
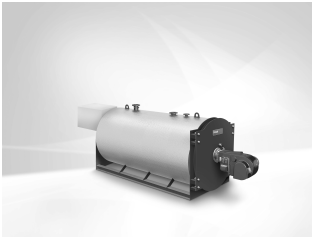


			Page
<b>Oil/gas boilers</b> (heat value/gas condensation)		<b>Hoval Max-3</b>	<b>500-3000 kW</b>
		<ul style="list-style-type: none"><li>■ Description</li><li>■ Part No.</li><li>■ Technical data<ul style="list-style-type: none"><li>Flue gas output diagrams</li></ul></li><li>■ Dimensions<ul style="list-style-type: none"><li>Base size</li><li>Furnace dimensions</li></ul></li><li>■ Engineering<ul style="list-style-type: none"><li>Mounting on site</li></ul></li><li>■ Examples</li></ul>	<ul style="list-style-type: none"><li>3</li><li>5</li><li>11</li><li>13</li><li>14</li><li>15</li><li>16</li><li>17</li><li>19</li><li>21</li></ul>
		<b>Hoval Max-3 condens E</b>	<b>3000-5000 kW</b>
		<ul style="list-style-type: none"><li>■ Description</li><li>■ Part No.</li><li>■ Technical data<ul style="list-style-type: none"><li>Flue gas output diagrams</li></ul></li><li>■ Dimensions</li><li>■ Engineering</li></ul>	<ul style="list-style-type: none"><li>23</li><li>24</li><li>27</li><li>29</li><li>32</li><li>33</li></ul>



**Hoval Max-3**  
**Oil/gas boiler**

*Boiler*

- 3-pass steel boiler according to EN 303 part 1 and 2 and EN 304 for firing of Diesel oil, oil L and gas.
- Max-3 (420-1250) complies with the Pressure Equipment Directive 2014/68/CE
- Boiler completely welded
- For LowNOx burner with intern flue gas recirculation
- Insulation at the boiler body 80 mm mineral wool mat
- Boiler completely cased with steel plate, red powder coated
- Flue gas outlet to the rear
- Heating flow connection to the top, heating return connections to the rear, incl. counter flanges, screws and seals

*Optional*

- Boiler control panel with boiler control and heating control in various versions
  - Boiler control
    - with TopTronic® E control
    - with thermostat T 2.2
    - with thermostat T 0.2
- Free-standing calorifier see Calorifiers
- Boiler door swivels to the left
- Delivery in single parts and welding on site, time to delivery approx. 8 weeks

*Delivery*

- Boiler, thermal insulation and casing delivered separately packed

*On site*

- Mounting of insulation and casing



Model range	
Max-3	Output
Type	kW
(420)	200-500
(530)	220-610
(620)	240-720
(750)	280-870
(1000)	350-1150
(1250)	480-1350
(1500)	650-1750
(1800)	750-2150
(2200)	920-2500
(2700)	1030-3000

**Permission Boiler**

CE product ID No. CE-0085BL0015  
according to Directive on appliances burning  
gaseous fuels 90/396/EG

**Pressure Equipment Directive 2014/68/CE**

## Boiler controller with TopTronic® E/E13.4 control

- Maximum operating temperature 90 °C

### TopTronic® E controller

#### Control panel

- Colour touchscreen 4.3 inch
- Heat generator blocking switch for interrupting operation
- Fault signalling lamp

#### TopTronic® E control module

- Simple, intuitive operating concept
- Display of the most important operating statuses
- Configurable start screen
- Operating mode selection
- Configurable day and week programmes
- Operation of all connected Hoval CAN bus modules
- Commissioning wizard
- Service and maintenance function
- Fault message management
- Analysis function
- Weather display (with HovalConnect option)
- Adaptation of the heating strategy based on the weather forecast (with HovalConnect option)

#### TopTronic® E basic module heat generator (TTE-WEZ)

- Control functions integrated for
  - 1 heating/cooling circuit with mixer
  - 1 heating/cooling circuit without mixer
  - 1 hot water loading circuit
  - bivalent and cascade management
- Outdoor sensor
- Immersion sensor (calorifier sensor)
- Contact sensor (flow temperature sensor)
- Rast-5 basic plug set

The supplementary plug set must be ordered in order to use expanded controller functions.

#### Options for TopTronic® E controller

- Can be expanded by max. 1 module expansion:
  - module expansion heating circuit or
  - module expansion heat accounting or
  - module expansion universal
- Can be networked with a total of up to 16 controller modules:
  - heating circuit/hot water module
  - solar module
  - buffer module
  - measuring module

Number of modules that can be additionally installed in the electrical box:

- 1 module expansion and 2 controller modules **or**
- 1 controller module and 2 module expansions **or**
- 3 controller modules

#### Notice

Max. 1 module expansion can be connected to the basic module heat generator (TTE-WEZ)!

#### Further information about the TopTronic® E see "Controls"

#### Oil automatic function device OFA

- Control function integrated for
  - flue gas sensor for safety shut-off
  - 0-10 V output for connecting a modulating main pump (incl. delta T-control with low consumption)
  - Standard plug connection for 2-stage burner 1x 230 V
  - Variable input for plant-specific functions (heat generator block, return sensor, info sensor etc.)
  - Variable output for plant-specific functions (thermostat function, operating message, etc.)

#### Delivery

- Boiler control panel separately delivered

#### On site

- Mounting of the control panel at the boiler left or right side

## Boiler controller with TopTronic® E/E13.5 control

- Maximum operating temperature 105 °C

- Configuration as TopTronic® E/E13.4 but:
- safety temperature limiter 120 °C

#### Delivery

- Boiler controller separately delivered

#### On site

- Mounting of the control panel at the boiler left or right side

## Control panel with thermostat T 2.2

- For systems without TopTronic® regulator.
- For direct 2-stage burner control, requirement starting from external calorifier or heater instruction is possible.
- Main switch "I/O"
- Safety temperature limiter 110 °C
- Selector switch burner load
- Switch summer/winter
- 3 boiler temperature regulators 30-90 °C
  - temperature regulator for base load heating
  - temperature regulator for full load heating
  - temperature regulator for calorifier
- Boiler and burner breakdown lamp
- Plug connection for burner (with cable and plug)

#### Optional

- 2 running time meters integrated
- 2 burner running time meters and pulse counters integrated
- Flue gas thermometer, 4.5 m capillary tube

#### Delivery

- Control panel separately delivered

#### On site

- Mounting of the control panel at the boiler left or right side

## Control panel with thermostat T 0.2

- For external control
- For systems without TopTronic® regulator
- For special control function

- Main switch "I/O"
- Safety temperature limiter 120 °C
- 3 boiler temperature regulators 50-105 °C
  - temperature regulator for base load heating
  - temperature regulator for full load heating
  - temperature regulator for calorifier
- without burner plug connection

#### Optional

- 2 running time meters integrated
- 2 burner running time meters and pulse counters integrated
- Flue gas thermometer, 4.5 m capillary tube
- Safety temperature limiter 130 °C

#### Delivery

- Control panel separately delivered

#### On site

- Mounting of the control panel at the boiler left or right side



Oil/gas boiler



**Hoval Max-3 (420-2700)**  
3-pass boiler made of steel for oil/gas  
LowNOx firing, without control panel  
For operating temperature up to 105 °C

**Execution: complete delivery**  
Boiler, thermal insulation and casing  
delivered separately packed.

Max-3 Type	Output kW	Working pressure bar
(420)	200-500	6
(530)	220-610	6
(620)	240-720	6
(750)	280-870	6
(1000)	350-1150	6
(1250)	480-1350	6
(1500)	650-1750	6
(1800)	750-2150	6
(2200)	920-2500	6
(2700)	1030-3000	6

7013 765  
7013 766  
7013 773  
  
7013 774  
7013 781  
7013 782  
7013 536  
  
7013 537  
7013 538  
7013 620



**Blind flange**  
made of steel incl. setscrews and gasket to  
Max-3 (420,530)  
Max-3 (620,750)  
Max-3 (1000-2700)

6002 192  
6030 026  
6002 156



**Intermediate flange drilled to match burner**  
made of steel incl. setscrews and gasket to  
Max-3 (420,530)  
Max-3 (620,750)  
Max-3 (1000-2700)

6017 595  
6017 593  
6017 594

Control panel  
with thermostat



- Control panel T 2.2**
- Operating temperature max. 90 °C
  - For systems without TopTronic® E controller.
  - For direct 2-stage burner control, incl. plug connection for burner requirement starting from external calorifier or heater instruction is possible.
    - without burner running time meter and pulse counter
    - incl. 2 burner running time meters integrated
    - incl. 2 burner running time meters and pulse counters integrated
  - For mounting on heat generator side right (standard) or left (configuration on request). Specify mounting variant in purchase order.

6015 017  
6015 477  
6015 478



- Control panel T 0.2**
- Operating temperature max. 105 °C
  - For external switching command
  - For systems without TopTronic® E controller.
  - For special control function without burner plug connection
    - without burner running time meter and pulse counter
    - incl. 2 burner running time meters integrated
    - incl. 2 burner running time meters and pulse counters integrated
  - For mounting on heat generator side right (standard) or left (configuration on request). Specify mounting variant in purchase order.

6015 016  
6015 475  
6015 476

Accessories to control panel  
with thermostat

**Flue gas thermometer**  
4 m, capillary tube

241 149

## Boiler controller with TopTronic® E control



**Boiler controller TopTronic® E/E13.4**  
for mounting on heat generator side right  
(standard) or left (configuration on request).  
Specify mounting variant in purchase order.  
Maximum operating temperature 90 °C

Control functions integrated for

- 1 heating circuit with mixer
- 1 heating circuit without mixer
- 1 hot water loading circuit
- bivalent and cascade management
- Can be optionally expanded by max.  
1 module expansion:
  - module expansion heating circuit or
  - module expansion heat accounting or
  - module expansion universal
- Can be optionally networked with a  
total of up to 16 controller modules  
(incl. solar module)

Consisting of:

- electrical box
- control panel
- TopTronic® E control module
- TopTronic® E basic module heat generator
- oil automatic function device OFA-200
- safety temperature limiter
- burner cable cpl. 2-stage, L = 5.0 m
- 1x outdoor sensor AF/2P/K
- immersion sensor TF/2P/5/6T/S1, L = 5.0 m  
with plug
- contact sensor ALF/2P/4/T/S1, L = 4.0 m  
with plug

### Notice

The electrical connection for each external  
burner must be clarified separately.

## Part No.

6040 236



**Boiler controller TopTronic® E/E13.5**  
for mounting on heat generator side right  
(standard) or left (configuration on request).  
Specify mounting variant in purchase order.  
Maximum operating temperature 105 °C.  
Configuration as boiler controller  
TopTronic® E/E13.4

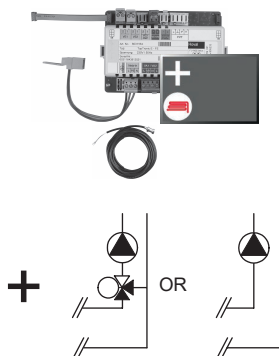
### Notice

The electrical connection for each external  
burner must be clarified separately.

6040 237

## TopTronic® E module expansions

for TopTronic® E basic module heat generator



### TopTronic® E module expansion heating circuit TTE-FE HK

Expansion to the inputs and outputs of the basic module heat generator or the heating circuit/domestic hot water module for implementing the following functions:

- 1 heating circuit without mixer or
- 1 heating circuit with mixer

incl. fitting accessories

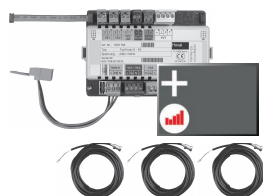
1x contact sensor ALF/2P/4/T L = 4.0 m

Can be installed in:

Boiler control, wall housing, control panel

#### Notice

The supplementary plug set may have to be ordered to implement functions differing from the standard!



### TopTronic® E module expansion heating circuit incl. energy balancing TTE-FE HK-EBZ

Expansion to the inputs and outputs of the basic module heat generator or the heating circuit/domestic hot water module for implementing the following functions:

- 1 heating/cooling circuit w/o mixer or
  - 1 heating/cooling circuit with mixer
- in each case incl. energy balancing

incl. fitting accessories

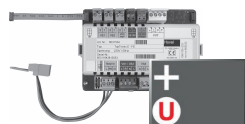
3x contact sensor ALF/2P/4/T L = 4.0 m

Can be installed in:

Boiler control, wall housing, control panel

#### Notice

Suitable flow rate sensors (pulse sensors) must be provided on site.



### TopTronic® E module expansion Universal TTE-FE UNI

Expansion to the inputs and outputs of a controller module (basic module heat generator, heating circuit/domestic hot water module, solar module, buffer module) for implementing various functions

incl. fitting accessories

Can be installed in:

Boiler control, wall housing, control panel

#### Further information

see "Controls" - "Hoval TopTronic® E module expansions" chapter

#### Notice

Refer to the Hoval System Technology to find which functions and hydraulic arrangements can be implemented.

## Part No.

6034 576

6037 062

6034 575

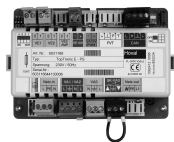
## Accessories for TopTronic® E



### Supplementary plug set

for basic module heat generator (TTE-WEZ)  
for controller modules and module expansion  
TTE-FE HK

6034 499  
6034 503



### TopTronic® E controller modules

TTE-HK/WW TopTronic® E heating circuit/  
hot water module  
TTE-SOL TopTronic® E solar module  
TTE-PS TopTronic® E buffer module  
TTE-MWA TopTronic® E measuring module

6034 571  
6037 058  
6037 057  
6034 574



### TopTronic® E room control modules

TTE-RBM TopTronic® E room control modules  
easy white  
comfort white  
comfort black

6037 071  
6037 069  
6037 070



### Enhanced language package TopTronic® E

one SD card required per control module  
Consisting of the following languages:  
HU, CS, SL, RO, PL, TR, ES, HR,  
SR, JA, DA

6039 253



### HovalConnect

HovalConnect LAN  
HovalConnect WLAN

6049 496  
6049 498

### HovalConnect available from mid-2020

Up to that point, TopTronic® E online is delivered.

