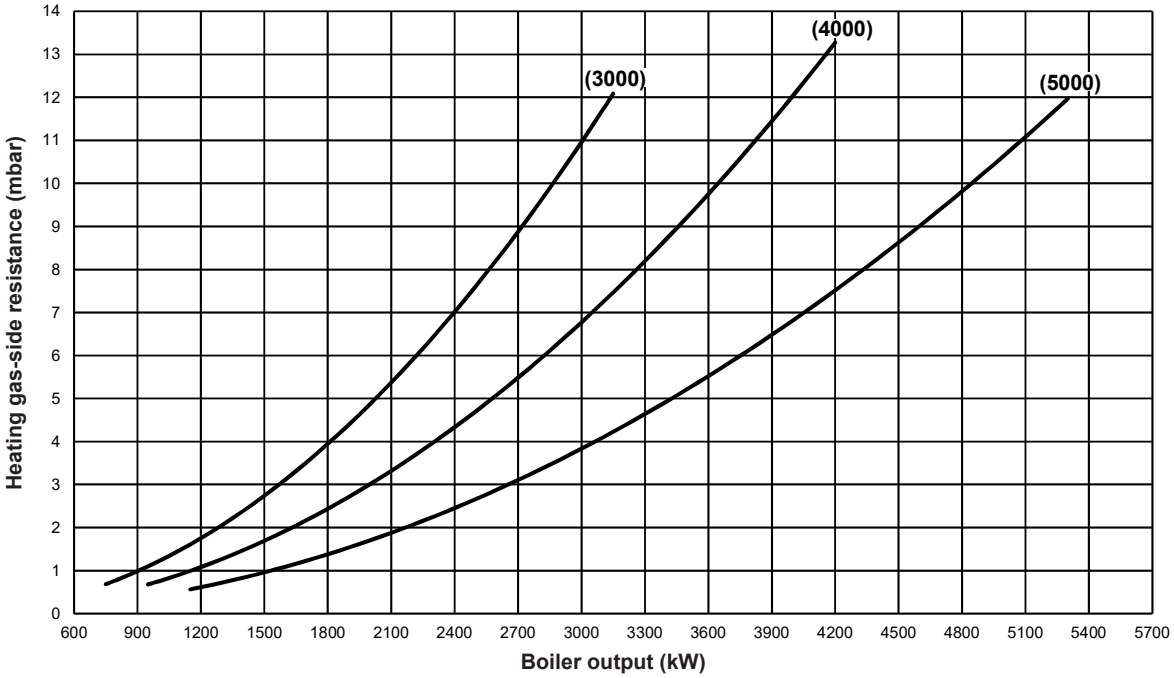
Max-3 condens heating gas-side resistance



kW = Boiler output
Boiler flow temperature 80 °C, return temperature 60 °C

mbar = Heating side resistance at λ = 1.14 (natural gas H, CO_2 = 10.5 %), 500 m above sea level (tolerance +/- 20 %)

Max-3 condens E heating gas-side resistance



kW = Boiler output
Boiler flow temperature 80 °C, return temperature 60 °C
mbar = Heating side resistance at λ = 1.14 (natural gas H, CO_2 = 10.5 %), 500 m above sea level (tolerance +/- 20 %)

4.3.1 Fuel

NOTICE

The boiler is only to be operated with the fuel stated on the boiler rating plate.

Max-3 condens or Max-3 condens boilers are normally suitable for burning the following fuels:
- EL low-sulphur fuel oil (sulphur content < 50 mg/kg) in accordance with DIN 51 6093, or eco heating oil in accordance with SN 181160.2
- All combustible gases according to DVGW Work sheet G 260

