



**Stokvis R3400/R3600 Boiler  
Gas Fired  
Floor Standing**

**Installation, Operation & Maintenance  
Manual**

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# Safety

## General regulations Application Norms and regulations

### General regulations

This documentation contains important information, which is a base for safe and reliable installation, commissioning and operation of the R3400/R3600 boiler. All activities described in this document may only be executed by authorized companies.

Changes to this document may be effected without prior notice. We accept no obligation to adapt previously delivered products to incorporate such changes.

Only original spare parts may be used when replacing components on the boiler, otherwise warranty will be void.

### Application

The R3400/R3600 boiler may be used for heating and hot water production purposes only. The boiler should be connected to closed systems with a maximum temperature of 100°C (high limit temperature), maximum setpoint temperature is 90°C.

### Norms and regulations

When installing and operating the R3400/R3600 boiler, all applicable norms (European and local) should be fulfilled:

- Local building regulations for installing combustion air and flue gas systems;
- Regulation for connecting the boiler to the electrical appliance;
- Regulations for connecting the boiler to the local gas network;
- Norms and regulations according to safety equipment for heating systems;
- Any additional local laws/regulations with regard to installing and operating heating systems.

### The R3400/R3600 boiler is CE approved and applies to the following European standards:

- 92 / 42 / EEC  
Boiler efficiency directive
- 90 / 396 / EEC  
Gas appliance directive
- 2006 / 95 / EEC  
Low voltage directive
- 2004 / 108 / EEC  
EMC directive
- EN 656  
Gas-fired central heating boilers – Type B boilers of nominal heat input exceeding 70 kW but not exceeding 300 kW
- EN 15417  
Gas-fired central heating boilers - Specific requirements for condensing boilers with a nominal heat input greater than 70 kW but not exceeding 1000 kW
- EN 13836  
Gas fired central heating boilers - Type B boilers of nominal heat input exceeding 300 kW, but not exceeding 1000 kW
- EN 15502-1  
Gas-fired central heating boilers - Part 1: General requirements and tests
- EN 55014-1  
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
- EN 55014-2  
Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard

- EN 61000-3-2  
Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current 16 A per phase)
- EN 61000-3-3  
Electromagnetic compatibility (EMC) - Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current 16 A per phase and not subject to conditional connection
- EN 60335-1  
Household and similar electrical appliances - Safety - Part 1: General requirements
- EN 50165  
Household and similar electrical appliances - Safety - Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections

### Additional national standards

#### Germany:

- RAL - UZ 61 / DIN 4702-8

#### Switzerland:

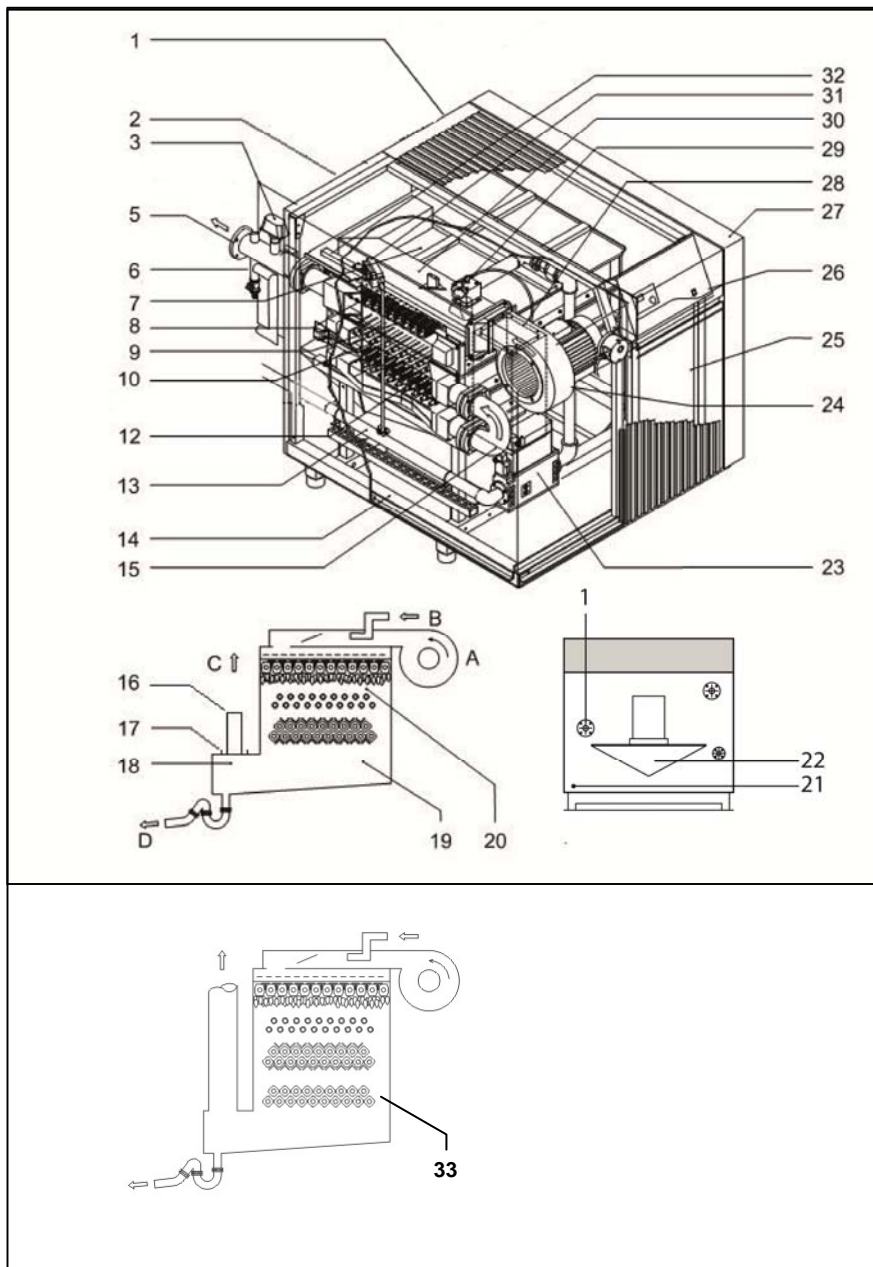
- SVGW

#### Austria:

- 15a V-BG

# Construction

## Layout of boiler Operating principle



### Layout of boiler

The R3400/R3600 boiler consists of the following main components:

- 1 Return water connection
- 2 Flue gas connection
- 3 Water flow switch
- 5 Flow water connection
- 6 Filling/draining valve
- 7 Top plate
- 8 Plenum
- 9 Burner
- 10 1st Heat exchanger
- 12 2nd Heat exchanger
- 13 Gastrain
- 14 Frame
- 15 180° Bend
- 16 Compensator
- 17 Flue gas connection
- 18 Condensate receptacle
- 19 Flue gas receptacle
- 20 Combustion chamber
- 21 Entry electrical connections
- 22 Syphon
- 23 Main gas valve
- 24 Fan
- 25 Electrical box
- 26 Control panel
- 27 Casing
- 28 Air inlet damper
- 29 Butterfly valve
- 30 Main mixing channel
- 31 Pilot gas valve
- 32 Pilot mixing channel
- 33 3rd Heat exchanger (only R3600)

- A Air  
B Gas  
C Flue gasses  
D Condensate

### Operating principle

The R3400/R3600 is a fully modulating boiler. The control unit of the boiler adapts the modulation ratio automatically to the heat demand requested by the system. This is done by controlling the speed of the fan. As a result, the Whirlwind mixing system will adapt the gas ratio to the chosen fan speed, in order to maintain the best possible combustion figures and therewith the best efficiency. The flue gases created by the combustion are transported downwards through

the boiler and leave at the back side into the chimney connection. The return water from the system enters the boiler in the lower section, where is the lowest flue gas temperature in the boiler. In this section condensation takes place. The water is being transported upwards through the boiler, in order to leave the boiler at the top (burner) section. The cross flow working principle (water up, flue gas down) ensures the most efficient combustion results.

The KM628 control unit can control the boiler operation based on:

- fixed temperature (stand alone operation);
- weather compensated operation (with optional controller);
- with 0-10V external influence (temperature or capacity) from a building management system.

# Technical data

## Technical data R3401 - R3405

		R3401	R3402	R3403	R3404	R3405	
Nominal heat output at 80-60°C max/min	kW	656/164	733/183	857/213	971/242	1084/270	
Nominal heat output at 75-60°C max/min	kW	657/164	734/183	858/213	972/242	1085/270	
Nominal heat output at 40/30°C max/min	kW	663/181	741/202	867/236	981/268	1095/298	
Nominal heat input Hi max/min*	kW	702/176	784/196	917/229	1038/260	1159/290	
Efficiency at 80/60°C	%	93.5					
Efficiency at 40/30°C	%	94.5					
Annual efficiency (NNG 75/60°C)	%	100.0					
Annual efficiency (NNG 40/30°C)	%	-					
Standstill losses (T <sub>water</sub> = 70°C)	%	0.2					
Max. condensate flow	l/h	-					
Gas consumption H-gas max/min (10,9 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	64.5/16.2	71.9/18.0	84.1/21.0	95.2/23.8	106.3/26.6	
Gas consumption L-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	84.3/21.1	94.0/23.5	109.9/27.4	124.4/31.2	139.0/34.8	
Gas consumption LPG. max/min (12,8 kWh/kg)	kg/h	54.9/13.8	61.2/15.3	71.6/17.9	81.1/20.3	90.5/22.6	
Gas pressure H-gas	mbar	20		35			
Gas pressure L/LL-gas	mbar	25		35			
Gas pressure LPG	mbar	30/50					
Maximum gas pressure	mbar	100					
Flue gas temperature at 80/60°C max/min	°C	165/70					
Flue gas temperature at 40/30°C max/min	°C	135/60					
Flue gas quantity max/min*	m <sup>3</sup> /h	1423/356	1580/395	1848/462	2091/523	2334/584	
CO <sub>2</sub> level main burner natural gas H/E/L/LL max/min	%	10.0/9.3					
CO <sub>2</sub> level main burner liquid gas P max/min	%	11.0/11.0					
CO <sub>2</sub> level pilot burner natural gas H/E/L/LL max/min	%	10.0/10.2					
CO <sub>2</sub> level pilot burner liquid gas P max/min	%	11.0/11.2					
NOx level max/min	mg/kWh	61.4/22.0					
CO level max/min	mg/kWh	9.8/3.3					
Max. permissible flue resistance max/min	Pa	150					
Water volume	l	50	53	70	75	80	
Water pressure max/min	bar	8/1					
Max. water temperature (High limit thermostat)	°C	100					
Maximum temperature setpoint	°C	90					
Nominal water flow at dT=20K	m <sup>3</sup> /h	28.5	31.6	37.0	41.8	46.8	
Hydraulic resistance at nominal water flow	kPa	46	53	36	43	50	
Electrical connection	V	400					
Frequency	Hz	50					
Mains connection fuse	A	16		20			
IP class	-	IP20					
Power consumption boiler (excl. pump)	W	900	900	1270	1270	1270	
Power consumption 3-step pump (optional)	W	980	1010	1020	1450	1500	
Weight (empty)	kg	675	740	840	950	1070	
Noise level at 1 meter distance	dB(A)	64					
Ionisation current minimum	µA	6					
PH value condensate	-	3.2					
CE certification code	-	CE-0063AR3514					
Water connections	-	DN65 PN16		DN80 PN16			
Gas connection	-	R 2"					DN65 PN16
Flue gas connection	mm	300	350		400		
Air intake connection (for room sealed use)	mm	250	300		355		
Condensate connection	mm	40					

