SMART **HEATING** TECHNOLOGY

Ireland

Purity to Nature
Savings to Clients
Comfort to Users

CHP Mechanical services

AUTOMATIC BIOMASS BOILERS

SMART 150–500–1500 kW

▪ Fully automatic, ecological boilers with excellent features ▪ Technical solution flexibility ▪ Multiple fuel possibility ▪ Economical and ecological operation ▪ 9 boilers in range ▪ Efficiency 96 % ▪ Output modulation 30–100 % ▪ Lambda sensor ▪ Ceramic Burner Option ▪ Vibrating Burner Plate Option ▪ Low Maintenance & Service requirements ▪ Heating circuits regulation ▪ Cascade installation solutions ▪ Mobile phone control ▪ Internet control ▪ Mobile container solutions ▪ Special boiler accessories

AUTOMATIC BIOMASS BOILERS

SMART 150–500–1500 kW

5 YEAR WARRANTY*

for a complete Technology Unit

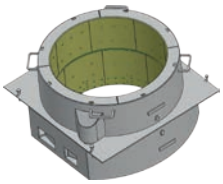
*Complete 5 year warranty conditions on request

New Boiler Design ➔

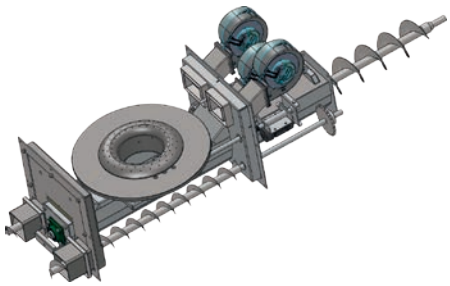
* Subject to a Fuel Composition, and Testing!

New Design Features ➔

Ceramic Burner



Vibrating Burner plate



SMART Boilers Application Options ➔

- Apartment Buildings
- Multifunctional Buildings
- Shopping Centres
- Production Plants & Industrial Premises & Storage Premises
- Agriculture & Aquaculture & Horticulture Farms
- Hotels/Motels/Wellness Centres/Pools
- Sport Arenas
- Municipality Buildings
- Schools, Hospitals, Police & Army Complexes
- City Districts

In association with:

SIEMENS

CE

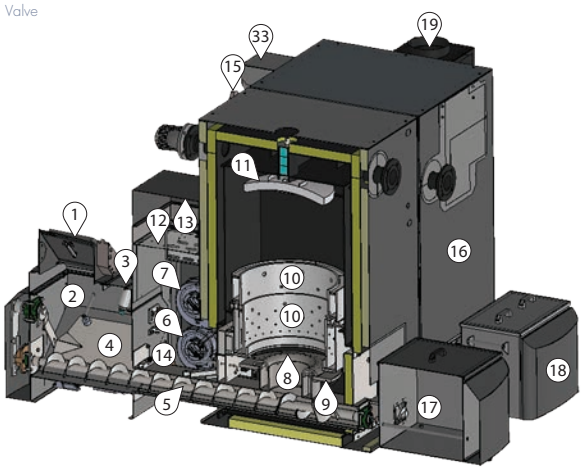
TÜV SÜD

ČSN-EN 303.5/2013

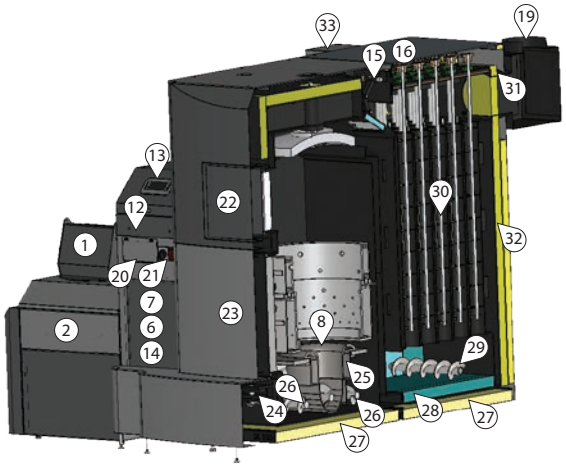
ISO 9001:2009

SMART 300–500 kW – Inside View - Front

1. Channel And Operational Bin Separation Valve
2. Operational Fuel Bin
3. Fuel Level Sensor
4. Moving Floor Mechanism
5. Feeding Screw
6. Primary Fan
7. Secondary Fans
8. Primary Burner Ring
9. Grating/Vibrating Wheel
10. Upper/Lower Burner Rings
11. Refractory Ceramics
12. Control Unit Siemens
13. Control Unit Cover with Display
14. Accessories
    – Ignition gun
    – Emergency Extinguishing Mechanism
    – Safety Temperature Sensors
15. Exchanger Valve Servo-Drive
16. Heat Exchanger With Turbulators
17. Combustion Chamber Ash Bin
18. Exchanger Ash Bin – Option
19. Chimney Extension Box



SMART 300–500 kW – Inside View - Side



20. Fuses
21. Main Switch
22. Small Service Doors
23. Big Service Doors
24. Grating/Vibrating Mechanism
25. Primary Air Channel
26. Ash Screws
27. Bottom Insulation
28. Bottom Hi-Temp Exchanger Insulation
29. Exchanger De-ashing – Option
30. Turbulators
31. Lambda Sensor
32. Dual Boiler Insulation
33. Turbulators Drive Motor

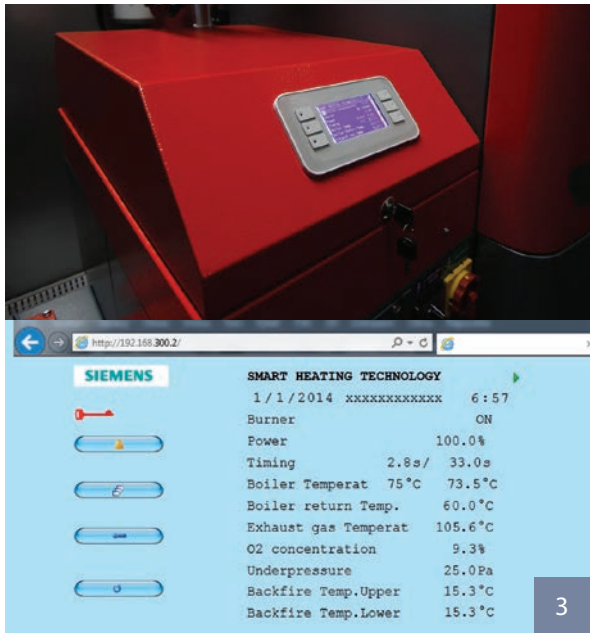
Mobile phone control
Internet control
Mobile container solutions