### TopTronic® E interface modules

GLT module 0-10 V  
HovalConnect Modbus  
HovalConnect KNX

6034 578  
6049 501  
6049 593



### TopTronic® E wall casing

WG-190 Wall casing small  
WG-360 Wall casing medium  
WG-360 BM Wall casing medium with  
control module cut-out  
WG-510 Wall casing large  
WG-510 BM Wall casing large with  
control module cut-out

6035 563  
6035 564  
6035 565  
6035 566  
6038 533



### TopTronic® E sensors

AF/2P/K Outdoor sensor  
TF/2P/5/6T Immersion sensor, L = 5.0 m  
ALF/2P/4/T Contact sensor, L = 4.0 m  
TF/1.1P/2.5S/6T Collector sensor, L = 2.5 m

2055 889  
2055 888  
2056 775  
2056 776



### System housing

System housing 182 mm  
System housing 254 mm

6038 551  
6038 552



Bivalent switch

2061 826

**Further information**  
see "Controls"

Accessories



**Flow temperature guard**  
for underfloor heating system  
(per heating circuit 1 guard)  
15-95 °C, differential gap 6 K, capillary tube  
max. 700 mm, setting (visible from the outside)  
inside the housing cover.

*Clamp-on thermostat RAK-TW1000.S*  
Thermostat with strap, without cable and plug

*Immersion thermostat RAK-TW1000.S SB 150*  
Thermostat with pocket ½" - depth of immer-  
sion 150 mm brass nickel-plated

**Vibration elements for boiler socket**  
For sound and vibration absorption.  
Made of rubber. Cross section 80/50 mm.

**Delivery**  
4 vibration elements per boiler,  
mounted under the boiler socket

to Max-3 Type	Set of pieces	Length mm
(420-530)	4	200
(620-750)	4	400
(1000,1250)	4	500
(1500,1800)	4	800
(2200,2700)	6	800

Part No.

242 902

6010 082

6003 739  
6003 741  
6003 742  
6005 623  
6005 624

Service



Commissioning

Commissioning by works service or Hoval  
trained authorised serviceman/company is  
condition for warranty.

For commissioning and other services  
please contact your Hoval sales office.

### Max-3 (420-1250)

Type		(420)	(530)	(620)	(750)	(1000)	(1250)
• Nominal output at 80/60 °C	kW	500	610	720	870	1150	1350
• Range of output (diesel oil, variant 1 and natural gas, variant 1)	kW	320-500	350-610	450-720	520-870	680-1150	850-1350
• Range of output (natural gas: variant 2)	kW	200-500	220-610	240-720	280-870	350-1150	480-1350
• Burner input max.	kW	539	662	781	944	1247	1459
• Boiler working temperature max. <sup>1</sup>	°C	90	90	90	90	90	90
• Boiler working temperature min.	°C	see table operating conditions (below)					
• Return flow temperature min.	°C	see table operating conditions (below)					
• Flue gas temperature min. at the boiler	°C	see table operating conditions (below)					
• Safety temperature limiter setting (water side) <sup>2</sup>	°C	110	110	110	110	110	110
• Working/test pressure	bar	6/9.6	6/9.6	6/9.6	6/9.6	6/9.6	6/9.6
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	92.7/87.5	92.4/87.2	92.4/87.2	92.5/87.3	92.5/87.3	92.5/87.3
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	95.2/89.8	95.3/89.9	94.9/89.5	95.2/89.8	95.3/89.9	95.2/89.8
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	94.8/89.5	94.7/89.4	94.3/89.0	94.8/89.4	94.9/89.5	94.8/89.4
• Stand-by loss qB at 70 °C	Watt	1000	1035	1120	1180	1250	1380
• Flue gas resistance at nominal output 180 °C flue gas temperature, 12.5 % CO <sub>2</sub> , 500 m over sea level (tolerance ± 20 %)	mbar	4.9	5.7	5.2	6.5	7.4	8.0
• Flue gas mass flow at nominal output 12.5 % CO <sub>2</sub> heating oil	kg/h	850	1037	1224	1479	1955	2295
• Flow resistance boiler <sup>3</sup>	z-value	0.022	0.022	0.008	0.008	0.003	0.003
• Water flow resistance at 10 K	mbar	40.4	60.1	30.5	44.5	29.1	40.2
• Water flow resistance at 20 K	mbar	10.1	15.1	7.6	11.1	7.3	10.0
• Water flow volume at 10 K	m³/h	42.8	52.2	61.7	74.5	98.5	115.7
• Water flow volume at 20 K	m³/h	21.4	26.1	30.8	37.2	49.2	57.9
• Boiler water content	litres	552	520	969	938	1528	1478
• Boiler gas volume	m³	0.583	0.602	0.846	0.872	1.350	1.390
• Insulation thickness boiler body	mm	80	80	80	80	80	80
• Weight (incl. casing)	kg	1093	1150	1770	1800	2500	2600
• Weight (without casing)	kg	943	1000	1590	1620	2360	2460
• Combustion chamber dimension Ø inside x length	mm	606/1624	606/1624	684/1899	684/1899	782/2182	782/2182
• Combustion chamber volume	m³	0.466	0.466	0.669	0.669	1.047	1.047
• Dimensions		see Dimensions					
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50	-50	-50	-50

<sup>1</sup> Limited by the boiler controller E13.4 TopTronic® E and T 2.2 to 90 °C or by E13.5 TopTronic® E and T 0.2 to 105 °C.

<sup>2</sup> Max. safety temperature for boiler controller E13.4 TopTronic® E and T 2.2: 110 °C or E13.5 TopTronic® E and T 0.2: 120 °C.

<sup>3</sup> Flow resistance boiler in mbar = Volume flow (m³/h)² x z factor

### Possible operating conditions:

Fuel		Diesel oil		Natural gas H, low-sulphur diesel oil		Oil L
		Variant 1	Variant 2	Variant 1	Variant 2	
min. flue gas temperature	°C	130	110	130	100	130
min. boiler temperature	°C	60	65	65	75	65
min. return temperature	°C	50	55	55	65	55
Return temperature control		yes	yes	yes	yes	yes

## Max-3 (1500-2700)

Type		(1500)	(1800)	(2200)	(2700)
• Nominal output at 80/60 °C	kW	1750	2150	2500	3000
• Range of output (diesel oil, variant 1 and natural gas, variant 1)	kW	1050-1750	1250-2150	1500-2500	1780-3000
• Range of output (natural gas: variant 2)	kW	650-1750	750-2150	920-2500	1030-3000
• Burner input max.	kW	1894	2324	2702	3243
• Boiler working temperature max. <sup>1</sup>	°C	90	90	90	90
• Boiler working temperature min.	°C		see table operating conditions (below)		
• Return flow temperature min.	°C		see table operating conditions (below)		
• Flue gas temperature min. at the boiler	°C		see table operating conditions (below)		
• Safety temperature limiter setting (water side) <sup>2</sup>	°C	110	110	110	110
• Working/test pressure	bar	6/9.6	6/9.6	6/9.6	6/9.6
• Boiler efficiency at 80/60 °C in full-load operation (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	92.4/87.2	92.5/87.3	92.5/87.3	92.5/87.3
• Boiler efficiency at 30 % partial load (EN 303) (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	95.2/89.8	95.3/89.2	95.2/89.2	95.2/89.2
• Nominal efficiency at 75/60 °C (DIN 4702-8) (related to net calorific value NCV / gross calorific value GCV, heating oil EL)	%	94.8/89.4	94.9/89.5	94.9/89.5	95/89.6
• Stand-by loss qB at 70 °C	Watt	1850	1950	2100	2300
• Flue gas resistance at nominal output 180 °C flue gas temperature, 12.5 % CO <sub>2</sub> , 500 m over sea level (tolerance ± 20 %)	mbar	7.0	8.8	9.1	8.0
• Flue gas mass flow at nominal output 12.5 % CO <sub>2</sub> heating oil	kg/h	3031	3723	4329	5195
• Flow resistance boiler <sup>3</sup>	z-value	0.022	0.022	0.002	0.001
• Water flow resistance at 10 K	mbar	45	67.9	91.8	132.2
• Water flow resistance at 20 K	mbar	11.3	17.0	23.0	33.1
• Water flow volume at 10 K	m <sup>3</sup> /h	150.0	184.3	214.3	257.1
• Water flow volume at 20 K	m <sup>3</sup> /h	75.0	92.1	107.1	128.6
• Boiler water content	litres	2343	2750	3050	3550
• Boiler gas volume	m <sup>3</sup>	1.956	2.510	2.761	3.037
• Insulation thickness boiler body	mm	80	80	80	80
• Weight (incl. casing)	kg	3566	4888	5017	5589
• Weight (without casing)	kg	3266	4633	4647	5189
• Combustion chamber dimension Ø inside x length	mm	880/2417	976/2605	976/2905	976/3233
• Combustion chamber volume	m <sup>3</sup>	1.58	2.07	2.30	2.41
• Dimensions		see Dimensions			
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50	-50

<sup>1</sup> Limited by the boiler controller E13.4 TopTronic® E and T 2.2 to 90 °C or by E13.5 TopTronic® E and T 0.2 to 105 °C.

<sup>2</sup> Max. safety temperature for boiler controller E13.4 TopTronic® E and T 2.2: 110 °C or E13.5 TopTronic® E and T 0.2: 120 °C.

<sup>3</sup> Flow resistance boiler in mbar = Volume flow (m<sup>3</sup>/h)<sup>2</sup> x z factor

### Possible operating conditions:

Fuel		Diesel oil		Natural gas H, low-sulphur diesel oil		Oil L
		Variant 1	Variant 2	Variant 1	Variant 2	
min. flue gas temperature	°C	130	110	130	100	130
min. boiler temperature	°C	60	65	65	75	65
min. return temperature	°C	50	55	55	65	55
Return temperature control		yes	yes	yes	yes	yes



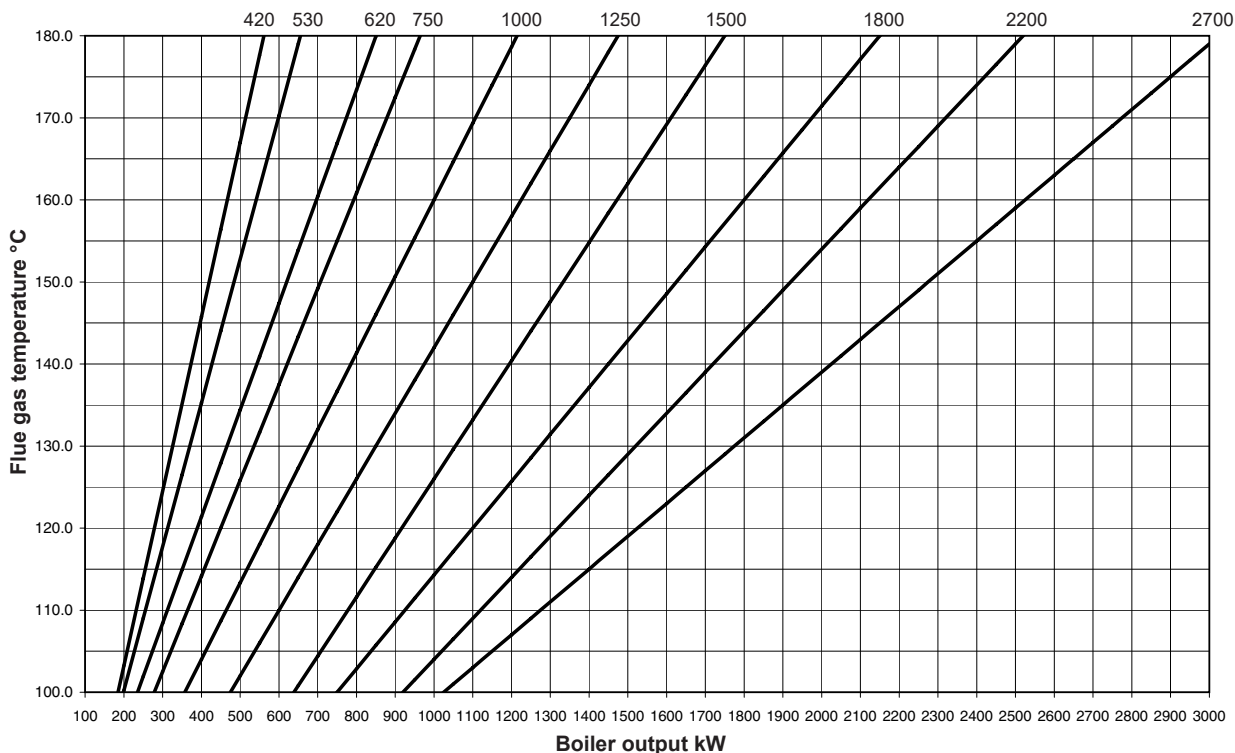
## Flue gas output diagram

### Flue gas temperature and power ranges

In order to achieve a good combustion quality (optimum flame burnout), the outputs must not be less than the specified minimum values.

For new systems, acid-resistant chimneys must be provided or the flue gas temperature must be set correspondingly higher (min. 160 °C).

The minimum flue gas temperature must be coordinated with the chimney conditions, otherwise the formation of sulphuric acid can lead to soot buildup in the chimney.



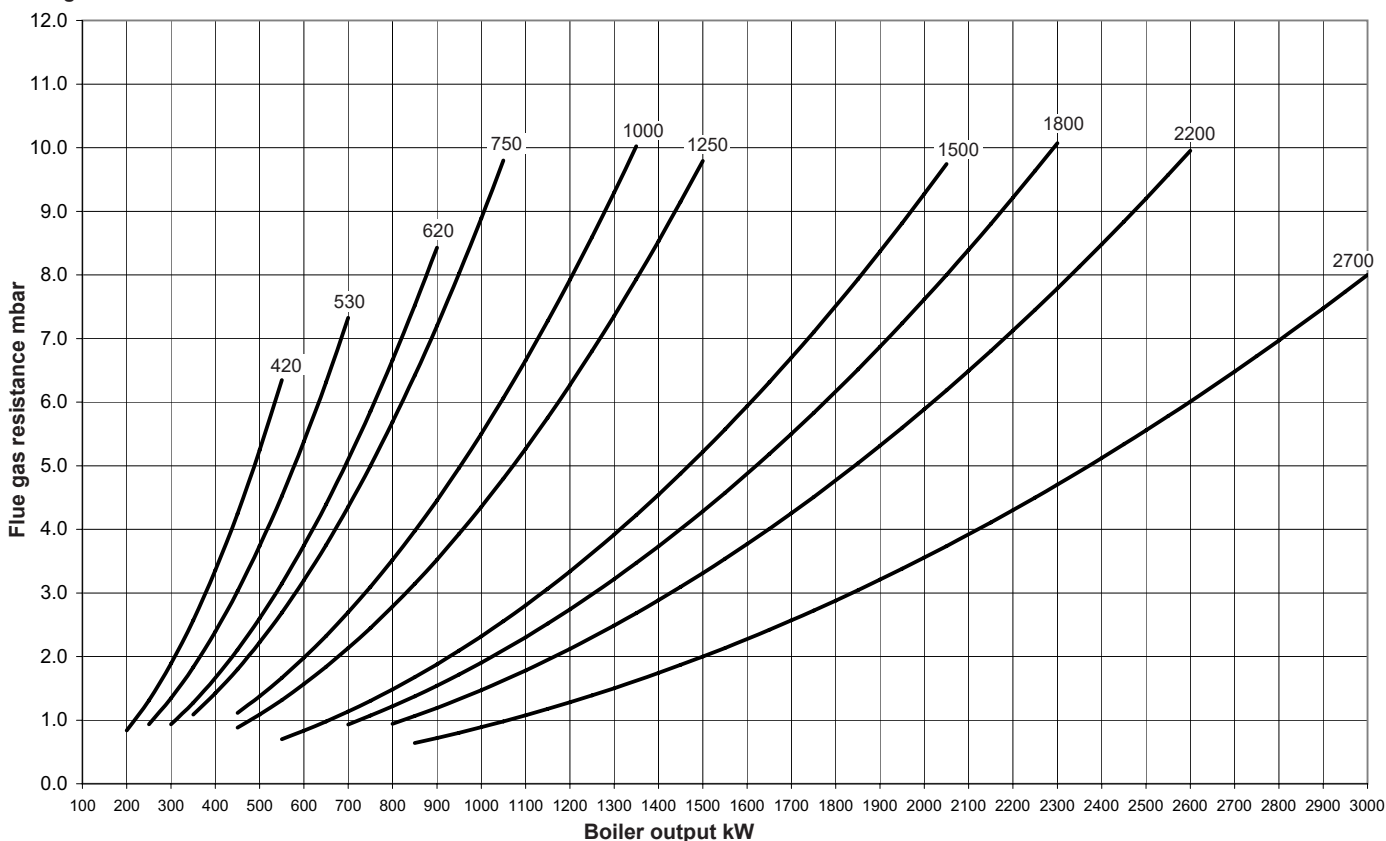
kW = Boiler output

°C = Flue gas temperature on a clean surface, boiler flow temperature 80 °C, return temperature 60 °C (in accordance with DIN 4702).

operation with heating oil EL,  $\lambda = 1.22$  with max. burner output (CO<sub>2</sub> heating oil EL = 12.5 %)

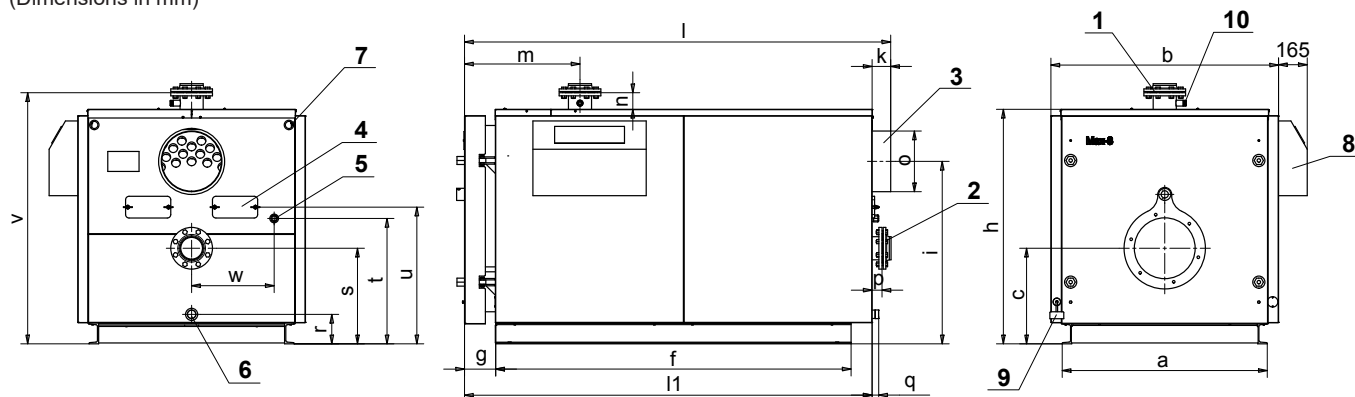
- A reduction of the boiler water temperature to -10 K causes a reduction of the flue gas temperature of approx. 6-8 K.
- A modification of the CO<sub>2</sub> concentration of +/-1 % causes a modification of the flue gas temperature of approx. +/-8 K.

## Flue gas resistor



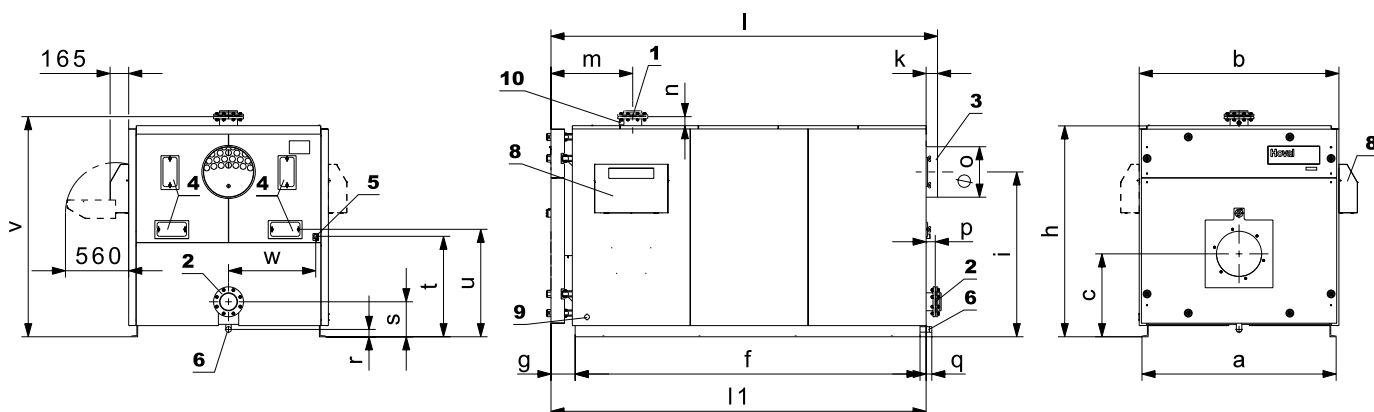
### Max-3 (420-1250)

(Dimensions in mm)



### Max-3 (1500-2700)

(Dimensions in mm)



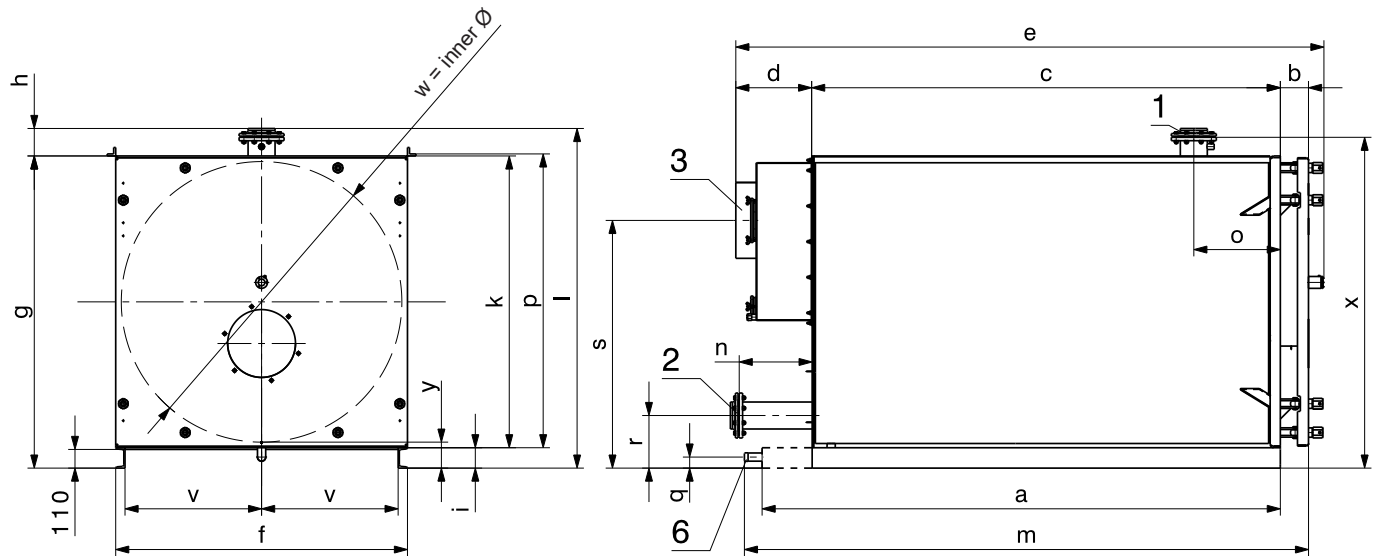
1	Flow	(420,530)	DN 100, PN 6	2	Return	(420,530)	DN 100, PN 6	5	Flue gas collector cleaning opening R 1"		
		(620,750)	DN 125, PN 6			(620,750)	DN 125, PN 6		6	Drain R 1½"	
		(1000,1250)	DN 150, PN 6			(1000,1250)	DN 150, PN 6		7	Cable routing	
		(1500-2200)	DN 150, PN 6			(1500-2200)	DN 150, PN 6		8	Control panel	
		(2700)	DN 200, PN 6			(2700)	DN 200, PN 6		9	Electrical connection	
				3	Flue gas outlet					10	Bushing Rp ¾" with immersion sleeve for boiler temperature sensor
				4	Cleaning opening						

Max-3 Type	a	b	c	f	g	h	i	k	l	l1	m	n	Ø o	p	q	r
(420,530)	1060	1190	515	1770	181	1230	950	104	2178	2074	641	100	299	54	34	175
(620,750)	1180	1310	550	2045	181	1350	1050	105	2452	2347	666	95	349	55	35	170
(1000,1250)	1370	1500	635	2330	181	1550	1250	107	2739	2632	681	111	349	77	37	175
(1500)	1560	1610	665	2685	212	1710	1350	103	3040	2940	722	80	447	83	34	65
(1800)	1720	1770	735	3055	214	1870	1460	103	3424	3320	724	80	447	83	52	65
(2200)	1720	1770	735	3355	214	1870	1460	101	3724	3625	724	80	447	81	50	65
(2700)	1750	1800	755	3700	212	1900	1410	82	4032	3950	722	80	647	82	51	65

Max-3 Type	s	t	u	v	w	x
(420,530)	350	595	660	1330	450	-
(620,750)	550	722	786	1445	475	-
(1000,1250)	415	620	685	1660	590	-
(1500)	310	777	842	1790	695	1850
(1800)	310	890	952	1950	773	2040
(2200)	310	890	952	1950	773	2340
(2700)	370	917	982	1980	790	2670

### Dimensions without insulation and casing

Boiler incl. flange, outlet without flue gas collector.  
(Dimensions in mm)



- 1 Flow 3 Flue gas outlet  
2 Return 6 Drain

Max-3 Type	a <sup>1</sup>	b	c	d	e	f	g	h	i	k	l	m	n	o	p
(420,530)	1920	150	1770	277	2222	1060	1180	196	120	1060	1376	2077	175	460	1072
(620,750)	2195	150	2045	228	2498	1180	1300	196	120	1180	1496	2353	172	485	1192
(1000,1250)	2480	150	2330	228	2783	1370	1500	187	120	1380	1660	2638	198	500	1392
(1500)	2685	164	2568	260	3078	1560	1680	162	120	1560	1842	2923	240	510	-
(1800)	3055	166	2760	450	3467	1720	1840	162	120	1720	2002	3325	430	510	-
(2200)	3355	166	3060	450	3767	1720	1840	162	120	1720	2002	3625	430	510	-
(2700)	3700	164	3390	430	4075	1750	1870	169	120	1750	2039	3953	430	510	-

Max-3 Type	q	r	s	v	w	x	y
(420,530)	175	350	950	475	990	-	-
(620,750)	170	550	1050	535	1110	-	-
(1000,1250)	175	415	1250	630	1298	-	-
(1500)	65	310	1350	725	1494	1790	153
(1800)	65	310	1460	805	1654	1950	153
(2200)	65	310	1460	805	1654	1950	153
(2700)	65	370	1410	820	1684	1980	153

\* Max-3 (1500-2700): socket protrudes

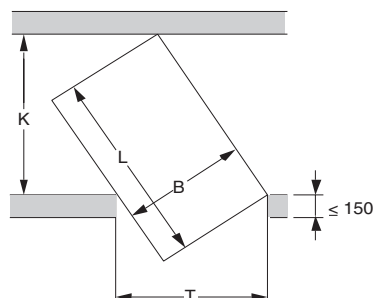
### Required min. width of door and corridor to bring in the boiler

The stated measurements are minimal dimensions

$$K = \frac{B}{T} \times L$$

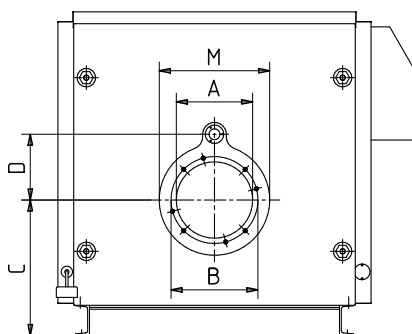
$$T = \frac{B}{K} \times L$$

- T Door width  
K Corridor width  
B Boiler width  
L Max. boiler length

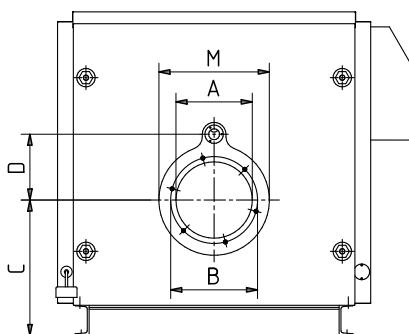


# Furnace dimensions

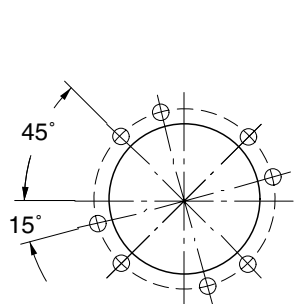
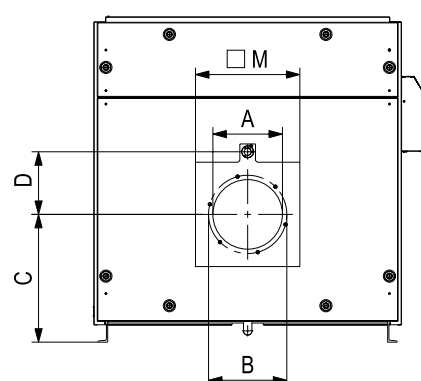
Max-3 (420,530)



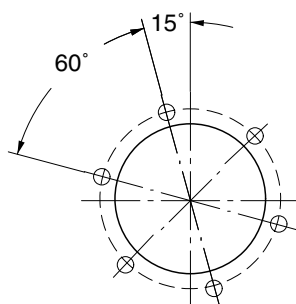
Max-3 (620-1250)



Max-3 (1500-2700)

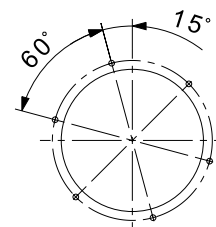


**Screw joint flange**  
Max-3 (420, 530)  
4 x M12 (45°)  
4 x M12 (15°)

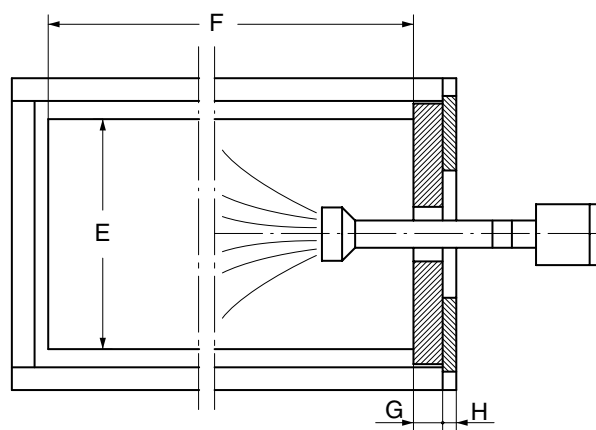


**Screw joint flange**  
Max-3 (620, 750)  
6 x M12 (15°)

**Screw joint flange**  
Max-3 (1000,1250)  
6 x M16 (15°)

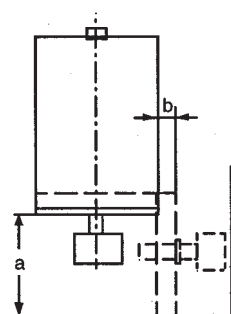


**Screw joint flange**  
Max-3 (1500-2700)  
6 x M16 (15°)



## Swinging out of boiler door

Boiler door is swivelling to the right or left  
(Dimensions in mm)



## Dimensions

(Dimensions in mm)

Max-3 Type	A	B	C	D	E	F	G	H	M
(420,530)	290	330	515	250	606	1624	163	30	420
(620,750)	350	400	550	310	684	1899	163	30	500
(1000,1250)	400	450	635	330	782	2182	163	30	550
(1500)	400	450	665	360	880	2417	170	30	600
(1800)	400	450	735	360	976	2605	170	30	600
(2200)	400	450	735	360	976	2905	170	30	600
(2700)	400	450	755	360	976	3233	170	30	600

Max-3 Type	a	b
(420)	1060	150
(530)	1060	150
(620)	1180	150
(750)	1180	150
(1000)	1370	150
(1250)	1370	150
(1500)	1520	175
(1800)	1680	175
(2200)	1680	175
(2700)	1700	175

## Standards and guidelines

The following standards and guidelines must be respected:

- technical information and installation manual of the Hoval company.
- hydraulic and technical control regulations of the Hoval company.
- local building law
- fire protection standards
- DIN EN 12828 Heating systems in building plans of hot water heating plants.
- DIN EN 12831 Heating plants in buildings - procedure for computing the normed heating capacity

## Water quality

### Heating water:

- **The European Standard EN 14868 and the Directive VDI 2035 must be observed.**
- Hoval boilers and calorifiers are designed for heating plants without significant oxygen intake (plant type I according to EN 14868).
- Plants with
  - continuous oxygen intake (e.g. underfloor heating systems without diffusion proof plastic piping) or
  - intermittent oxygen intake (e.g. where frequent refilling is necessary)
 must be equipped with separate circuits.
- Treated heating water must be tested at least once yearly. According to the inhibitor manufacturer's instructions, more frequent testing may be necessary.
- A refilling is not recommended if the quality of the heating water in existing installations (e.g. exchange of boiler) conforms to VDI 2035. The Directive VDI 2035 applies equally to the replacement water.
- New and if applicable existing installations must be adequately cleaned and flushed before being recharged! The boiler may only be filled after the heating system has been flushed.
- Parts of the boiler which have contact with water are made of ferrous materials.
- On account of the danger of stress cracking corrosion the chloride, nitrate and sulfate contents of the heating water must not exceed 200 mg/l in total.
- The pH value of the heating water should lie between 8.3 and 9.5 after 6 to 12 weeks of heating operation.

### Filling and replacement water:

- For a plant using Hoval boilers untreated domestic water is generally best suited as filling and replacement water. However, the quality of the untreated domestic water must at least fulfil the standard set in VDI 2035 or be desalinated and/or be treated with inhibitors. The stipulations of EN 14868 must be observed.
- In order to maintain a high level of boiler efficiency and to avoid overheating of the heating surfaces the values given in the table should not be exceeded (dependent on boiler performance ratings - for multi-boiler plants rating of smallest boiler applies - and on the water content of the plant).
- The total amount of filling and replacement water which is used throughout the total service life of the boiler must not exceed three times the water capacity of the plant.

## Combustion air supply

The combustion air supply must be warranted. The air opening must not be lockable. It is very important to ensure that the combustion air is free from halogen compounds. These are present, for example, in spray cans, varnishes, glues, solvents and cleansing agents.

### Room air dependent operation:

- Minimum free cross-section for the air opening can be assumed as follows by way of simplification. Nominal heat output is the determining factor!
- A minimum free cross-section of once 150 cm<sup>2</sup> or twice 75 cm<sup>2</sup> and an additional 2 cm<sup>2</sup> for each kW boiler capacity in excess of 50 kW is required for the air opening into the outside air.

## Burner installation

- With gas and dual-fuel burners, the burner housing weight is to be directly supported by a strut to the floor.
- Depending on the size of the burner flange, an intermediate flange may be required to attach the burner. The intermediate flange including screws and seal must be supplied by the burner company.
- The lines must be positioned so that the boiler door can still be fully opened.
- To allow the boiler door to be swung out 90° to the left or right, the connections must be flexible and routed to the burner in a sufficiently large loop
- In systems with ThermoCondensor, the burner must additionally absorb the resistance of the heat exchanger

The space between the burner pipe and the hinged flange is to be insulated. A line must be routed from the burner to the sight glass to carry cooling air, in order to cool the boiler sight glass and keep it clean.  
(Delivery by the burner company)

## Electric connection of the burner

- Control voltage 1 x 230 V
- Burner motor 1 x 230 V / 3 x 400 V.
- The burner must be connected to the burner connection plug of the boiler.
- For safety reasons the electrical cable of the burner must be that short that the plug must be removed when swivelling boiler door.

## Sound absorbing

Sound absorption is possible through the following steps:

- Heating room walls, ceiling and floor should be very solidly built, a sound absorber should be mounted into the air inlet. Pipe holders and support should be protected by means of anti-vibration sleeves.
- Install sound absorber hood for burner.
- If living rooms are located above or under the boiler room, vibration absorbers have to be mounted to the boiler base. Pipes and flue gas tube must be connected flexibly with compensators.
- Connect circulating pumps to the piping network using expansion joints.
- For damping of flame noise it is possible to install a silencer into the flue gas tube (space should be foreseen for later installation).

## Measures for sound reduction

Make sure right from the planning phase that bedrooms are not situated in the immediate vicinity of the sound source (heating room, chimney).

A reduction of the radiated burner air sound level in the heating room (reduction of the burner noises) of up to approx. 12 dB can be achieved encapsulating the burner (sound absorbing hood).

## Maximum filling quantity without/with demineralisation

	Carbonate hardness of filling water up to...							
	<0.1	0.5	1	1.5	2	2.5	3	>3.0
[mol/m <sup>3</sup> ] <sup>1</sup>	<1	5	10	15	20	25	30	>30
f°H	<0.56	2.8	5.6	8.4	11.2	14.0	16.8	>16.8
d°H	<0.71	3.6	7.1	10.7	14.2	17.8	21.3	>21.3
e°H	<10	50.0	100.0	150.0	200.0	250.0	300.0	>300
~mg/l	<20	100.0	200.0	300.0	400.0	500.0	600.0	>600
Conductance <sup>2</sup>								
<b>Boiler size of the individual boiler</b>	<b>maximum filling quantity without desalination</b>							
200 to 600 kW		50 l/kW	50 l/kW	20 l/kW	always desalinate			
over 600 kW								

<sup>1</sup> Total of alkaline earths

<sup>2</sup> If the conductance in µS/cm exceeds the tabular value an analysis of the water is necessary.

A significant part of the noise development in the combustion chamber and in the secondary heating surfaces is radiated as airborne noise via the flue gas line.

In addition, depending on dimensioning of the chimney and intersection, resonance effects caused by the vibration of the combustion noises (amplification) can occur.

These noises can be reduced on the one hand by measures on the burner side, such as modification of the flame geometry, the atomisation characteristic or the fuel throughput.

On the other hand, flue gas silencers achieve an important noise reduction.

These silencers must usually be adapted to low frequencies of 60-250 Hz.

Flue gas silencers work based on the principle of sound absorption.

The kinetic energy of the flue gases is consumed due to friction, which means a draughting requirement increase in the flue gas line is necessary. This must be taken into account when dimensioning the burner.

The connection piece from the boiler to the flue gas silencer must be gas-tight as the draught and pressure zero points lie behind the flue gas silencer.

The space required of approx. 1 m for retrofitting of a flue gas silencer should be provided during planning.

Note also that secondary air devices are installed only behind a flue gas silencer.

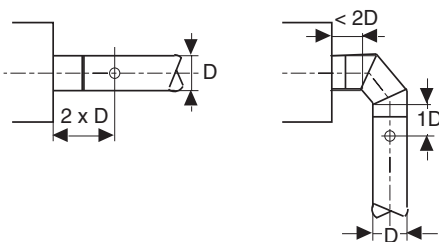
## Installation instructions

Please observe the installation instructions supplied with every boiler.

## Chimney/flue gas system

### Flue gas line

- The flue gas tube between boiler and chimney must be connected with an angle 30-45° to the chimney.
- If the flue gas tube is longer than 1 m, it must be insulated.



- The flue gas tube must be designed that no condensate water can get into the boiler.
- A closeable flue gas measuring socket with an inner diameter of 10-21 mm must be foreseen. The socket has to be led over the thermal insulation.

### Chimney

- The flue gas system must be humidity-insensitive and acid-proof and admitted for flue gas temperatures up to > 160 °C.
- For existing chimney installation the restoration must be carried out according to the instructions of the chimney constructor.
- Calculation of the profile of the chimney according to DIN 4705.
- It is recommendable to use a secondary air valve for chimney draft limiting.

### Expansion tank/expansion

- Ideally, the pressure expansion tank should be connected to the heating system as described in our example applications, with a removable or sealable actuation device. This means that it is not necessary to drain the entire system in order to carry out work.

### Safety valve

- A safety valve and an automatic air vent must be installed in the safety flow.

### Required chimney diameter

Basics: Smooth chimneys  
made of stainless steel,  
flue gas line  $\leq 5$  m,  $\Sigma \zeta = 2.2$ ,

Flue gas line and chimney insulated.  
Height above sea level  $\leq 1000$  m,  
outdoor temperature  $\leq 30$  °C.

Max-3	Type (420)		Type (530)		Type (620)		Type (750)	
m	Flue gas line Ø mm	Chimney Ø mm	Flue gas line Ø mm	Chimney Ø mm	Flue gas line Ø mm	Chimney Ø mm	Flue gas line Ø mm	Chimney Ø mm
25	300	300	300	300	300	300	350	350
20	300	300	300	300	300	300	350	350
15	300	300	300	300	350	300	350	350
10	300	300	350	300	350	350	400	350

m = chimney height (m)

### Mounting on site

#### Max-3 (420-1250)

If the local situation does not permit bringing in the whole boiler, the possibility of the place assembly exists.

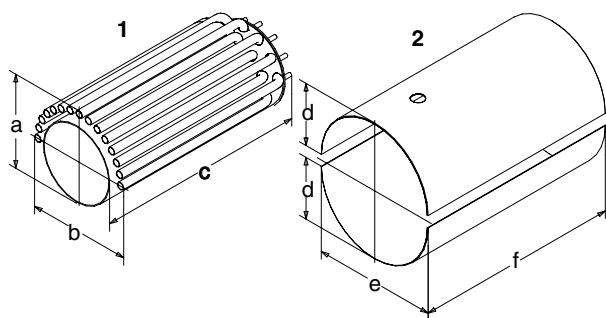
- The element welding on site incl. pressure test are to be coactive to obtain from Hoval.

Time to delivery approx. 8 weeks

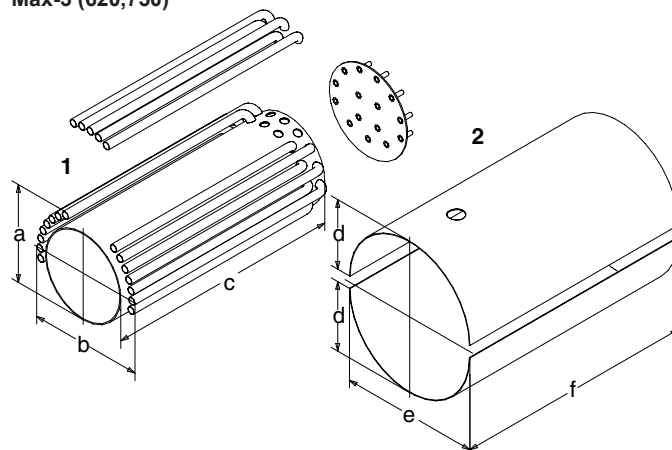


### Dimensions and weights of the single parts

#### Max-3 (420,530)



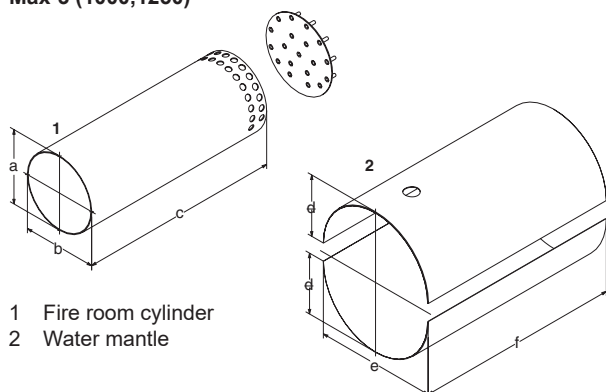
#### Max-3 (620,750)



## Mounting on site

### Dimensions and weights of the single parts

#### Max-3 (1000,1250)



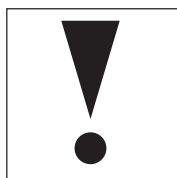
#### Combustion chamber 1

Max-3 Type	a	b	c	Weight kg
(420,530)	730	835	1725	325
(620,750)	745	915	2000	410
(1000,1250)	800	800	2180	375

#### Water mantle - half shell 2

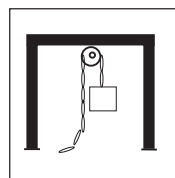
Max-3 Type	d	e	f	Weight kg
(420,530)	500	1000	1665	105
(620,750)	560	1120	1940	135
(1000,1250)	655	1310	2225	215

## Planning hints



### Important preparations

- Old boiler must be dismantled and removed.
- The heating room, if necessary with boiler base, must be available with beginning of work.



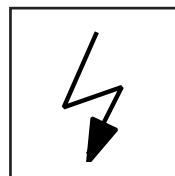
### Assembly aids

If no concrete cover is present, at which a chain course with Hilti pegs can be installed, an appropriate scaffold for loads up to 2500 kg must be present.



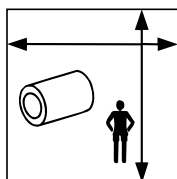
### Boiler material

- The boiler material is delivered by Hoval (in single parts) and must be brought in on site.
- If bringing in the boiler parts does not take place immediately after unloading, the parts are to be stored weather-protected.



### Power connection

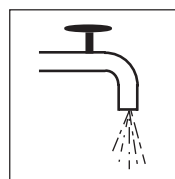
A power connection for the welding machine with a 5-pin plug socket, 3 x 400 V must be present.



### Heating room preparation

#### Required space

In the heating room sufficient space for the assembly of the boiler must be available (see space requirement below)



### Water connection

In the heating room a water connection ( $\frac{3}{4}$ " with fresh water for filling and squeezing off the welded boiler has to be present.

## Required space for mounting and welding in the boiler room

#### Min. room dimensions in mm

	(420)	(530)	(620)	(750)	(1000)	(1250)
Length	3700	3700	4500	4500	5000	5000
Width	2200	2200	2500	2500	3500	3500
Height	2500	2500	3000	3000	3200	3200

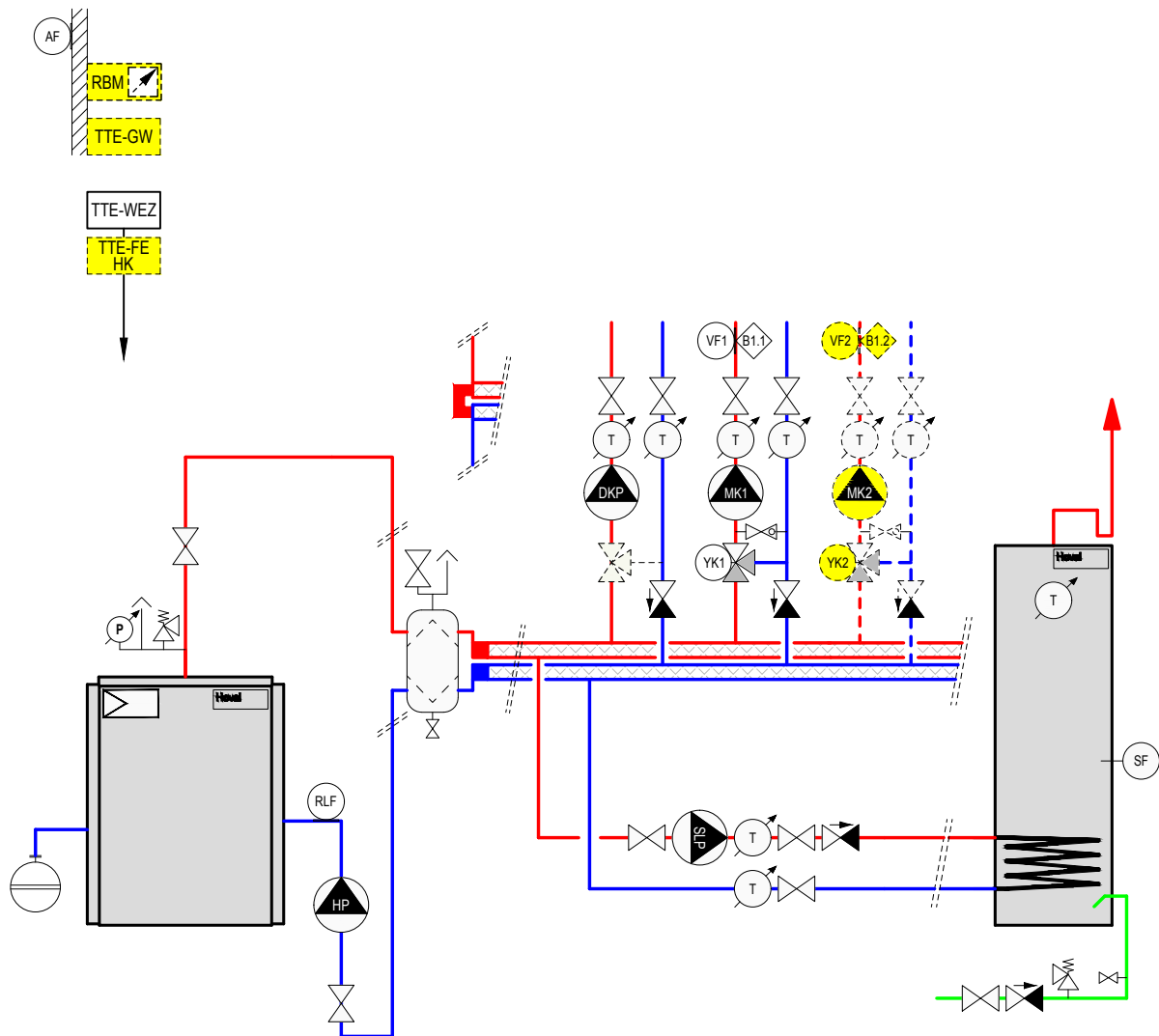


### Max-3 (420-2700)

Oil/gas boiler with

- main pump
- return temperature control (effective on mixer circuit)
- hydraulic switch
- calorifier
- 1 direct circuit and 1-... mixer circuit(s)

#### Hydraulic schematic BEFE010



#### Notice:

- The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.
- With underfloor heating a flow temperature monitor must be built in.
- Shut-off devices to the safety valve (pressurised expansion tank, safety valve, etc.) are to safe against unintended closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (installed)
VF1	Flow temperature sensor 1
B1.1	Flow temperature guard (if required)
MK1	Pump mixer circuit 1
YK1	Actuator mixer 1
AF	Outdoor sensor
SF	Calorifier sensor
DKP	Pump for heating circuit without mixer
RLF	Return sensor
SLP	Calorifier charging pump
HP	Main pump

#### Option

RBM	TopTronic® E room control module
TTE-GW	TopTronic® E Gateway

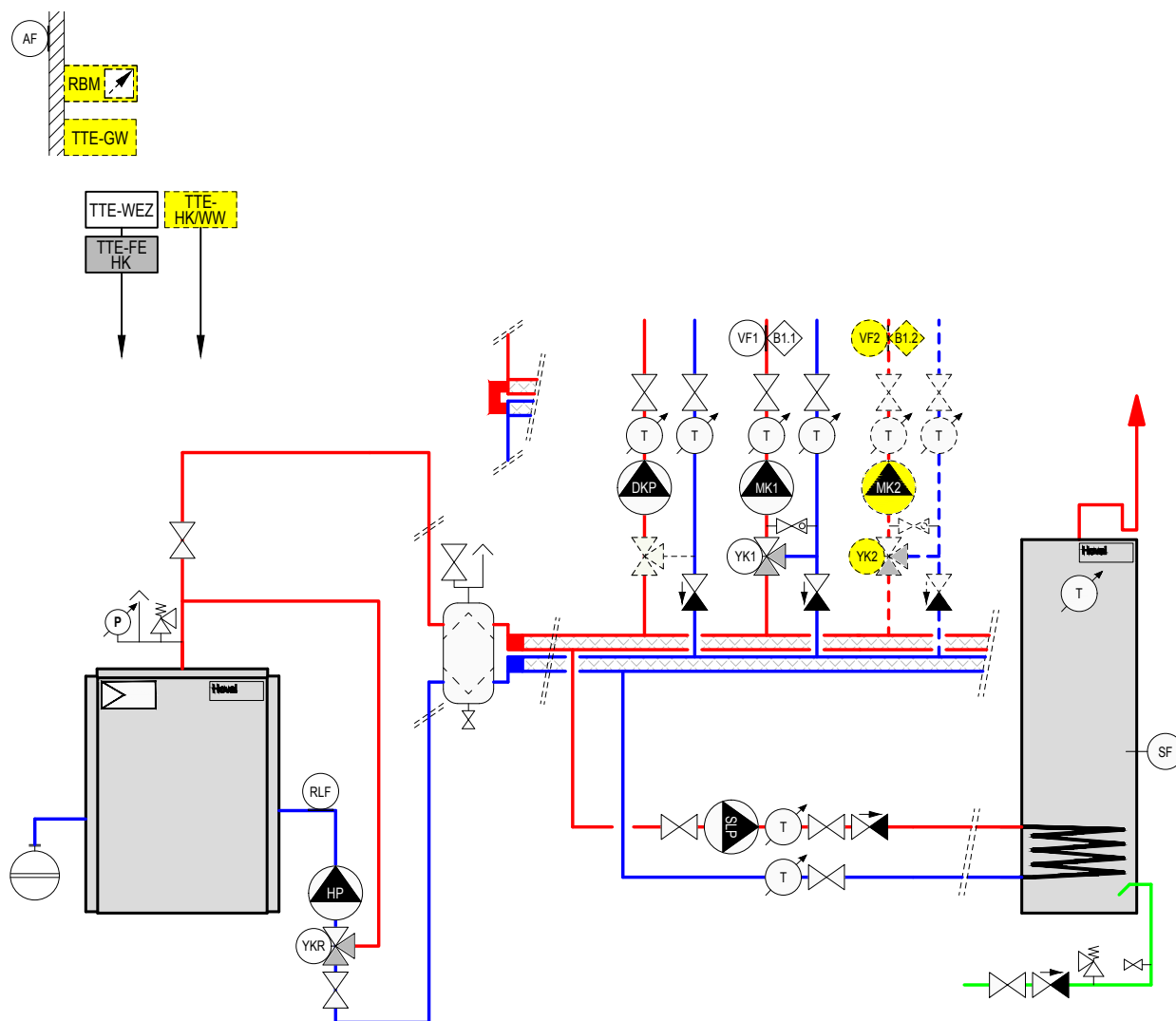
TTE-FE HK	TopTronic® E module expansion heating circuit
VF2	Flow temperature sensor 2
B1.2	Flow temperature guard (if required)
MK2	Pump mixer circuit 2
YK2	Actuator mixer 2

### Max-3 (420-2700)

Oil/gas boiler with

- main pump
- return temperature control (continuous)
- hydraulic switch
- calorifier
- 1 direct circuit and 1-... mixer circuit(s)

Hydraulic schematic BEFE020



#### Notice:

- The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.
- With underfloor heating a flow temperature monitor must be built in.
- Shut-off devices to the safety valve (pressurised expansion tank, safety valve, etc.) are to safe against unintended closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (installed)
VF1	Flow temperature sensor 1
B1.1	Flow temperature guard (if required)
MK1	Pump mixer circuit 1
YK1	Actuator mixer 1
YKR	Actuator return mixer
SF	Calorifier sensor
RLF	Return sensor
DKP	Pump for heating circuit without mixer
SLP	Calorifier charging pump
KKP	Boiler circuit pump

#### Option

RBM	TopTronic® E room control module
TTE-GW	TopTronic® E Gateway
TTE-HK/WW	TopTronic® E heating circuit/DHW module

TTE-FE HK	TopTronic® E module expansion heating circuit
VF2	Flow temperature sensor 2
B1.2	Flow temperature guard (if required)
MK2	Pump mixer circuit 2
YK2	Actuator mixer 2

## Hoval Max-3 condens E oil/gas condensing boiler

### Boiler

- Three-pass steel boiler with plain pipes and integrated flue gas heat exchanger, fully mounted on steel frame
- For burning ecological fuel oil EL low-sulphur (sulphur content < 50 ppm) according to standard SN 181 160 2 and natural gas H as well as liquid gas with internal flue gas recirculation
- Boiler door swivelling to the right
- With sight glass on the boiler door
- Thermal insulation on the boiler body and flue gas heat exchanger with 100 mm mineral wool
- Boiler fully cased, aluminium casing
- Flue gas outlet to the rear
- Heating flow and heating return at top.
- Bracket for control on right side of the boiler as standard

### Optional

- Installation of the boiler insulation on site
- Boiler door swivelling to the left (please specify on ordering)
- Bracket for control on left side of the boiler (please specify on ordering)

### On site

- Electrical connection to the burner
- Boiler thermometer and pressure gauge

### Delivery

- Boiler fully assembled and cased
- Prices free construction site without unloading

## Control panel with thermostat T 0.2

- For external control
- For systems without TopTronic® T regulator
- For special control function
- Main switch "I/O"
- Safety temperature limiter 120 °C
- 3 boiler temperature regulators 50-105 °C
  - temperature regulator for base load heating
  - temperature regulator for full load heating
  - temperature regulator for calorifier
- without burner plug connection

### Optional

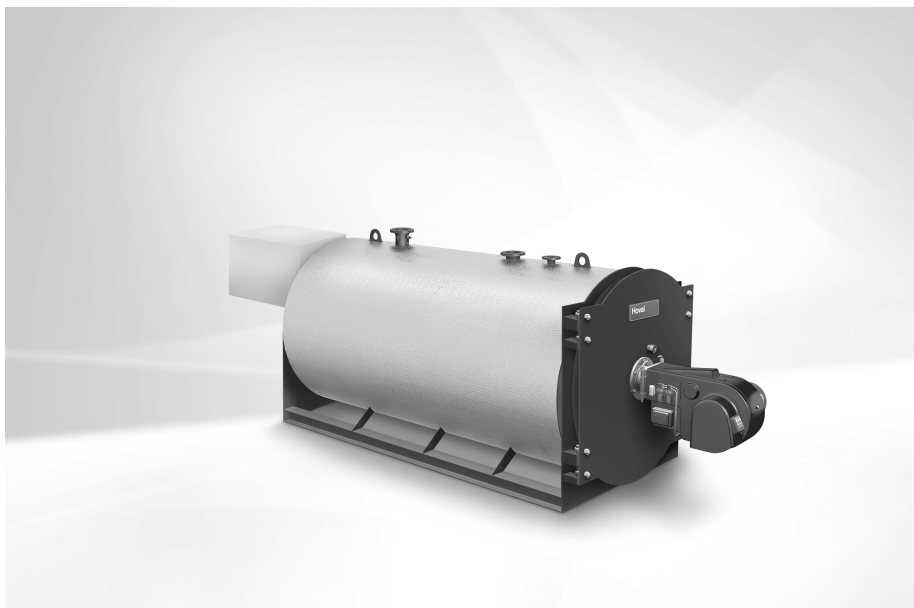
- 2 running time meters integrated
- 2 burner running time meters and pulse counters integrated
- Flue gas thermometer, 4 m capillary tube

### Delivery

- Control panel separately delivered

### On site

- Mounting of the control panel at the boiler left or right side



### Boiler permission

CE 0036 according to pressure  
equipment directive 2014/68/EU

### Model range

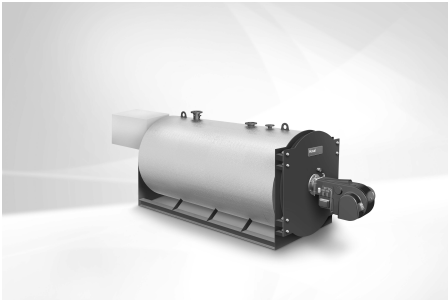
Max-3 condens E natural gas H type	Output return 30 °C kW
(3000)	862-3412
(4000)	1099-4546
(5000)	1345-5732

### Model range

Max-3 condens E ecological heating oil type	Output return 30 °C kW
(3000)	838-3325
(4000)	1064-4431
(5000)	1295-5578

**Note that in the EU member states the Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants must be complied with.**

Oil/gas boiler



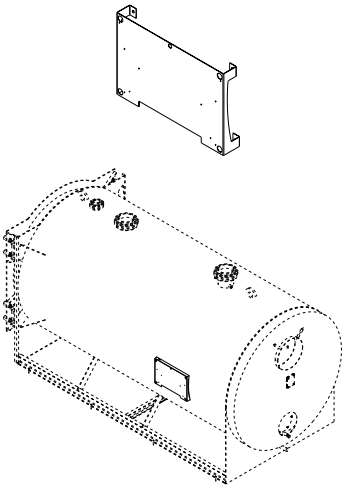
**Hoval Max-3 condens E**  
Three-pass steel boiler for oil/gas firing with integrated flue gas heat exchanger. Mounted on steel frame, completely insulated and cased.

Max-3 condens E Type	Output return 30°/natural gas kW	Working pressure bar
(3000)	862-3412	6
(3000)	862-3412	10
(4000)	1099-4546	6
(4000)	1099-4546	10
(5000)	1345-5732	10

Part No.

7015 756  
7015 760  
  
7015 757  
7015 761  
7015 762

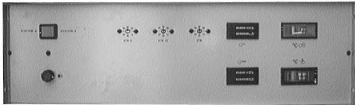
Delivery time on request



**Console for boiler controller**  
Console for attaching the boiler controller TopTronic® E/E13.4 TopTronic® E/E13.5, T2.2 and T0.2 on the right or left of the boiler

6043 924

Control panel  
with thermostat



Control panel T 0.2

- Operating temperature max. 105 °C
- For external switching command
- For systems without TopTronic® E controller.
- For special control function without burner plug connection
  - without burner running time meter and pulse counter
  - incl. 2 burner running time meters integrated
  - incl. 2 burner running time meters and pulse counters integrated
- For mounting on heat generator side right (standard) or left (configuration on request). Specify mounting variant in purchase order.

Accessories to control panel  
with thermostat

Flue gas thermometer  
4 m, capillary tube

Part No.

6015 016

6015 475

6015 476

241 149

Accessories



**Vibration elements for the plinth rail**  
for Max-3 E (3000-6000) and  
Max-3 condens E (3000-6000)  
for support under the plinth rail of  
the boiler. Prevent transmission of  
sound and vibrations.  
Set of 10 vibration elements  
Material: rubber  
Cross section: 80/50 mm  
Size: L800  
Length: 800 mm

Part No.

6007 968

# 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 output at 80/60 °C	kW	3162	4215	5305
• Nominal 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
• Firing output	kW	794-3255	1007-4340	1225-5465
• Boiler working temperature max. <sup>1</sup>	°C	105	105	105
• Boiler working temperature min.	°C	see table operating conditions (below)		
• Return flow temperature min. (directly into the boiler downstream of the flue gas heat exchanger)	°C	see table operating conditions (below)		
• Safety temperature limiter setting (water side) <sup>2</sup>	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (option)	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
• Standby losses qB at 70°C	Watt	2166	2383	2620
• Flue gas temperature at nominal output 80/ 60 °C	°C	82	83	83
• Resistance on the heating gas side at nominal output (natural gas H, mbar 10.5 % CO <sub>2</sub> ), 500 above sea level (tolerance ± 20 %)		12.2	13.4	12.0
• Flue gas mass flow at nominal output (natural gas H, 10.5 % CO <sub>2</sub> )	kg/h	4806	6408	8069
• Flow resistance boiler <sup>3</sup>	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)	litres	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 Dimensions		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

<sup>1</sup> Limited by the boiler controller T0.2 to 105 °C.

<sup>2</sup> Max. safety temperature for boiler controller T0.2: 120 °C.

<sup>3</sup> Flow resistance boiler in mbar = flow rate (m³/h)² x z

## Operating conditions:

Fuel		Low-sulphur heating oil EL Ecological heating oil EL	Natural gas H
min. boiler temperature	°C	65	75
min. return temperature <sup>1)</sup>	°C	55	65
Return temperature control <sup>1)</sup>		yes	yes

<sup>1)</sup> Before entering boiler return

**Max-3 condens E (3000-5000) for ecological heating oil EL**

Type fuel		(3000) Low-sulphur heating oil EL / Ecological heating oil EL	(4000)	(5000)
• Nominal output at 80/60 °C	kW	3162	4215	5305
• Nominal 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
• Firing output	kW	794-3255	1007-4340	1225-5465
• Boiler working temperature max. <sup>1</sup>	°C	105	105	105
• Boiler working temperature min.	°C	see table operating conditions (below)		
• Return flow temperature min. (directly into the boiler downstream of the flue gas heat exchanger)	°C	see table operating conditions (below)		
• Safety temperature limiter setting (water side) <sup>2</sup>	°C	120	120	120
• Operating/test pressure	bar	6/9.6	6/9.6	10/16
• Operating/test pressure (option)	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
• Standby losses qB at 70°C	Watt	2166	2383	2620
• Flue gas temperature at nominal output 80/ 60 °C	°C	81	82	81
• Resistance on the heating gas side at nominal output (natural gas H, 12.5 % CO <sub>2</sub> ), 500 above sea level (tolerance ± 20 %)	mbar	12.2	13.4	12.0
• Flue gas mass flow at nominal output (natural gas H, 12.5 % CO <sub>2</sub> )	kg/h	5105	6807	8508
• Flow resistance boiler <sup>3</sup>	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	4.0	5.3	7.1
• Boiler water capacity (incl. flue gas heat exchanger)	litres	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 Dimensions		
• Draught/underpressure at flue gas outlet max.	Pa	-50	-50	-50

<sup>1</sup> Limited by the boiler controller T0.2 to 105 °C.

<sup>2</sup> Max. safety temperature for boiler controller T0.2: 120 °C.

<sup>3</sup> Flow resistance boiler in mbar = flow rate (m³/h)² x z

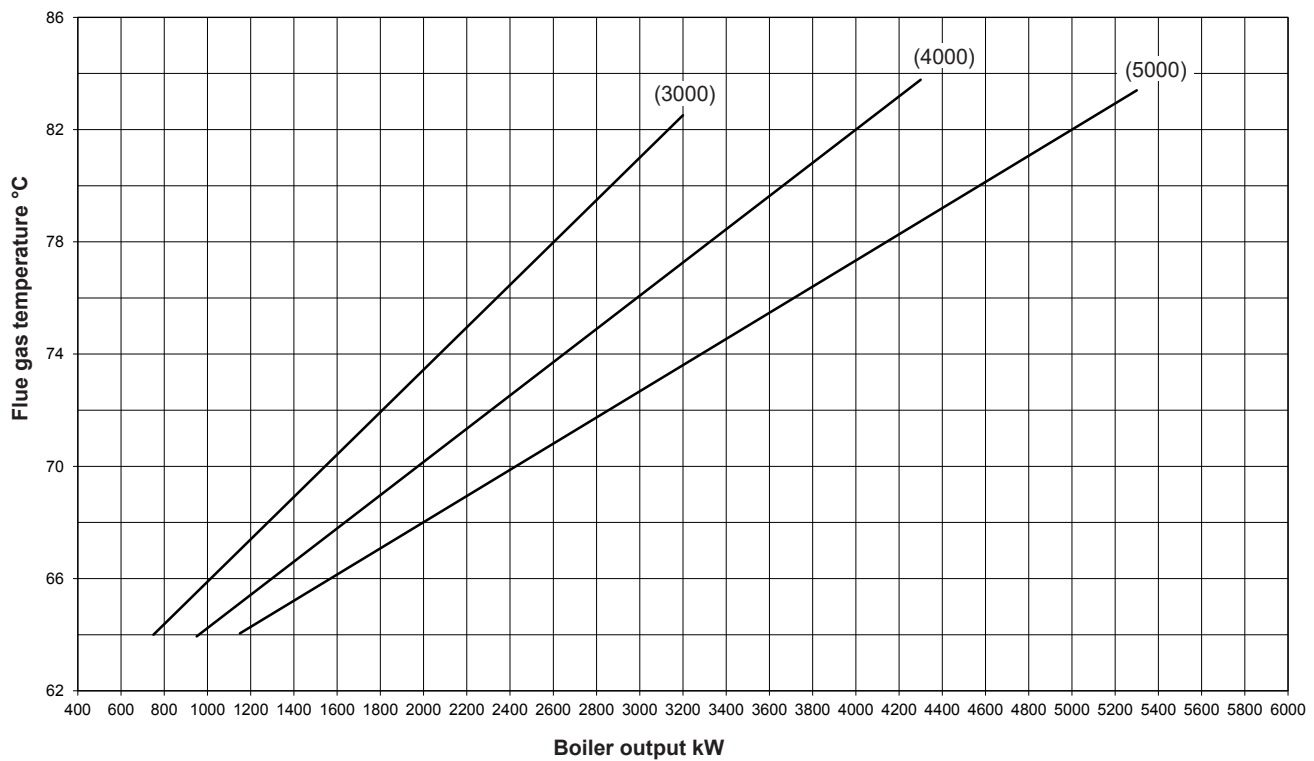
**Operating conditions:**

Fuel		Low-sulphur heating oil EL Ecological heating oil EL	Natural gas H
min. boiler temperature	°C	65	75
min. return temperature <sup>1)</sup>	°C	55	65
Return temperature control <sup>1)</sup>		yes	yes

<sup>1)</sup> Before entering boiler return



### Flue gas output diagram



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

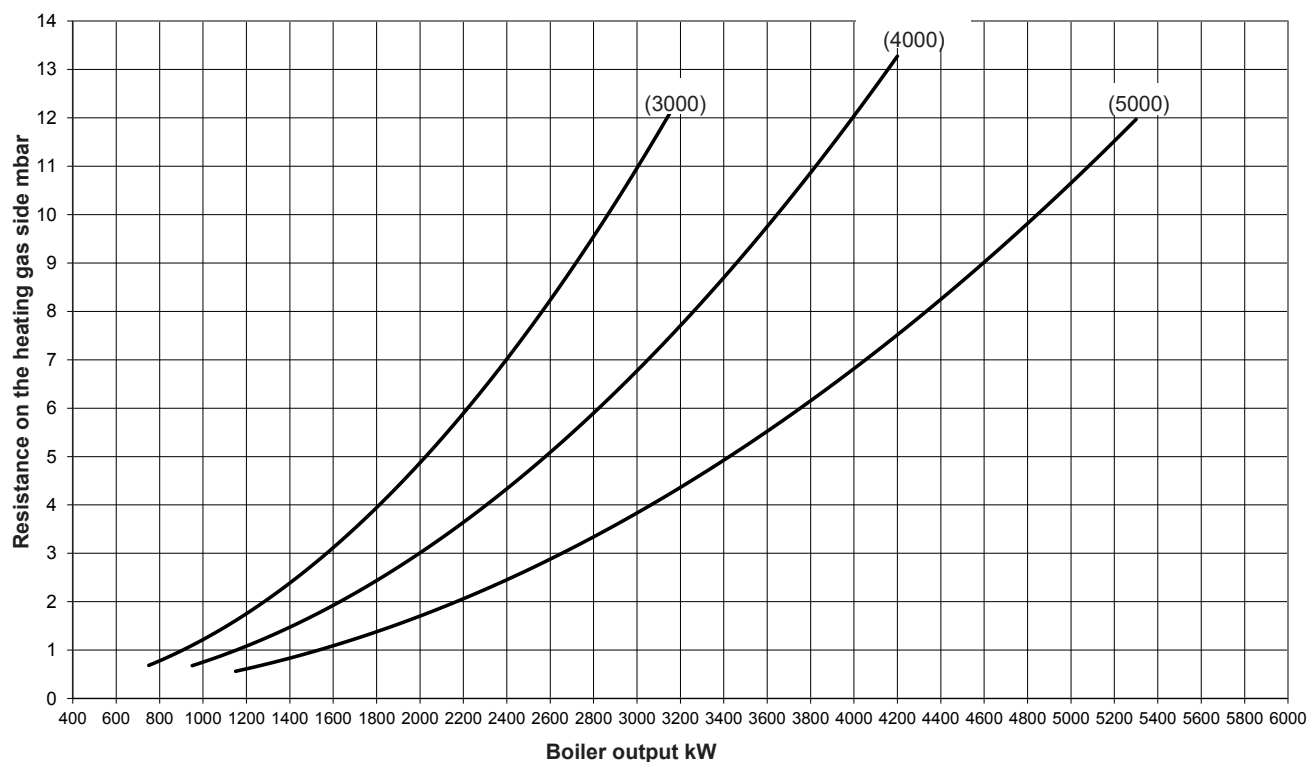
kW = Boiler output

°C = Flue gas temperature on a clean surface, boiler flow temperature 80 °C, return temperature 60 °C (in accordance with DIN 4702).

- Operation with natural gas  
H,  $\lambda = 1.14$  with max. burner output (CO<sub>2</sub> natural gas H = 10.5 %)

- A reduction of the boiler water temperature of -10 K causes a reduction of the flue gas temperature of approx. 6-8 K.  
- A change in the air index I of +/-0.09 % effectuates a change in the flue gas temperature of approx. +/-8 K.

### Resistance on the heating gas side

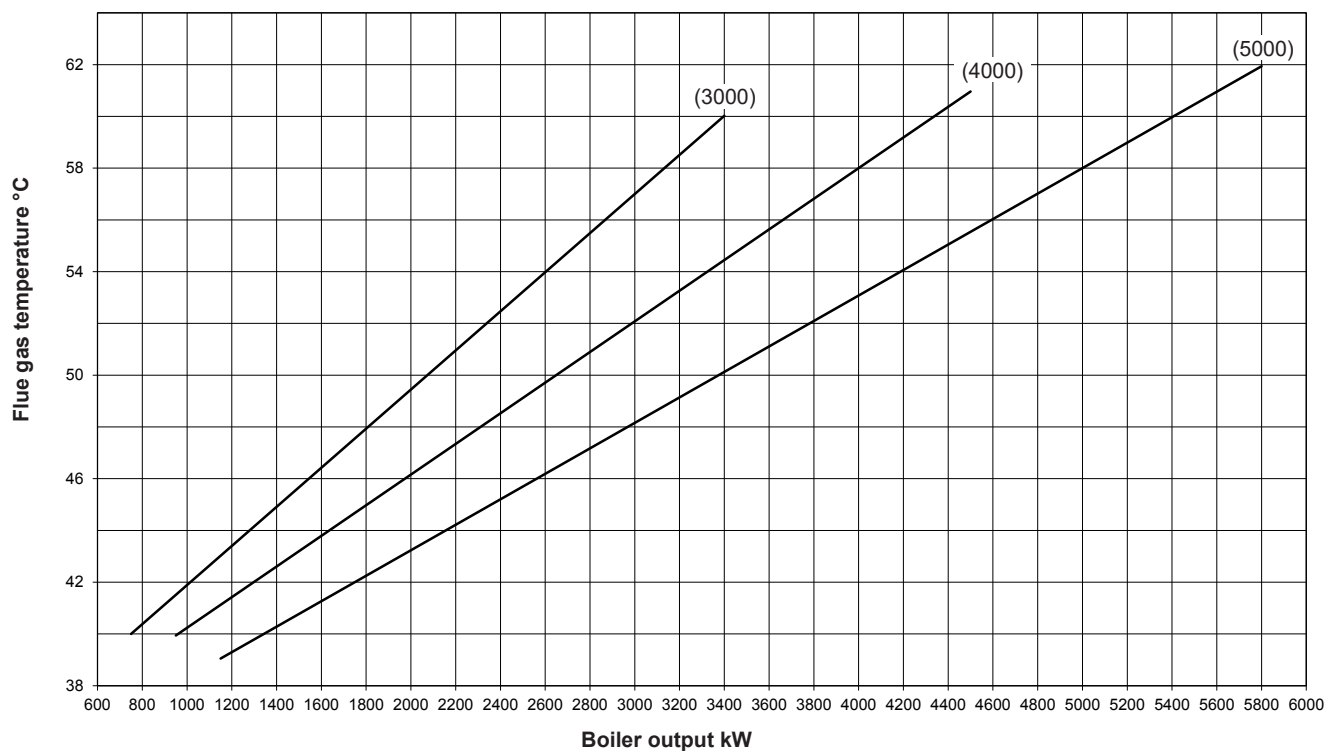


kW = Boiler output

boiler flow temp. 80 °C, return temp. 60 °C

mbar = Resistance on the heating gas side at  $\lambda = 1.14$  (natural gas H: CO<sub>2</sub> = 10.5 %), 500 above sea level (tolerance: +/- 20 %)

## Flue gas output diagram



A change in the air index I of +/-0.09 % effectuates a change in the flue gas temperature of approx. +/-8 K.

kW = Boiler output

°C = Flue gas temperature on a clean surface, boiler flow temperature 80 °C, return temperature 30 °C (in accordance with DIN 4702).

- Operation with natural gas H,  $\lambda = 1.14$  with max. burner output (CO<sub>2</sub> natural gas H = 10.5 %)

- A reduction of the boiler water temperature of -10 K causes a reduction of the flue gas temperature of approx. 6-8 K.  
- A change in the air index I of +/-0.09 % effectuates a change in the flue gas temperature of approx. +/-8 K.

a) Conversion of the flue gas heat exchanger output at reduced boiler capacity and changed flue gas heat exchanger water entry temperature

b) Flue gas temperature downstream of flue gas heat exchanger at reduced boiler capacity

Heat exchanger output at full boiler load and water entry temperature 30°C

Max-3 condens E		(3000)	(4000)	(5000)
Natural gas (H)	kW	351	483	636
Heating oil extra light	kW	351	483	636

The nominal output of the heat exchanger at reduced boiler capacity or with changed water entry temperatures can be approximately calculated as follows.

Output adapted to the actual operating case ~ conversion factor from table figure 1 x conversion factor from figure 2 x heat exchanger full load output

#### Example

- Boiler Max-3 condens E (4000)
- Maximum boiler output = 4800 kW
- Desired output = 3500 kW
- Accordingly, 3500 kW / 4800 kW = 73 % of the nominal output
- Water temperature entry into the heat exchanger = 40°C

Read off from figures 1 and 2

- Correction factor for reduced output from figure 1 = 0.70
- Correction factor for increased water entry temperature from figure 2 = 0.85
- Heat exchanger output catalogue specification at 30°C = 483 kW

Result corresponding to above formula:

Actual output =  $\sim 0.70 \times 0.85 \times 483 = \sim 287$  kW

Current total heat output of the boiler/heat exchanger combination = 3500 kW + 287 kW =  $\sim 3787$  kW

Nominal output of the flue gas heat exchanger at reduced boiler capacity or changed water entry temperature

Figure 1: Conversion factor for calculating the actual heat exchanger output with reference to a water entry temperature of 30°C

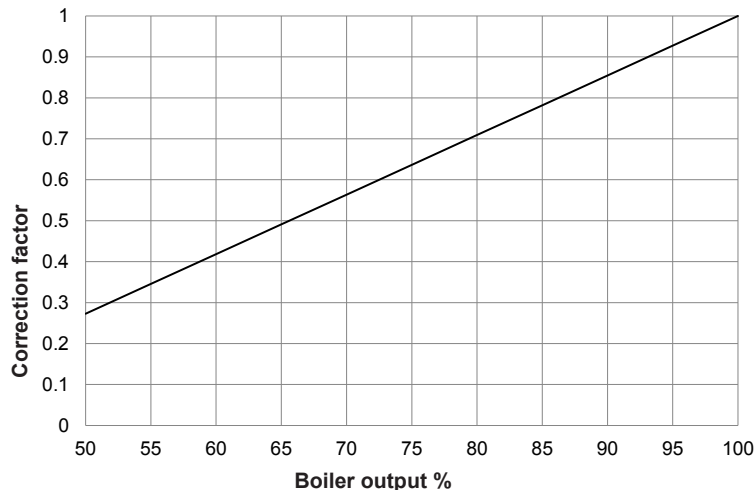


Figure 2: Conversion factor for calculating the heat exchanger output with other water entry temperatures