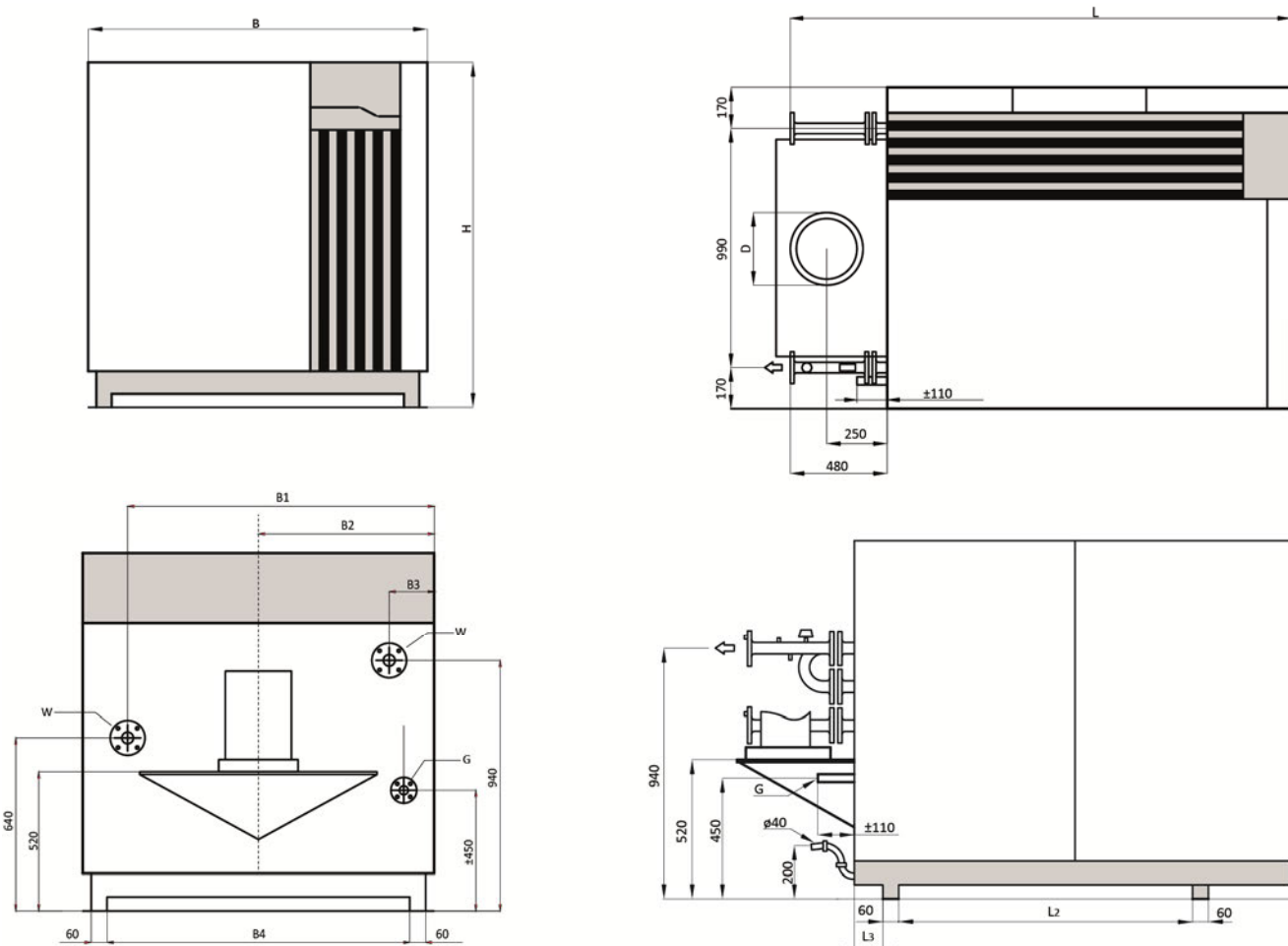
# Technical data

## Technical data R3406

		<b>R3406</b>	
Nominal heat output at 80-60°C max/min	kW	1196/298	
Nominal heat output at 75-60°C max/min	kW	1197/298	
Nominal heat output at 40/30°C max/min	kW	1209/329	
Nominal heat input Hi max/min*	kW	1279/320	
Efficiency at 80/60°C	%	93.5	
Efficiency at 40/30°C	%	94.5	
Annual efficiency (NNG 75/60°C)	%	100.0	
Annual efficiency (NNG 40/30°C)	%	-	
Standstill losses (T <sub>water</sub> = 70°C)	%	0,2	
Max. condensate flow	l/h	-	
Gas consumption H-gas max/min (10,9 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	117.3/29.3	
Gas consumption L-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	153.4/38.4	
Gas consumption LPG. max/min (12,8 kWh/kg)	kg/h	99.9/25.0	
Gas pressure H-gas	mbar	35	
Gas pressure L/LL-gas	mbar	35	
Gas pressure LPG	mbar	30/50	
Maximum gas pressure	mbar	100	
Flue gas temperature at 80/60°C max/min	°C	165/70	
Flue gas temperature at 40/30°C max/min	°C	135/60	
Flue gas quantity max/min*	m <sup>3</sup> /h	2578/645	
CO <sub>2</sub> level main burner natural gas H/E/L/LL max/min	%	10.0/9.3	
CO <sub>2</sub> level main burner liquid gas P max/min	%	11.0/11.0	
CO <sub>2</sub> level pilot burner natural gas H/E/L/LL max/min	%	10.0/10.2	
CO <sub>2</sub> level pilot burner liquid gas P max/min	%	11.0/11.2	
NOx level max/min	mg/kWh	61.4/22.0	
CO level max/min	mg/kWh	9.8/3.3	
Max. permissible flue resistance max/min	Pa	150	
Water volume	l	85	
Water pressure max/min	bar	8/1	
Max. water temperature (High limit thermostat)	°C	100	
Maximum temperature setpoint	°C	90	
Nominal water flow at dT=20K	m <sup>3</sup> /h	51,6	
Hydraulic resistance at nominal water flow	kPa	58	
Electrical connection	V	400	
Frequency	Hz	50	
Mains connection fuse	A	20	
IP class	-	IP20	
Power consumption boiler (excl. pump)	W	1270	
Power consumption 3-step pump (optional)	W	1500	
Weight (empty)	kg	1200	
Noise level at 1 meter distance	dB(A)	64	
Ionisation current minimum	µA	6	
PH value condensate	-	3.2	
CE certification code	-	CE-0063AR3514	
Water connections	-	DN80 PN16	
Gas connection	-	DN65 PN16	
Flue gas connection	mm	400	
Air intake connection (for room sealed use)	mm	355	
Condensate connection	mm	40	

# Technical data

## Dimensions R3401 - R3406



Dimensions		R3401	R3402	R3403	R3404	R3405	R3406
L	mm	2150	2150	2523	2518	2523	2368
L2	mm	700	700	1166	1166	1166	1166
L3	mm	108	108	88	88	88	88
H	mm	1355	1355	1355	1355	1355	1355
B	mm	1330	1330	1130	1130	1330	1330
B1	mm	1160	1210	1003	1053	1203	1253
B2	mm	665	665	565	565	665	665
B3	mm	170	120	127	77	127	77
B4	mm	1146	1146	946	946	1146	1146
D	mm	300	350	350	400	400	400
W	DN	DN65 PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN80 PN16	DN80 PN16
G	R	R 2"	R 2"	R 2"	R 2"	DN65 PN16	DN65 PN16

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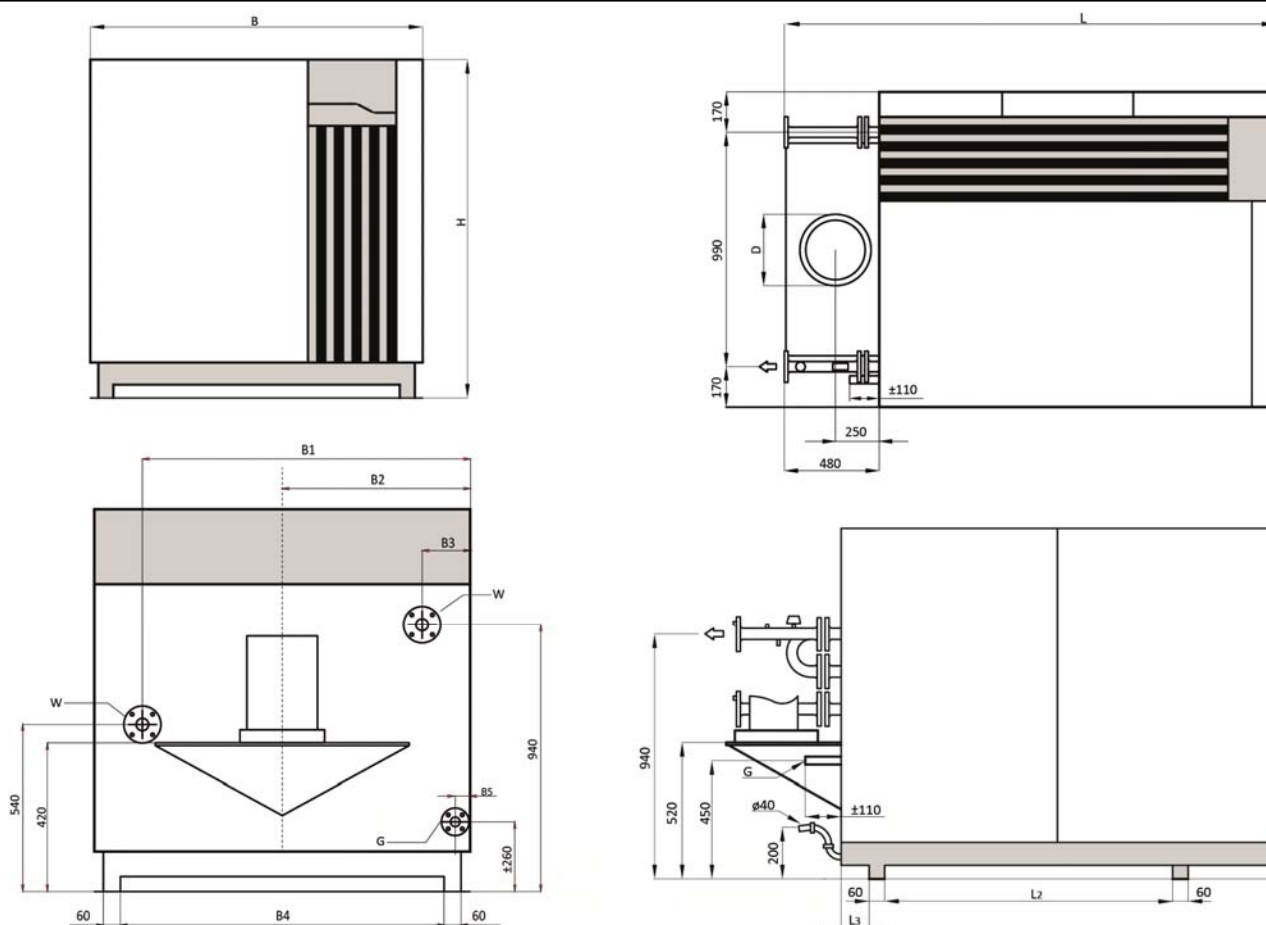
# Technical data

## Technical data R3600 - R3605 Standard

		R3600	R3601	R3602	R3603	R3604	R3605
Nominal heat output at 80-60°C max/min	kW	572/142	639/182	747/212	846/241	945/269	1043/297
Nominal heat output at 75-60°C max/min	kW	576/144	643/184	753/215	852/243	952/272	1050/300
Nominal heat output at 40/30°C max/min	kW	602/159	672/203	786/237	890/268	994/300	1097/331
Nominal heat input Hi max/min*	kW	585/146	653/187	764/218	865/247	966/276	1066/305
Efficiency at 80/60°C	%	97.8					
Efficiency at 40/30°C	%	102.9					
Annual efficiency (NNG 75/60°C)	%	105,1					
Annual efficiency (NNG 40/30°C)	%	109,8					
Standstill losses (T <sub>water</sub> = 70°C)	%	0,3					
Max. condensate flow	l/h	-					
Gas consumption H-gas max/min (10,9 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	53.7/13.4	59.9/17.1	70.1/20.0	79.4/22.7	88.6/25.3	97.8/27.9
Gas consumption L-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	70.3/17.6	78.3/22.4	91.6/26.2	103.7/29.6	115.8/33.1	127.8/36.5
Gas consumption LPG. max/min (12,8 kWh/kg)	kg/h	45.7/11.4	51.0/14.6	59.7/17.1	67.6/19.3	75.5/21.6	83.3/23.8
Gas pressure H-gas	mbar	20					
Gas pressure L/LL-gas	mbar	25					
Gas pressure LPG	mbar	30/50					
Maximum gas pressure	mbar	100					
Flue gas temperature at 80/60°C max/min	°C	85/65					
Flue gas temperature at 40/30°C max/min	°C	59/36					
Flue gas quantity max/min*	m <sup>3</sup> /h	969/242	1076/307	1258/359	1424/407	1590/454	1756/502
CO <sub>2</sub> level main burner natural gas H/E/L/LL max/min	%	10.0/9.3	10.0/9.3				
CO <sub>2</sub> level main burner liquid gas P max/min	%	11.0/11.0	11.0/11.0				
CO <sub>2</sub> level pilot burner natural gas H/E/L/LL max/min	%	-	10.0/10.2				
CO <sub>2</sub> level pilot burner liquid gas P max/min	%	-	11.0/11.2				
NOx level max/min	mg/kWh	32.3/18.8	11.5/19.5				
CO level max/min	mg/kWh	8.2/10.9	27.3/6.5				
Max. permissible flue resistance max/min	Pa	100	150				
Water volume	l	69	73	97	104	110	117
Water pressure max/min	bar	8/1					
Max. water temperature (High limit thermostat)	°C	100					
Maximum temperature setpoint	°C	90					
Nominal water flow at dT=20K	m <sup>3</sup> /h	24,7	27,6	32,2	36,5	40,8	45,0
Hydraulic resistance at nominal water flow	kPa	48	56	38	45	53	60
Electrical connection	V	400					
Frequency	Hz	50					
Mains connection fuse	A	10	16	20			
IP class	-	IP20					
Power consumption boiler (excl. pump)	W	420	900	1270			
Power consumption 3-step pump (optional)	W	940	980	1020	1400	1450	1500
Power consumption speed controlled pump (optional)	W	471	616	561	661	867	956
Weight (empty)	kg	810	890	1040	1150	1280	1410
Noise level at 1 meter distance	dB(A)	64					
Ionisation current minimum	µA	6					
PH value condensate	-	3.2					
CE certification code	-	CE-0063AR3514					
Water connections	-	DN65 PN16		DN80 PN16			
Gas connection	-	R 2"				DN65 PN16	
Flue gas connection	mm	300		350		400	
Air intake connection (for room sealed use)	mm	250		300		355	
Condensate connection	mm	40					

## Technical data

### Dimensions R3600 - R3605 Standard



Dimensions		R3600	R3601	R3602	R3603	R3604	R3605
L	mm	1843	2150	2523	2523	2523	2523
L2	mm	700	590	1166	1166	1166	1166
L3	mm	108	198	88	88	88	88
H	mm	1355	1405	1405	1405	1405	1405
B	mm	1230	1330	1130	1130	1330	1330
B1	mm	1110	1210	1003	1053	1203	1253
B2	mm	615	665	565	565	665	665
B3	mm	120	120	127	77	127	77
B4	mm	1046	1146	946	946	1146	1146
D	mm	300	300	350	350	400	400
W	DN	DN65 PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN80 PN16	DN80 PN16
G	R	R 2"	R 2"	R 2"	R 2"	DN65 PN16	DN65 PN16