4.3.2 Electrical connection

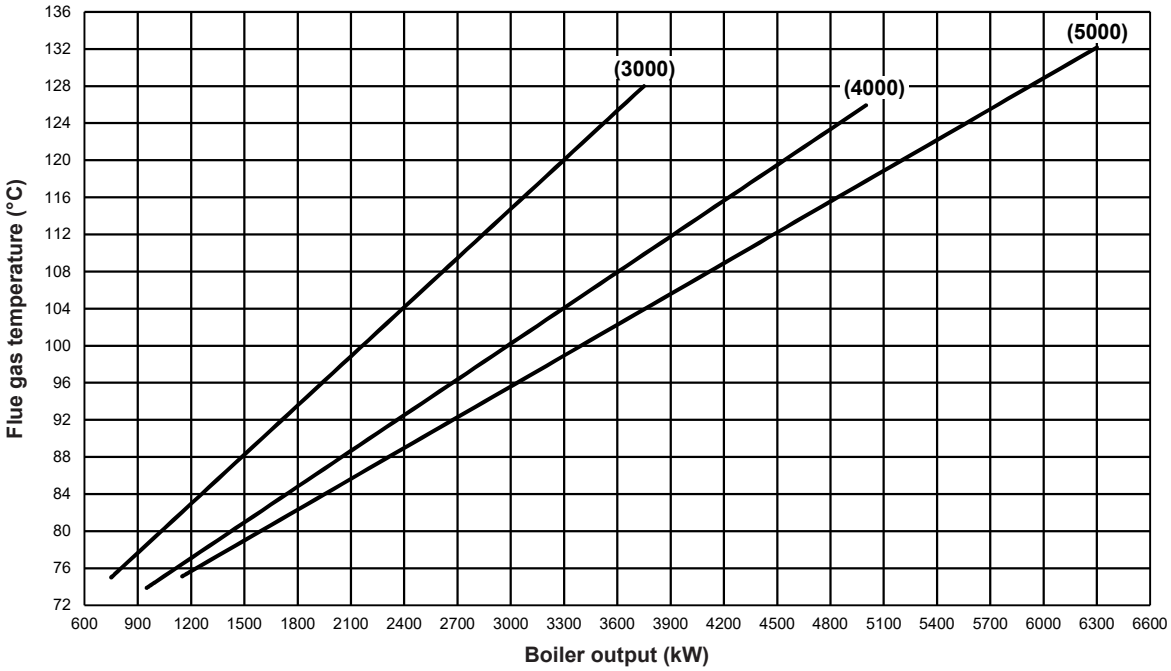
A qualified technician must install the electrical supply to the equipment. The connection diagram is located in the electrical box of the heat generator; the circuit diagram is supplied separately.

Electrical connection of burner
- The burner must be connected to the boiler with the standard plug and socket connection.
- The burner cable must be installed so that the plug and socket connection has to be disconnected in order to swing out the burner.

4.4 Flue gas and output diagram

4.4.1 Max-3 condens (3000-5000) flue gas and output diagram

Max-3 condens (VL 80 °C / RL 60 °C) flue gas and output diagram

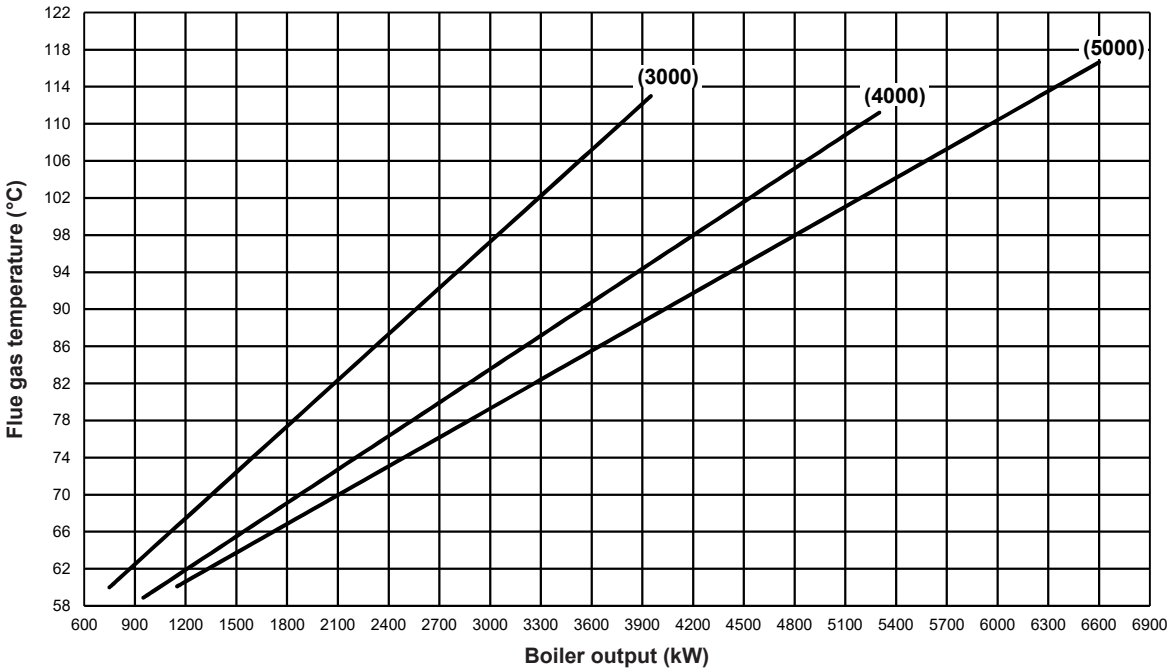


The data shown here represent an average value based on measurements taken with burners from various manufacturers.

