

■ Description

**Hoval CompactGas
Gas boiler**

Boiler

- High-efficiency boiler to EN 14394 for firing of gas
- Downstream heating surface made of **aluFer®** bounded pipe
- Boiler completely welded
- Also suitable for LowNOx burner with extremely low pollutant emissions
- Insulation at the boiler body 80 mm mineral wool mat and special fabric
- Boiler completely cased with steel plate, red powder coated
- Accessible cover from checkered sheet.
- Flue gas outlet, heating flow and heating return connections to the top incl. counter flanges, screws and seals
- Condensate trap

Optional

- Control panel with boiler control and regulators in different designs
- Free-standing calorifier see Calorifiers
- Boiler door swivels to the left

Delivery

- Gas boiler, thermal insulation and casing are delivered separately packed

On site

- Installation of the thermal insulation, casing and condensate trap



Model series

CompactGas type	Output kW
(700)	250-700
(1000)	300-1000
(1400)	420-1400
(1800)	540-1800
(2200)	660-2200
(2800)	840-2800
(3500)	1050-3500
(4200)	1260-4200

Permissions boilers

CompactGas (700-4200)
CE product ID No.: CE 0085 BT0376
according to Directive on appliances burning gaseous fuels 90/396/EG

The boiler complies with the PED Pressure Equipment Directive 2014/68/EU

■ Description

Boiler control with TopTronic® E/E13.4 controller

- Max. operating temperature 90 °C

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 online option)
- Adaptation of the heating strategy based on the weather forecast (with online 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

Note

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

Further information about the TopTronic® E
see "Controls"

Delivery

- Boiler control separately delivered

On site

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

Boiler control with TopTronic® E/E13.5 controller

- Max. operating temperature 105 °C

- Design as boiler control TopTronic® E/E13.4, but:
- Safety temperature limiter 120 °C

Delivery

- Boiler control 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® controller
- 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

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® controller
- 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

■ Part No.



CompactGas Gas boiler (700-4200)

Part No.

Boiler

High-efficiency boiler made of steel for gas firing, without control panel

Design: delivery complete

Boiler, thermal insulation and casing separately packed and delivered

CompactGas type	Output kW	Working pressure bar	
(700)	250-700	6	7013 351
(1000)	300-1000	6	7013 352
(1400)	420-1400	6	7013 353
(1800)	540-1800	6	7013 354
(2200)	660-2200	6	7013 355
(2800)	840-2800	10	7013 356
(3500)	1050-3500	10	7014 800
(4200)	1260-4200	10	7014 321

The minimum boiler operating temperature and the minimum boiler return temperature must imperatively be observed (see technical data).
A return temperature control must be provided!

The condensate trap must imperatively be mounted on the flue gas outlet of the boiler!



Blind flange made of steel incl. setscrews and gasket

for CompactGas (700)	6002 192
for CompactGas (1000)	6030 026
for CompactGas (1400-2800)	6002 156
for CompactGas (3500,4200)	6043 944



Intermediate flange drilled to match burner

made of steel incl. setscrews and gasket to CompactGas (700)	6017 595
CompactGas (1000)	6017 593
CompactGas (1400-2800)	6017 594

■ Part No.

**Boiler controllers
with thermostats****Part No.****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 6015 017
 - incl. 2 burner running time meters integrated 6015 477
 - incl. 2 burner running time meters and pulse counters integrated 6015 478
- for mounting on heat generator side right (standard) or left (configuration on request). Specify mounting variant in purchase order.

**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 6015 016
 - incl. 2 burner running time meters integrated 6015 475
 - incl. 2 burner running time meters and pulse counters integrated 6015 476
- 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

241 149

■ Part No.

**Boiler controller
with TopTronic® E control****Part No.**

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

6040 236

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



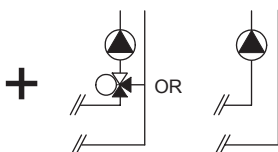
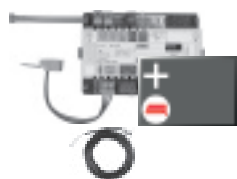
Boiler controller TopTronic® E/E13.5
for mounting on heat generator side right
(standard) or left (configuration on request).
Specify mounting variant in purchase order.
Maximum operating temperature 105 °C
Configuration as boiler controller
TopTronic® E/E13.4

6040 237

■ Part No.

TopTronic® E module expansions
for TopTronic® E basic module heat generator

Part No.



TopTronic® E module expansion heating circuit TTE-FE HK

6034 576

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:

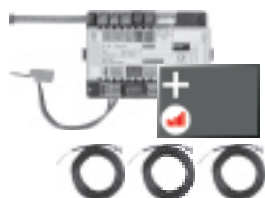
- 1 heating circuit without mixer or
- 1 heating circuit with mixer

incl. fitting accessories
1x contact sensor ALF/2P/4/T L = 4.0 m

Can be installed in:
Boiler control, wall housing, control panel

Note

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

6037 062

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:

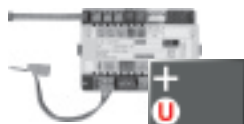
- 1 heating/cooling circuit w/o mixer or
 - 1 heating/cooling circuit with mixer
- in each case incl. energy balancing

incl. fitting accessories
3x contact sensor ALF/2P/4/T L = 4.0 m

Can be installed in:
Boiler control, wall housing, control panel

Note

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



TopTronic® E module expansion Universal TTE-FE UNI

6034 575

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

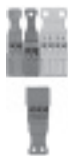
Further information

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

Note

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

■ Part No.



Accessories for TopTronic® E

Part No.