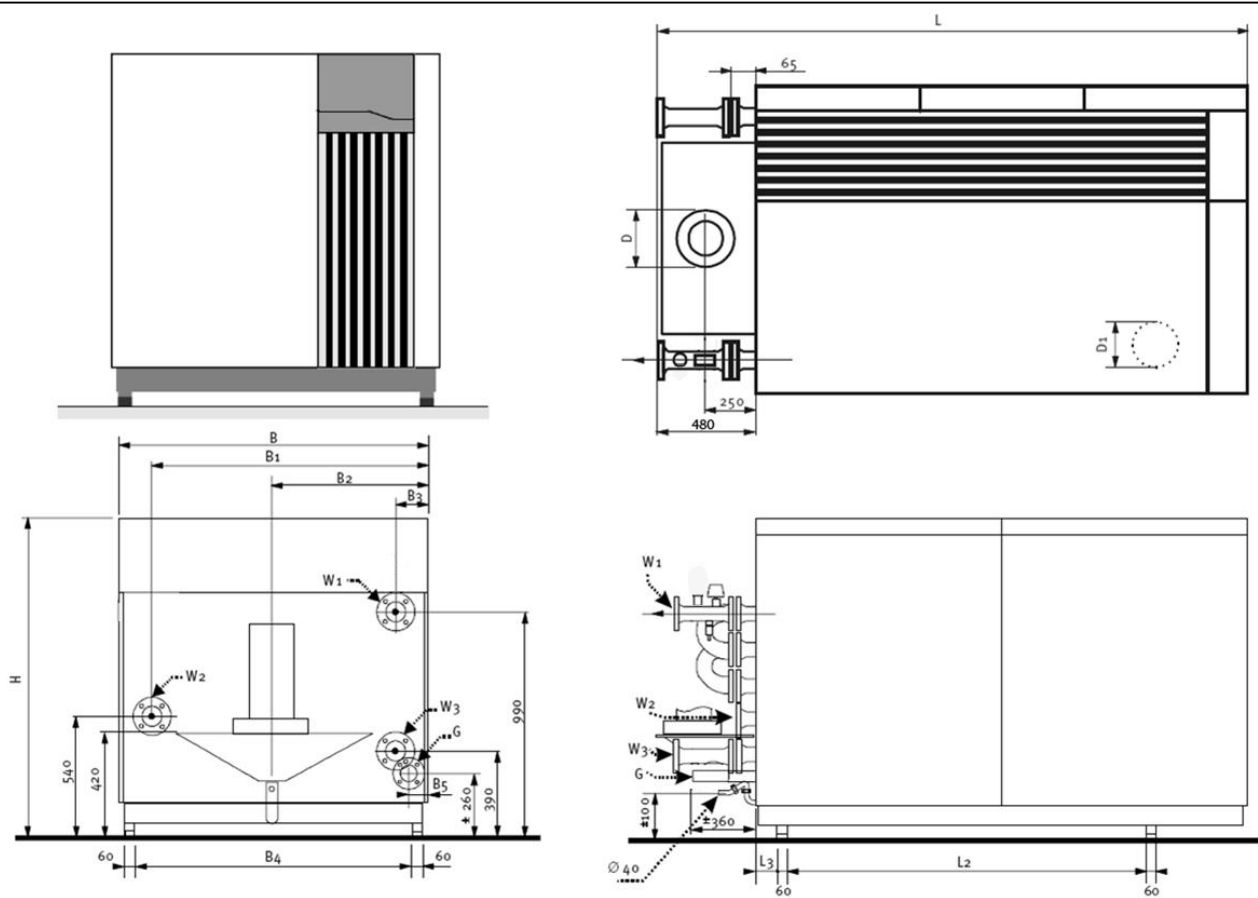
# Technical data

## Technical data R3600 - R3605 Split system

		R3600	R3601	R3602	R3603	R3604	R3605
Nominal heat output at 80-60°C max/min	kW	572/142	639/182	747/212	846/241	945/269	1043/297
Nominal heat output at 75-60°C max/min	kW	576/144	643/184	753/215	852/243	952/272	1050/300
Nominal heat output at 40/30°C max/min	kW	602/159	672/203	786/237	890/268	994/300	1097/331
Nominal heat input Hi max/min*	kW	585/146	653/187	764/218	865/247	966/276	1066/305
Efficiency at 80/60°C	%	97.8					
Efficiency at 40/30°C	%	102.9					
Annual efficiency (NNG 75/60°C)	%	105,1					
Annual efficiency (NNG 40/30°C)	%	109,8					
Standstill losses (T <sub>water</sub> = 70°C)	%	0,3					
Max. condensate flow	l/h	-					
Gas consumption H-gas max/min (10,9 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	53.7/13.4	59.9/17.1	70.1/20.0	79.4/22.7	88.6/25.3	97.8/27.9
Gas consumption L-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	70.3/17.6	78.3/22.4	91.6/26.2	103.7/29.6	115.8/33.1	127.8/36.5
Gas consumption LPG. max/min (12,8 kWh/kg)	kg/h	45.7/11.4	51.0/14.6	59.7/17.1	67.6/19.3	75.5/21.6	83.3/23.8
Gas pressure H-gas	mbar	20					
Gas pressure L/LL-gas	mbar	25					
Gas pressure LPG	mbar	30/50					
Maximum gas pressure	mbar	100					
Flue gas temperature at 80/60°C max/min	°C	85/65					
Flue gas temperature at 40/30°C max/min	°C	59/36					
Flue gas quantity max/min*	m <sup>3</sup> /h	969/242	1076/307	1258/359	1424/407	1590/454	1756/502
CO <sub>2</sub> level main burner natural gas H/E/L/LL max/min	%	10.0/9.3	10.0/9.3				
CO <sub>2</sub> level main burner liquid gas P max/min	%	11.0/11.0	11.0/11.0				
CO <sub>2</sub> level pilot burner natural gas H/E/L/LL max/min	%	-	10.0/10.2				
CO <sub>2</sub> level pilot burner liquid gas P max/min	%	-	11.0/11.2				
NOx level max/min	mg/kWh	32.3/18.8	11.5/19.5				
CO level max/min	mg/kWh	8.2/10.9	27.3/6.5				
Max. permissible flue resistance max/min	Pa	100	150				
Water volume	l	73	73	97	104	110	117
Water pressure max/min	bar	8/1					
Max. water temperature (High limit thermostat)	°C	100					
Maximum temperature setpoint	°C	90					
Nominal water flow at dT=20K	m <sup>3</sup> /h	24,7	27,6	32,2	36,5	40,8	45,0
Hydraulic resistance at nominal water flow	kPa	48	56	38	45	53	60
Electrical connection	V	400					
Frequency	Hz	50					
Mains connection fuse	A	10	16		20		
IP class	-	IP20					
Power consumption boiler (excl. pump)	W	730	900		1270		
Weight (empty)	kg	810	890	1040	1150	1280	1410
Noise level at 1 meter distance	dB(A)	64					
Ionisation current minimum	µA	6					
PH value condensate	-	3.2					
CE certification code	-	CE-0063AR3514					
Water connections	-	DN65 PN16		DN80 PN16			
Gas connection	-	R 2"				DN65 PN16	
Flue gas connection	mm	300		350		400	
Air intake connection (for room sealed use)	mm	250		300		355	
Condensate connection	mm	40					

## Technical data

### Dimensions R3600 - R3605 Split system



Dimensions		R3600	R3601	R3602	R3603	R3604	R3605
L	mm	1843	2150	2523	2523	2523	2523
L2	mm	700	590	1166	1166	1166	1166
L3	mm	108	198	88	88	88	88
H	mm	1355	1405	1405	1405	1405	1405
B	mm	1230	1330	1130	1130	1330	1330
B1	mm	1110	1210	1003	1053	1203	1253
B2	mm	615	665	565	565	665	665
B3	mm	120	120	127	77	127	77
B4	mm	1046	1146	946	946	1146	1146
B5	mm	100	65	115	65	115	65
D	mm	300	300	350	350	400	400
D1	mm	250	250	300	300	355	355
W1	DN	DN65 PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN80 PN16	DN80 PN16
W2	DN	DN65 PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN80 PN16	DN80 PN16
W3	DN	DN65 PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN80 PN16	DN80 PN16
G	R	R 2"	R 2"	R 2"	R 2"	DN65 PN16	DN65 PN16

## Extent of delivery

### Standard boiler Accessories

---

#### Standard boiler

A boiler delivery package contains the following components:

Component	Pcs.	Package
R3400/R3600 Boiler fully assembled and tested	1	Mounted on wooden blocks with wooden border, sealed in PE foil
Adjustable feet	4	Cardboard box on top of boiler
Syphon for condensate connection	1	Cardboard box on top of heatexchanger (under casing)
Operation and Installation manual	1	Map attached to back panel of the boiler
Wiring diagram	1	Map attached to back panel of the boiler

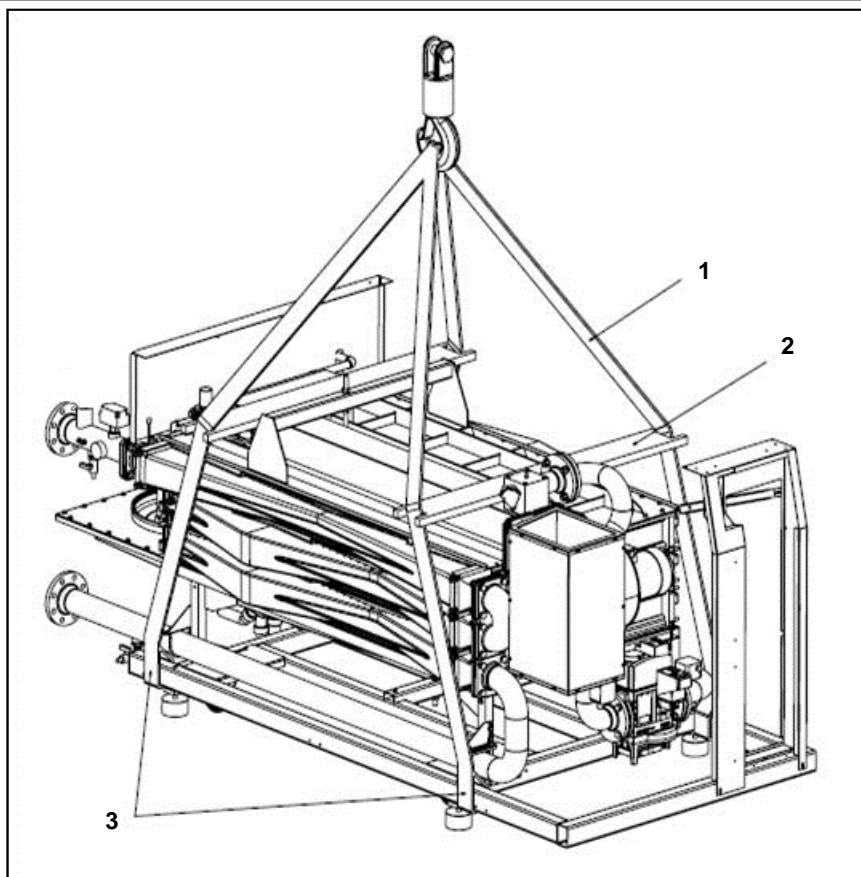
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#### Accessories

On request it is possible to get various options and/or accessories. Ask your supplier for the possibilities.

# Installation

## Transport



### Boiler transport

The R3400/R3600 boiler will be supplied as a complete unit being fully assembled and pre-tested. The boiler can be transported with a pallet truck (at least 1m wide), picking the boiler up from the side.

Whenever necessary, the boiler can be dismantled into smaller parts for easier transport inside the building. The table below shows the main dismantled parts with their weight and dimensions.

When the R3400/R3600 boiler has to be transported with a crane, it is necessary to remove the casing before connecting the boiler to the crane. Always connect the crane to the frame of the boiler by using straps.

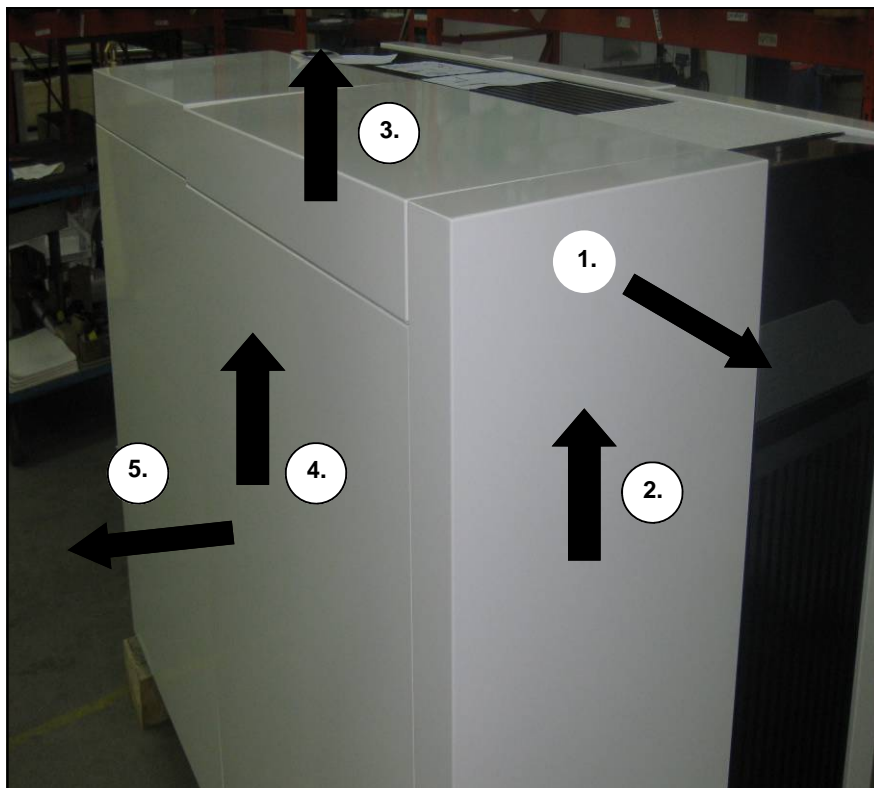
- 1 Hoisting belt (4x)
- 2 Wooden retaining beam (2x)
- 3 Hoisting belt position (4x)

Component		R3401	R3600	R3402 R3601	R3403 R3602	R3404 R3603	R3405 R3604	R3406 R3605
Burner	m [kg]	135	135	140	210	215	220	225
	L [mm]	1010	1010	1010	1420	1420	1420	1420
	W [mm]	1150	1150	1310	1010	1110	1210	1310
	H [mm]	420	420	500	500	500	500	500
1 <sup>st</sup> Heat exchanger	m [kg]	120	120	135	180	185	190	195
	L [mm]	1010	1030	1010	1420	1420	1420	1420
	W [mm]	1150	1150	1310	1010	1110	1210	1310
	H [mm]	160	150	160	160	160	160	160
2 <sup>nd</sup> Heat exchanger	m [kg]	135	135	150	200	200	210	210
	L [mm]	1010	1030	1010	1420	1420	1420	1420
	W [mm]	1150	1050	1310	1010	1110	1210	1310
	H [mm]	160	150	160	160	160	160	160
3 <sup>rd</sup> Heat exchanger (only R3600 series)	m [kg]	-	135	150	200	200	210	210
	L [mm]	-	1030	1010	1420	1420	1420	1420
	W [mm]	-	1050	1310	1010	1110	1210	1310
	H [mm]	-	150	160	160	160	160	160
Frame H for R3600 in ( )	m [kg]	50	50	60	70	70	70	70
	L [mm]	1325	1325	1630	2004	2004	2004	2004
	W [mm]	1165	1165	1266	1066	1066	1266	1266
	H [mm]	460	360	500 (370)	500 (370)	500 (370)	500 (370)	500 (370)
Condensate receptacle	m [kg]	< 25	< 25	< 25	< 35	< 35	< 35	< 35
	L [mm]	1320	1320	1450	1950	1950	1950	1950
	W [mm]	990	990	1070	770	870	970	1070
	H [mm]	400	275	400	400	400	400	400