kW = Boiler output
°C = Flue gas temperature with reduced heating surface, boiler flow temperature 80 °C, return temperature 60 °C (field measurement according to DIN 4702).

- Operation with natural gas H, λ = 1.14 at full burner load (CO_2 natural gas H = 10.5 %)
- A reduction of the boiler water temperature of -10 K effectuates a reduction of the flue gas temperature of approx. 6-8 K.
- A change in the air index λ of +/- 0.09 % effectuates a change in the flue gas temperature of approx. ± 8 K.

Max-3 condens (VL 80 °C / RL 30 °C) flue gas and output diagram



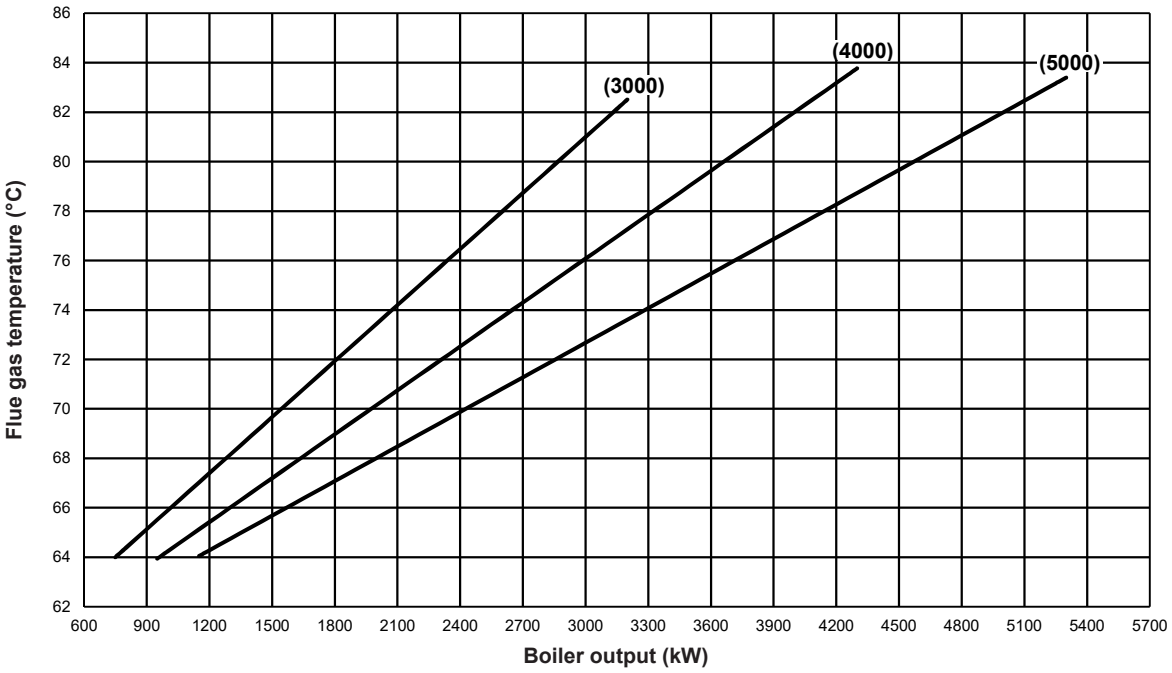
The data shown here represent an average value based on measurements taken with burners from various manufacturers.

kkW = Boiler output
°C = Flue gas temperature with reduced heating surface, boiler flow temperature 80 °C, return temperature 30 °C (field measurement according to DIN 4702).

- Operation with natural gas H, λ = 1.14 at full burner load (CO_2 natural gas H = 10.5 %)
- A reduction of the boiler water temperature of -10 K effectuates a reduction of the flue gas temperature of approx. 6-8 K.
- A change in the air index λ of +/- 0.09 % effectuates a change in the flue gas temperature of approx. ± 8 K.