UNIT CONVERTER	
1 GJ = 1000 MJ	
1 GJ = 277, 778 kWh	1 GJ = 0,278 MWh
1 GJ = 238 846 kcal	

FUEL – CALORIFIC VALUE
1 kg – Wood pellets = 16,5–18,5 MJ = 4,6–5,1 kWh
1 kg – Lignite = 10,5–17,2 MJ = 2,9–4,8 kWh
1 kg – Wood chips with moisture 10 % = 16,4 MJ = 4,6 kWh
1 kg – Wood chips with moisture 20 % = 14,3 MJ = 4,0 kWh
1 kg – Wood chips with moisture 30 % = 12,2 MJ = 3,4 kWh
1 kg – Wood chips with moisture 40 % = 10,1 MJ = 2,8 kWh
1 m^3 – Natural gas = 37,82 MJ = 10,5 kWh

SMART BOILERS OPERATING DATA											
Technical data of the boiler											
Marking		150	180	200	220	250	300	350	400	450	500
Nominal power Pn	kW	150	180	199	220	250	300	350	400	450	500
Partial load (power) Pp	kW	40	45	50	55	65	75	90	100	115	140
Boiler efficiency at Pn	%	>95	>95	>95	>95	>95	>95	>95	>95	>95	>95
Boiler class		5	5	5	5	5	5	5	5	5	5
Water											
Water volume	l	380	420	460	460	500	690	740	790	850	900
Diameter of water connection	"	3	3	3	3	3	4	4	4	4	4
Diameter of water connection	DN	80	80	80	80	80	100	100	100	100	100
Hydraulic-pressure drop of the boiler at the temperature fall 20°	mbar	65	73	80	80	87	95	102	110	122	130
Boiler temperature	°C	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*
Minimal temperature of returnable water	°C	55	55	55	55	55	55	55	55	55	55
Maximal operational pressure	bar	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
Test pressure	bar	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5
Temperature of furnace	°C	900-1100									
Pressure of furmace	mbar	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04
Required draught of the chimney	mbar	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Requirement for the forced draught		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combustion temperature at Pn	°C	96,6	97,2	104,9	98	96,6	99,6	99,3	98,9	98,2	97,2
Combustion temperature at Pp	°C	63,1	63,1	72,4	63,1	63,1	63,1	62,9	62,7	62,4	62,2
Diameter of flue gas duct	mm	220	220	220	220	220	300	300	300	300	300
Diameter of chimney	mm	250	250	250	250	250	350	350	350	350	350
Fuel clasification according to norm EN 14961											
Wood pellets - C1	Tested fuel	D6, M10, A1,5, DU90,0									
Wood chips - B1		P45, M30, A3.0									

*Boilers can be operated at 90°C only when special conditions are met



SMART **HEATING** TECHNOLOGY

Ireland

Purity to Nature
Savings to Clients
Comfort to Users

CHP Mechanical services

AUTOMATIC BIOMASS BOILERS

SMART 150–500 kW

COMPLETE TECHNICAL SPECIFICATION

▪ Dimensions and weights of technologies 150–250 kW ▪ Dimensions and weights of technologies 300–500 kW ▪ Service zones of technologies 150–500 kW ▪ Technical specifications 150–500 kW ▪ Certified operating values 150–500 kW

AUTOMATIC BIOMASS BOILERS

SMART 150–250 kW

SMART HEATING TECHNOLOGY Ireland

DIMENSIONS AND WEIGHTS OF TECHNOLOGIES 150–250 kW

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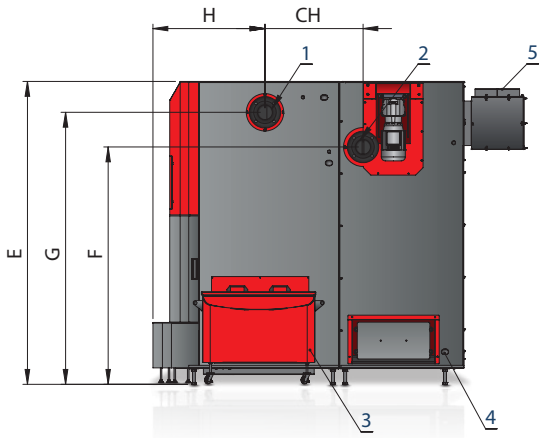
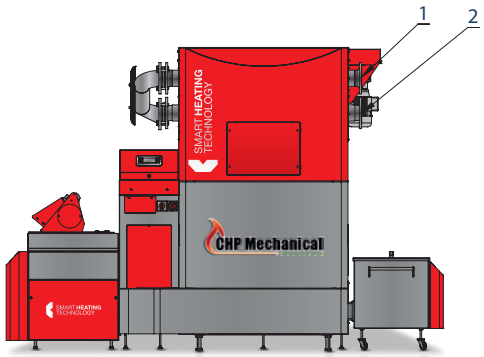
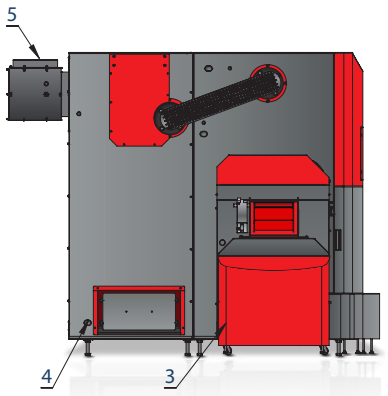
ISO 9001:2009