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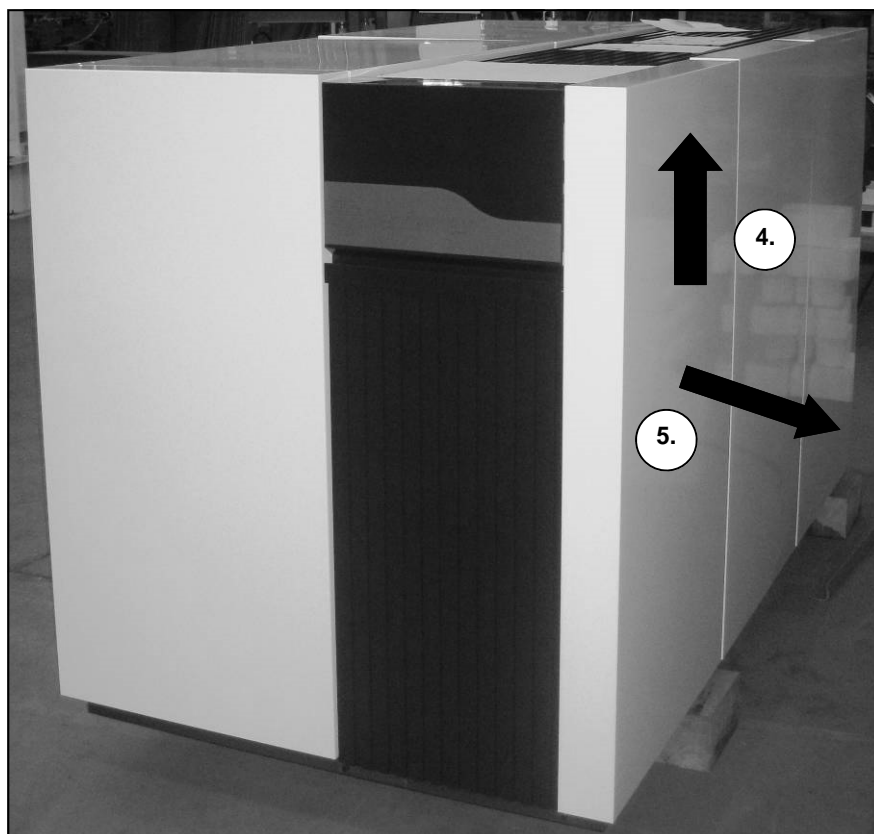
# Installation

## Removing the casing



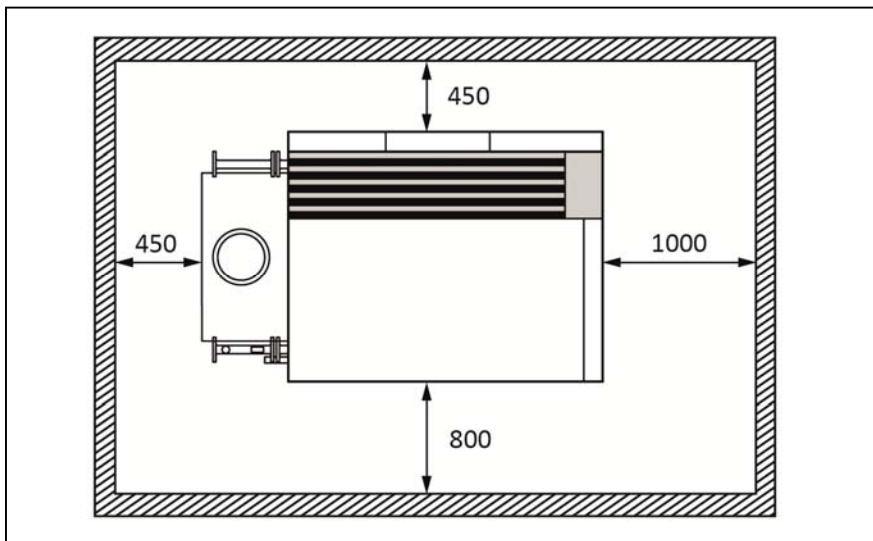
### Boiler transport

Remove the casing before transporting the boiler, in order to avoid damage to the casing parts during transportation. Removing the casing is done as follows:



# Installation

## Boiler installation

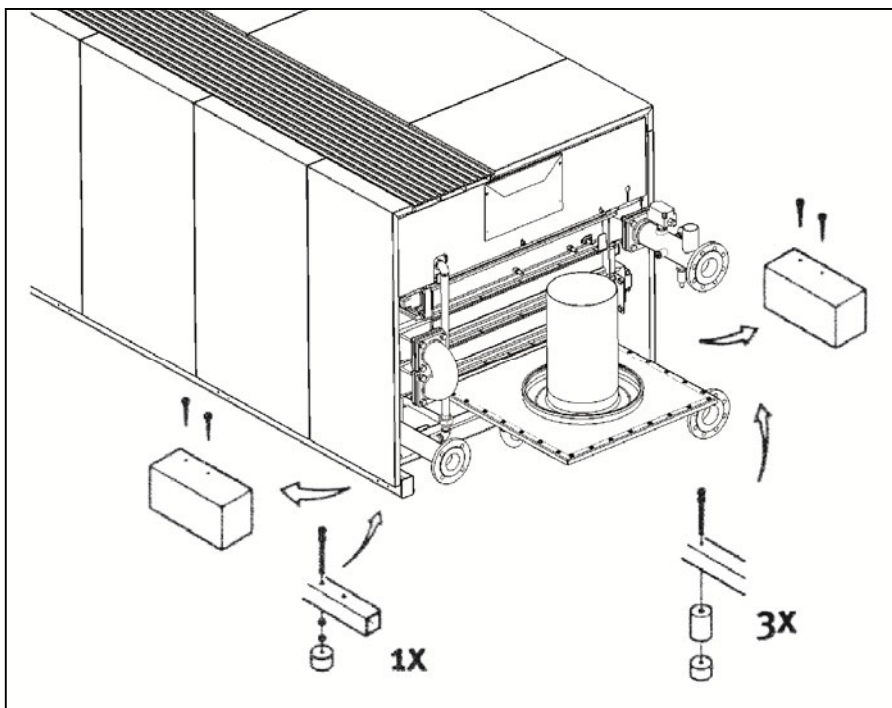


### Boiler installation

The boiler should be positioned in a frost-proof boiler room. If the boiler room is on the roof, the boiler itself may never be the highest point of the installation.

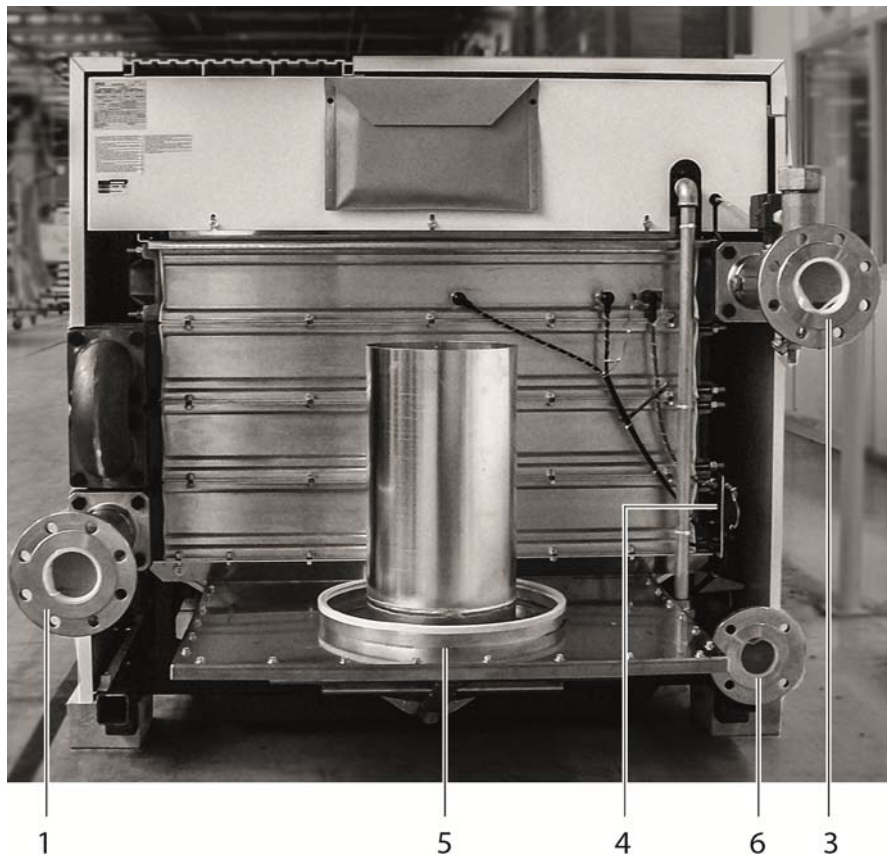
When positioning the boiler, please note the recommended minimum clearance in the picture. When the boiler is positioned with less free space, maintenance activities will be more difficult.

Once the boiler is in the correct position, the wooden blocks should be removed and the adjustable feet (with vibration absorption dampers) should be adjusted to the right height. Water and gas connections should be done after mounting the feet, as they effect the exact height of all connections.



# Installation

## Connecting the boiler



### Connecting the boiler

This chapter will explain how to make all connections to the boiler with regard to:

- Hydraulic connections (1, 3)
- Condensate drain connection (7)
- Gas connection (6)
- Flue gas connection (5)
- Air intake connection (only when using roomsealed, order separately) (2)
- Electrical connection (4)

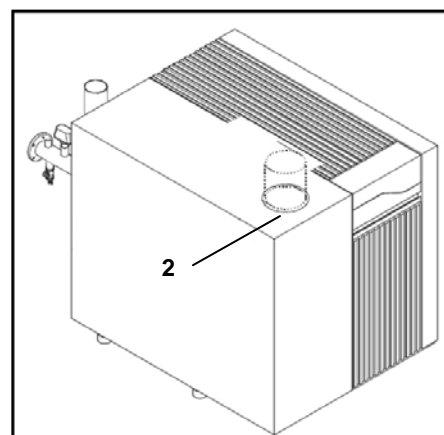
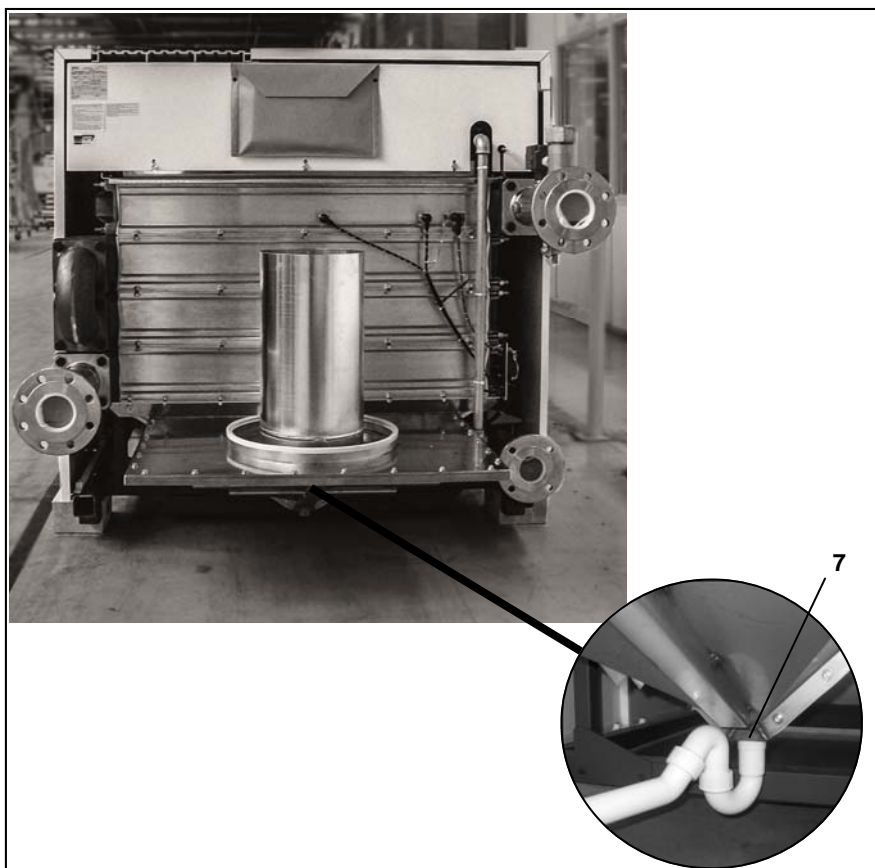
The boiler should always be connected in such a way, that the system applies to all relevant standards and regulations (European, national and local). It's the responsibility of the installer to ensure that all standards and regulations are respected.

### Hydraulic connections

The boiler should always be connected in such a way, that water flow through the boiler can be ensured at all times. Connect the flow (3) and return (1) connection of the system tension free to the boiler connections. If the boiler is used in a system with two return circuits (only R3600 series), the common return becomes the low temperature return, the 2nd return connection is the high temperature return (remove cap/flange before connecting).

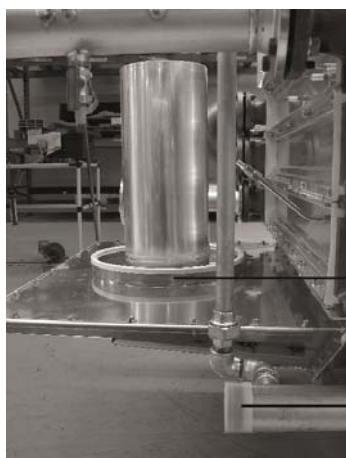
### Condensate connection (7)

After filling with water, the syphon (included in delivery) should be installed to the connection at the bottom of the condensate receptacle. The connection to the draining system should always be done with an open connection, in order to avoid a flooding of the boiler in case of a blocked drain.