4.4.2 Max-3 condens E (3000-5000) flue gas and output diagram

Max-3 condens E (VL 80 °C / RL 60 °C) flue gas and output diagram

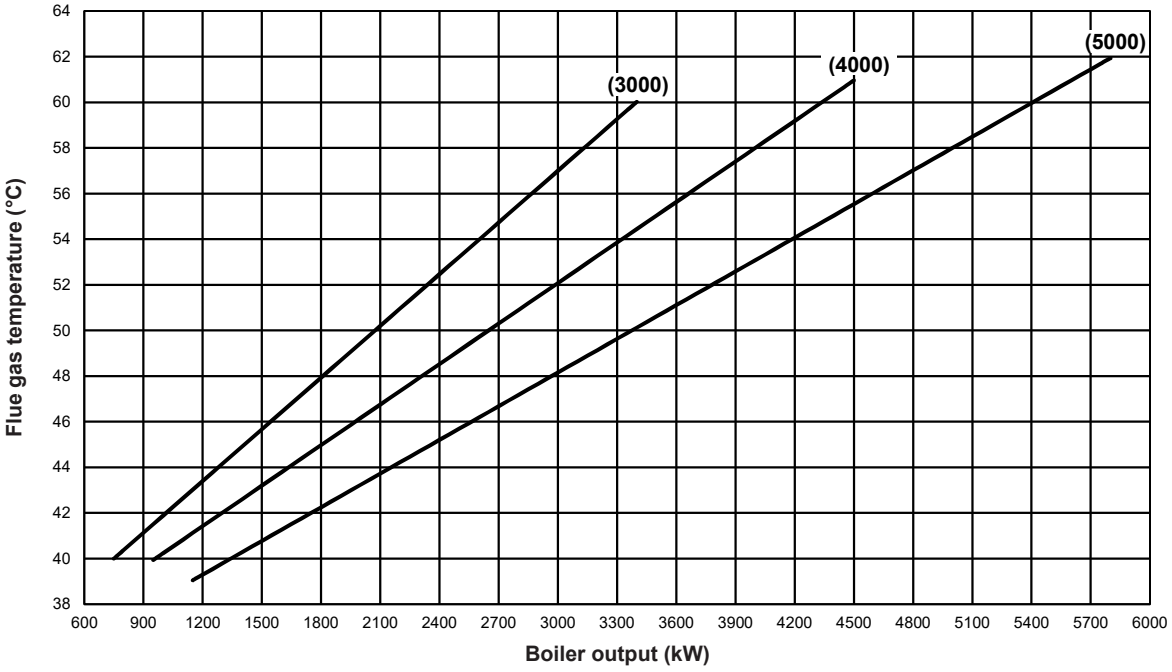


The data shown here represent an average value based on measurements taken with burners from various manufacturers.

kkW = Boiler output
°C = Flue gas temperature with reduced heating surface, boiler flow temperature 80 °C, return temperature 60 °C (field measurement according to DIN 4702).

- Operation with natural gas H, λ = 1.14 at full burner load (CO_2 natural gas H = 10.5 %)
- A reduction of the boiler water temperature of - 10 K effectuates a reduction of the flue gas temperature of approx. 6-8 K.
- A change in the air index λ of +/- 0.09 % effectuates a change in the flue gas temperature of approx. ± 8 K.

Max-3 condens E (VL 80 °C / RL 30 °C) flue gas and output diagram



The data shown here represent an average value based on measurements taken with burners from various manufacturers.

kW = Boiler output
°C = Flue gas temperature with reduced heating surface, boiler flow temperature 80 °C, return temperature 30 °C (field measurement according to DIN 4702).

- Operation with natural gas H, λ = 1.14 at full burner load (CO_2 natural gas H = 10.5 %)
- A reduction of the boiler water temperature of - 10 K effectuates a reduction of the flue gas temperature of approx. 6-8 K.
- A change in the air index λ of +/- 0.09 % effectuates a change in the flue gas temperature of approx. ± 8 K.

4.5 Minimum value limiting of boiler return temperature

Hydraulic and control measures must be provided to ensure that the temperatures do not fall below the permissible minimum boiler flow and return temperature under any operating conditions.

4.6 Discharge of start-up condensate from the boiler

- When commissioning a cold boiler, condensate always occurs within the boiler. This collects in the lower area of the boiler (flue gas collector) and is then evaporated through the boiler's continued heating up.
- The boiler should therefore – also for this reason – only be started up without “network acceptance”, so that the condensation temperature threshold (approx. 55 °C) is exceeded as quickly as possible
- If necessary, the condensate which occurs can be drained via the flue gas collector's cleaning fitting (remove cap on the drain connection before starting the burner, connect ball valve and temperature-resistant drain hose).