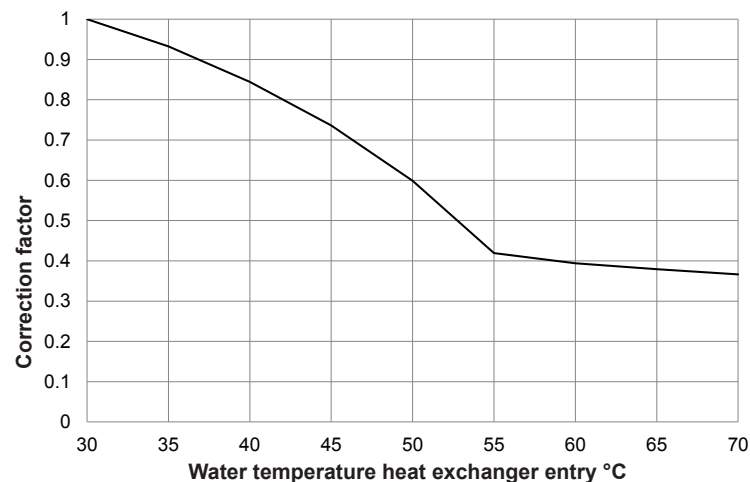
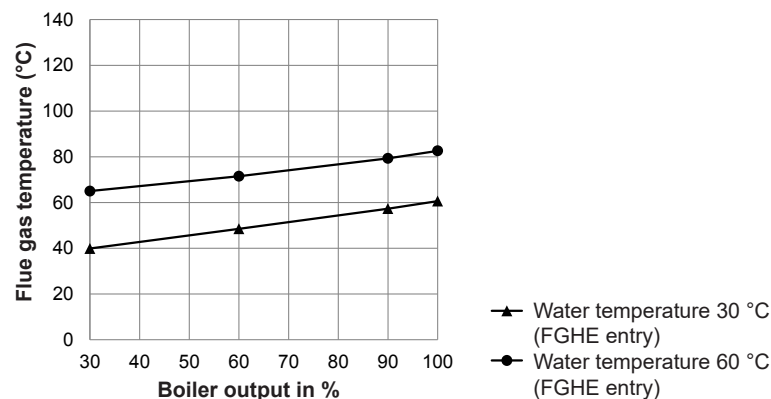


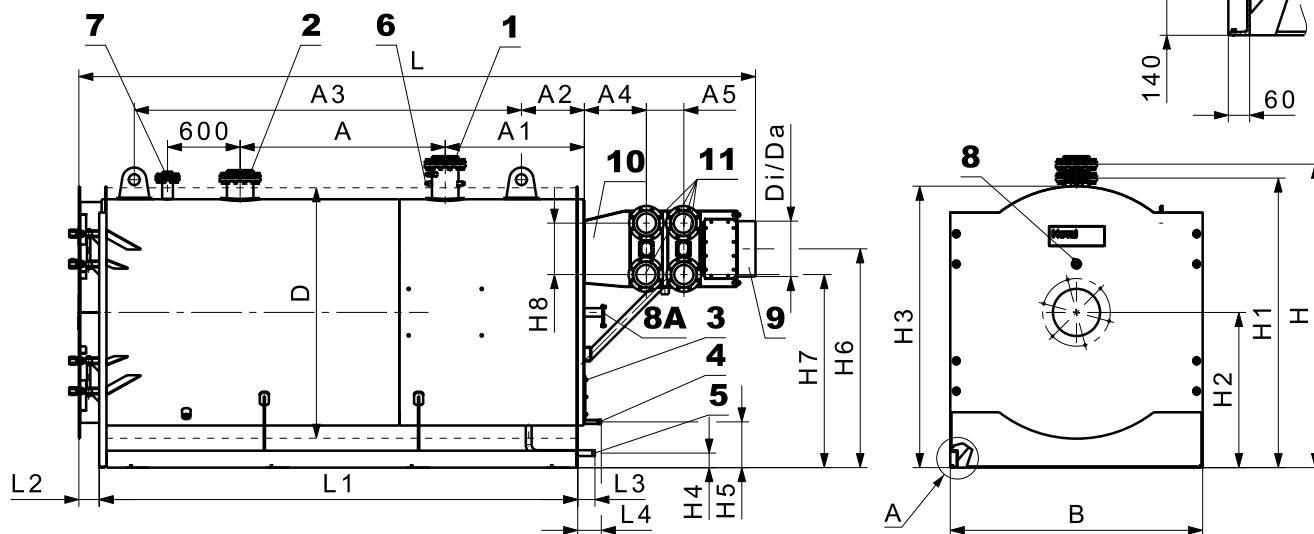
Figure 3: flue gas temperature depending on the boiler capacity and the water temperature (30 or 60°C) on entering the flue gas heat exchanger (average boiler size values)



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

(Dimensions in mm)

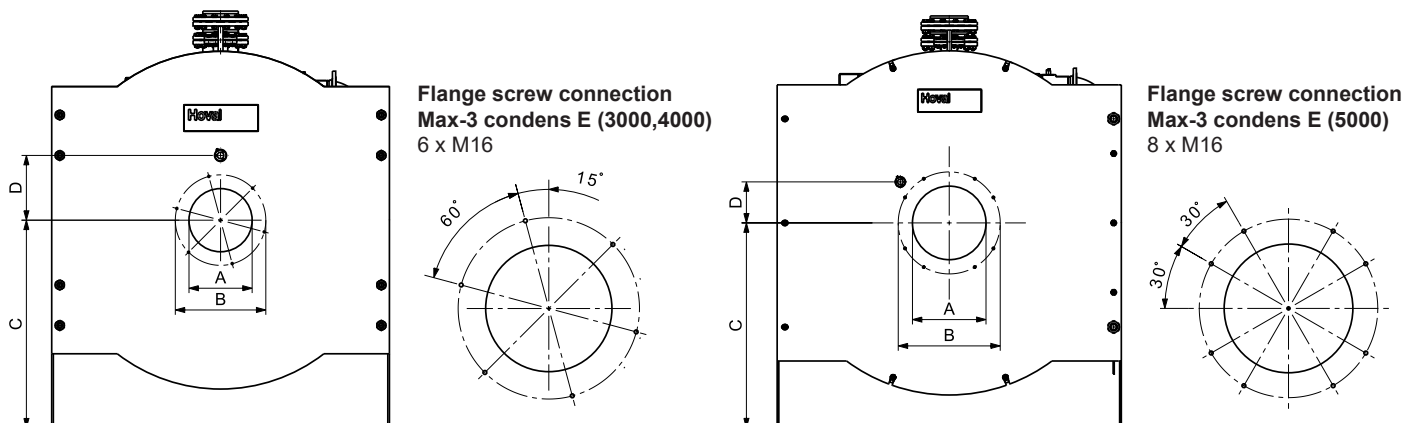
The control can be fitted on the right or left side.



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



### 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

## Standards and guidelines

The following standards and guidelines must be respected:

- technical information and installation manual of the Hoval company.
- hydraulic and control technical control regulations of the Hoval company.
- local building law
- fire protection standards
- DVGW guidelines
- DIN EN 12828 Heating systems in building plans of hot water heating plants.
- DIN EN 12831 Heating plants in buildings - procedure for computing the normed heating capacity
- VDE 0100

## Water quality

### Heating water:

- The European Standard EN 14868 and the Directive VDI 2035 must be observed.
- Hoval boilers and calorifiers are designed for heating plants without significant oxygen intake (plant type I according to EN 14868).
- Plants with
  - **continuous** oxygen intake (e.g. under-floor heating systems without diffusion proof plastic piping) or
  - **intermittent** oxygen intake (e.g. where frequent refilling is necessary)
 must be equipped with **separate circuits**.
- Treated heating water must be tested at least once yearly. According to the inhibitor manufacturer's instructions, more frequent testing may be necessary.
- A refilling is not recommended if the quality of the heating water in existing installations (e.g. exchange of boiler) conforms to VDI 2035. The Directive VDI 2035 applies equally to the replacement water.
- New and if applicable existing installations must be adequately cleaned and flushed before being recharged! The boiler may only be filled after the heating system has been flushed.
- Parts of the boiler which have contact with water are made of ferrous materials.

- On account of the danger of stress cracking corrosion the chloride, nitrate and sulfate contents of the heating water must not exceed 200 mg/l in total.
- The pH value of the heating water should lie between 8.3 and 9.5 after 6 to 12 weeks of heating operation.

### Filling and replacement water:

- For a plant using Hoval boilers untreated domestic water is generally best suited as filling and replacement water. However, the quality of the untreated domestic water must at least fulfil the standard set in VDI 2035 or be desalinated and/or be treated with inhibitors. The stipulations of EN 14868 must be observed.
- In order to maintain a high level of boiler efficiency and to avoid overheating of the heating surfaces the values given in the table should not be exceeded (dependent on boiler performance ratings - for multi-boiler plants rating of smallest boiler applies - and on the water content of the plant).
- The total amount of filling and replacement water which is used throughout the total service life of the boiler must not exceed three times the water capacity of the plant.

### Combustion air

- The combustion air supply must be warranted. The air opening must not be lockable.
- Minimal free cross section for air opening 6.5 cm<sup>2</sup> per 1 kW boiler output.

### Space requirements

- The cleaning opening on the flue gas collector must be easily accessible.

### Burner mounting

- For mounting of the burner an adapter flange may be required depending on the size of the burner flange. The adaptor flange including screws must be delivered by the burner company.
- The pipes must be fitted in such a way that the boiler door can be opened completely.
- The connections must be flexible and lead in a sufficient large loop to the burner so that the boiler door can be swung out around 90° to the left or right.

The space between the burner pipe and the hinged flange is to be insulated. A line must be routed from the burner to the sight glass to carry cooling air, in order to cool the boiler sight glass and keep it clean. (Delivery by the burner company)

### Electric connection of the burner

- Control voltage 1 x 230 V
- Burner motor 1 x 230 V / 3 x 400 V.
- The burner must be connected to the burner connection plug of the boiler.
- For safety reasons the electrical cable of the burner must be that short that the plug must be removed when swivelling boiler door.

### Sound absorption

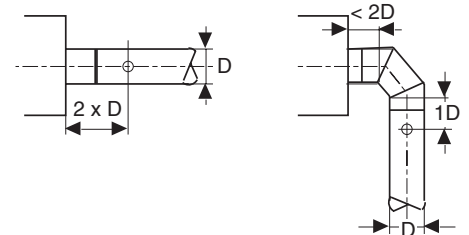
Sound absorption is possible through the following steps:

- Heating room walls, ceiling and floor should be very solidly built, a sound absorber should be mounted into the air inlet. Pipe holders and support should be protected by means of anti-vibration sleeves.
- Install sound absorber hood for burner.
- If living rooms are located above or under the boiler room, vibration absorbers have to be mounted to the boiler base. Pipes and flue gas tube must be connected flexible with compensators.
- Circulating pumps have to be connected with compensators to the pipes.
- For damping of flame noise it is possible to install a silencer into the flue gas tube (space should be foreseen for later installation).

### Chimney/flue gas system

#### Flue gas line

- The flue gas connection pipe between the boiler and the vertical part of the flue gas line should be routed into the vertical part with a 30-45° incline.
- A closable flue gas test port with a circular internal diameter of between 10-21 mm must be installed in the connection tube. The port must protrude beyond the thermal insulation.



#### Flue gas system

- The flue gas must be routed through a tested and approved flue gas line
- The flue gas line must be gas-tight, moisture-insensitive, resistant to corrosion and acids and approved for use with flue gas temperatures of >200°C
- The flue gas line must be suitable for operation at over pressure
- The flue gas line must be routed with a slope so that the flue gas system condensate which forms can flow back into the flue gas heat exchanger
- The cross-sections are to be calculated for boilers without draughting requirements.
- Observe standards EN 13384 and EN 1443

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

General requirements		colourless, free of undissolved substances and foaming agents
pH value at 25 °C		8.2-11.5
Conductance at 25 °C	µS/cm	< 1500
Total alkaline earths (Ca + Mg) <sup>1</sup>	mmol/l	< 0.02
	° dH	< 0.112
	° fH	< 0.19
Silica acidic capacity 8.2 <sup>2</sup> (p-value)	mmol/l	1-5
Silica (SiO <sub>2</sub> )	mg/l	< 100
Phosphate (P <sub>2</sub> O <sub>4</sub> ) <sup>3</sup>	mg/l	5-10
Sodium sulphite (Na <sub>2</sub> SO <sub>3</sub> ) <sup>3</sup>	mg/l	5-10
Iron	mg/l	< 0.2
Copper	mg/l	< 0.1

<sup>1</sup> Previously specified in °dH, conversion: 1 mmol/l = 5.6 °dH (German hardness)

<sup>2</sup> Previously specified as p-value, silica conversion 8.2 1 = p-value 1

<sup>3</sup> Proof only required if respective dosing chemicals are used.

The following value does not have to be verified constantly during plant operation: silica (SiO<sub>2</sub>)

#### Condensate discharge

- A permit for discharge of the flue gas condensate into the sewage system must be obtained from the relevant authority.
- The condensate from the flue gas system can be discharged via the Max-3 condens E flue gas heat exchanger. A condensate trap is no longer needed in the flue gas duct system. However, a corresponding condensate drain must be provided at the bottom of the stack.
- A siphon must be installed on the Max-3 condens E condensate drain (the siphon is not included in the scope of delivery).

#### 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 – due also to 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).

#### Remarks

- 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!
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- 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!

#### Hydraulic integration

If the flue gas heat exchanger is integrated into a separate control and/or pump circuit, this must be equipped with at least a safety thermostat (installed directly downstream of or in the water outlet from the flue gas heat exchanger) and a safety valve. This equipment with a safety valve particularly applies if this circuit is designed so that it can be “shut off”.

**For selection of the calorifier,**  
see “Calorifiers”.