Supplementary plug set

for basic module heat generator (TTE-WEZ) 6034 499
 for controller modules and module expansion TTE-FE 6034 503
 HK

TopTronic® E controller modules

TTE-HK/WW TopTronic® E heating circuit/
 hot water module 6034 571
 TTE-SOL TopTronic® E solar module 6037 058
 TTE-PS TopTronic® E buffer module 6037 057
 TTE-MWA TopTronic® E measuring module 6034 574

TopTronic® E room control modules

TTE-RBM TopTronic® E room control modules
 easy white 6037 071
 comfort white 6037 069
 comfort black 6037 070

Enhanced language package TopTronic® E

one SD card required per control module 6039 253
 Consisting of the following languages:
 HU, CS, SK, RO, PL, TR, ES, HR, SR, PT,
 NL, DA, JA

TopTronic® E remote connection

TTE-GW TopTronic® E online LAN 6037 079
 TTE-GW TopTronic® E online WLAN 6037 078
 SMS remote control unit 6018 867
 System component SMS remote
 control unit 6022 797

TopTronic® E interface modules

GLT module 0-10 V 6034 578
 Gateway module Modbus TCP/
 RS485 6034 579
 Gateway module KNX 6034 581

TopTronic® E wall casing

WG-190 Wall casing small 6035 563
 WG-360 Wall casing medium 6035 564
 WG-360 BM Wall casing medium with
 control module cut-out 6035 565
 WG-510 Wall casing large 6035 566
 WG-510 BM Wall casing large with
 control module cut-out 6038 533

TopTronic® E sensors

AF/2P/K Outdoor sensor 2055 889
 TF/2P/5/6T Immersion sensor, L = 5.0 m 2055 888
 ALF/2P/4/T Contact sensor, L = 4.0 m 2056 775
 TF/1.1P/2.5S/6T Collector sensor, L = 2.5 m 2056 776

System housing

System housing 182 mm 6038 551
 System housing 254 mm 6038 552

Bivalent switch 2061 826

Further information
 see "Controls"

■ Part No.

Part No.



Flow temperature guard

for under floor heating (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

242 902

Immersion thermostat RAK-TW1000.S SB 150
Thermostat with pocket 1/2" - depth of immersion 150 mm brass nickel-plated

6010 082



Vibration elements for boiler socket

For sound and vibration absorption. Made of rubber. Cross-section 80/50 mm.

Delivery

Set of 4 vibration elements per boiler, mounted under the boiler socket

To CompactGas type	Size	Length mm	
(700, 1000)	(4 pcs)	400	6003 741
(1400)	(4 pcs)	500	6003 742
(1800-2800)	(4 pcs)	800	6005 623
(3500,4200)	(8 pcs)	800	6007 967

■ Part No.



Service

Part No.

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.

■ Technical data

CompactGas (700-1800)

Type		(700)	(1000)	(1400)	(1800)
• Nominal output at 80/60 °C	kW	700	1000	1400	1800
• Range of output at 80/60 °C	kW	250-700	300-1000	420-1400	540-1800
• Burner input maximum	kW	725	1037	1458	1865
• Maximum working temperature ¹	°C	105	105	105	105
• Minimum working temperature	°C	75	75	75	75
• Minimum boiler return temperature	°C	35	35	35	35
• Safety temperature limiter setting (water side) ²	°C	120	120	120	120
• Working/test pressure	bar	6/9	6/9	6/9	6/9
• Boiler efficiency at full load at 80/60 °C (related to net calorific value NCV / gross calorific value GCV)	%	96.5/87.0	96.4/86.9	96.0/86.5	96.5/87.0
• Efficiency at partial load 30% (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	97.4/87.7	97.4/87.7	97.3/87.7	97.4/87.7
• Standard efficiency 75/60 °C (according to DIN 4702 part 8) (related to net calorific value NCV / gross calorific value GCV)	%	97.4/87.7	97.4/87.8	97.1/87.5	97.5/87.9
• Stand-by loss at 70 °C	Watt	850	1000	1200	1350
• Flue gas temperature at nominal output at 80/60 °C	°C	94	101	102	99
• Maximum chimney draught	Pa	20	20	20	20
• Flue gas resistance at nominal output 10.5% CO ₂ natural gas 500 m over sea level (Tolerance ± 20%)	mbar	4.9	4.8	4.7	5.7
• Flue gas mass flow at nominal output 10.5% CO ₂ natural gas	kg/h	1133	1623	2271	2923
• Flow resistance boiler ³	z-value	0.012	0.012	0.003	0.003
• Water flow resistance at 20 K	mbar	10.8	22.0	10.8	17.9
• Water flow volume at 20 K	m ³ /h	30.0	42.9	60.0	77.1
• Boiler water content	litres	670	1130	1580	2020
• Insulation thickness boiler body	mm	80	80	80	80
• Weight (incl. casing)	kg	1390	2100	2794	3500
• Weight (without casing)	kg	1250	1960	2654	3200
• Heating surface	m ²	36.52	44.23	68.49	89.51
• Combustion chamber dimension Ø inside x length	mm	584/1835	684/1985	830/2180	830/2301
• Combustion chamber volume	m ³	0.492	0.729	1.179	1.244
• Dimensions				see Dimensions	

¹ Limited by the boiler control T2.2 to 90 °C resp. U3.2 and T0.2 to 105 °C.

² Maximum safety temperature for boiler control T2.2: 110 °C resp. U3.2 and T0.2: 120 °C.

³ Flow resistance boiler in mbar = volume flow (m³/h)² x z

■ Technical data

CompactGas (2200-4200)

Type		(2200)	(2800)	(3500)	(4200)
• Nominal output at 80/60 °C	kW	2200	2800	3500	4200
• Range of output at 80/60 °C	kW	660-2200	840-2800	1050-3500	1260-4200
• Burner input maximum	kW	2280	2901	3626	4351
• Maximum working temperature ¹	°C	105	105	105	105
• Minimum working temperature	°C	75	75	75	75
• Minimum boiler return temperature	°C	35	35	35	35
• Safety temperature limiter setting (water side) ²	°C	120	120	120	120
• Working/test pressure	bar	6/9	10/16	10/16	10/16
• Boiler efficiency at full load at 80/60 °C (related to net calorific value NCV / gross calorific value GCV)	%	96.5/87.0	96.5/87.0	96/86.5	96/86.5
• Efficiency at partial load 30% (EN 303) (related to net calorific value NCV / gross calorific value GCV)	%	97.5/87.8	97.5/87.8	97/87.3	97/87.3
• Standard efficiency 75/60 °C (according to DIN 4702 part 8) (related to net calorific value NCV / gross calorific value GCV)	%	97.5/87.9	97.5/87.9	97/87.4	97/87.4
• Stand-by loss at 70 °C	Watt	1550	1800	2180	2290
• Flue gas temperature at nominal output at 80/60 °C	°C	93	92	93	91
• Maximum chimney draught	Pa	20	20	20	20
• Flue gas resistance at nominal output 10.5 % CO ₂ natural gas 500 m over sea level (Tolerance ± 20%)	mbar	6.5	7.2	7.9	8.5
• Flue gas mass flow at nominal output 10.5 % CO ₂ natural gas	kg/h	3571	4546	5665	6798
• Flow resistance boiler ³	z-value	0.003	0.002	0.002	0.002
• Water flow resistance at 20 K	mbar	26.7	28.8	32	33.8
• Water flow volume at 20 K	m ³ /h	94.3	120.0	150	180.6
• Boiler water content	litres	2534	2844	3553	3628
• Insulation thickness boiler body	mm	80	80	80	80
• Weight (incl. casing)	kg	4455	5702	7980	8200
• Weight (without casing)	kg	4105	5302	7580	7800
• Heating surface	m ²	117.26	142.34	178.33	217.21
• Combustion chamber dimension					
• Ø inside x length	mm	830/3076	922/3272	1050/2998	1050/3308
• Combustion chamber volume	m ³	1.663	2.222	2.596	2.88
• Dimensions		see Dimensions			