! **NOTICE**

- When draining the condensate, it must be ensured that no uncontrolled escape of flue gas occurs in the installation room (do not keep the ball valve open “constantly”, but only drain off the condensate “intermittently”).
- The locally valid waste water regulations must be observed when disposing of the condensate!

As soon as the boiler has reached its minimum temperature and this can be kept stable via the return boost, the burner should be shut off briefly and the closure cap mounted on the cleaning drain connection again.

- The drain connection on the boiler's flue gas collector is not intended for the permanent connection of a drainage line – frequent condensation in the area of the boiler is impermissible!

4.7 Setting the temperature controllers

Basic setting of the controller is carried out by the heating contractor.

4.8 Safety valves

The heating system and hot water supply must each be protected with one safety valve against impermissible over pressure. The discharge capacity of the heating system safety valve must correspond to the boiler’s maximum nominal heat output. The valve is installed in the safety flow. In Germany, only safety valves with the code letter “H” in the approval mark may be connected, and they must always be connected at the boiler safety flow.

4.9 Supply pump (boiler with free-standing calorifier)

Speed of rotation and output regulation must correspond to the requirements of the free-standing calorifier. Setting carried out by the heating installation engineer.

4.10 Heating pump

Speed of rotation and output regulation must correspond to the requirements of the system. They are to be set by the heating installation engineer.

4.11 Heating connections

For boiler rooms adjacent to the domestic sphere, the heating connections on the boiler are to be flexibly connected with compensators.

5. Commissioning

5.1 Water quality

- Hoval boilers and calorifiers are suitable for heating systems without significant oxygen intake (system type I in accordance with EN 14868).
- Systems with
  - continuous oxygen intake (e.g. underfloor heating systems without diffusion-proof plastic piping) or
  - intermittent oxygen intake (e.g. requiring frequent topping-up) must be equipped with a system separation.
- Treated heating water must be tested at least 1x per year, or more frequently if specified by the manufacturer of the inhibitor.
- On existing systems (for example if the boiler is replaced), where the quality of the existing heating water meets the requirements of VDI 2035, re-filling of the system is not recommended. The requirements of VDI 2035 also apply to replacement water.
- Before filling new systems and, where necessary, existing systems, the heating system must be professionally cleaned and flushed. The boiler must not be filled until the heating system has been flushed.
- All parts of the boiler/calorifier which come into contact with water are made of ferrous materials and stainless steel.
- Due to the danger of stress corrosion, the sum of the chloride, nitrate and sulphate contents of the heating water must not exceed a total of 200 mg/l (ÖNORM H5195 stipulates that the limit value for chlorides is 30 mg/l).
- The pH-value of the heating water should be between 8.3 and 9.5 after 6 - 12 weeks of heating operation.

Filling and replacement water:

- As a rule, untreated domestic water is best suited as filling and replacement water for a system with Hoval boilers. However, the quality of the untreated mains water must still meet the requirements of VDI 2035 or be demineralised and/or treated with inhibitors. The requirements of EN 14868 must be met in this context.
- To maintain high boiler efficiency and prevent overheating of the heating surfaces, the values in **table 1** must be upheld.
- The total quantity of filling and replacement water added to the boiler over its service life must not be higher than three times the system water content.

Table 1: Standard values for boiler and circuit water for circulation boiler (shell boiler)

Max. allowable operating pressure	bar	> 0.5 <= 25
General requirements		colourless, free of undissolved substances and foaming agents
pH value at 25 °C		8.2-11.5
Conductivity at 25 °C	µS/cm	< 1500
Total alkaline earths (Ca + Mg) [1]	mmol/l	< 0.02
	°dH	< 0.112
	°fH	< 0.19
Silica acidic capacity 8.2 [2] (p-value)	mmol/l	1-5
Silica (SiO_2)	mg/l	< 100
Phosphate (P_2O_4) [3]	mg/l	5-10
Sodium sulphite (Na_2SO_3) [3]	mg/l	5-10
Iron	mg/l	< 0.2
Copper	mg/l	< 0.1

[1] Previously specified in °dH, conversion: 1 mmol/l = 5.6 °dH (German hardness)
[2] Previously specified as p-value, silica conversion 8.2 1 = p-value 1
[3] Proof only required if respective dosing chemicals are used.