# Installation

## Connecting the boiler



### Gas connection (6)

The gas connection must be made by an authorized installer in accordance with the applicable national and local standards and regulations.

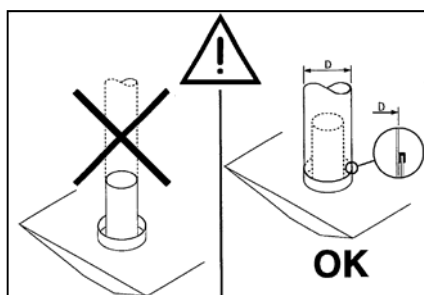
Connect the gas line from the system tension free to the gas connection (6) of the boiler. A gas cock should be mounted directly behind the boiler.

A gas filter can be mounted directly on the gas connection of the boiler.

### Flue gas connection (5)

Regulations for the construction of flue gas systems are very different for each country. It should be ensured that all national regulations with regard to flue gas systems are respected.

Connect the flue gas system to the flue gas connection (5) of the boiler, use fluegas systems with seamless connections only. It's not necessary to make a separate condensate drain for the flue gas system, as the condensate will be drained via the syphon of the boiler. Please note the following issues:



- It's recommended to use stainless steel systems
- The diameter of the flue gas system must be chosen by calculation according to the national regulations
- Construct the flue gas system as short as possible (for maximum length see planner documentation)
- Construct horizontal ways with a minimum angle of 3°

### Air intake connection (3)

When using the boiler roomsealed. The air intake can be connected if the boiler was ordered as roomsealed. The diameter should be calculated according to the national regulations, together with the flue gas system. The total resistance of both systems should never overcome the maximum permissible resistance of the fan inside the boiler (see also chapter: Technical data).

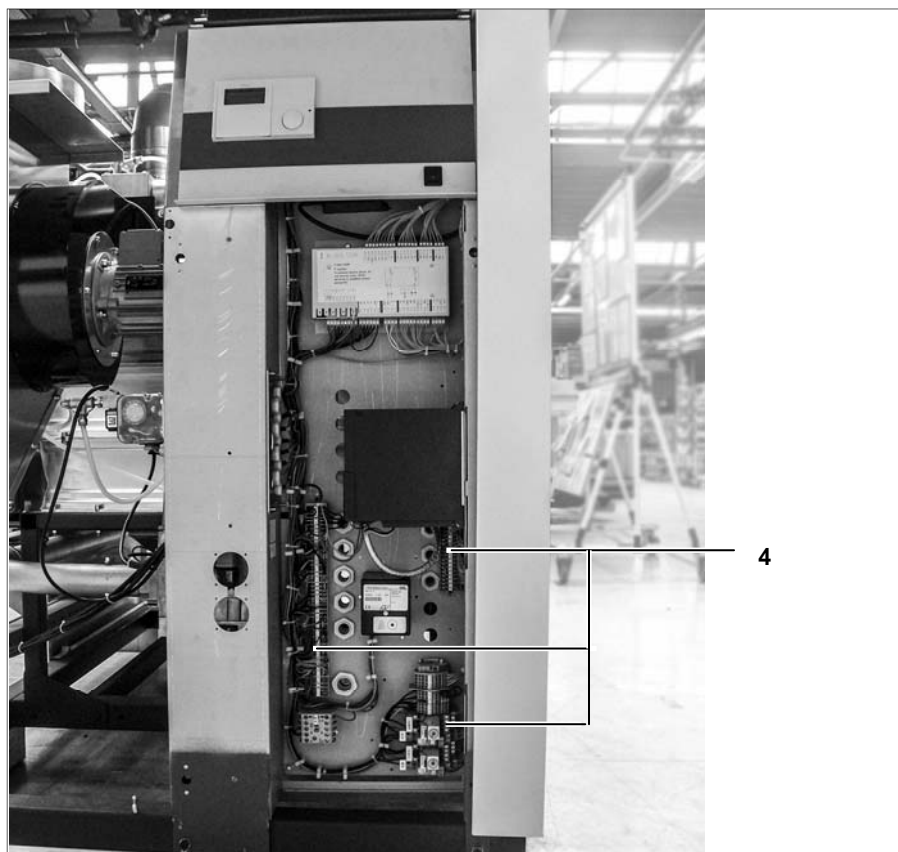
### Electrical connection (4)

The electrical connection must be made by an authorized installer in accordance with the applicable national and local standards and regulations.

For the power supply it's necessary to use a mains isolator switch with a contact opening of at least 3 mm within the boiler room. This switch can be used to switch off the power supply for maintenance purposes.

Cables can be inserted through the cable trays and glands at the back of the electrical panel at the front of the boiler.

Connect all wires to the terminals according to the wiring diagram of the boiler (enclosed in map attached to back panel of the boiler).



# Commissioning

## Water and hydraulic system

Commissioning of the boiler should be carried out by authorized personnel only. Failure to respect this condition makes the guarantee void. A protocol of the commissioning should be filled out (see end of this chapter for example of commissioning protocol).

This chapter explains the commissioning of the boiler with the standard boiler controller. When an additional system controller is installed, please refer to its manual for commissioning the controller.

Boiler output [kW]	Max. sum of alkaline earths [mol/m <sup>3</sup> ]	Max. total hardness [d°H]
600 - 2000	1.5	8.4

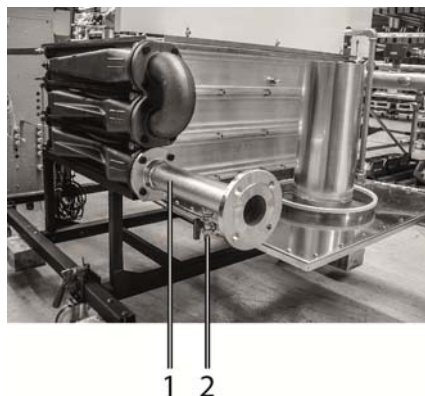
### Water quality

The system should be filled with water with a PH value between 8,0 and 9,5. The chloride value of the water should not exceed 50 mg/l. Entry of oxygene by diffusion should be prevented at all times. Damage to the heat exchanger because of oxygene diffusion will not be taken under warranty.

In installations with higher water volumes, it's necessary to respect the maximum filling and additional volumes with corresponding hardness values as stated in the german VDI2035 standard. In the table you can find the nominal values for filling and additional water for the R3400/R3600 according to the the VDI2035.

The table at the left gives an indication of the relation between the water quality and the maximum water filling volume during the lifetime of the boiler. Consult the original text of the VDI2035 for more detailed information.

Concentrate Ca(HCO <sub>3</sub> ) <sub>2</sub>		Capacity of installation Q (kW)							
		600	800	1000	1200	1400	1600	1800	2000
mol/m <sup>3</sup>	d°H	Maximum water (re)fill volume V <sub>max</sub> [m <sup>3</sup> ]							
≤0.5	≤2.8	-	-	-	75.1	87.6	100.2	122.7	125.2
1.0	5.6	-	-	-	37.6	43.8	50.1	56.3	62.6
1.5	8.4	12.0	16.7	20.9	25.0	29.2	33.4	37.6	41.7
2.0	11.2	9.4	12.5	15.7	18.8	21.9	25.0	28.2	31.3
2.5	14.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0
≥3.0	≥16.8	6.3	8.3	10.4	12.5	14.6	16.7	18.8	20.9



### Water pressure

Open the valves to the system. Check the water pressure in the system. If the water pressure is too low (see table below), increase the pressure up to at least the minimum required water pressure in the table.  
Filling can be done via the fill and drain valve (2) on the return connection (1) of the boiler.

Minimum operating pressure [bar]	Flow temperature [°C]
> 1.5	90
> 1.0	80

### Hydraulic system

Check if the boiler is hydraulically connected to the system in such way, that water flow can be secured at all times during burner operation. The water flow is supervised by the water flow switch in the boiler and a lack of flow will lead to a direct burner stop and lockout of the boiler.

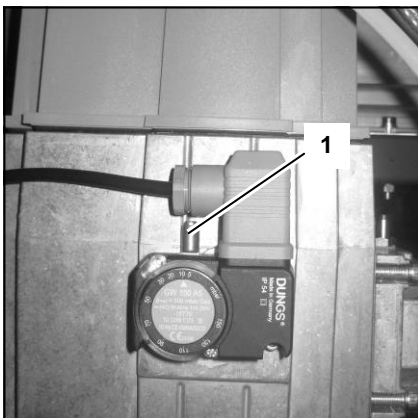
# Commissioning

## Gas supply

### Condensate connection

### Flue and air intake connections

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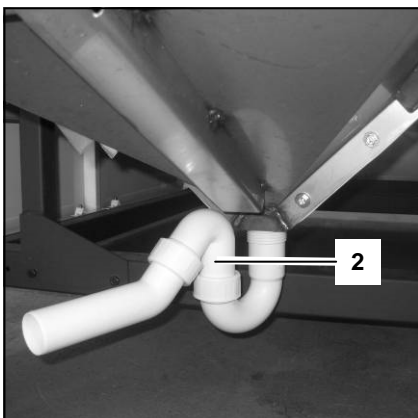


#### Gas supply

Check the gas supply connection to the boiler for tightness. If any leakage is found, reseal the leakage before starting the boiler!

Remove any air between the gas valve and the gas line. This can be done at the test point (1) at the gas pressure switch. Don't forget to close the test point afterwards!

Check the gas type and values with the local gas company, in order to know for which gas type the boiler should be commissioned.



#### Condensate connection

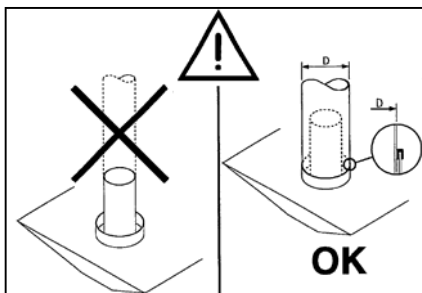
Remove the syphon (2) from the condensate connection. Fill it with water and place it back in the original position. Make sure the syphon is filled before starting the boiler, in order to prevent flue gases discharging through the condensate connection!

#### Flue and air intake connections

Check whether the flue and air intake systems are made according to the national and local regulations. Installations which don't comply with the regulations, are not allowed to be commissioned.

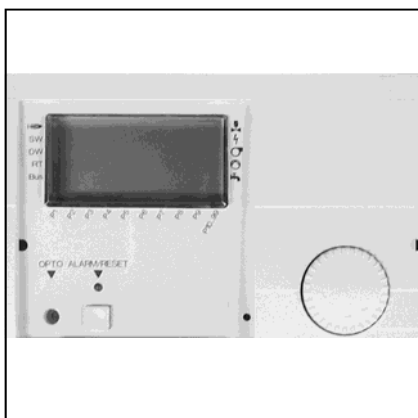
Make sure that all connections are free.

The size of flue gas and air intake connections may not be reduced.



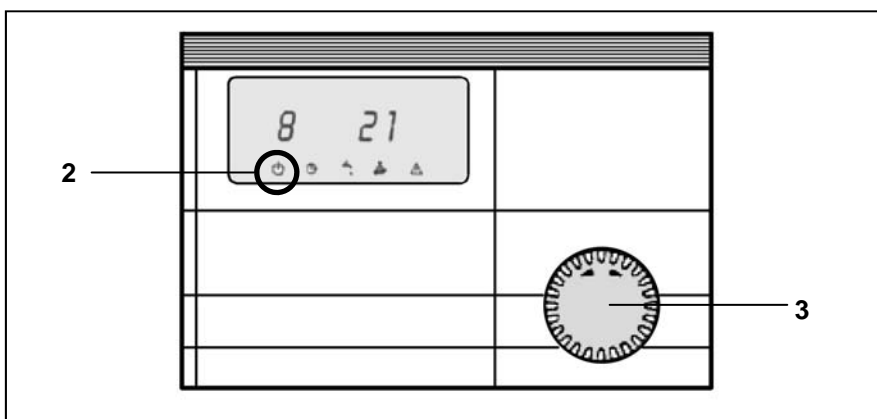
# Commissioning

## Prepare boiler for first startup

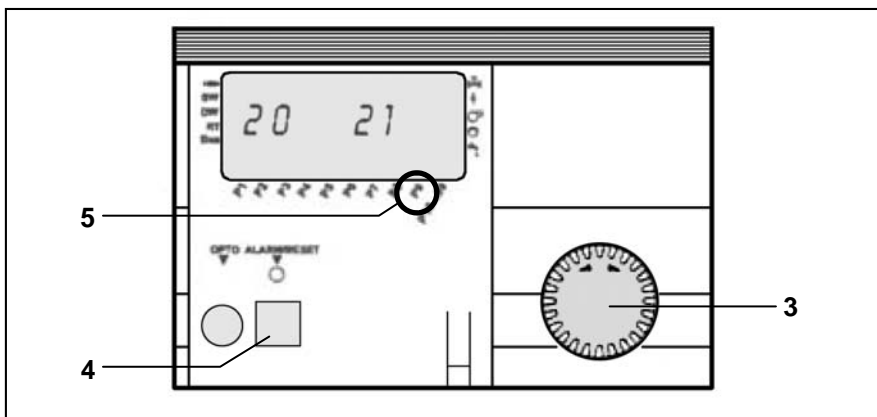


### Prepare boiler for first startup

- Open gas connection;
- Switch on mains isolator switch for power supply to the boiler;
- Switch on boiler with on/off switch (1)



- Make sure the boiler remains in standby operation  $\phi$  (2) use rotational switch (3);
- Check the pump operation: make sure that the direction of the rotation is correct;
- Remove any air from the pump by removing the end cap of the pump motor housing.

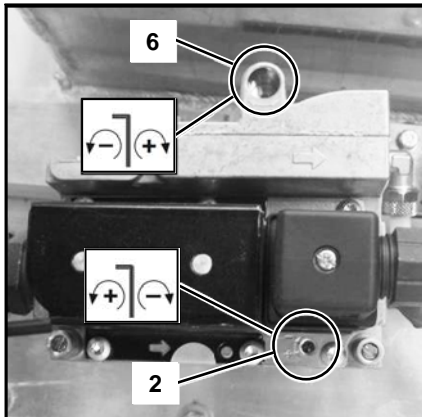


It's recommended to keep the boiler at 50% load for a while after the first startup, as this is the easiest base for starting the combustion analysis. This can be assured as follows:

- Open the lid of the boiler controller;
- Use rotational switch (3) for going to parameter P9 in the menu;
- Change P9 (5) into 50% (push programming button (4), change value with rotational switch (3), push programming button (4) to confirm);
- Close the lid of the boiler controller.

# Commissioning

## Combustion analysis



### Combustion check at full load

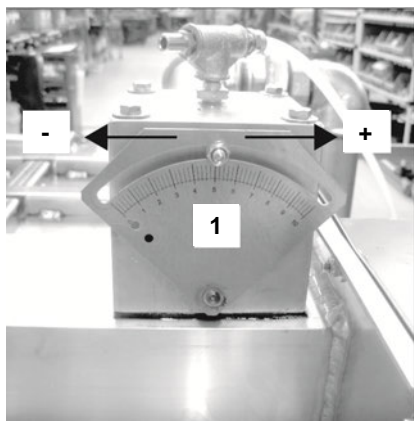
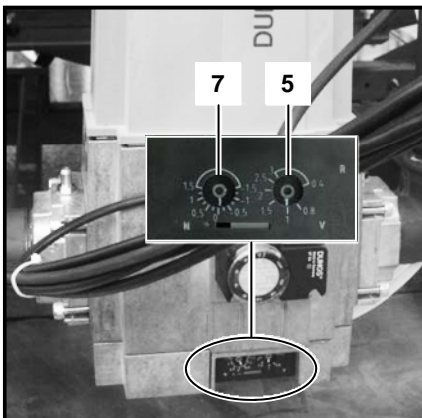
Start the boiler at service mode for full load operation (⚡2). When you have reduced P9 to 50 % (see previous chapter), the boiler will operate at 50% load. Allow the boiler to stabilise the combustion for 3 minutes. Then increase P9 step by step up to 100%.

First check the combustion values of the pilot burner using the measuring tube on the back of the boiler (3). The values can be corrected with the adjustment screw on the pilot gas valve (2).

Then check the combustion values of the main burner using a measuring point in the flue (4). The values can be corrected with the adjustment screw (V) on the main gas valve (5).

**Attention:** When changing between gas types G20/G25/G31 the main burner full load adjustment is done on the butterfly valve (1).

The adjustment is very sensitive, make tiny adjustments! Lower number on the butterfly means more gas, higher number means less gas.



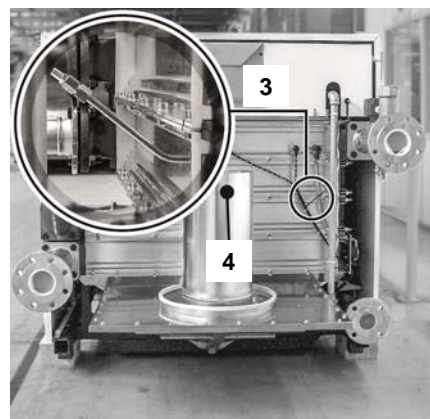
### Combustion check at minimum load

Switch the boiler to service mode for minimum load operation (⚡1). Check the combustion settings the same way as described for full load. The combustion settings for the pilot burner can be adjusted using the adjustment screw on the pilot gas valve (6). The combustion settings for the main burner can be adjusted using the adjustment screw (N) on the main gas valve (7).

### Combustion check at 50% load

An additional reference check of combustion values at 50% load is recommended in order to check if the gas valve is set in such way, that the modulating behaviour is normal. The CO<sub>2</sub> value should be in between the settings of full load and minimum load. CO value should be equal to full load and minimum load values.

Make sure parameter P9 is set back to 100 and switch the boiler to automatic operation (⊖) after the combustion test is finished.



Pilot burner		
Combustion settings for natural gas G20 / G25		
		All boilers
CO <sub>2, max</sub>	%	10.0 ± 0.2
CO <sub>max</sub>	ppm	< 1000
CO <sub>2, min</sub>	%	10.2 ± 0.2
CO <sub>min</sub>	ppm	< 1000

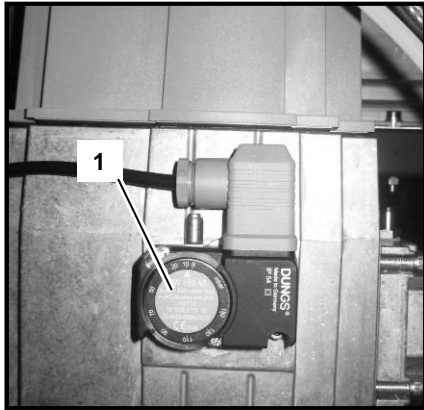
Pilot burner		
Combustion settings for LPG G31		
Parameter change required P19 : 100% ► 86%		
		All boilers
CO <sub>2, max</sub>	%	11.0 ± 0.2
CO <sub>max</sub>	ppm	< 1000
CO <sub>2, min</sub>	%	11.2 ± 0.2
CO <sub>min</sub>	ppm	< 1000

Main burner		
Combustion settings for natural gas G20 / G25		
		All boilers
CO <sub>2, max</sub>	%	10.0 ± 0.2
CO <sub>max</sub>	ppm	< 30
CO <sub>2, min</sub>	%	9.3 ± 0.2
CO <sub>min</sub>	ppm	< 30

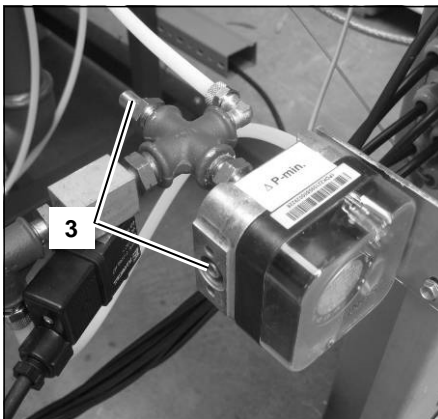
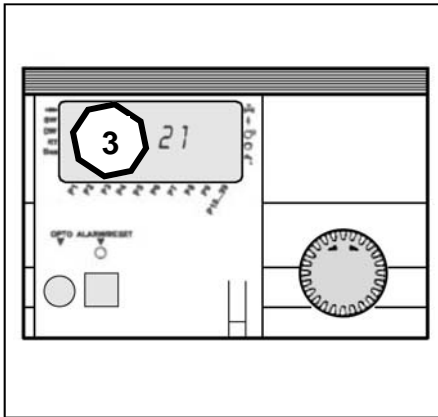
Main burner		
Combustion settings for LPG G31		
Parameter change required P19 : 100% ► 86%		
		All boilers
CO <sub>2, max</sub>	%	11.0 ± 0.2
CO <sub>max</sub>	ppm	< 30
CO <sub>2, min</sub>	%	11.0 ± 0.2
CO <sub>min</sub>	ppm	< 30

# Commissioning

## Air pressure switch

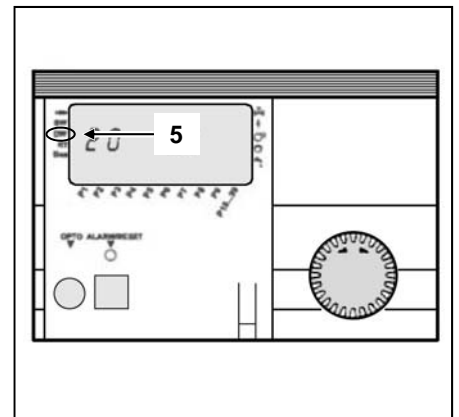
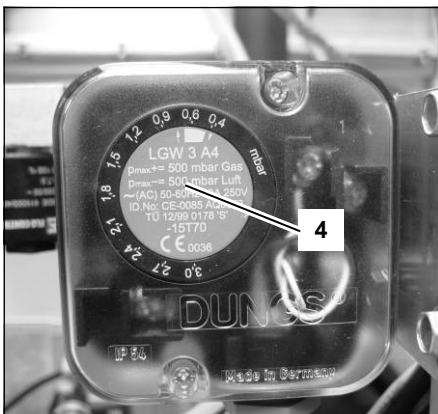


Start the boiler at service mode for full load operation (A2). Check the gas pressure on the inlet of the gas valve: the gas pressure should never go below the required value → see technical data. Slowly close the gas shut off valve before the boiler until the measured gas pressure reaches 75% of the required gas pressure. Adjust the dial on the min gas pressure switch (1) until the boiler locks out on code 3. After the adjustment reopen the gas shut off valve.



### Adjustment Air pressure switch

Connect a pressure gauge to the indicated measuring points on the switch (3). Start the boiler at service mode for minimum load operation (A1). Measure the pressure differential across the switch, this should be  $\approx 0.8$  mbar. Turn the dial on the switch (4) counter-clockwise until the end. Reduce the setting on parameter P17 step by step until the pressure differential is 0.4 mbar. Slowly turn the dial on the switch clockwise until the boiler goes to lockout. Set P17 back to its original setting!! Reset the lockout. Restart the boiler and check if the switch contact closes at 0.4 mbar (indicator at DW in display of the boiler controller (5)). If required, repeat the above procedure.



# Commissioning

## Check water flow

### Check water flow

The water flow through the boiler can be checked with two different methods shown below.

#### $\Delta T$ measurement

Check the temperature difference over the boiler ( $\Delta T$  flow-return) when the boiler is running on 100% load. The nominal  $\Delta T$  is 20K and must be at least between 15K and 25K for secure boiler operation. An indication of the actual flow rate can be found with the following calculation (see table below for nominal data):

$$q_{\text{actual}} = (\Delta T_{\text{nominal}} / \Delta T_{\text{measured}}) * q_{\text{nominal}} \quad [\text{m}^3/\text{h}]$$

#### $\Delta p$ measurement

Check the pressure difference over the boiler ( $\Delta p$  flow-return) when the boiler pump is running (burner on is not required). The nominal  $\Delta p$  for each boiler type can be found in the table below, actual  $\Delta p$  must be within:  $0.35 * \Delta p_{\text{nom}} \leq \Delta p \leq 1.75 * \Delta p_{\text{nom}}$ . An indication of the actual flow rate can be found with the following calculation (see table below for nominal data):

$$q_{\text{actual}} = \sqrt{(\Delta p_{\text{measured}} / \Delta p_{\text{nominal}})} * q_{\text{nominal}} \quad [\text{m}^3/\text{h}]$$

**Flow rate R3401 - R3405 at  $\Delta T$  20K**

		R3401	R3402	R3403	R3404	R3405
Nominal flow	[m <sup>3</sup> /h]	28.5	31.6	37.0	41.8	46.8
$\Delta p$ at nom. flow	[kPa]	46	53	36	43	50

**Flow rate R3406 at  $\Delta T$  20K**

		R3406				
Nominal flow	[m <sup>3</sup> /h]	51,6				
$\Delta p$ at nom. flow	[kPa]	58				

**Flow rate R3600 - R3605 at  $\Delta T$  20K**

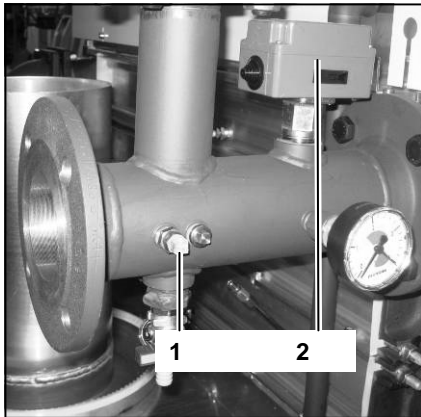
		R3600	R3601	R3602	R3603	R3604	R3605
Nominal flow	[m <sup>3</sup> /h]	24,7	27,6	32,2	36,5 40,8		45,0
$\Delta p$ at nom. flow	[kPa]	48	56	38	45 53		60

# Commissioning

## Check functionality of safety devices

### Gas tightness check

### Boiler shut down

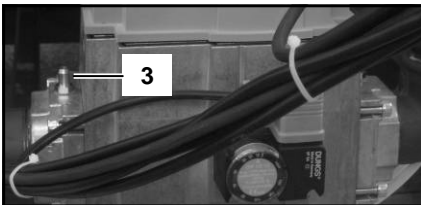


#### Check functionality of safety devices

All safety devices have to be checked on good functioning. Safety devices on a standard boiler are a water flow temperature sensor, water flow switch, minimum gas pressure switch and ionisation electrode. These devices can be checked as described below.

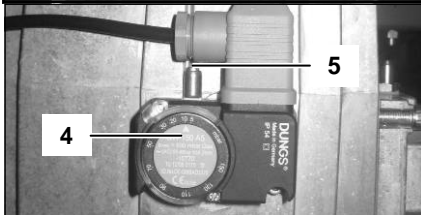
#### Water flow temperature sensor (1)

Disconnect the plug from the sensor while the boiler is switched on. This should result in a lockout no. 12. The lockout should disappear as soon as the plug is placed back in position, the boiler will restart.



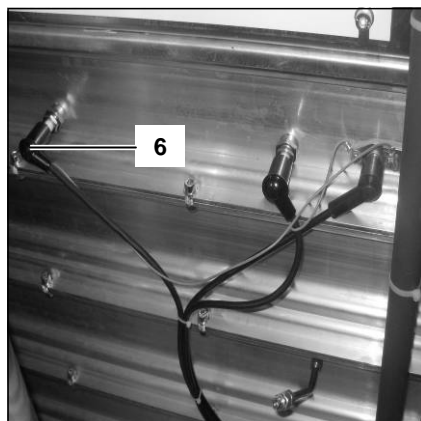
#### Water flow switch (2)

Close (slowly!) the valve in the flow connection to the system while the boiler is running on minimum load. When the valve is almost closed and the water flow is insufficient, the water flow switch will switch off and the boiler will go in lockout 40. Open the valve. A manual reset is necessary.



#### Minimum gas pressure switch (4)

Close the gas cock when the boiler is in standby position (⏻). Open the test point on the gas valve (3) while measuring the gas pressure on the test point of the gas pressure switch (5). The boiler will go in lockout no. 2 when the switch off setting is achieved. Close both test points and open the gas cock.



#### Ionisation electrode (6)

Remove electrical connection from the ionisation electrode while the boiler is running, the boiler will go in lockout no.5. The boiler will try to restart. With the electrical connection removed, the restart will result in lockout no. 4. When the connection is already mounted, the restart will be successful.

Measuring the ionisation current can be done by mounting a multi-meter (set to  $\mu A$ ) in between the ionisation electrode and its electrical connection. The ionisation current should always be above 1.2  $\mu A$ , in normal conditions it will be 6  $\mu A$  and above.

#### Gas tightness check

Check the gas tightness of all sealed connections with an approved soap or electronic gas analyzer, for example:

- Test points
- Bolt connections
- Gaskets of mixing system, etc.

#### Boiler shut down

When the boiler will not be used for longer periods, shut down the boiler by following procedure:

- Switch the boiler in standby operation (⏻)
- Switch off the boiler with the on/off switch (7)
- Disable power supply to the boiler by deactivating the mains isolator switch in the boiler room
- Close the gas supply to the boiler.



# Commissioning

## Commissioning protocol

Commissioning Protocol R3400/R3600			
<b>Project</b>			
Boiler type		Project	
Serial number		Address	
Year		City	
Nominal load (Hi) [kW]		Date	
Nominal output (Hi) [kW]		Engineer	
<b>System</b>			
Water pressure [bar]	Installation:	Roof top	<input type="checkbox"/>
Water pH [-]		Ground floor	<input type="checkbox"/>
Water hardness [d°H]		Basement	<input type="checkbox"/>
Water chloride [mg/l]		Other: .....	<input type="checkbox"/>
Water ΔT full load [°C]	Hydraulics:	Low velocity header	<input type="checkbox"/>
Water Δp <sub>boiler</sub> [kPa]		Plated heat exchanger	<input type="checkbox"/>
Water flow [m³/h]		Bypass boiler	<input type="checkbox"/>
Pump setting [-]		Other: .....	<input type="checkbox"/>
<b>Safety devices</b>			
High limit setting [°C]	Water flow sensor checked		<input type="checkbox"/>
Temp. limiter setting [°C]	Water flow switch checked		<input type="checkbox"/>
Min. gas pressure switch setting [mbar]			
Ignition time burner [sec]			
<b>Combustion analysis</b>			
	<b>100% load</b>	<b>50% load</b>	<b>Min. load</b>
Gas consumption [m³/h]	[m³/h]	[m³/h]	[m³/h]
Gas pressure [mbar]	[mbar]	[mbar]	[mbar]
CO <sub>2</sub> pilot burner [%]	[%]	[%]	[%]
O <sub>2</sub> pilot burner [%]	[%]	[%]	[%]
CO pilot burner [ppm]	[ppm]	[ppm]	[ppm]
NOx pilot burner [ppm]	[ppm]	[ppm]	[ppm]
CO <sub>2</sub> main burner [%]	[%]	[%]	[%]
O <sub>2</sub> main burner [%]	[%]	[%]	[%]
CO main burner [ppm]	[ppm]	[ppm]	[ppm]
NOx main burner [ppm]	[ppm]	[ppm]	[ppm]
T <sub>atmospheric</sub> [°C]	[°C]	[°C]	[°C]
T <sub>fluegas</sub> [°C]	[°C]	[°C]	[°C]
T <sub>water, flow</sub> [°C]	[°C]	[°C]	[°C]
T <sub>water, return</sub> [°C]	[°C]	[°C]	[°C]
Ionisation current [μA]	[μA]	[μA]	[μA]
p <sub>fan</sub> [mbar]	[mbar]	[mbar]	[mbar]
p <sub>top panel</sub> [mbar]	[mbar]	[mbar]	[mbar]
p <sub>combustion chamber</sub> [mbar]	[mbar]	[mbar]	[mbar]
<b>Parameter settings</b>			
P1 Setpoint temperature heating [°C]	P12 Boiler hysteresis [°C]		[°C]
P2 Setpoint temperature DHW [°C]	P17 Fan speed min. load [%]		[%]
P11 Maximum boiler setpoint [°C]	P19 Fan speed 100% load [%]		[%]
<b>Remarks</b>			

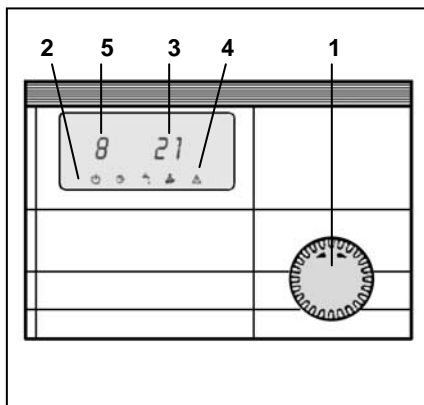
# Operating instructions

## Main menu (operating mode)

## Parameter menu (information/programming mode)

## Changing parameter values

The boiler controller has two menus: the main menu (operating mode) when the lid is closed, and the parameter menu (information/programming mode) when the lid is open. Both menus and possibilities are explained in the next paragraphs.

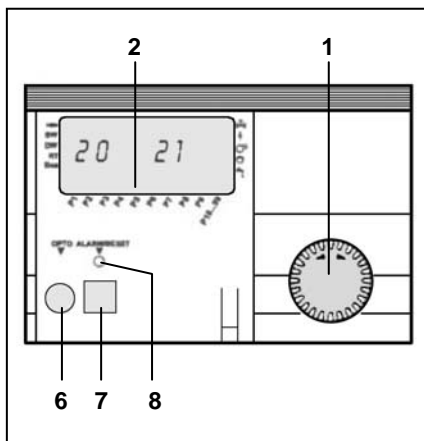


### Main menu (operating mode) → lid closed

With the lid closed and by using the rotational switch (1) clockwise or anticlockwise the boilers' operating mode (2) can be set. The available modes are:

- ⏻ Standby mode (only frost protection)
- 🕒 Automatic operation mode (heating and DHW)
- ☀ Summer mode (only DHW, no heating)
- ⚙ I Service mode minimum load
- ⚙ II Service mode full load (limited by P9)

Besides the operating mode, the display also shows the actual water flow temperature (3) and, in case of a lockout, a warning triangle (4) combined with a lockout code (5). The explanation of the lockout codes can be found in chapter "Lockouts".



### Parameter menu (information/programming mode) → lid open

With the lid open and by using the rotational switch (1) clockwise or anticlockwise it's possible to read/change certain values/parameters from the boiler controller. An arrow at the bottom of the display (2) indicates which parameter has been selected. The available values/parameters are:

- P1 Actual / setpoint water flow temperature [°C]
- P2 Actual / setpoint DHW temperature [°C]
- P3 Actual temperature/capacity setpoint for boiler [°C]\*
- P4 --
- P5 Actual outside temperature [°C] (if sensor is connected)
- P6 Actual fluegas temperature [°C]
- P7 --
- P8 Actual low velocity header temperature [°C] (if sensor is connected)
- P9 Actual / Limit boiler output [%]
- P10 Password for advanced settings

\* P3 shows the actual temperature setpoint of the boiler, either coming from P1/P2 or from an additional (weather compensated) controller or building management system (2-10V). When the boiler capacity is controlled via a cascade manager or building management system (2-10V), P3 shows the actual capacity setpoint of the boiler.

Behind the lid you find an optical I/O connection (6), a reset/programming button (7) and an alarm/programming LED (8). Besides the parameter values/settings, the display also shows additional information with regard to input and output indications to and from the boiler:

### Output indications

- ⚡ Power to main gas valve
- ⚡ Power to ignition transformer
- 🌀 Fan control signal
- 🌀 Power to primary boiler pump
- 🌀 Power to DHW pump/diverter valve

### Input indications

- 🔥 Flame ionisation detected
- SW Water flow switch active
- DW Air pressure switch active
- RT Boiler enabled\*\*
- Bus Bus communication active

\*\*The boiler enable signal is equipped with a jumper in the standard delivery and therefore the boiler will normally be enabled. If a building management system is connected to provide the enable signal to the boiler (jumper should be removed), check the building management system if the boiler remains disabled.

### Changing parameter values

For changing any parameters, in the example parameter P2 (DHW setpoint), the following procedure should be carried through:

- Open the lid (the arrow at the bottom of the display indicates parameter P1)
- Turn the rotational switch clockwise until the arrow indicates parameter P2

- Press the reset/programming button to select (the LED lights up)
- Turn the rotational switch until the desired DHW setpoint value has been reached
- Press the reset/programming button to confirm (the LED goes out)
- Close the lid.

The new value is now activated. All parameters can be changed by following the same procedure as described above.

# Maintenance

## Checklist Replacing the electrodes

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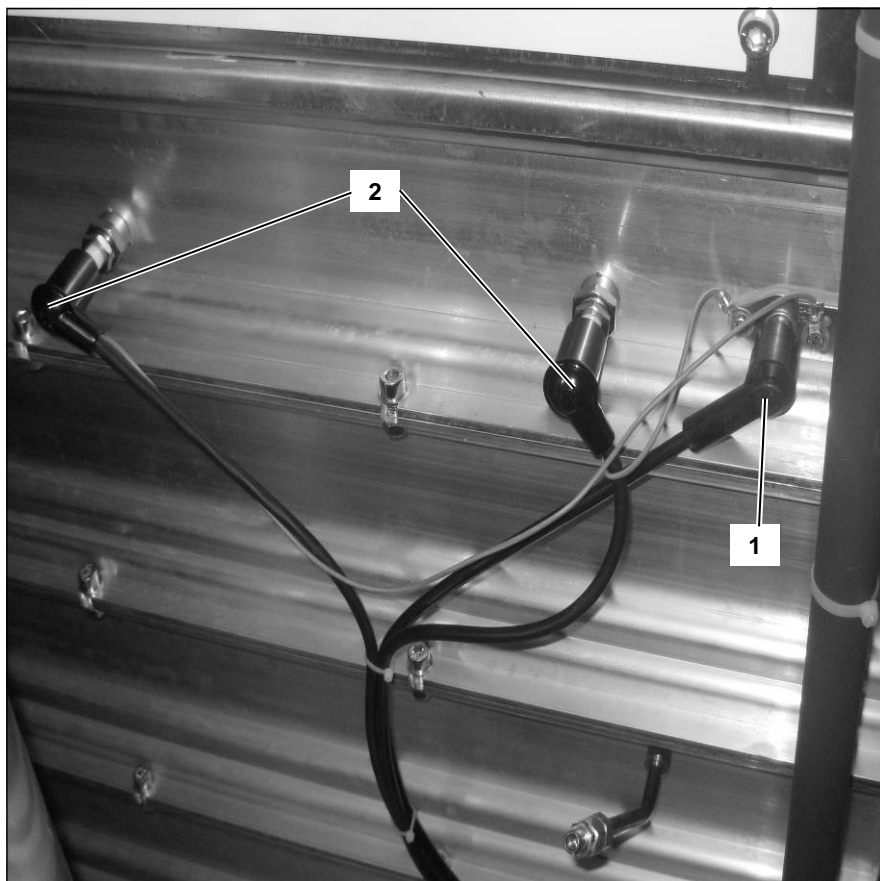
Maintenance of the boiler should be carried out by authorized personnel only.

In order to ensure continued good and safe operation of the boiler, it should be inspected at least once per year. A maintenance protocol should be filled out (see end of this chapter for example of maintenance protocol).

### Checklist

The following activities must be carried out, see following paragraphs for an extensive description of the main activities:

- Replace the ignition and ionisation electrodes;
- Clean the condensate receptacle;
- Clean and refill the syphon;
- Check the water pressure of the system;
- Check the water quality of the system water as well as supply water;
- Check the water flow rate through the boiler;
- Check/correct the combustion values at full and minimum load with a combustion analyzer;
- Check the gas pressure to the boiler;
- Check the tightness of all sealed connections and test points;
- Check the functionality of all safety devices;
- Fill out a maintenance protocol.

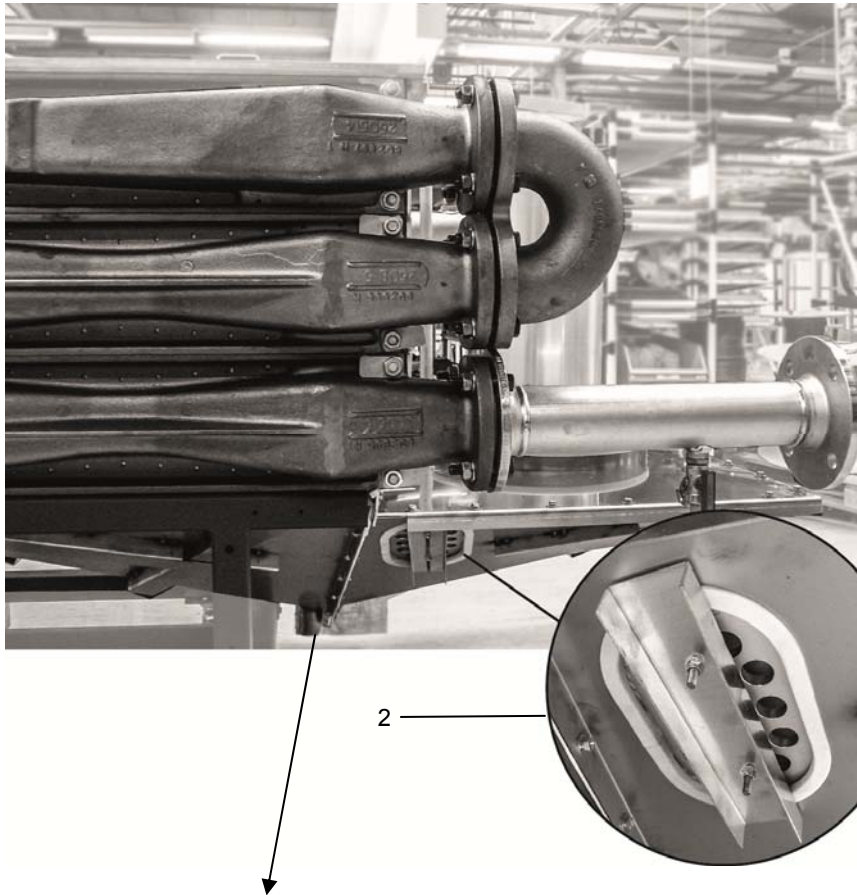


### Replacing the electrodes

The electrodes are positioned on the right hand side of the boiler. Replace the ignition electrode (1) and ionisation electrodes (2) as shown on the picture.

# Maintenance

## Cleaning the condensate receptacle Cleaning and refilling the syphon



### Cleaning the condensate receptacle

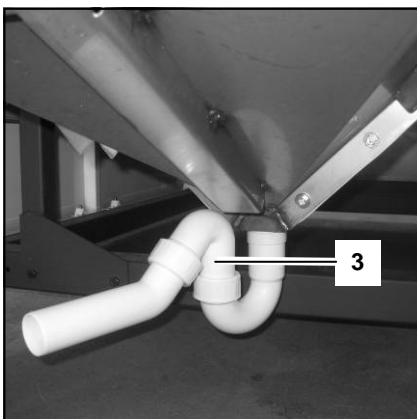
- Remove the inspection hatch (2) to access the inside of the condensate receptacle;
- Clean the receptacle;
- Mount the inspection hatch.

### Water pressure and quality

Check if the water pressure and quality meet the requirements. Consult the chapter “commissioning: water and hydraulic system” for more detailed information.

### Water flow rate

Check if the water flow rate through the boiler is within the limits. Consult the chapter “commissioning: check water flow” for more detailed information.



### Combustion analysis

Check the combustion at full load and minimum load, correct the settings if necessary. An additional reference check at 50% load is recommended. Consult the chapter “commissioning: combustion analysis” for more detailed information.

### Gas pressure

Check the dynamic pressure of the gas supply to the boiler, when the boiler is running at full load. In case of a boiler cascade, all boilers should be running at full load. See technical data for required values.

### Combustion analysis

Check the combustion at full load and minimum load, correct the settings if necessary. An additional reference check at 50% load is recommended. Consult the chapter “commissioning: combustion analysis” for more detailed information.

### Gas pressure

Check the dynamic pressure of the gas supply to the boiler, when the boiler is running at full load. In case of a boiler cascade, all boilers should be running at full load. See technical data for required values.

### Cleaning and refilling the syphon


- Remove the syphon (3) from the condensate connection;
- Clean and fill it with fresh water;
- Mount the syphon back in the original position.

# Maintenance

## Maintenance Protocol

Maintenance Protocol R3400/R3600			
<b>Project</b>			
Boiler type		Project	
Serial number		Address	
Year		City	
Nominal load (Hi) [kW]		Date	
Nominal output (Hi) [kW]		Engineer	
<b>System</b>			
Water pressure [bar]			
Water pH [-]			
Water hardness [d°H]			
Water chloride [mg/l]			
Water $\Delta T$ full load [°C]			
Water $\Delta p_{\text{boiler}}$ [kPa]			
Water flow [m³/h]			
Pump setting [-]			
<b>Safety devices</b>			
High limit setting [°C]		Water flow sensor checked <input type="checkbox"/>	
Temp. limiter setting [°C]		Water flow switch checked <input type="checkbox"/>	
Min. gas pressure switch setting [mbar]			
Ignition time burner [sec]			
<b>Combustion analysis</b>			
	<b>100% load</b>	<b>50% load</b>	<b>Min. load</b>
Gas consumption	[m³/h]	[m³/h]	[m³/h]
Gas pressure	[mbar]	[mbar]	[mbar]
CO <sub>2</sub> Pilot burner	[%]	[%]	[%]
O <sub>2</sub> Pilot burner	[%]	[%]	[%]
CO Pilot burner	[ppm]	[ppm]	[ppm]
NOx Pilot burner	[ppm]	[ppm]	[ppm]
CO <sub>2</sub> Main burner	[%]	[%]	[%]
O <sub>2</sub> Main burner	[%]	[%]	[%]
CO Main burner	[ppm]	[ppm]	[ppm]
NOx Main burner	[ppm]	[ppm]	[ppm]
T <sub>atmospheric</sub>	[°C]	[°C]	[°C]
T <sub>fluegas</sub>	[°C]	[°C]	[°C]
T <sub>water, flow</sub>	[°C]	[°C]	[°C]
T <sub>water, return</sub>	[°C]	[°C]	[°C]
Ionisation current	[µA]	[µA]	[µA]
p <sub>fan</sub>	[mbar]	[mbar]	[mbar]
p <sub>top panel</sub>	[mbar]	[mbar]	[mbar]
p <sub>combustion chamber</sub>	[mbar]	[mbar]	[mbar]
<b>Parameter settings</b>			
P1 Setpoint temperature heating [°C]		P12 Boiler hysteresis [°C]	
P2 Setpoint temperature DHW [°C]		P17 Fan speed min. load [%]	
P11 Maximum boiler setpoint [°C]		P19 Fan speed 100% load [%]	
<b>Remarks</b>			

# Lockouts

In case of a lockout, a warning triangle () and a flashing error code appears on the display. The cause of a fault should first be determined and eliminated before the boiler is being reset. In case the lockout appears more than twice within 6 minutes or maintains for longer than 6 minutes, the error code is added with a "3". The table below shows all possible lockouts and an indication of possible cause.

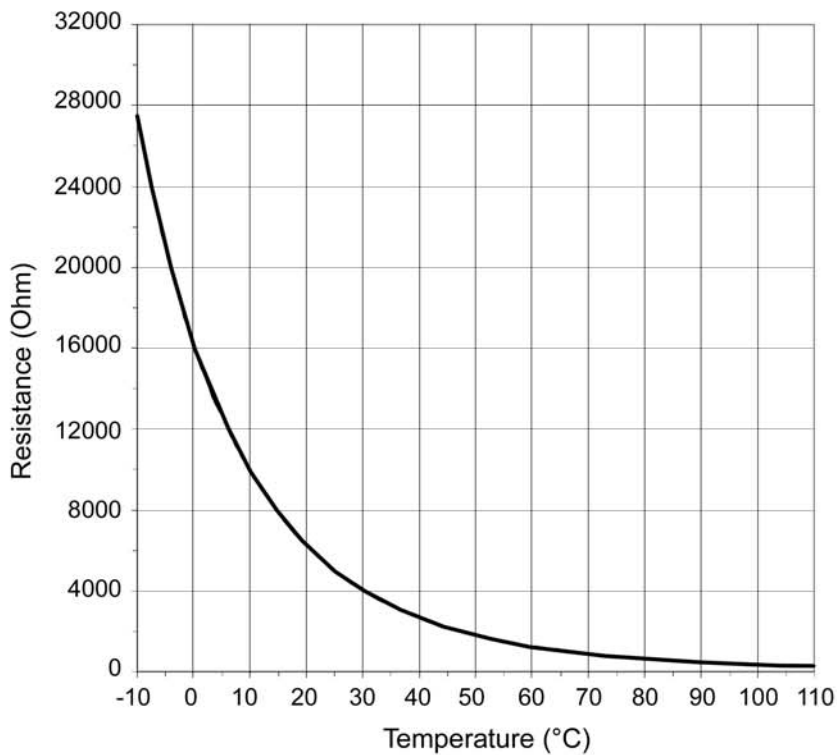
No.	Error type	Explanation	Possible solution
1	Lockout	Water flow temperature has exceeded the high limit temperature setting (100°C).	Check if boiler is in automatic mode (⊙), Check if water flow through the boiler is sufficient, check if (P11+P12) < High limit setting (V9).
2	Interlock	Gas pressure has dropped below minimum value of minimum gas pressure switch or additional safety device connected to the interlock input has been interrupted (during startup).	Check gas supply pressure / check function of additional safety device on interlock input.
3	Interlock	Gas pressure has dropped below minimum value of minimum gas pressure switch or additional safety device connected to the interlock input has been interrupted (during operation).	Check gas supply pressure / check function of additional safety device on interlock input.
4	Lockout	No flame ionisation signal detected during burner start.	Check phase/neutral of power supply (phase sensitivity!), check gas supply, check ignition spark, increase gas valve setting min. load (alan key screw).
5	Lockout	Flame ionisation signal lost during operation.	Check gas supply pressure during operation, check gas valve setting via combustion analysis.
6	Interlock	Water flow temperature has exceeded the temperature limiter setting (97°C).	Check if boiler is in automatic mode (⊙), check if water flow through the boiler is sufficient, check if (P11+P12) < Temp. limiter setting (V10).
7	Lockout	External safety device connected to the lockout input has been interrupted.	Check the external safety devices (water pressure switches, safety thermostat, etc.)
11	Lockout	Flame ionisation signal detected before burner start.	Check ionisation electrode, measure ionisation current when boiler is off, check wiring between ionisation electrode and boiler controller.
12	Interlock	Water flow temperature sensor is defective.	Check resistance of sensor (see chapter "sensor values"), check wiring between water flow temperature sensor and boiler controller.
14	Interlock	DHW temperature sensor (optional) is defective.	Check resistance of sensor (see chapter "sensor values"), check wiring between DHW temperature sensor and boiler controller.
15	Interlock	Outside temperature sensor (optional) is defective.	Check resistance of sensor (see chapter "sensor values"), check wiring between outside temperature sensor and boiler controller.
18	Interlock	Header temperature sensor (optional) is defective.	Check resistance of sensor (see chapter "sensor values"), check wiring between header temperature sensor and boiler controller.

# Lockouts

No.	Error type	Explanation	Possible solution
20	Lockout	Error gas valve V1, flame ionisation signal detected longer than 5 seconds after burner stop.	Check closing position of valve V1 within gas combi valve, replace gas valve.
21	Lockout	Error gas valve V2, flame ionisation signal detected longer than 5 seconds after burner stop.	Check closing position of valve V2 within gas combi valve, replace gas valve.
22	Lockout	APS contact does not close during prepurge.	Check setting APS, check if fan is running.
23	Lockout	APS contact remains closed when fan is off.	Check setting APS
27	Lockout	APS contact opens during operation.	Check setting APS
30	Lockout	CRC error in control system parameters (P11-P40).	Check parameter settings of P11-P40, change value of one parameter within P11-P40 (lockout disappears), change all parameters back to original settings.
31	Lockout	CRC error in boiler safety parameters (V1-V16).	Check parameter settings of V1-V16, change value of one parameter within V1-V16 (lockout disappears), change all parameters back to original settings.
32	Interlock	Power supply voltage to boiler controller is too low.	Check fuse of boiler controller, check power supply to boiler controller.
40	Lockout	Water flow switch has been interrupted when pump being enabled.	Check pump operation, check water flow through the boiler, check functionality of water flow switch.
x.y.	Lockout	(all lockout codes which are not listed above) Internal lockout of boiler controller.	Press reset. Change boiler controller when lockout can not be reset or occurs more frequently.

# Sensor values

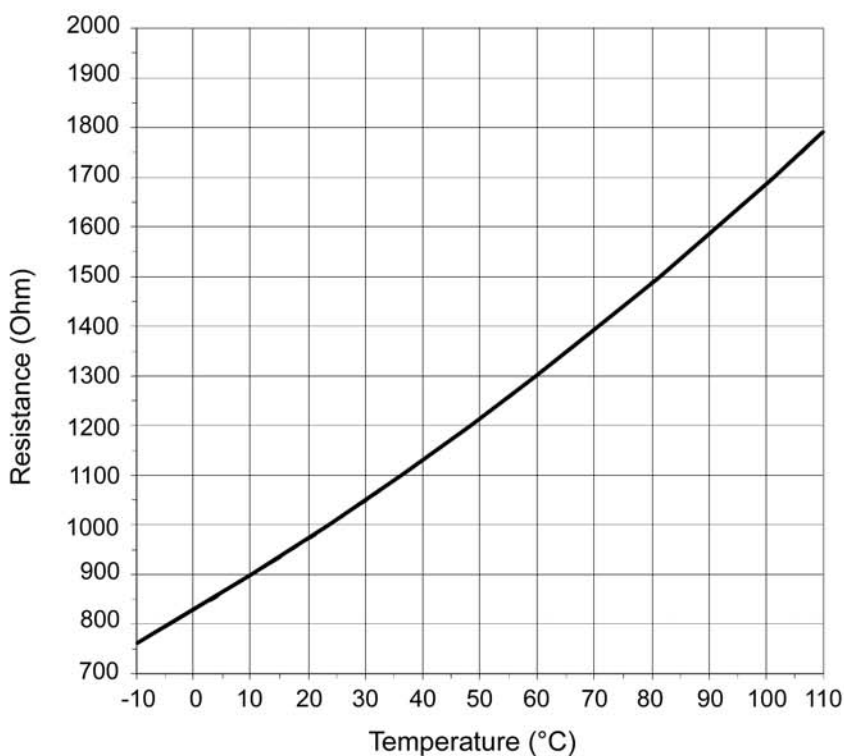
Water flow and fluegas temperature sensor (5kΩ NTC)



The diagrams show the sensor values for all boiler sensors and optional sensors available in accessory kits. The diagrams contain average values, as all sensors are liable to tolerances.

When measuring the resistance values, the boiler should always be switched off. Measure close to the sensor, in order to avoid value deviations.

DHW, outside and header temperature sensor (1kΩ PTC)



# Declaration of Conformity

## Declaration of Conformity

Rendamax BV, Hamstraat 76, 6465 AG Kerkrade (NL),  
declares that the products

**R3400/R3600**

are in conformity with the following standards:

EN 656  
EN 15417  
EN 13836  
EN 55014-1 / -2  
EN 61000-3-2 /-3  
EN 60 335-1/ -2

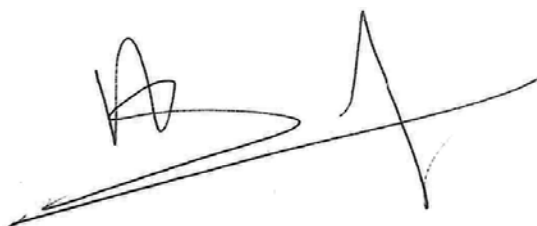
and in accordance with the guidelines of directives:

92 / 42 / EEC (boiler efficiency directive)  
90 / 396 / EEC (gas appliance directive)  
73 / 23 / EEC (low voltage directive)  
89 / 336 / EEC (EMC directive)

These products are designated with CE nr.:

**CE – 0063AR3514**

Kerkrade, 10-06-2013

A handwritten signature in black ink, consisting of a stylized 'A' followed by a long horizontal stroke and a vertical stroke at the end.

A.J.G. Schuiling  
Plant Manager

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