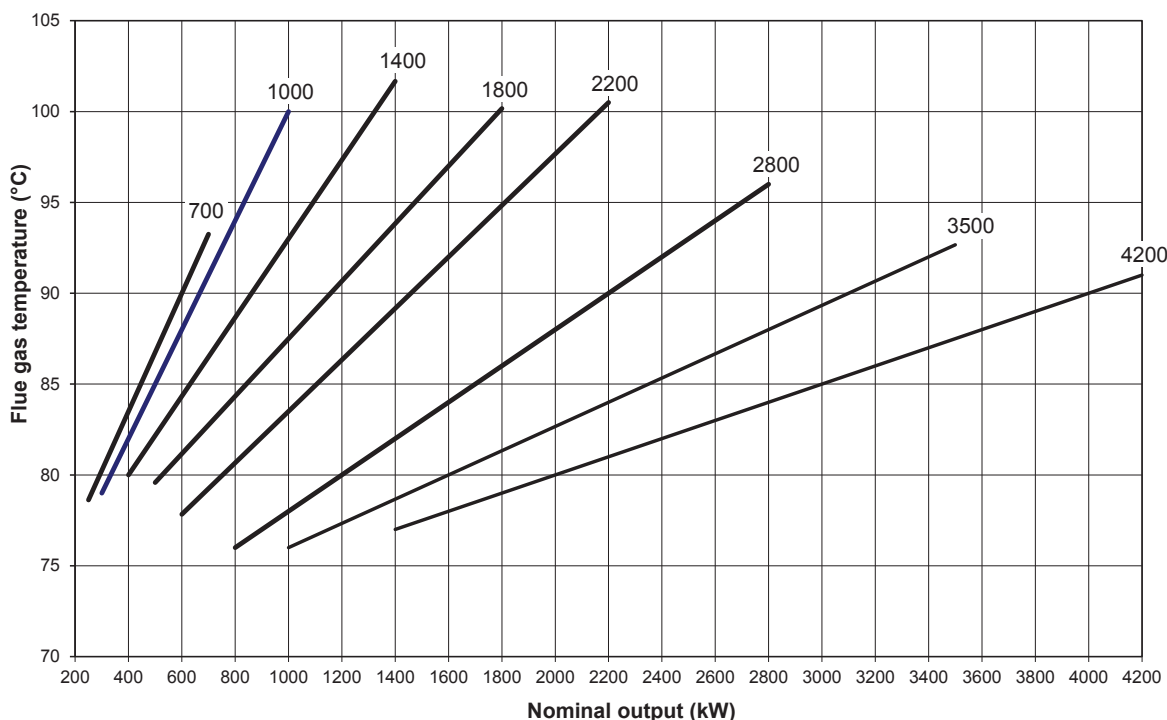
¹ Limited by the boiler control T2.2 to 90 °C resp. U3.2 and T0.2 to 105 °C.

² Maximum safety temperature for boiler control T2.2: 110 °C resp. U3.2 and T0.2: 120 °C.

³ Flow resistance boiler in mbar = volume flow (m³/h)² x z

■ Technical data

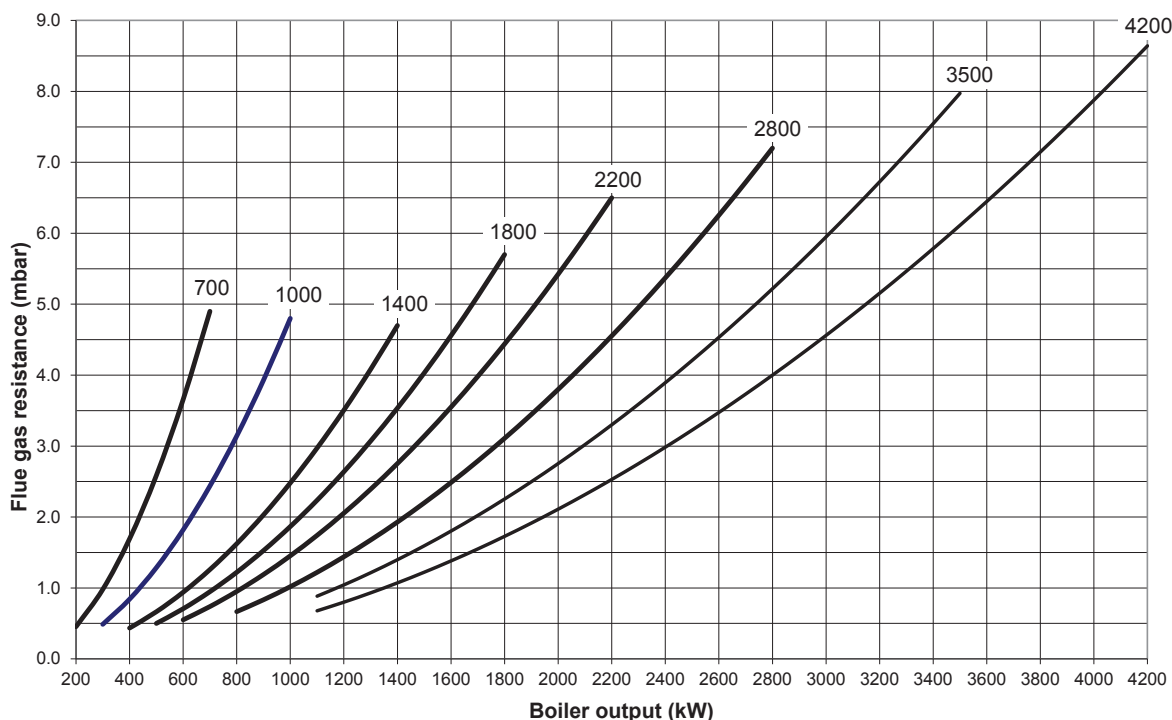
Flue gas and output diagram



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

- Operated with natural gas H, $\lambda = 1.15$ with max. burner output (CO₂ natural gas H = 10.5%)
- A reduction of the boiler water temperature to -10K causes a reduction of the flue gas temperature of approx. 6-8 K.
- A modification of the lambda λ (CO₂ concentration) of ± 0.09 causes a modification of the flue gas temperature of approx. ± 8 K.