The following value does not have to be verified constantly during plant operation: silica (SiO_2)

5.2 Filling the calorifier (if fitted)

The boiler may be put into operation even when the calorifier is not filled.

5.3 Commissioning

Important:

At the time of initial commissioning, check that all safety and control devices are functioning properly (in accordance with the operating instructions).

The operation and maintenance of the system must be explained to the user in detail.

In some areas, gas or dual-fuel systems may only be commissioned by an engineer from the local gasworks. Check with the local gasworks to make sure.

5.4 Hand-over to the operator / safe-keeping

Have the operator confirm in writing that the operating and maintenance procedures have been explained and that he or she has received a copy of the relevant operating manuals. The manufacturer of the unit is responsible for providing operating instructions for the complete system. This technical information / these assembly instructions must not be destroyed after completing the commissioning procedures, but should be permanently stored with the plant.

6. Maintenance (only for boiler controller with TopTronic® E control)

6.1 Information for combustion controller / chimney sweep regarding emission monitor key

This chapter is exclusively intended to describe the function of emissions and manual operation settings for the firing monitoring technician / chimney sweep. All operating elements are described in the operating instructions.

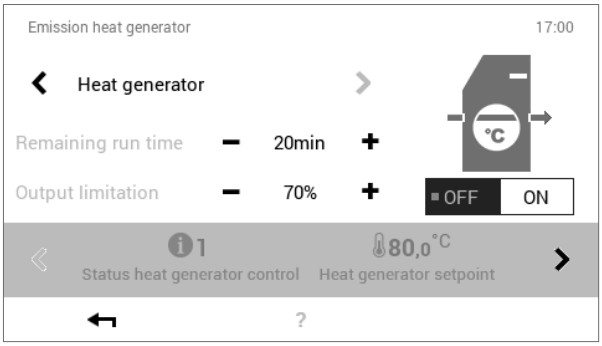
CAUTION

Danger of scalding with hot water, since the hot water temperature can exceed the target setpoint temperature.

NOTICE

In order to protect underfloor heating systems against impermissible superheating during emissions measurement / manual operation, it is necessary to implement appropriate safety measures (e.g. pump switch-off with maximum thermostat). The output and duration of the emission measurement can be set in the “Emission” main menu, and reactivated if required.

Emission metering



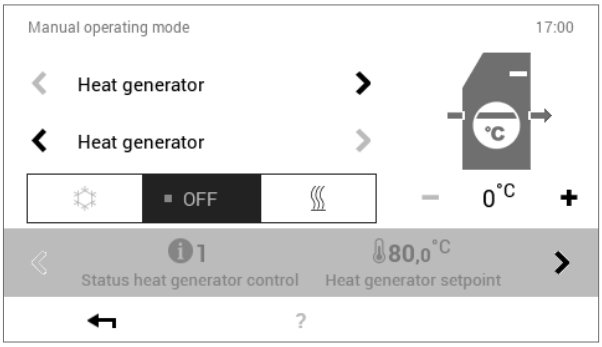
Setting at:
Home screen > Main menu (page 1) > Emission.

For detailed information see operating instructions, “Emission” chapter.

Power limitation with 2-stage burner:	
0 to 50% = 1st stage	51 to 100% = 2nd stage

REACTION to emission metering
- Go back after expiry of the time unit/time specification of return to the main menu
- Setpoint temperature = Maximum temperature limit
- Forced energy is used in an attempt to keep the corresponding heat generator temperature to 60 °C
- Regulate heating circuits and the calorifiers to their maximum temperature (in the direct heating circuit only if the hot water basic program is set to parallel operation)

Manual mode



Settings under:
Home screen > Main menu (page 2) > Manual operation.

For detailed information see operating instructions, “Emission” chapter.

REACTION for manual operation
- Setting the required setpoint temperature using the selected heating or hot water circuit
- All heating pumps ON
- Note the maximum permissible temperature of surface heating!

6.2 Cleaning

Insufficient cleaning not only leads to increased fuel consumption, it also shortens the operating time of the boiler.

CAUTION

The boiler must be cleaned at least 1 x per year by a chimney sweep.
(Observe local regulations).

- Disconnect the heat generator from the mains (main switch, fuse).
- Unscrew the hexagon locking nuts with holes with the supplied steel spike (Figure 02).