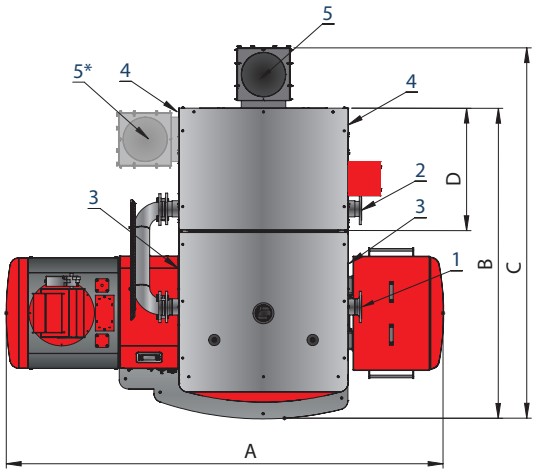
▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users







1. Water outlet DN80/PN6
2. Water inlet DN80/PN6
3. In/out water valve 3/4" of burning chamber
4. In/out water valve 3/4" of heat exchanger
5. Chimney outlet avg. 220 mm
* Option for limited spaces



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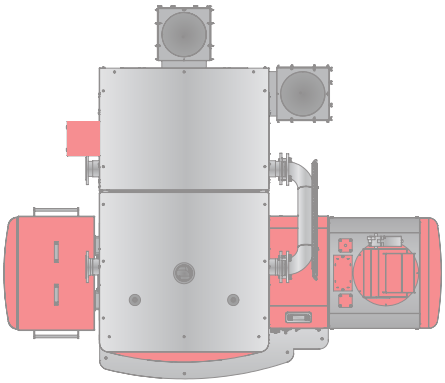

Right sided

	150	180	200	250
A	2825	2825	2825	2825
B	1750	1870	1990	2110
C	2160	2280	2400	2520
D	580	700	820	940
E	1820	1820	1820	1820
F	1345	1345	1345	1345
G	1570	1570	1570	1570
H	715	715	715	715
CH	600	600	600	600

WEIGHTS		
Burning chamber 150 – 250 kW	1 210 kg	Total weight
Exchanger 150	1 050 kg	2 260 kg
Exchanger 180	1 150 kg	2 360 kg
Exchanger 200	1 200 kg	2 410 kg
Exchanger 250	1 300 kg	2 510 kg

FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 300–500 kW

SMART HEATING TECHNOLOGY Ireland

DIMENSIONS AND WEIGHTS OF TECHNOLOGIES 300–500 kW

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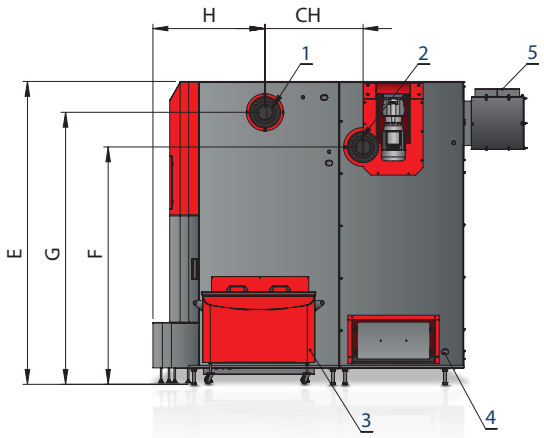
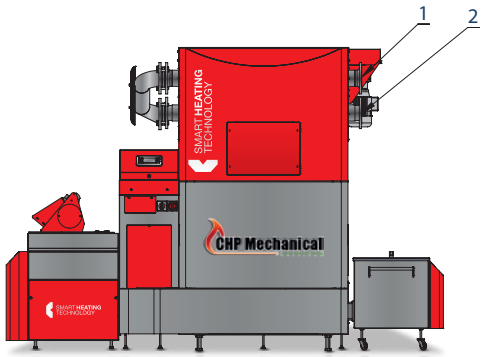
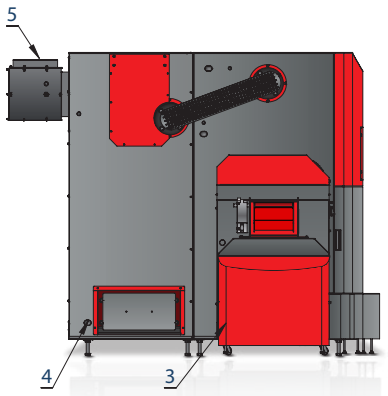
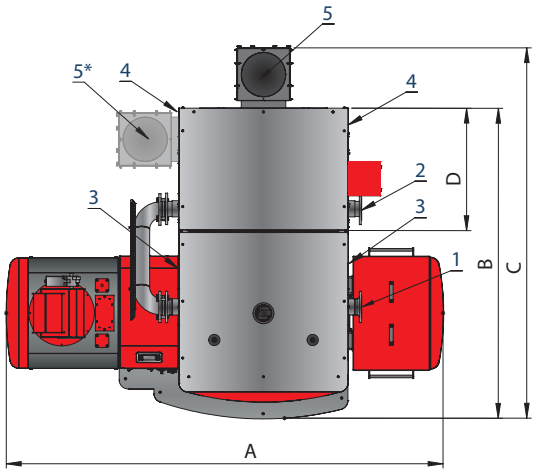
▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users



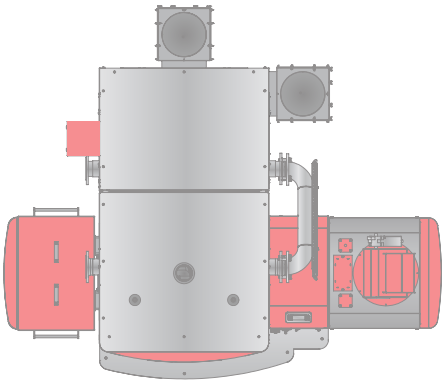




1. Water outlet DN100/PN6
2. Water inlet DN100/PN6
3. In/out water valve 3/4" of burning chamber
4. In/out water valve 3/4" of heat exchanger
5. Chimney outlet avg. 300 mm
* Option for limited spaces