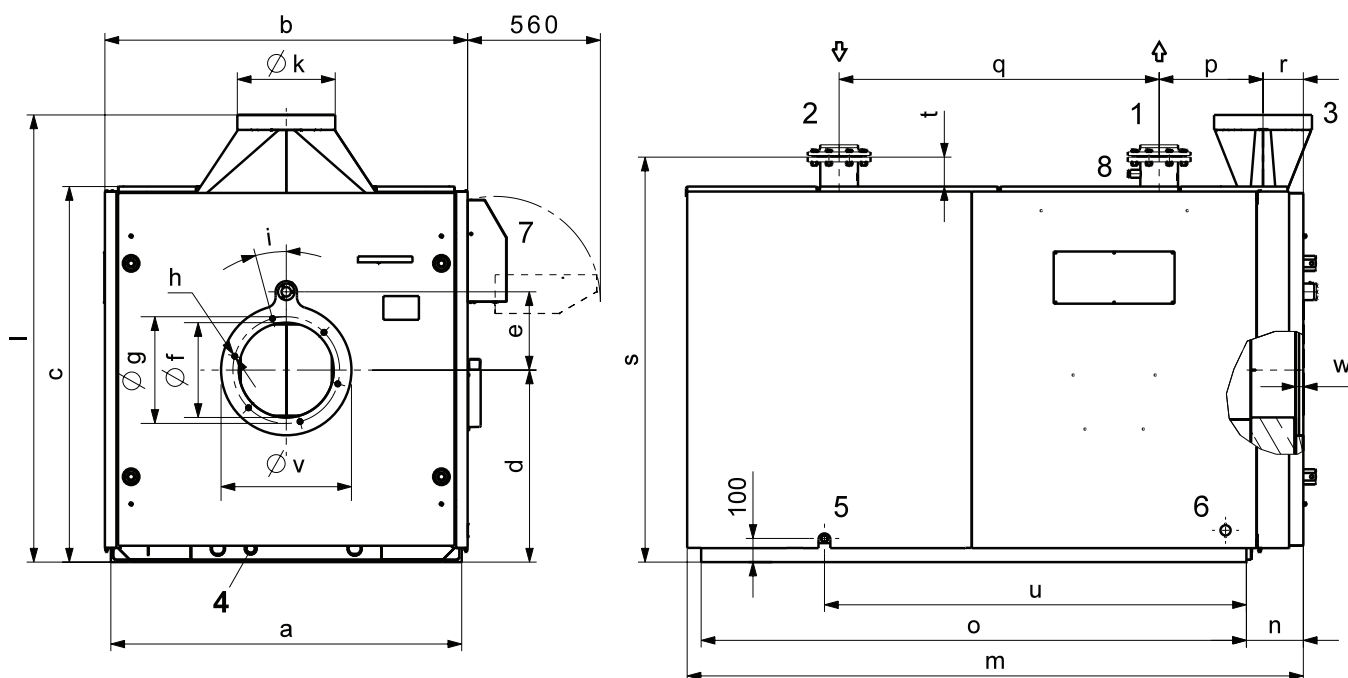
Flue gas resistance



■ Dimensions

CompactGas (700-4200)

(Dimensions in mm)



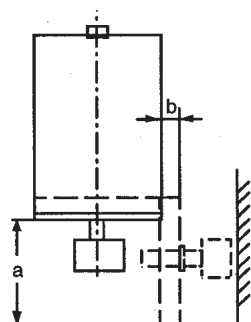
Type	a	b	c	d	e	f	g	h	i	k	l*	m	n	o	p	q	r	s	t	u	v	w
(700)	1100	1150	1175	591	250	290	330	4xM12	15°/45°	303	1436	2229	240	1930	389	1110	170	1271	96	1406	420	31
(1000)	1280	1330	1384	710	310	350	400	6xM12	15°	353	1646	2430	240	2130	438	1210	170	1487	103	1564	500	31
(1400)	1480	1530	1584	810	330	400	450	6xM16	15°	403	1886	2600	240	2300	438	1350	170	1708	124	1780	550	31
(1800)	1580	1630	1684	860	360	400	450	6xM16	15°	453	2038	2790	257	2438	438	1350	187	1808	124	1884	600	48
(2200)	1580	1630	1684	860	360	400	450	6xM16	15°	453	2038	3529	257	3213	438	2125	187	1808	124	2659	600	48
(2800)	1680	1730	1784	910	360	400	450	6xM16	15°	503	2188	3745	257	3430	638	2100	187	1908	124	2799	600	48
(3500)	1850	1928	1995	1018	360	400	450	6xM16	15°	553	2398	3905	337	3510	668	2123	236	2121	126	3141	600x600	65
(4200)	1850	1928	1995	1018	360	400	450	6xM16	15°	603	2398	4205	337	3810	668	2423	236	2121	126	3441	600x600	65

* with condensate trap: + 155 mm
A condensate trap must imperatively be mounted!

1 Flow		2 Return		3 Flue gas outlet
(700)	DN 125, PN 6	(700)	DN 125, PN 6	4 Draining R 1½"
(1000)	DN 125, PN 6	(1000)	DN 125, PN 6	5 Condensate drain D 31/25 mm (on both sides)
(1400)	DN 150, PN 6	(1400)	DN 150, PN 6	6 Electrical connection (on both sides)
(1800)	DN 150, PN 6	(1800)	DN 150, PN 6	7 Control panel
(2200)	DN 150, PN 6	(2200)	DN 150, PN 6	8 Sleeve Rp ¾" with immersion pocket for boiler temperature sensor
(2800)	DN 200, PN 10	(2800)	DN 200, PN 10	
(3500)	DN 200, PN 10	(3500)	DN 200, PN 10	
(4200)	DN 200, PN 10	(4200)	DN 200, PN 10	

Tilting out of the boiler door

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

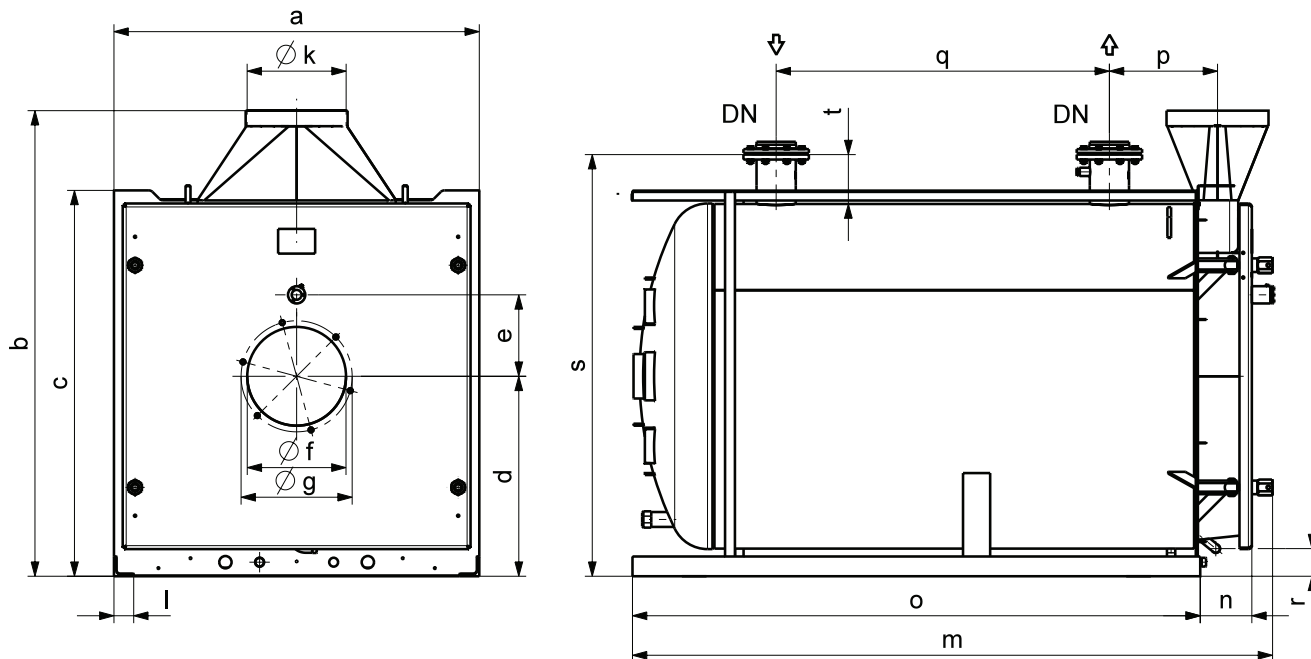


Type	a	b
(700)	875	120
(1000)	1052	120
(1400)	1252	120
(1800)	1337	120
(2200)	1337	120
(2800)	1435	120
(3500)	1700	160
(4200)	1700	160

■ Dimensions

CompactGas (700-4200)

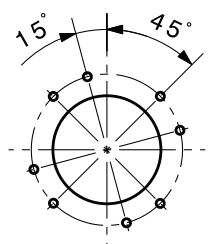
(Dimensions in mm)



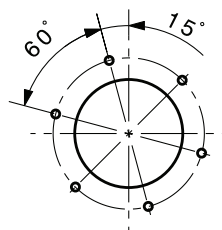
Type	a	b*	c	d	e	f	g	k (inside)	l	m	n	o	p	q	r	s	t	DN
(700)	1100	1436	1153	590	250	290	330	303	80	2212	209	1930	388	1110	64	1271	180	125
(1000)	1280	1646	1363	710	310	350	400	353	80	2423	209	2130	438	1210	96	1487	180	125
(1400)	1480	1886	1563	810	330	400	450	403	80	2593	209	2300	438	1350	112	1708	200	150
(1800)	1580	2038	1663	860	360	400	450	453	80	2731	209	2438	438	1350	112	1808	200	150
(2200)	1580	2038	1663	860	360	400	450	453	80	3506	209	3213	438	2125	112	1808	200	150
(2800)	1680	2188	1763	910	360	400	450	503	80	3723	209	3430	638	2100	112	1908	200	200
(3500)	1850	2398	1995	1018	360	400	450	553	80	3820	315	3450	668	2123	135	2121	200	200
(4200)	1850	2398	1995	1018	360	400	450	603	80	4111	315	3760	668	2423	135	2121	200	200

* with condensate trap: + 155 mm
A condensate trap must imperatively be mounted!

Burner connection dimensions



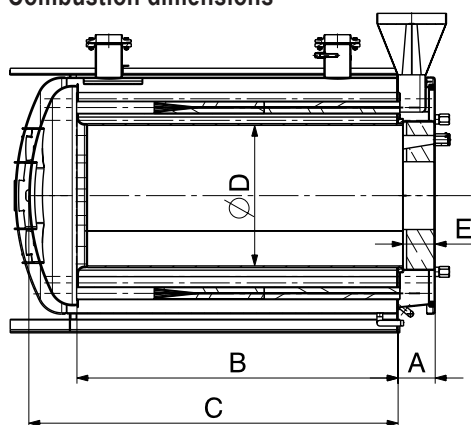
**Screw joint flange
CompactGas (700)**
4 x M12 (15°)
4 x M12 (45°)



**Screw joint flange
CompactGas (1000)**
6 x M12 (15°)

**Screw joint flange
CompactGas (1400-4200)**
6 x M16 (15°)

Combustion dimensions



Type	A	B	C	D	E
(700)	219	1644	1835	584	189
(1000)	219	1748	1985	684	189
(1400)	219	1896	2180	830	189
(1800)	219	1998	2301	830	189
(2200)	219	2773	3076	830	189
(2800)	219	2968	3288	922	189
(3500)	280	3000	3337	1050	256
(4200)	280	3300	3637	1050	256

■ Engineering

Standards and guidelines

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. In particular, attention must be paid to the following stipulations:
- 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 filling and replacement 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 necessary 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.

Heating room

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 cm² per 1 kW boiler output.

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.
- Length and diameter of the burner pipe should be possible to swivel the boiler door incl. burner by 90°.
- So that the boiler door can be swung out around 90° to the left or right, the connections must be flexible and lead in a sufficient large loop to the burner.