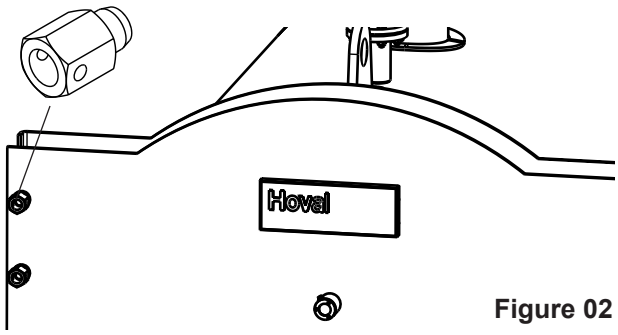


Figure 02

CAUTION

The locking nuts without holes must under no circumstances be loosened. Otherwise the door panel can detach from the boiler.

- Tilt out the boiler door with boiler.
- Thoroughly clean the combustion chamber (2), second compartment (3) and third compartment (4) with a brush or by spraying.
- Remove the cleaning cover (5, Figure 03) behind on the flue gas collector. Remove residues from the collector. Brush the boiler rear wall and the space between the pipe ends clean.
- Empty the flue gas collector at the outlet (6) during wet cleaning.
- Sal the cleaning openings tight.
- Close the boiler doors and tighten screws.
- Insert burner connection plug and switch the boiler back on.

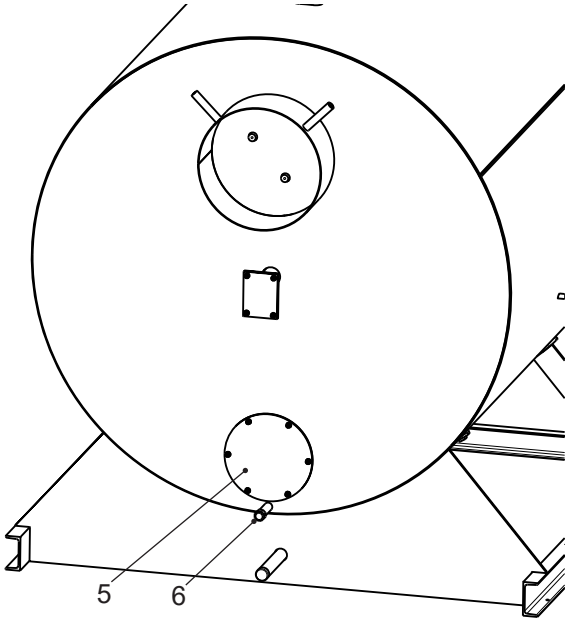


Figure 03

6.3 Lubrication of the seal and thread

6.3.1 Lubrication of the seal

Reversing chamber
Combustion chamber
Cleaning opening (flue gas collector)

6.3.2 Lubrication of the thread

Hinged flange bottom/top
Cleaning opening (flue gas collector)

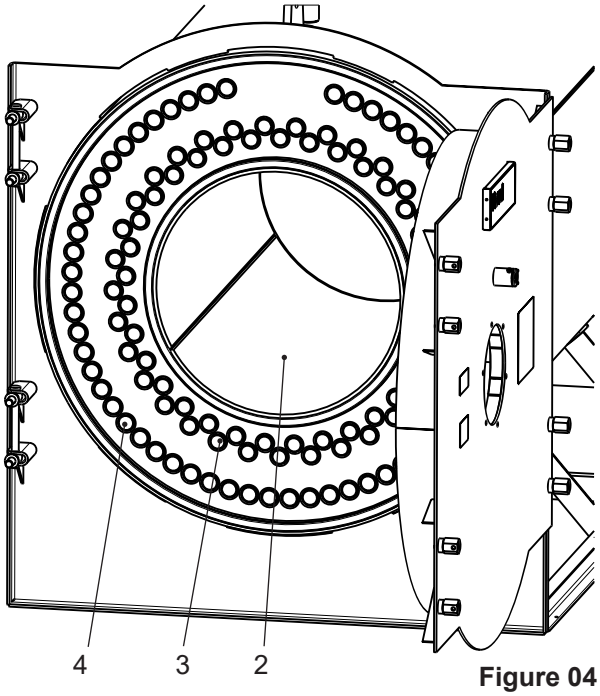


Figure 04

During long operating breaks, preserve the boiler.

6.4 Cleaning the flue gas heat exchanger

In principle, the cleaning intervals conform with the local regulations.