Left sided



Right sided

	300	350	400	450	500
A	2940	2940	2940	2940	2940
B	2080	2200	2320	2440	2560
C	2480	2600	2720	2840	2960
D	820	940	1060	1180	1300
E	1995	1995	1995	1995	1995
F	1560	1560	1560	1560	1560
G	1790	1790	1790	1790	1790
H	750	750	750	750	750
CH	655	655	655	655	655

WEIGHTS		
Burning chamber 300 – 500 kW	1 550 kg	Total weight
Exchanger 300	1 500 kg	3 050 kg
Exchanger 350	1 600 kg	3 150 kg
Exchanger 400	1 700 kg	3 250 kg
Exchanger 450	1 800 kg	3 350 kg
Exchanger 500	1 950 kg	3 500 kg

FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 150–500 kW

SMART HEATING TECHNOLOGY Ireland

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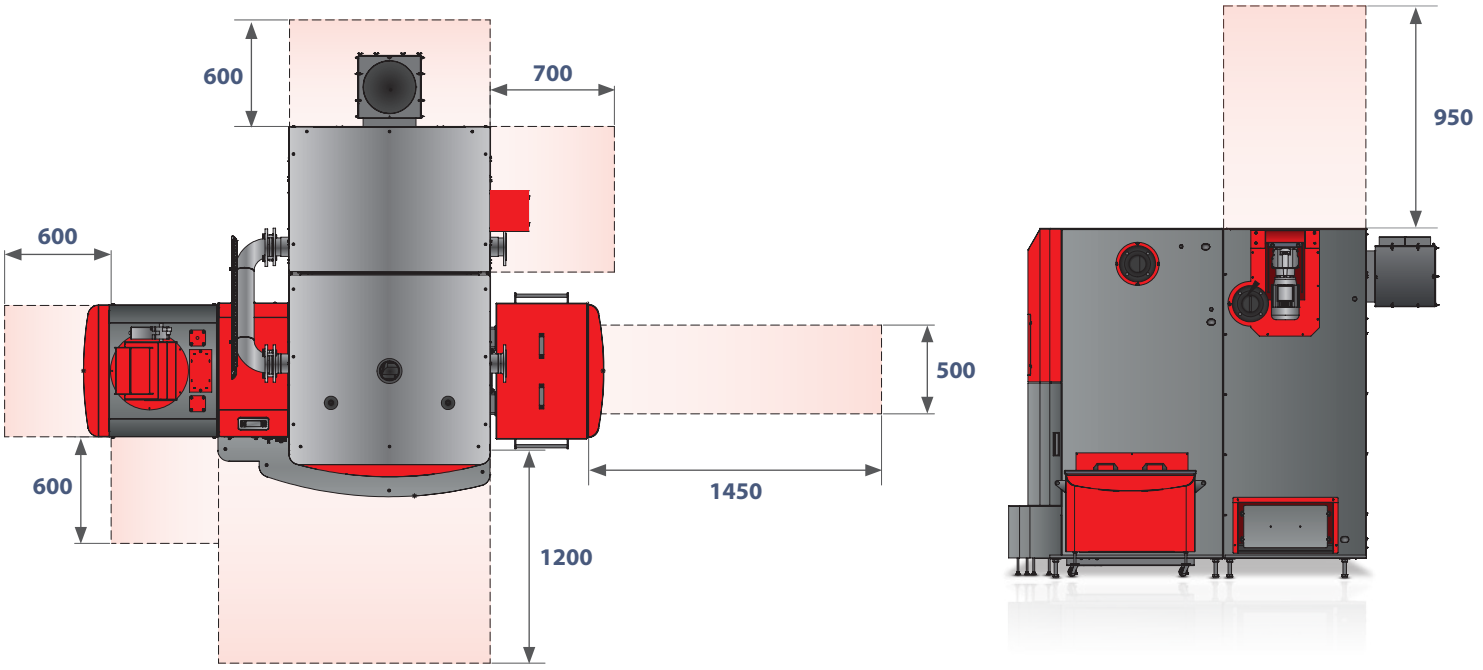
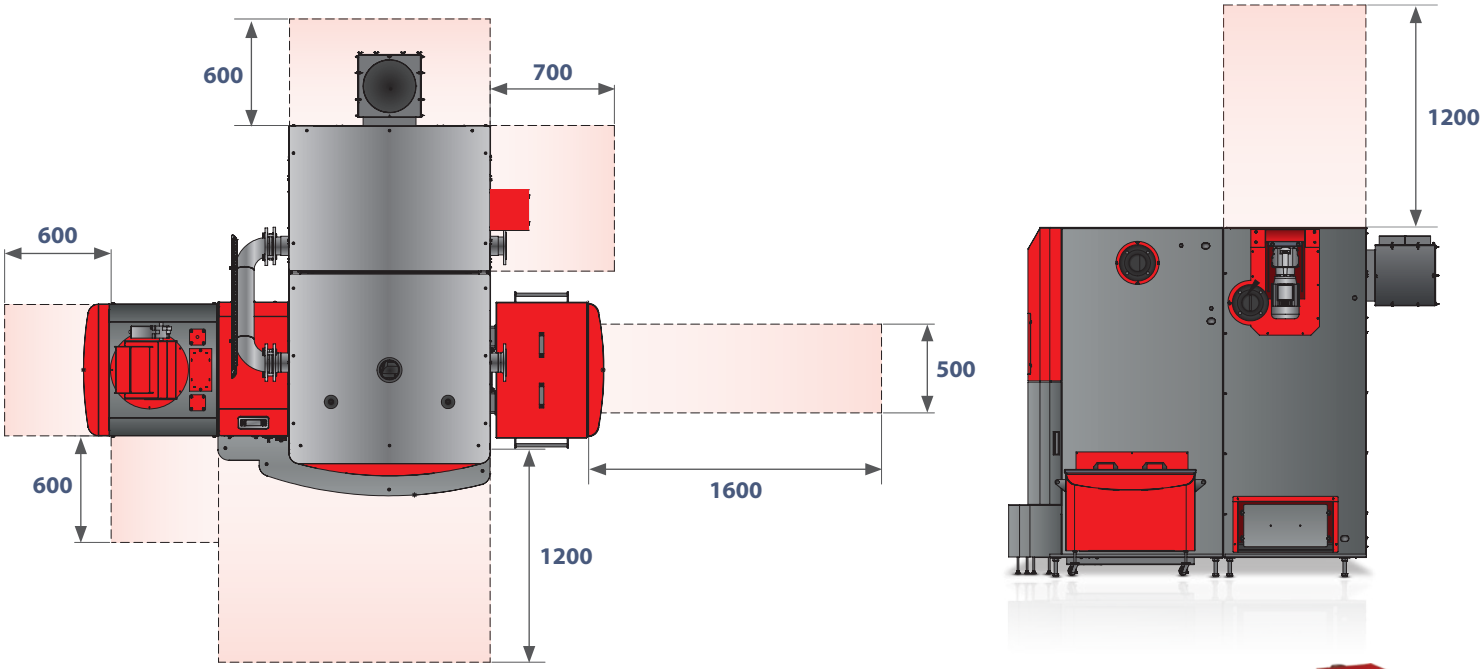
▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users

SERVICE ZONES OF TECHNOLOGIES 150–500 kW

SMART 150–250 kW



SMART 300–500 kW



FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 150–500 kW

SMART HEATING TECHNOLOGY Ireland

TECHNICAL SPECIFICATIONS 150–500 kW

ČSN-EN 303.5/2013

ISO 9001:2009

▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users

SMART BOILERS OPERATING DATA											
Technical data of the boiler											
Marking		150	180	200	220	250	300	350	400	450	500
Nominal power Pn	kW	150	180	199	220	250	300	350	400	450	500
Partial load (power) Pp	kW	40	45	50	55	65	75	90	100	115	140
Boiler efficiency at Pn	%	>95	>95	>95	>95	>95	>95	>95	>95	>95	>95
Boiler class		5	5	5	5	5	5	5	5	5	5
Water											
Water volume	l	380	420	460	460	500	690	740	790	850	900
Diameter of water connection	"	3	3	3	3	3	4	4	4	4	4
Diameter of water connection	DN	80	80	80	80	80	100	100	100	100	100
Hydraulic-pressure drop of the boiler at the temperature fall 20°	mbar	65	73	80	80	87	95	102	110	122	130
Boiler temperature	°C	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*	60-90*
Minimal temperature of returnable water	°C	55	55	55	55	55	55	55	55	55	55
Maximal operational pressure	bar	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
Test pressure	bar	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5
Temperature of furnace	°C	900-1100									
Pressure of furmace	mbar	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04
Required draught of the chimney	mbar	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Requirement for the forced draught		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combustion temperature at Pn	°C	96,6	97,2	104,9	98	96,6	99,6	99,3	98,9	98,2	97,2
Combustion temperature at Pp	°C	63,1	63,1	72,4	63,1	63,1	63,1	62,9	62,7	62,4	62,2
Diameter of flue gas duct	mm	220	220	220	220	220	300	300	300	300	300
Diameter of chimney	mm	250	250	250	250	250	350	350	350	350	350
Fuel clasification according to norm EN 14961											
Wood pellets - C1	Tested fuel	D6, M10, A1,5, DU90,0									
Wood chips - B1		P45, M30, A3.0									
Electrical installation											
Electrical connection		3+N+PE 50Hz 230/400V TN-C-S									
Conveyor engine	W	550	550	550	550	550	550	550	550	550	550
Feeding auger engine	W	550	550	550	550	550	550	550	550	550	550
Exchanger cleaning engine (s)	W	550	550	550	550	550	2 x 550	2 x 550	2 x 550	2 x 550	2 x 550
Ash-removing engine	W	550	550	550	550	550	550	550	550	550	550
Fan of primary air	W	66	66	66	66	66	66	66	66	66	66
Fan of secondary air 1	W	66	66	66	66	66	170	170	170	170	170
Fan of secondary air 2	W	66	66	66	66	66	170	170	170	170	170
Chimney exhaust fan	W	300	300	300	300	300	1100	1100	1100	1100	1100
Electrical ignition	W	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Separation flap valve	W	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5
Total	W	4304,5	4304,5	4304,5	4304,5	4304,5	4762,5	4762,5	4762,5	4762,5	4762,5

*Boilers can be operated at 90°C only when special conditions are met

FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 150–200 kW

SMART HEATING TECHNOLOGY Ireland

CERTIFIED OPERATING VALUES 150–200 kW

ČSN-EN 303.5/2013

ISO 9001:2009

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AUTOMATIC BIOMASS BOILERS SMART 150–200 kW		SMART 150				SMART 180				SMART 200			
		Wood pellets		Wood chips		Wood pellets		Wood chips		Wood pellets		Wood chips	
		Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum
Measured values													
Rated heat capacity	kW	150	150	150	150	180	180	180	180	199	199	199	199
Combustion product temperature	°C	116,1	72,4	96,6	63,1	111,4	70,8	97,2	63,1	96,1	73,1	104,9	72,4
Fuel consumption	kg/hour	36,30	9,78	37,18	9,45	42,50	11,10	44,80	11,30	42,60	12,48	50,60	14,50
Input water temperature	°C	60,2	67,1	60,3	62,4	59,5	65,7	60,0	61,4	57,8	67,2	55,0	71,3
Outlet water temperature	°C	80,5	85,2	78,8	79,2	79,1	83,3	78,0	78,4	73,0	82,6	77,1	79,0
Cooling water temperature	°C	9,6	11,1	9,6	11,0	9,6	11,1	9,6	11,0	11,1	7,8	10,6	11,5
Cooling water flow rate	m^3/hod	6,733	2,033	7,080	1,950	8,433	2,401	9,034	2,304	2,695	0,650	2,673	0,755
Draught behind boiler	Pa	125,0	35,0	125,0	35,0	126,0	33,0	126,0	33,0	130,0	30,0	130,0	30,0
Ambient temperature	°C	24,0	26,3	24,2	22,6	24,0	25,3	25,0	23,0	25,2	24,9	24,1	26,2
Relative air humidity	%	45,3	44,7	38,6	37,2	45,0	44,5	40,0	39,0	42,3	41,1	41,0	40,0
Barometric pressure	kPa	99,23	99,24	99,10	99,20	99,00	99,25	99,00	99,22	98,92	98,95	99,07	99,07
Flue gas analysis													
Oxygen O_2	%	8,12	12,66	8,08	11,40	7,92	12,39	7,89	11,46	8,02	12,71	8,02	12,71
Carbon dioxide CO_2	%	11,37	7,28	11,61	8,70	11,43	7,65	11,73	8,65	11,79	7,53	11,79	7,53
Carbon monoxide CO	ppm	46	175	100	146	49	171	93	153	58	181	58	181
Higher hydrocarbons OGC	ppm	4	2	3	5	4	3	3	5	7	4	7	4
Nitrogen dioxides Nox	ppm	81	47	83	55	81	49	84	54	65	38	65	38
Dust	mg/m^3	28	17	52	41	29	44	47	41	29	18	51	44
02 = 10%													
Carbon monoxide CO	mg/m^3	49	289	106	209	51	275	97	220	62	301	112	244
Higher hydrocarbons OGC	mg/m^3	2	1	1	3	2	2	1	3	10	8	2	4
Nitrogen dioxides Nox	mg/m^3	143	126	144	130	140	127	144	127	113	102	151	120
Dust	mg/m^3	24	23	44	47	25	25	39	47	25	25	44	51
Auxiliary combustion values (solid fuels)													
Mass flow rate gases	kg/sec	0,109	0,044	0,099	0,033	0,126	0,047	0,117	0,040	0,155	0,053	0,148	0,066
Stoichiometric oxygen value	m^3/kg	0,957	0,957	0,832	0,832	0,957	0,957	0,832	0,832	0,949	0,948	0,848	0,848
Stoichiometric air value	m^3/kg	4,559	4,556	3,963	3,960	4,559	4,556	3,963	3,958	4,520	4,512	4,037	4,036
Stoichiometric volume of dry combustion products	m^3/kg	4,448	4,445	3,884	3,881	4,448	4,445	3,884	3,879	4,445	4,438	3,949	3,948
Stoichiometric air multiple		1,61	2,48	1,61	2,16	1,59	2,41	1,59	2,19	1,61	2,51	1,60	2,50
Volume of dry combustion products, actual	m^3/kg	7,436	11,573	6,474	8,622	7,400	11,107	6,397	8,669	7,411	11,553	6,435	10,048
Volume of H_2O in the combustion air	m^3/kg	0,102	0,177	0,076	0,089	0,100	0,164	0,081	0,114	0,101	0,150	0,081	0,140
Volume of H_2O in the combustion produts	m^3/kg	0,956	1,032	0,922	0,935	0,954	1,019	0,927	0,942	0,867	0,916	0,956	1,015
Maximum volume CO_2	%	19,01	19,01	19,37	19,37	19,01	19,01	19,40	19,40	19,60	19,66	19,22	19,22
Calculated values - heat overview													
Loss of sensible heat of combustion products (chimney)	%	6,4	4,7	4,8	3,5	6,0	4,5	4,8	3,5	4,5	4,5	5,3	4,5
Loss of gas underburning	%	0,0	0,2	0,1	0,1	0,0	0,2	0,1	3,5	0,0	0,2	0,0	0,2
Loss of mechanical underburning	%	0,1	0,1	0,3	0,3	0,1	0,1	0,3	0,1	0,1	0,2	0,0	0,1
Loss of heat transfer into the environment	%	0,8	1,1	0,8	2,1	0,8	1,2	0,8	0,4	0,6	0,9	0,6	0,7
Total loss	%	7,3	6,1	6,0	6,0	6,9	6,0	5,9	5,9	5,2	5,8	6,0	5,4
Efficiency - indirect method	%	92,7	93,9	94,0	94,0	93,1	94,0	94,1	94,1	94,8	94,2	94,0	94,6
Heat input	kW	167,0	45,0	158,9	40,4	195,4	51,1	191,7	48,3	203,3	59,5	216,8	62,1
Heat capacity	kW	159,2	43,0	152,0	38,4	186,1	48,8	183,0	46,0	193,7	56,6	206,2	59,3
Uncertainty of determining heat capacity	%+/-	6,7	1,8	6,4	1,6	7,8	2,0	7,7	1,9	8,1	2,4	8,7	2,5
Efficiency - direct method	**%**	**95,3**	**95,6**	**95,6**	**95,1**	**95,0**	**95,0**	**95,5**	**95,2**	**95,3**	**95,1**	**95,1**	**95,5**
Capacity / rated output	%	106,1	28,7	101,3	25,6	103,4	27,1	101,5	25,6	97,3	28,4	103,6	29,8

▪ Measured ▪ Interpolace is in complience with EN303.5 coll. 5.3.1

FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 250–350 kW

SMART HEATING TECHNOLOGY Ireland

ČSN-EN 303.5/2013

ISO 9001:2009

▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users

CERTIFIED OPERATING VALUES 250–350 kW

AUTOMATIC BIOMASS BOILERS SMART 250–350 kW		SMART 250				SMART 300				SMART 350			
		Wood pellets		Wood chips		Wood pellets		Wood chips		Wood pellets		Wood chips	
		Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum
Measured values													
Rated heat capacity	kW	250	250	250	250	300	300	300	300	350	350	350	350
Combustion product temperature	°C	100,4	66,9	98,6	63,1	92,5	64,2	99,6	63,1	93,8	63,1	99,3	62,9
Fuel consumption	kg/hour	56,90	14,20	62,70	15,60	67,15	16,42	75,50	18,70	78,90	18,50	86,90	20,80
Input water temperature	°C	57,9	62,4	59,4	59,1	56,7	60,0	59,0	57,4	58,4	60,6	59,3	57,7
Outlet water temperature	°C	75,7	78,9	76,1	76,4	73,3	75,8	74,7	75,0	75,5	76,1	75,0	74,5
Cooling water temperature	°C	9,6	11,0	9,6	11,0	9,6	11	9,6	11,0	9,5	10,7	9,6	11,0
Cooling water flow rate	m^3/hod	12,400	3,300	13,600	3,130	15,234	3,873	16,850	3,720	17,272	4,492	19,438	4,428
Draught behind boiler	Pa	128,0	28,0	128,0	28,0	130,0	25,0	130,0	25,0	151,0	25,0	150,0	25,0
Ambient temperature	°C	24,3	23,1	25,7	23,3	24,4	21,5	26,4	23,6	26,0	23,0	27,0	24,0
Relative air humidity	%	43,7	44,0	44,1	43,9	42,9	43,7	46,9	47,2	37,0	38,0	41,0	41,0
Barometric pressure	kPa	99,21	99,30	99,10	99,30	99,20	99,30	99,10	99,30	99,20	99,30	99,07	99,22
Flue gas analysis													
Oxygen O_2	%	7,45	11,77	7,43	11,59	7,12	11,32	7,11	11,68	7,59	10,37	7,17	11,20
Carbon dioxide CO_2	%	11,56	8,51	12,10	8,53	11,66	9,13	12,35	8,44	11,46	9,61	12,15	8,88
Carbon monoxide CO	ppm	55	162	75	169	59	155	63	180	82	133	101	173
Higher hydrocarbons OGC	ppm	3	5	4	6	2	6	4	7	6	5	3	6
Nitrogen dioxides Nox	ppm	80	52	86	50	80	55	87	48	74	61	93	56
Dust	mg/m^3	33	26	34	41	35	31	25	41	30	30	45	54
02 = 10%													
Carbon monoxide CO	mg/m^3	55	243	77	246	58	220	63	265	87	182	101	246
Higher hydrocarbons OGC	mg/m^3	1	3	2	4	1	4	2	4	3	3	2	4
Nitrogen dioxides Nox	mg/m^3	134	128	143	121	130	129	142	116	124	129	153	128
Dust	mg/m^3	26	31	28	48	27	35	20	48	24	32	25	48
Auxiliary combustion values (solid fuels)													
Mass flow rate gases	kg/sec	0,167	0,055	0,160	0,055	0,196	0,060	0,191	0,066	0,236	0,064	0,224	0,070
Stoichiometric oxygen value	m^3/kg	0,958	0,957	0,832	0,831	0,958	0,957	0,832	0,830	0,958	0,957	0,832	0,830
Stoichiometric air value	m^3/kg	4,560	4,557	3,963	3,953	4,560	4,558	3,963	3,950	4,560	4,558	3,962	3,951
Stoichiometric volume of dry combustion products	m^3/kg	4,449	4,446	3,883	3,874	4,449	4,446	3,883	3,871	4,449	4,447	3,882	3,872
Stoichiometric air multiple		1,54	2,25	1,54	2,25	1,50	2,14	1,50	2,23	1,56	1,99	1,51	2,19
Volume of dry combustion products, actual	m^3/kg	7,315	10,021	6,217	8,779	7,254	9,245	6,088	8,857	7,388	8,843	6,191	8,481
Volume of H_2O in the combustion air	m^3/kg	0,095	0,133	0,091	0,172	0,091	0,111	0,099	0,124	0,087	0,098	0,089	0,174
Volume of H_2O in the combustion produts	m^3/kg	0,949	0,988	0,937	0,959	0,946	0,966	0,945	0,971	0,942	0,953	0,935	0,953
Maximum volume CO_2	%	19,01	19,00	19,37	19,40	19,01	19,01	19,37	19,36	19,01	19,01	19,40	19,40
Calculated values - heat overview													
Loss of sensible heat of combustion products (chimney)	%	5,2	4,0	4,7	3,5	4,6	3,6	4,7	3,5	4,7	3,3	4,7	3,3
Loss of gas underburning	%	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1	0,0	0,1
Loss of mechanical underburning	%	0,0	0,1	0,3	0,5	0,0	0,1	0,3	0,6	0,0	0,1	0,3	0,6
Loss of heat transfer into the environment	%	0,7	1,6	0,7	1,6	0,7	1,8	0,6	1,4	0,6	1,4	0,5	1,2
Total loss	%	6,0	5,8	5,7	5,7	5,4	5,6	5,5	5,5	5,3	4,9	5,4	5,1
Efficiency - indirect method	%	94,0	94,2	94,3	94,3	94,6	94,4	94,5	94,5	94,7	95,1	94,6	95,0
Heat input	kW	261,5	65,3	268,1	66,8	308,8	75,5	322,7	80,0	363,0	85,2	371,4	89,0
Heat capacity	kW	248,8	62,2	255,4	63,7	293,6	71,8	307,1	76,4	345,8	81,4	354,5	85,2
Uncertainty of determining heat capacity	%+/-	10,4	2,6	10,7	2,7	12,3	3,0	12,9	3,2	14,5	3,4	14,9	3,6
Efficiency - direct method	**%**	**95,0**	**95,0**	**95,3**	**95,4**	**95,1**	**95,0**	**95,2**	**95,5**	**95,3**	**95,5**	**95,4**	**95,7**
Capacity / rated output	%	99,5	24,9	102,0	25,5	97,9	23,9	102,4	25,5	98,8	23,3	101,6	24,7

▪ Measured ▪ Interpolace is in complience with EN303.5 coll. 5.3.1

FULLY AUTOMATIC, ECO-FRIENDLY BOILERS WITH EXCELLENT FEATURES!

AUTOMATIC BIOMASS BOILERS

SMART 400–500 kW

SMART HEATING TECHNOLOGY Ireland

CERTIFIED OPERATING VALUES 400–500 kW

ČSN-EN 303.5/2013

ISO 9001:2009

▪ Purity to Nature ▪ Savings to Clients ▪ Comfort to Users

AUTOMATIC BIOMASS BOILERS SMART 400–500 kW		SMART 400				SMART 450				SMART 500			
		Wood pellets		Wood chips		Wood pellets		Wood chips		Wood pellets		Wood chips	
		Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum	Rated	Minimum
Measured values													
Rated heat capacity	kW	400	400	400	400	450	450	450	450	500	500	500	500
Combustion product temperature	°C	95,1	62,0	98,9	62,7	96,3	60,9	98,6	62,4	97,6	59,8	98,2	62,2
Fuel consumption	kg/hour	90,70	20,60	98,30	22,90	102,48	22,74	109,60	25,00	114,26	24,85	121,00	27,12
Input water temperature	°C	60,2	61,1	59,7	57,9	61,9	61,7	60,0	58,2	63,6	62,2	60,3	58,4
Outlet water temperature	°C	77,8	76,5	75,4	74,1	80,0	76,8	75,7	73,6	82,2	77,1	76,0	73,1
Cooling water temperature	°C	9,4	10,4	9,6	11,0	9,3	10,0	9,6	11,0	9,2	9,7	9,6	11,0
Cooling water flow rate	m^3/hod	19,311	5,110	22,025	5,135	21,349	5,729	24,613	5,843	23,387	6,347	27,200	6,550
Draught behind boiler	Pa	173,0	25,0	170,0	26,0	194,0	25,0	190,0	26,0	215,0	25,0	210,0	26,0
Ambient temperature	°C	27,0	24,0	28,0	24,0	29,0	25,7	28,5	24,6	30,2	27,1	29,2	24,9
Relative air humidity	%	32,0	33,0	35,0	35,0	27,0	28,0	29,5	28,6	21,1	22,8	23,7	22,4
Barometric pressure	kPa	99,10	99,30	99,05	99,15	99,20	99,30	99,02	99,07	99,20	99,30	98,99	98,99
Flue gas analysis													
Oxygen O_2	%	8,06	9,43	7,24	10,73	8,52	8,48	7,30	10,25	8,99	7,53	7,36	9,77
Carbon dioxide CO_2	%	11,26	10,10	11,95	9,31	11,05	10,58	11,74	9,75	10,85	11,06	11,54	10,18
Carbon monoxide CO	ppm	105	111	139	167	128	89	176	160	151	67	214	153
Higher hydrocarbons OGC	ppm	9	3	2	6	13	2	1	5	16	0	0	4
Nitrogen dioxides Nox	ppm	68	67	100	65	62	72	106	73	56	78	112	81
Dust	mg/m^3	25	29	66	67	19	28	86	79	14	27	106	92
02 = 10%													
Carbon monoxide CO	mg/m^3	116	144	140	227	144	106	178	207	173	68	216	188
Higher hydrocarbons OGC	mg/m^3	5	2	1	3	6	1	1	3	8	0	0	2
Nitrogen dioxides Nox	mg/m^3	118	130	164	139	111	130	174	151	105	130	185	162
Dust	mg/m^3	20	29	30	48	17	25	34	48	13	22	39	48
Auxiliary combustion values (solid fuels)													
Mass flow rate gases	kg/sec	0,276	0,068	0,257	0,074	0,316	0,072	0,290	0,077	0,356	0,076	0,323	0,081
Stoichiometric oxygen value	m^3/kg	0,958	0,957	0,832	0,830	0,958	0,957	0,831	0,830	0,958	0,957	0,831	0,830
Stoichiometric air value	m^3/kg	4,560	4,559	3,961	3,951	4,560	4,559	3,960	3,952	4,560	4,559	3,959	3,952
Stoichiometric volume of dry combustion products	m^3/kg	4,449	4,447	3,882	3,872	4,448	4,448	3,881	3,873	4,448	4,448	3,880	3,873
Stoichiometric air multiple		1,62	1,85	1,52	2,08	1,67	1,70	1,52	1,96	1,73	1,55	1,53	1,85
Volume of dry combustion products, actual	m^3/kg	7,521	8,442	6,294	8,106	7,655	8,040	6,396	7,730	7,788	7,638	6,499	7,354
Volume of H_2O in the combustion air	m^3/kg	0,082	0,085	0,080	0,134	0,078	0,072	0,070	0,093	0,073	0,059	0,060	0,053
Volume of H_2O in the combustion produts	m^3/kg	0,937	0,940	0,926	0,935	0,933	0,927	0,916	0,917	0,928	0,914	0,906	0,899
Maximum volume CO_2	%	19,01	19,01	19,37	19,36	19,00	19,01	19,37	19,36	19,01	19,01	19,37	19,36
Calculated values - heat overview													
Loss of sensible heat of combustion products (chimney)	%	4,8	3,0	4,7	3,2	4,8	2,6	4,6	3,0	4,9	2,3	4,6	2,8
Loss of gas underburning	%	0,1	0,1	0,1	0,1	0,1	0,0	0,1	0,1	0,1	0,0	0,1	0,1
Loss of mechanical underburning	%	0,0	0,1	0,4	0,6	0,0	0,1	0,4	0,5	0,0	0,1	0,4	0,5
Loss of heat transfer into the environment	%	0,5	1,1	0,5	0,9	0,3	0,7	0,3	0,7	0,2	0,3	0,2	0,4
Total loss	%	5,3	4,2	5,4	4,6	5,2	3,4	5,3	4,2	5,2	2,7	5,2	3,7
Efficiency - indirect method	%	94,8	95,9	94,7	95,4	94,8	96,6	94,7	95,9	94,8	97,3	94,8	96,3
Heat input	kW	417,2	94,9	420,1	98,1	471,3	104,6	468,7	107,1	525,5	114,3	517,4	116,1
Heat capacity	kW	398,0	91,0	401,8	94,0	450,2	100,6	449,2	102,7	502,4	110,2	496,5	111,5
Uncertainty of determining heat capacity	%+/-	16,7	3,8	16,9	4,0	18,9	4,2	18,9	4,3	21,1	4,6	20,9	4,7
Efficiency - direct method	**%**	**95,4**	**95,9**	**95,6**	**95,8**	**95,5**	**96,2**	**95,8**	**96,0**	**95,6**	**96,4**	**96,0**	**96,1**
Capacity / rated output	%	99,5	22,8	100,9	23,9	100,0	22,4	100,1	23,1	100,5	22,0	99,3	22,3

▪ Measured ▪ Interpolace is in complience with EN303.5 coll. 5.3.1

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