The space between burner pipe and swivel flange must be isolated. 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)

Electrical 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:

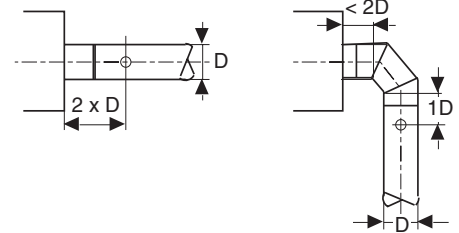
- Heating room walls, ceiling and floor should be very solidly built, a sound absorber should be mounted into the air inlet. Pipe holders and support should be protected by means of anti-vibration sleeves.
- Install sound absorber hood for burner.
- If living rooms are located above or under the boiler room, vibration absorbers have to be mounted to the boiler base. Pipes and flue gas tube must be connected flexibly with compensators.

- 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 tube

- The flue gas tube between boiler and chimney must be connected with an angle of 30-45° to the chimney.



- The flue gas tube must be designed that no condensate can get into the boiler. A condensate trap must imperatively be mounted on the flue gas outlet of the boiler.
- A closeable flue gas measuring socket with an inner diameter of 10-21 mm must be foreseen.

Chimney

- The flue gas system must be humidity-insensitive and acid proof and admitted 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 EN 13384-1 and 2.
- It is recommended to use a secondary air valve for chimney draft limiting. The air valve must be mounted after the flue gas sound absorber (if fitted).

Sanitary installation

- The service water temperature must correspond to the local regulations.
- The safety valve may be adjusted on max. 8 bar.

Regulations of the calorifier

- See Calorifiers

Maximum filling quantity without/with demineralisation based on VDI 2035

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

¹ Total of alkaline earths

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

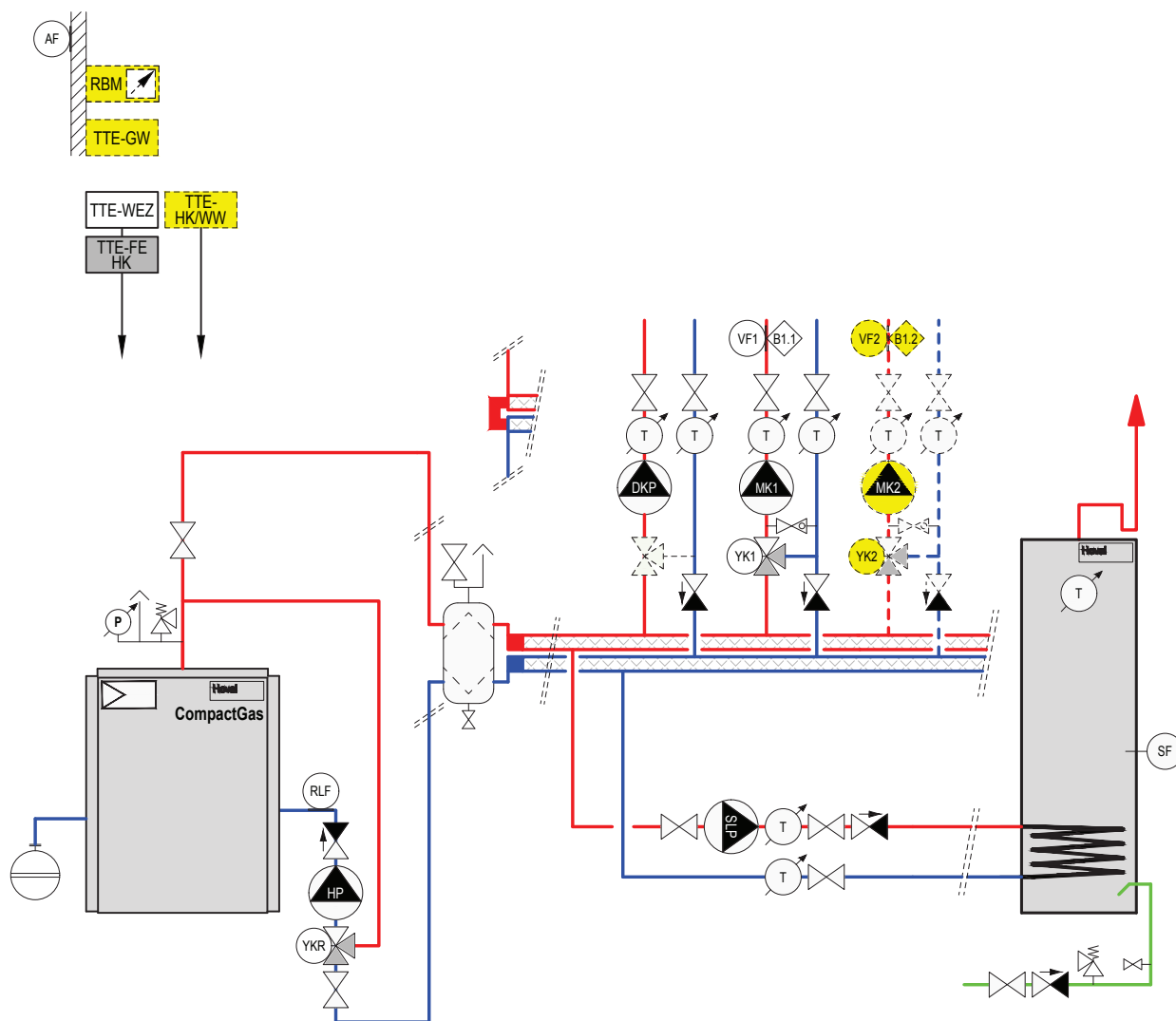
■ Examples

CompactGas (700-4200)

Gas boiler with

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

Hydraulic schematic BDGE020



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

- Option*
- RBM TopTronic® E room control module
 - TTE-GW TopTronic® E Gateway
 - TTE-HK/WW TopTronic® E heating circuit/hot water module

- VF2 Flow temperature sensor 2
- B1.2 Flow temperature guard (if required)
- MK2 Pump mixer circuit 2
- YK2 Actuator mixer 2

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!

1. General

- 1.1 The following Terms and Conditions shall apply to all our present and future contracts for deliveries and other services (even if the said Terms and Conditions are not specifically mentioned in verbal, telephonic or fax communications).
- 1.2 All deviations from the present Terms and Conditions, ancillary verbal agreements and subsequent contractual amendments shall only be valid if they have been confirmed by us in writing.
- 1.3 Buying terms and conditions of the client shall not be valid even if they are not specifically rejected by us. Our Standard Terms and Conditions of Delivery shall be regarded as accepted at the latest upon receipt of our goods and services by the client.
- 1.4 If a provision of the present Terms and Conditions of Delivery proves to be wholly or partially invalid, the contracting parties shall replace the aforesaid provision by a new provision which comes as close as possible to the legal and economic intention of the invalid provision.

2. Offers

- 2.1 Our offers shall be subject to change without notice.
- 2.2 Orders shall only be regarded as accepted when they have been confirmed by us in writing.
- 2.3 Illustrations, drawings and all technical details in catalogues and printed material shall be approximate values as customary within the industry. They shall only be binding if specific reference is made to them in the contract. We shall also reserve the right to make technical and design changes after the conclusion of the contract.
- 2.4 Cost estimates, drawings and other documents shall remain our property and shall be subject to copyright protection; they may not be made available to third parties.

3. Regulations in the country of destination

- 3.1 At the latest at the time of the order, the buyer shall draw our attention to the regulations and standards in force in the country of destination relating to the design of the delivered goods and the operation thereof and also to the execution of services.
- 3.2 Our deliveries and services shall comply with the regulations and standards in the country of destination provided the buyer has drawn our attention thereto in accordance with Section 3.1.
- 3.3 The buyer shall duly inform us of any special application features of goods ordered from us if these differ from our general recommendations.

4. Prices

- 4.1 Our prices shall be ex works, net, excluding packaging.
- 4.2 All ancillary costs, e.g. freight, insurance, export, transit, import and other approvals, licenses and authentications, shall be for the account of the buyer. The buyer shall also bear all taxes, charges, customs duty, etc., which are levied in connection with the contract.
- 4.3 We shall reserve the right to make price adjustments if wage rates or material prices change between the date of the order confirmation and the contractual performance of the contract. Price increases shall normally be notified three months in advance. We shall be bound to the price stated in the order confirmation for a period of three months after the effective date of the price increase.

5. Payment terms

- 5.1 Unless otherwise agreed in writing, our invoices shall be payable within thirty days with no cash discount. Payment shall be deemed to have been made when the amount in question is at our unrestricted disposal on our account in Swiss Franks.
- 5.2 Payment dates shall be observed even if any delays whatsoever occur after shipment of the goods from our works. The buyer shall not be permitted to reduce or withhold payments on account of complaints or counterclaims not recognised by us.
- 5.3 Payments shall also be made if insignificant components are missing but usage of the delivered goods is not rendered impossible as a result or if rectification work has to be carried out on the delivery. We shall be entitled to reject rectification of the defect as long as the buyer has not discharged his/its obligations to us.
- 5.4 If the buyer fails to comply with the agreed payment dates, default interest shall be paid from the agreed due date without a reminder being issued; the aforesaid interest shall be based on the interest rates prevailing at the domicile of the buyer, but shall be not less than four percent above the current discount rate of the Swiss Central Bank.

- 5.5 We shall be entitled to make deliveries of pending orders dependent upon settlement of outstanding claims.

6. Reservation of title

- 6.1 Delivered goods shall remain our property (reserved goods) pending full and complete payment of all present and future claims to which we are entitled regardless of their legal cause. This shall also apply if payments are made in settlement of specifically designated claims.
- 6.2 The buyer shall be entitled to process and sell reserved goods in the ordinary course of business.
- 6.3 If our reserved goods are combined or intermingled with other goods, the buyer shall hereby transfer his/its ownership rights in the new goods or chattels to us upon the conclusion of the contract in the amount of the invoice value of the reserved goods.
- 6.4 If the goods are resold by the buyer, he/it shall hereby transfer to us upon the conclusion of the contract with us his/its claims arising from the aforesaid resale in the amount of the invoice value of the reserved goods.
- 6.5 If the reserved goods are used by the buyer to perform a works or works delivery contract, his/its claim from the aforesaid works or works delivery contract shall hereby be assigned to us in the same amount and on the same date as for the purchase price claim (Section 6.4).
- 6.6 As long as he/it is honouring his/its payment obligations, the buyer shall, however, be authorised to collect his/its resale claim which has been assigned to us. He/it may not dispose of such claims by way of assignment to third parties, however. The empowerment of the buyer to collect the claim may be revoked by us at any time. We shall be entitled to notify third party debtors of the assignment. The buyer shall be entitled to provide us with the necessary information and documents in order to enable us to enforce our rights.
- 6.7 If the value of our securities exceeds our total claims by more than 10 %, we shall be obliged to release securities of our choice at the request of the buyer.
- 6.8 The buyer shall inform us immediately of any pledge or other impediment to our property enforced by third parties.
- 6.9 The buyer shall be obliged to collaborate in measures required to protect our title. He/it shall, in particular, empower us upon the conclusion of the contract to make entries or prior notice of the reservation of title at his/its cost in public registers, books and documents, etc., in accordance with the relevant national laws and shall perform all formalities in this respect.
- 6.10 The buyer shall maintain the reserved goods at his/its cost for the duration of the reservation of title and shall insure the said goods against theft, breakage, fire, water and other risks in our favour. He/it shall also take all steps to ensure that our property claims are neither adversely affected nor rescinded.

7. Delivery periods

- 7.1 Delivery periods and deadlines stated by us shall be approximate unless we have given an express written confirmation of a deadline as binding.
- 7.2 Delivery periods shall be deemed to have been met if notification of readiness to deliver has been sent to the buyer before the end of the delivery period.
- 7.3 The delivery period shall be prolonged if details required for the performance of the contract are not received on time or if they are subsequently changed by the buyer.
- 7.4 The delivery period shall also be reasonably prolonged if impediments arise which we cannot avert despite exercise of the necessary care (e.g. major operational disruptions, industrial disputes, delayed or defective deliveries, force majeure, etc.).
- 7.5 If an agreed delivery date is met by more than 14 days, the buyer shall be obliged to set us a reasonable period of grace. The buyer may only withdraw from the contract if our goods have not been delivered by the end of the said period of grace. Compensation claims for non-performance, delayed performance or any consequential losses shall be excluded unless there was gross negligence on our part.

8. Transfer of risk

- 8.1 Unless expressly agreed otherwise in writing, our "ex works" deliveries shall be made in accordance with the international rules

on the interpretation of commercial clauses of the International Chamber of Commerce (Incoterms) in the version in force on the date of the order confirmation.

- 8.2 The transfer of risk shall be determined by the aforesaid Incoterms.
- 8.3 Insurance against damages of any kind shall be the responsibility of the buyer.
- 8.4 Complaints in connection with the transport shall be immediately notified by the buyer to the last carrier upon receipt of the delivery.
- 8.5 If despatch is delayed at the request of the buyer or for any other reasons not attributable to us, the risk shall pass to the buyer on the original date envisaged for the "ex works" delivery. We shall be entitled to demand payment from this date onwards.

9. Delivery inspection

- 9.1 The buyer shall be required to inspect deliveries immediately. If the goods do not comply with the order or the delivery note or if visible defects are identified, he/it shall be obliged to notify the aforesaid to us in writing within eight days of receipt. Later complaints shall not be recognised. (Re transport damages, cf. Section 8.4)

10. Assembly and operations

- 10.1 The assembly, putting into operation, operation and maintenance of the delivered goods shall be carried out in accordance with our guidelines. They may be executed by our staff or by appropriately trained third parties as agreed with the buyer.
- 10.2 If we require a commissioning certificate for certain product groups, warranty claims for the proper functioning of the equipment can only be enforced if a proper hand-over has been documented by a confirmed commissioning certificate received by us within one month of the hand-over.

11. Warranty

11.1 Warranty period

- 11.1.1 The general warranty period shall be 12 months from the first commissioning but no longer than 18 months from the date on which the relevant goods left our works.

If despatch is delayed for reasons not attributable to us, the warranty shall lapse no later than 18 months after notification of the readiness to deliver.

The general warranty period shall exclude electrical components for which the warranty period shall be 6 months from the first commissioning but no later than 12 months from the date of shipment from our works.

- 11.1.2 We refer to Section 11.6.1 with regard to the warranty period for third party products.
- 11.1.3 The warranty period for components which we have repaired during the warranty period or have delivered as replacement shall be 12 months from the completion of our repair or from the date of the replacement delivery but no longer than the end of a period equivalent to twice the original warranty period as per Section 11.1.1.
- 11.2 Liability for material, design and workmanship defects
- 11.2.1 The contractual condition of the goods shall be based on the condition upon the transfer of risk.
- 11.2.2 Defects shall be notified to us immediately in writing.
- 11.2.3 We shall be liable for all components which can be shown to have become defective or unusable before the end of the warranty period as a result of defective materials, defective design or defective workmanship, with such components being repaired or replaced ex works immediately at our choice.
- 11.3 Liability for warranted qualities
- 11.3.1 Warranted qualities shall only be those which are specifically designated as such in the order confirmation or in the relevant specifications.
- 11.3.2 The aforesaid assurance shall apply at the latest until the end of the warranty period. If a taking-over test has been agreed with the buyer, the assurance shall be deemed as performed if proof of the relevant qualities is furnished during the aforesaid test.
- 11.3.3 If the warranted qualities are not performed or only partially performed, the buyer shall be entitled to an immediate rectification. The buyer shall grant us the necessary time and opportunity for this purpose.
- 11.3.4 If the rectification is abortive or only partially successful, the buyer shall be entitled to a reasonable reduction of the purchase price. If the defect is so serious that it cannot be rectified within

a reasonable period of time, and if deliveries or services for the notified purpose are not usable or are only usable to a much lesser extent, the buyer shall be entitled to refuse acceptance of the defective component or to withdraw from the contract if part-acceptance is economically unreasonable. We shall only be obliged to refund amounts which have been paid to us for the components affected by the aforesaid withdrawal.

11.4 Exclusion of liability for defects

- 11.4.1 Our liability shall exclude damages which cannot be proved to have been sustained as a result of defective material, defective design or defective workmanship.
- 11.4.2 Damages shall therefore be excluded for example which were caused by
- improper work of other persons with regard to planning, site preparation, assembly, operation and maintenance;
 - plant concepts and designs which do not comply with the latest state of the art;
 - non-observance of our guidelines for planning, assembly, commissioning, operations and maintenance;
 - force majeure (e.g. thunderstorms).
- 11.4.3 The following shall be excluded in particular
- corrosion damages (e.g. as a result of aggressive water, unsuitable water treatment, oxygen intakes, emptying the plant over a longer period of time, falling below the dew point, chemical or electrochemical effects, etc.);
 - damages caused by air pollution (e.g. the accumulation of intense dust, aggressive vapours, etc.);
 - damages caused by unsuitable equipment and fuels;
 - damages caused by overcharging, excessive water pressure, scaling, improper electrical connections and inadequate fuse protection.
- 11.4.4 Components shall also be excluded from the warranty which are subject to natural wear and tear (e.g. burner nozzles, combustion chamber inserts, ignition and monitoring components in contact with fire, fireclay and wall facings, fuses, seals and flexible tubes).
- 11.5 Commissioning certificate
- 11.5.1 We hereby draw attention to the due and proper hand-over and - if envisaged - the commissioning certificate in accordance with Section 10.2 as prerequisites for our warranty.
- 11.6 Deliveries and services of sub-contractors
- 11.6.1 Our liability for third party products which form a major part of the delivered goods (e.g. warehouse and conveying equipment, burners, measuring and control equipment, electrical components, flue gas and waste water cleaning equipment) shall - if permissible - be limited to an assignment of our claims against the suppliers of the said third party products.

12. Exclusion of further liability

- 12.1 The buyer shall have no rights and claims for materials, design and workmanship defects or the lack of warranted qualities unless specifically mentioned in Sections 11.1 to 11.6.
- 12.2 All claims for compensation, reduction in the contract price, rescission of the contract or withdrawal from the contract shall be excluded in particular unless these are specifically mentioned. Under no circumstances shall the buyer have any compensation claim for damages which were not sustained by the delivered goods themselves (e.g. replacement costs, cost for establishing the cause of the damage, expertises, production stoppages, production losses, lost orders, lost profit and other direct or indirect damages). The aforesaid liability exclusion shall not apply in the event of gross negligence on our part.
- 12.3 The exclusion as per Section 12.2 shall apply for all breaches of contract and all claims of the buyer regardless of why they were lodged from a legal point of view. It shall therefore also apply for a breach of any ancillary obligations (e.g. inadequate advice, etc.).

13. Jurisdiction

- 13.1 The place of jurisdiction for the buyer and for us shall be Vaduz. We shall be entitled to bring action against the buyer at his/its domicile, however.
- 13.2 The legal relationship between the parties shall be governed by the substantive laws of Switzerland. The application of the UN convention on contracts for the international sale of goods (CISG) shall be excluded.