To prevent malfunctions, we recommend checking the heat exchanger, condensate drainage line and the neutralisation equipment (if present) at least 1 x a year and cleaning if necessary.

Cleaning process:
- Disconnect the heat generator from the mains (main switch, fuse, etc.).
- Remove the insulation cover (1, Figure 05) on the side opening of the heat exchanger and open the cover (2, Figure 05).
- Remove the contact protection cover (3, Figure 05) on the rear cleaning cover of the boiler exhaust manifold and open the cover below.
- When the surface is lightly covered with dust, it is sufficient to blow out the pipes of the heat exchanger with compressed air.
- If there is thick dirt build-up or scale deposits on the straight tubes or the housing of the heat exchanger, it can be cleaned safely by blowing out the straight tubes with high-pressure water. Pressures between 50 and 200 bar are sufficient.
- If oil or soot deposits have caused heavy contamination in a loose structure, it can be cleaned with warm water with the addition of an appropriate alkaline cleansing agent or by blowing it out with a steam-jet degreaser.
- If brushes are used to clean the heat exchanger pipes, only Perlon or stainless steel brushes can be used - never use “normal” steel brushes!

! **NOTICE**

a. When wet cleaning the heat exchanger, it must be ensured that the cleaning solution can drain away (through the condensate drainage line of the heat exchanger or the boiler exhaust manifold drainage). If needed, lay suitable drainage hoses. Avoid allowing an excessive amount of wash solution from entering the boiler flue tube.

b. Any notes on safety and use of the cleaning agent must be observed and upheld.

c. “If wet cleaning has been done, the heating surfaces of the boiler and the flue gas collector must be rinsed with a neutral liquid and dried directly after cleaning work on the heat exchanger and before recommissioning the boiler.”

- After cleaning, assemble the access panel (use a new seal if necessary!), disassemble any connected water drainage hoses and re-establish the normal operating state, then put the system back into operation.

- After monitoring the seals of the access panel (caution: hot surfaces!), the associated insulation contact protection covers must be reassembled without fail!

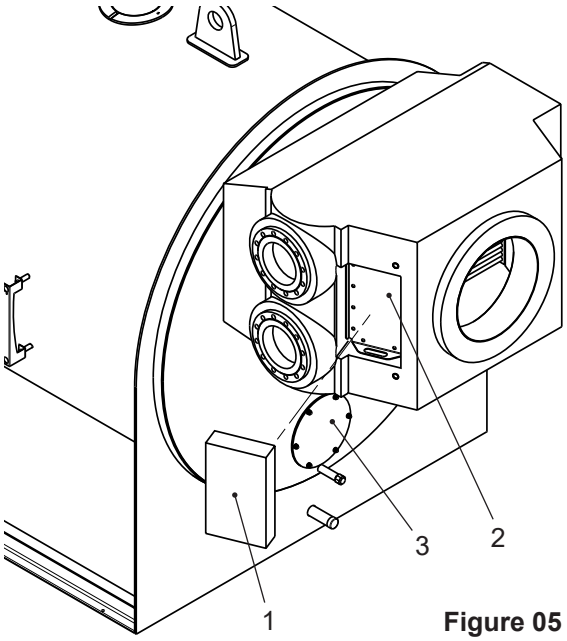


Figure 05

COPY FOR PLANT USER

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Confirmation

The user (owner) of the system herewith confirms that
- he has received adequate instruction in the operating and maintenance of the installation,
- received and taken note of the operating and maintenance instructions and, where applicable other documents concerning the installation and any further components.
- and is consequently sufficiently familiar with the installation.

Installation address:

Type:

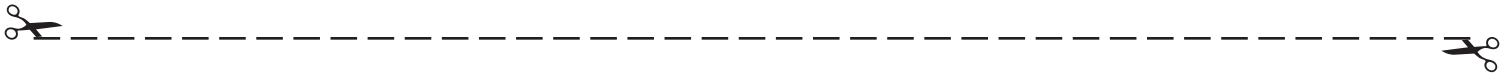
Serial number:

Year of manufacture:

Place, Date:

System installer:

System user:



COPY OF SYSTEM INSTALLER

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Confirmation

The user (owner) of the system herewith confirms that
- he has received adequate instruction in the operating and maintenance of the installation,
- received and taken note of the operating and maintenance instructions and, where applicable other documents concerning the installation and any further components.
- and is consequently sufficiently familiar with the installation.

Installation address:

Type:

Serial number:

Year of manufacture:

Place, Date:

System installer:

System user: