Unical

SPK

SPK 150÷600

SPK 1000

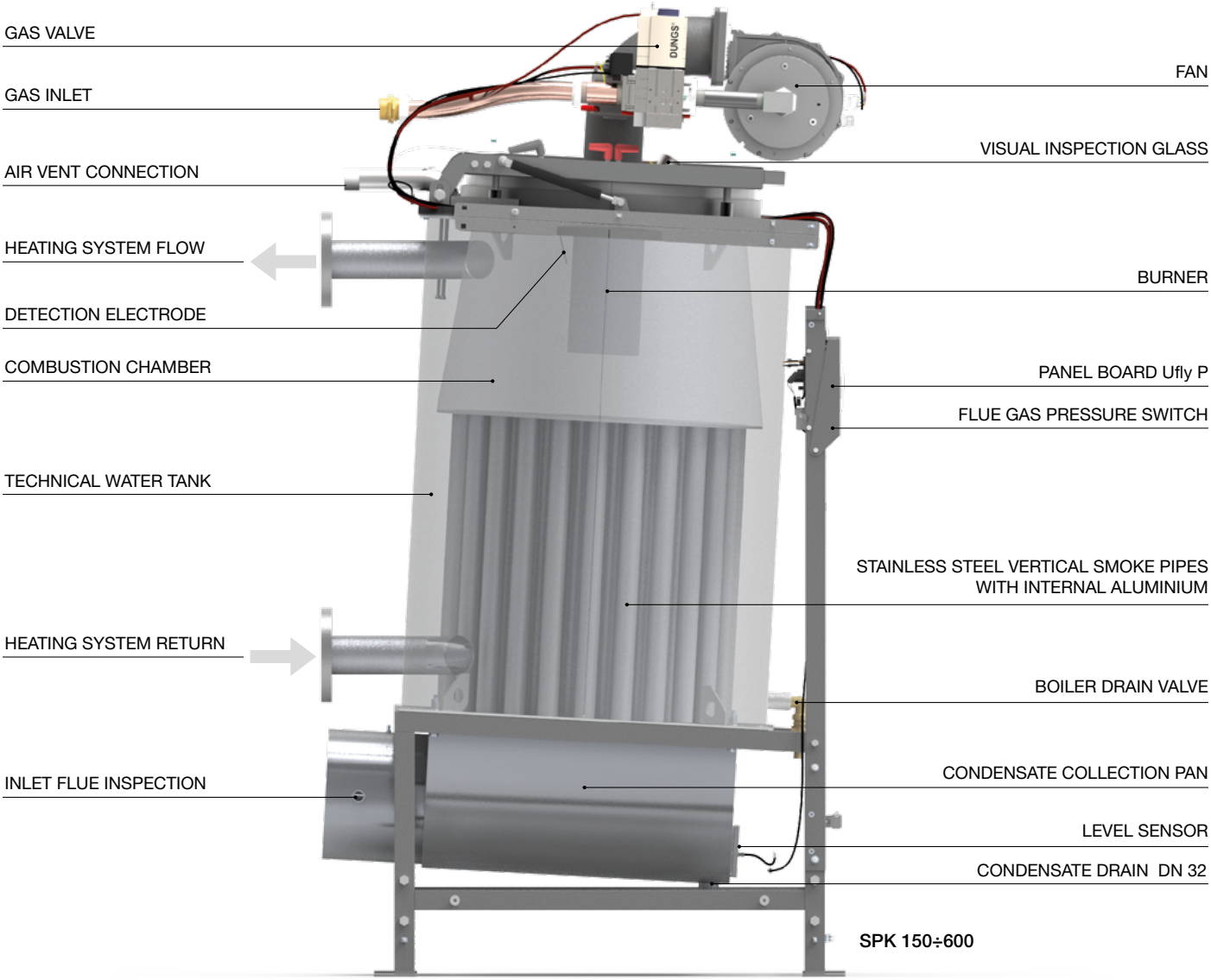
BREVETTO Unical PATENT

smoke pipes

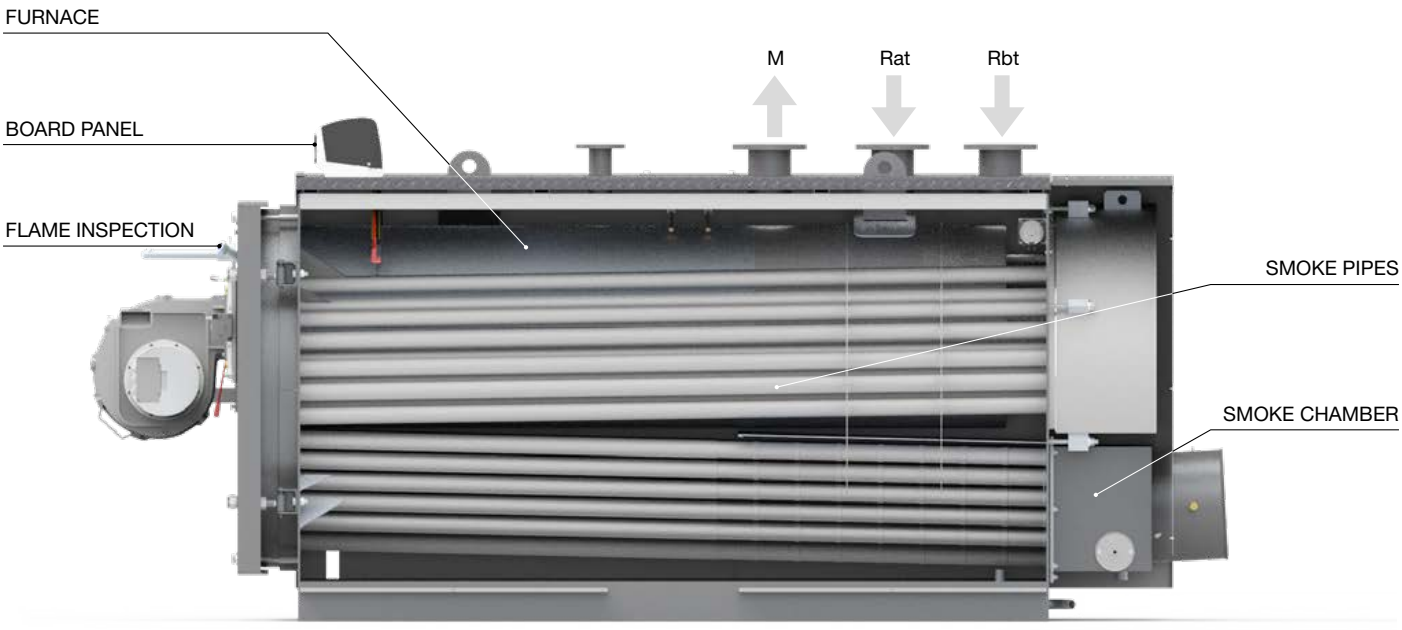
VERY LOW TEMPERATURE CONDENSING BOILER Low NO_x Class 6								
OUTPUT RANGE	from 150 to 1000 kW							
OPERATION TEMPERATURE	no limit on the return temperature							
SUPPLY	Natural Gas or LPG							
MODELS	150	230	300	348	400	500 (*)	600 (*)	1000 (*)
SEASONAL EFFICIENCY	A					(*)		
large water content, boiler body completely in stainless steel, with two return connections wide modulation premix burner, no circulation pump is required								

* Appliances not covered by Directive 2009/125/CE. The scope of the ERP Directive is up to 400 kW.

MAIN COMPONENTS



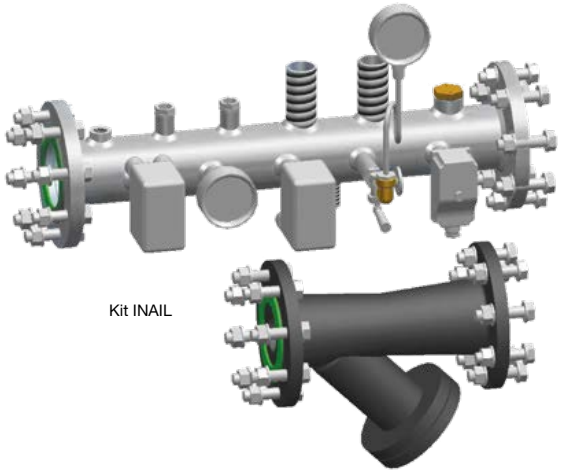
SPK 150÷600



SPK 1000

PRODUCT PLUS VALUES

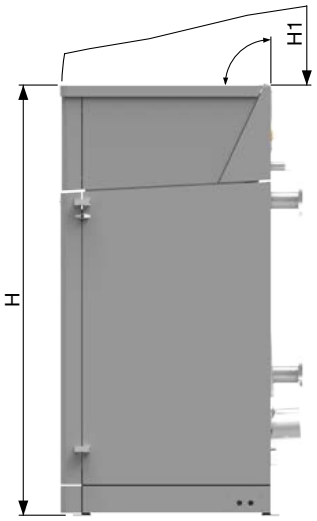
- **GENERATOR WITH ZERO FLOW (without recirculation)**
  designed with geometries suitable to allow a natural circulation (inside the boiler).
  No minimum temperature limit on the return.
  Minimum circulation pump not required.
- **THERMAL ELEMENT WITH VERTICAL DEVELOPMENT (HORIZONTAL FOR SPK 1000), LARGE WATER CONTENT**
  entirely in stainless steel AISI 316L, complete with premix modulating burner, with safety devices, silenced with thermal protection shield.
  The parts not in contact with flame or fumes in AISI 304.
- **VERTICAL CYLINDRICAL COMBUSTION CHAMBER (HORIZONTAL FOR SPK 1000)**
  with passing bottom
- **SPECIAL SMOKE PIPES (Unical patent)**
  in stainless steel, with multifins inserts in Al/Si/Mg with very high thermal conductivity, specially designed to improve condensate drainage and optimize heat exchange.
- **HYDRAULIC FLOW AND RETURN CONNEECTIONS (DOUBLE RETURN FOR SPK 1000)** they are positioned so as not to interfere with the semi-cylindrical smoke chamber below, which also acts as a condensate collector, equipped with condensate level switch and smoke pressure control.
- **LOW NO_x MODULATING PREMIX BURNER**
- **MAXIMUM CERTIFIED EFFICIENCY**
- **MODULATION RATIO**
  up to 1:4.3 (up to 1:2 for SPK 1000)
- **SEASONAL EFFICIENCY +30%**
  in comparison with the conventional boilers
- **ELECTRONIC PANEL BOARD Ufly P + 1 SHC**
  for command and control, with proportional regulation
- **BCM 2.0 for boiler management**
- **KIT GATEWAY P (optional)**
  for Ufly P remote connection
- **SMOKE NON-RETURN VALVE**
  reduces sensible heat losses and increases operational safety
- **EASY OPENING OF THE COMBUSTION CHAMBER DOOR**
  thanks to two pneumatic cylinders and hinges on the rear side
- **PRESSURE AVAILABLE**
  at the exhaust fumes **100 Pa**
- **MODULATING PUMP** (optional)
  managed directly by the boiler to ensure maximum condensation at all regimes
- **KIT INAIL with safety devices and return filter** (optional)
- **POSSIBILITY OF CALIBRATION according to the thermal needs of the system**
  (possible customization of the requested power)
- **COMBUSTION CHAMBER DOOR**
  insulated with super-light recyclable cement, with opening assisted by pneumatic shock absorbers
- **EXTERNAL CASING**
  with 50 mm thick rook wool insulation



Kit INAIL

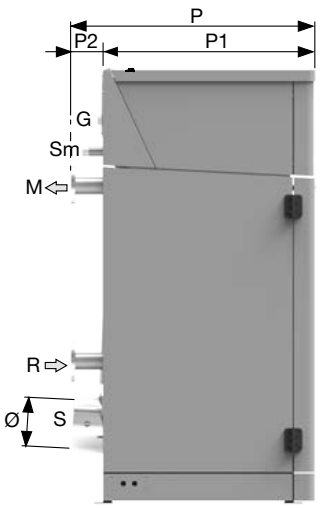
DIMENSIONS SPK 150÷600

SIDE VIEW

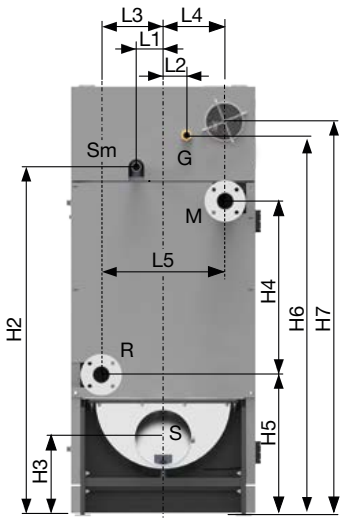


FRONT VIEW

SIDE VIEW



REAR VIEW



SPK	Depth mm			Width mm						Height mm								Weight kg
	P	P1	P2	L	L1	L2	L3	L4	L5	H	H1	H2	H3	H4	H5	H6	H7	
150	944	777	156	666	120	81	228,5	228,5	457	1809	65,6	1467	323,5	770	554,5	1579	1679	347+60*
230	1092	939	142	846	120	43	277	277	554	1917	65,6	1557	356	800	604,5	1697	1768	399+80*
300	1181	1026	144	910	100	200	297	297	594	1946	65,6	1618	353	825	600,5	1741	1796	459+90*
348	1276	1149	124	996	100	200	338	338	676	2130	65,6	1712	390	853	664	1794	1974	610+106*
400	1276	1149	124	996	100	200	338	338	676	2130	65,6	1712	390	853	664	1794	1974	610+106*
500	1276	1149	124	996	100	200	338	338	676	2130	65,6	1712	390	853	664	1794	1974	610+106*
600	1398	1256	142	1096	200	220	386	386	772	2206	65,6	1753	390	900	673	1863	2052	755+120*

*weight casing

DIMENSIONS TO INSERT THE BOILER IN THE BOILER ROOM

FRONT VIEW

SIDE VIEW

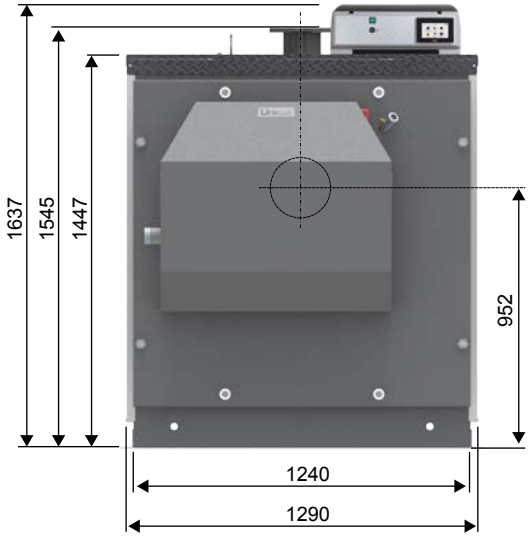
Boiler dimensions without its casing (mm)

SPK	P	L	H
150	917	655	1785
230	1027	795	1895
300	1134	845	1910
348	1258	965	2075
400	1258	965	2075
500	1258	965	2075
600	1313	1065	2186

For more information, visit www.unical.eu

DIMENSIONS SPK 1000

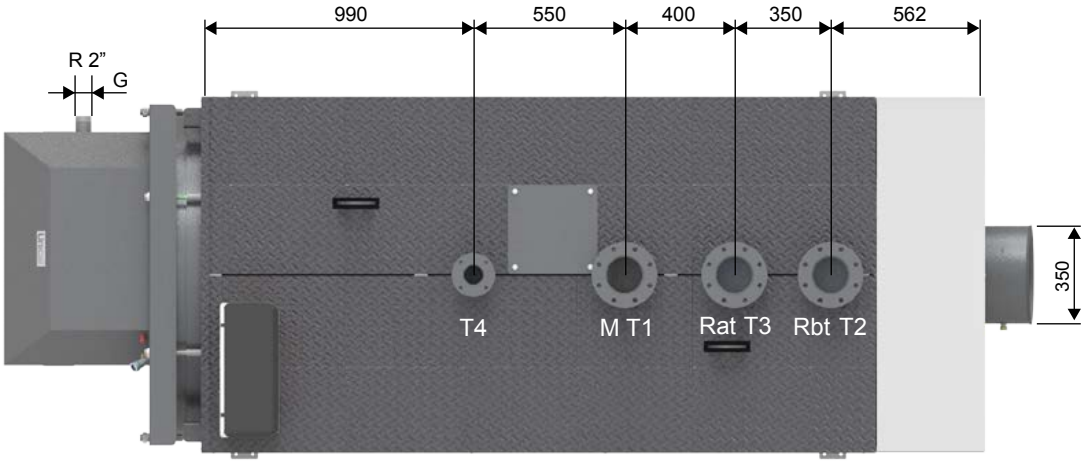
FRONT VIEW



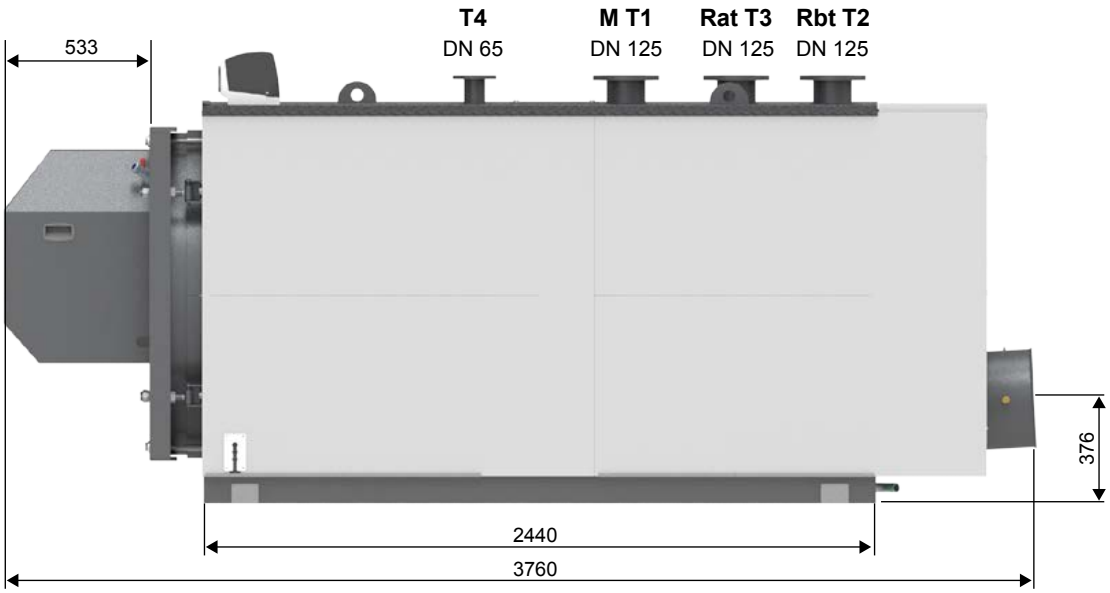
REAR VIEW

SPK	Net Weight kg
1000	2440

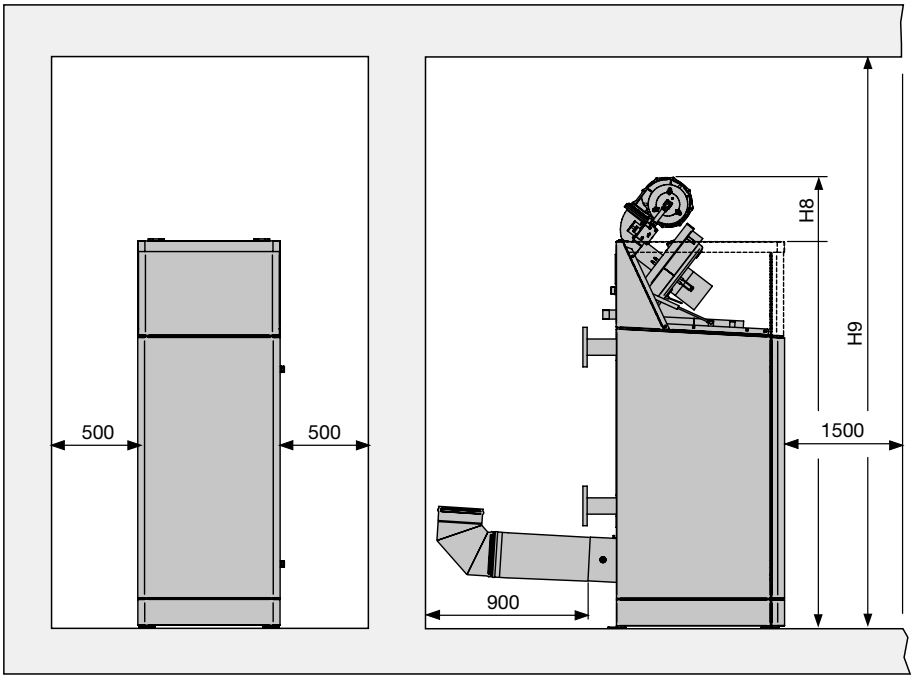
VIEW FROM ABOVE



SIDE VIEW



POSITIONING IN THE BOILER ROOM - SPK 150÷600



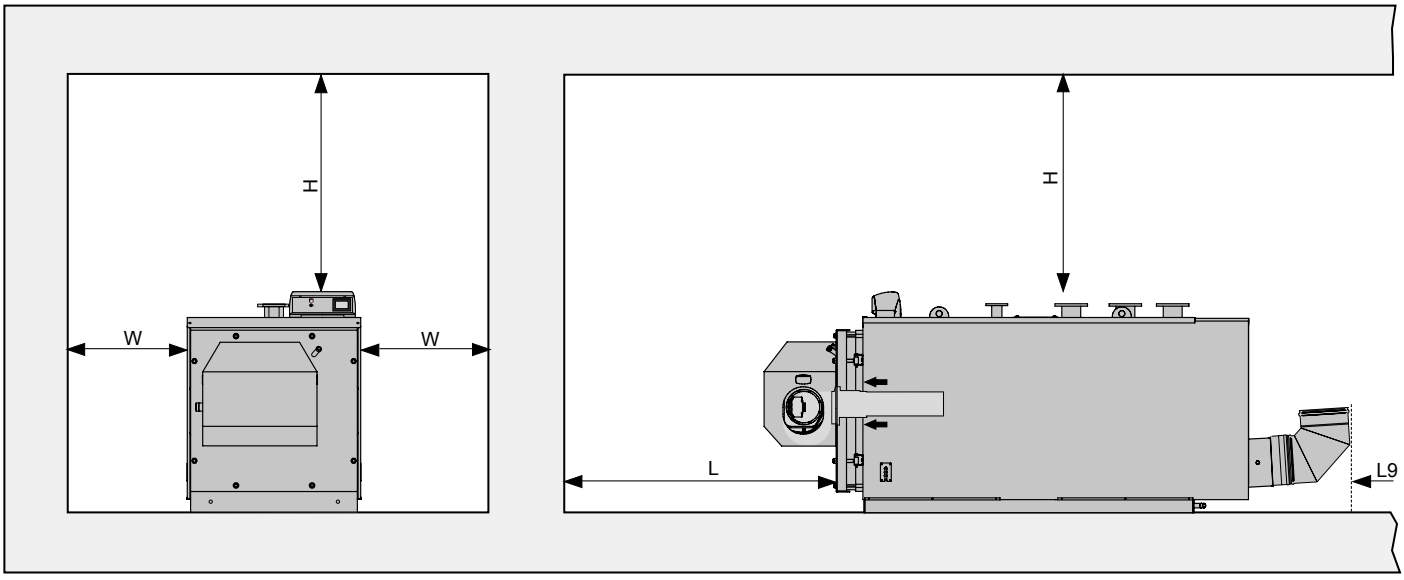
In the installation consider overall opening height.

Clearance (mm)

SPK	H8*	H9
150	2109	2300
230	2147	2500
300	2366	2500
348	2690	3000
400	2690	3000
500	2690	3000
600	2770	3000

* space for combustion chamber opening

POSITIONING IN THE BOILER ROOM - SPK 1000

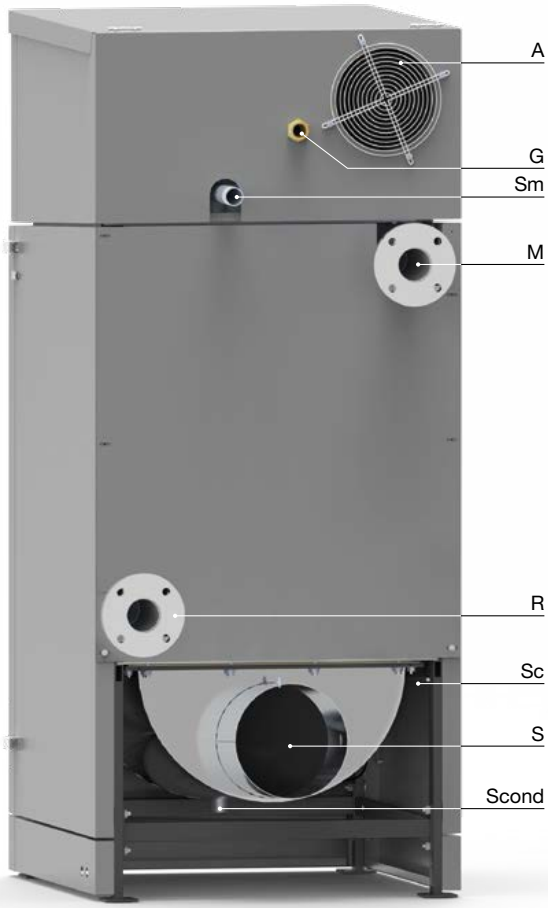


Clearance (mm)

SPK	W	L	L9	H
1000	2000	3800	1000	1000

The distance is recommended to allow both the opening of the door and the assembly /disassembly of the burner.

CONNECTIONS

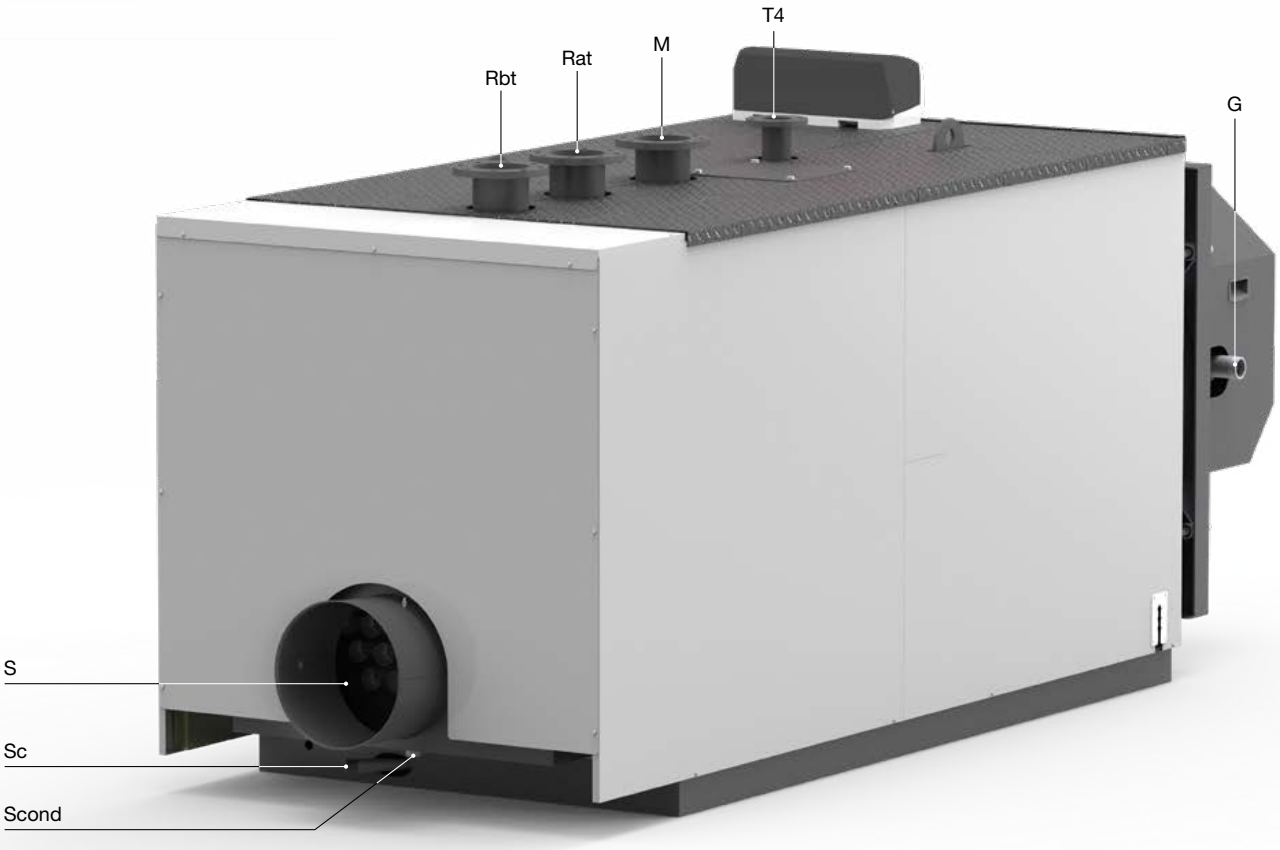


G	Gas Inlet
M	Flow
R	Return
A	Air intake
T4	Expansion vessel
S	Flue gas exhaust
Sm	Air vent connection
Sc	Boiler drain
Scond	Condensation drain

(*) FLUE SOCKET ADAPTER (optional)
Ø 200 - Ø 150 (SPK 150)
for adaption to existing chimneys Ø150

SPK	G inch	M PN16	R PN16	A Ø mm	S Ø mm	Sm inch	Scond Ø mm
150	1”	DN 65	DN 65	150	200 (*)	1”	DN 40
230	1” ¼	DN 65	DN 65	250	250	1” ¼	DN 40
300	1” ¼	DN 80	DN 80	250	250	1” ½	DN 40
348	1” ½	DN 80	DN 80	250	300	1” ½	DN 40
400	1” ½	DN 80	DN 80	250	300	1” ½	DN 40
500	1” ½	DN 80	DN 80	250	300	1” ½	DN 40
600	1” ½	DN 100	DN 100	250	300	1” ½	DN 40

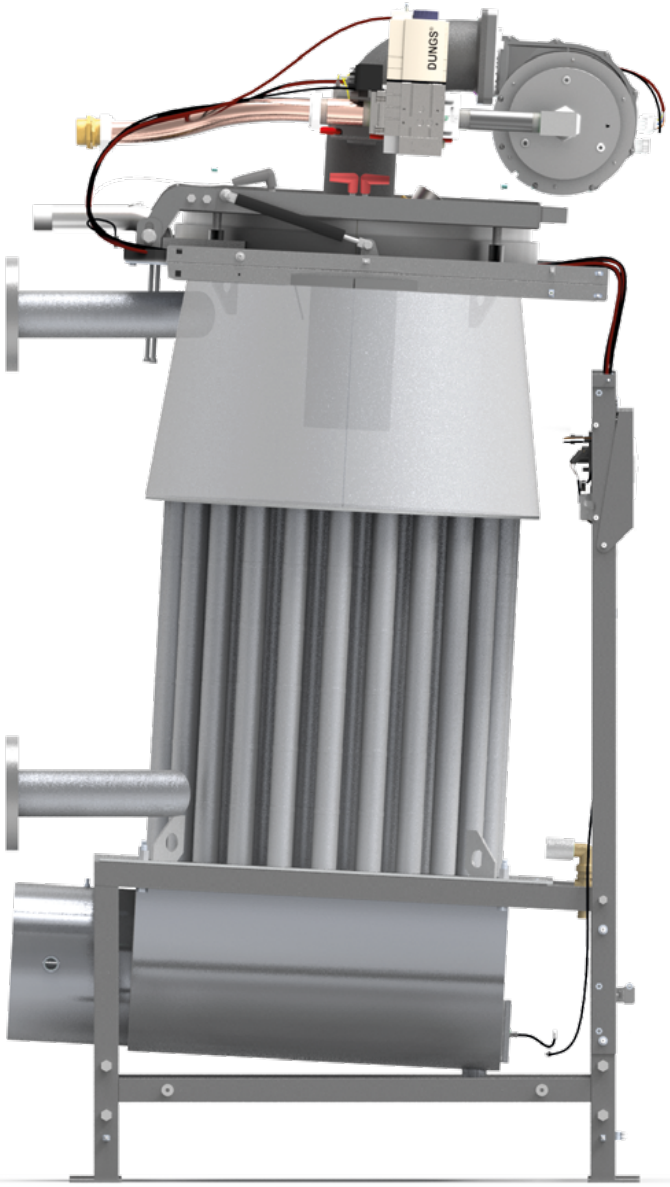
SPK	G inch	M PN6	R (at-bt) PN6	T4 PN6	S Ø mm	Sc inch	Scond Ø mm
1000	2”	DN 125	DN 125	DN 65	350	1”	DN 40



FURNACE AND HYDRODYNAMIC STRUCTURE

- Vertical furnace
- Truncated cone shaped combustion chamber
- Construction in stainless AISI 316 L
- Sized for premix burner

Model	Combustion chamber volume m^3
SPK 150	0.06
SPK 230	0.11
SPK 300	0.135
SPK 348	0.216
SPK 400	0.216
SPK 500	0.220
SPK 600	0.240
SPK 1000	0.75



The thermal exchange with the installation is guaranteed by specific return manifold placed in such position to guarantee the maximum efficiency of the heat exchanger.

Both, the large diameter manifold and the large water content guarantee the maximum water circulation with the minimum pressure losses.
The water, through the forced circulation, surrounds completely the stainless steel heat exchanger (combustion chamber and smoke pipes) and, heated, is pushed towards the flow connection.

The special design of the heat exchanger allows the complete shut down of the boiler, with zero water circulation, without the need of recirculation pumps. This guarantees the reduction of the installation costs and the electrical running consumption.

SPECIAL SMOKE PIPES (patented)

SMOKE PIPES:

- Exceptional thermal exchange
- Functional outflow of the condensate
- Absence of wet acidic deposits
- Washout, for gravity, of the smooth exchange surfaces
- Greater duration

BREVETTO Unical PATENT

LOW NOx PREMIX BURNER

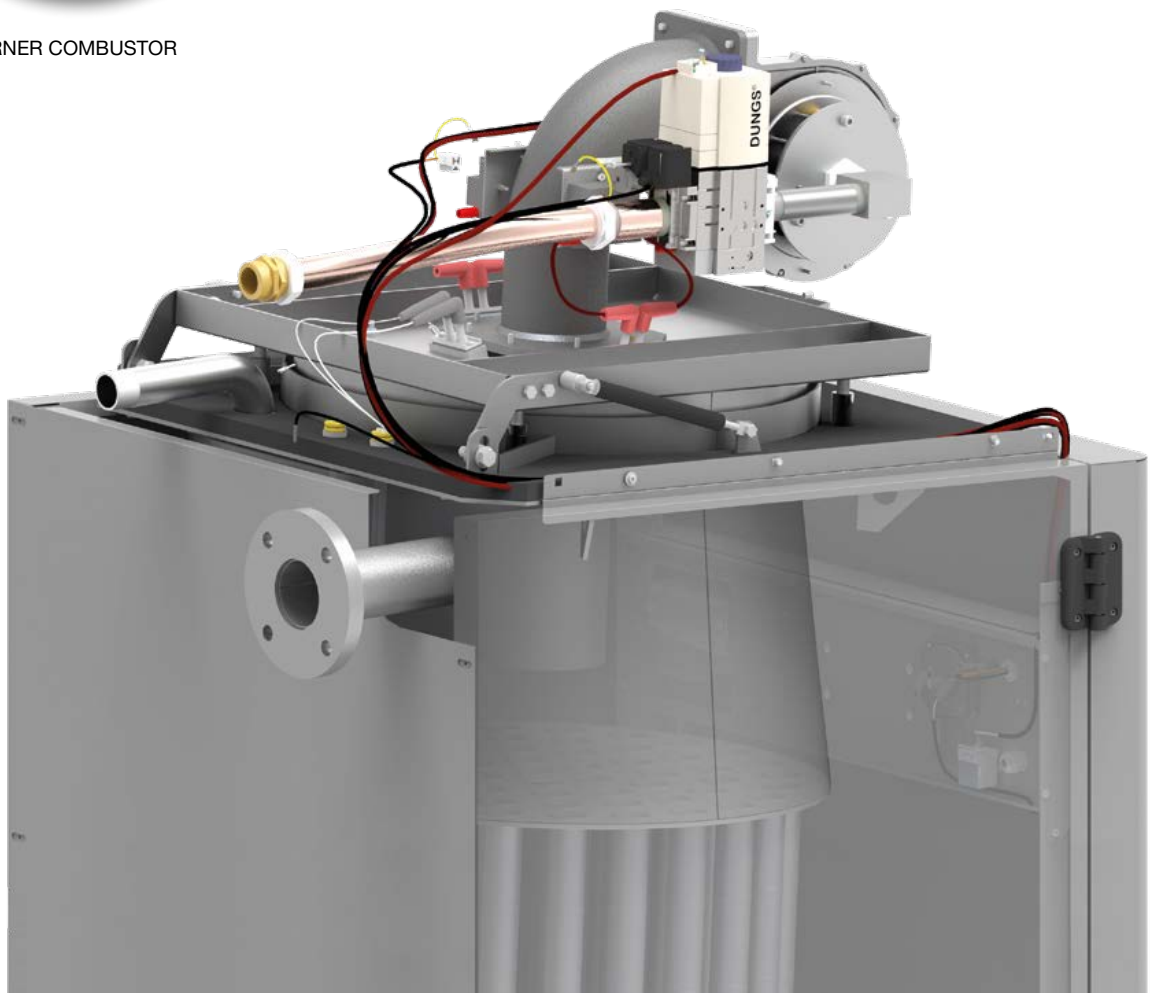
The delivered output depends on the rpm of the fan serving the gas valve. The flame control is managed directly by the electronic PCB of the burner, endowed of BMM (=Burner Module Manager).

The opening of the gas valve is generated by “Venturi effect” in the VOLUTE of the fan and the air-gas mixing happens in its inside, before being sent in the combustion chamber (premix). The combustion happens on the surface of the special cylindrical burner in FeCr alloy fibre.

The wide flame surface guarantees:

- low combustion temperature
- reduced turbulence with the following advantages:
- higher transferred energy if compared with a traditional burner with the same flame temperature
- absolute working safety for the absence of turbulences
- low pollution thanks to the complete oxidation of the natural gas molecules
- optimum combustion efficiency: maximum CO_2 = 9.3%
- fast achievement of the condensation conditions, since 54°C
- optimization of the efficiency thanks to the low smoke temperature and the low “air excess”
- minimum **NO_x emissions, Class 6** (see table of technical data).

BURNER COMBUSTOR



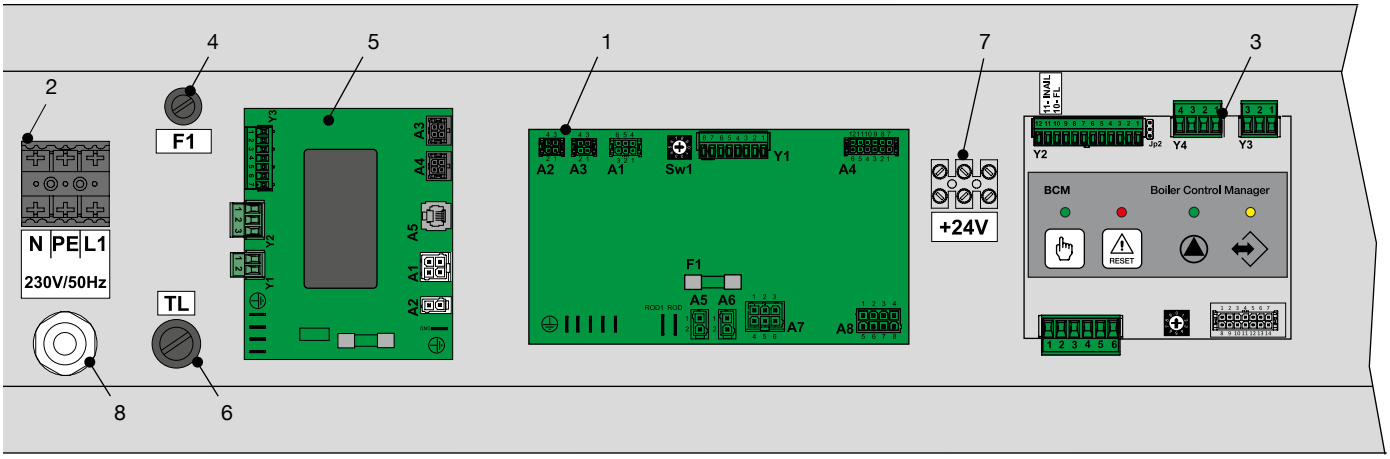
CONTROL PANEL

THERMOREGULATION Ufly P (std. supplied)

KIT GATEWAY P (optional)
for Ufly P remote connection

BCM 2.0 Boiler Cascade Manager (std. supplied)

BASIC ELECTRICAL CONNECTIONS

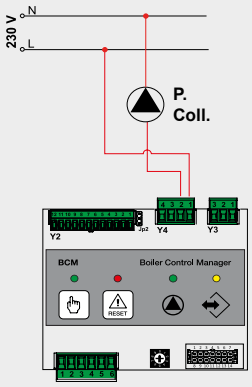


1. PCB for management of the burner
2. Terminal strip for electrical supply 230 V
3. Boiler controller BCM
4. Fuse 4-6.3 A on electrical supply
5. PCB for supply
6. Limit thermostat with manual reset
7. Additional terminal strip for +24V BCM
8. Cable clamp for supply cable

BASIC ELECTRICAL CONNECTIONS

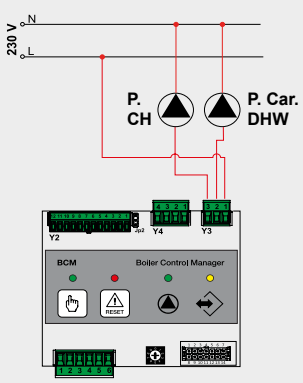
The boiler is supplied with the predisposition to manage a direct flow and DHW tank.
If Stemp ACC is connected, automatically will be activated the DHW service, which will have the priority on the pumps shown in the below figures.

If the management of addidional services is required (DHW tanks, mixed zones, solar system, etc.) it will be necessary to buy multifunction **SHC** to be connected to the local bus for the complete management through the thermoregulation **Ufly P**.



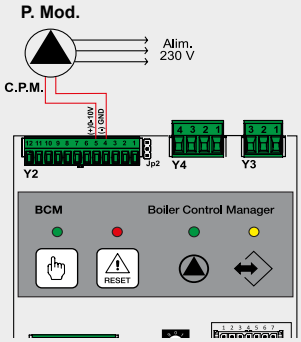
Connect the cables on Y4 1-2 as indicated

P. Coll - Optional manifold pump (Primary ring)



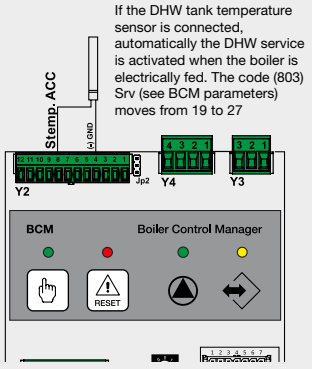
Connect the cables on Y3 1-2-3 as indicated

P. CH – Central Heating Pump (Heating circuit)
P. Car DHW – DHW tank loading pump



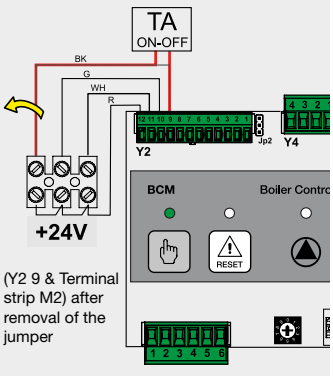
Connect the cables for modulation control as indicated (Y2 4-5). Electrical supply is external.

P. Mod – Modulating Pump (optional)



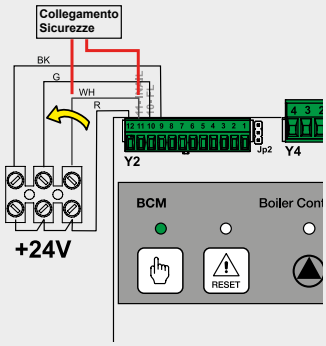
Connect the cables of the temperature sensor as indicated (Y2 4-8)

Stemp ACC – DHW tank temperature sensor (optional)



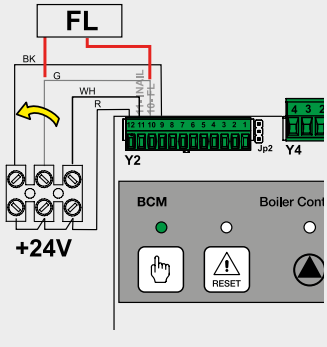
(Y2 9 & Terminal strip M2) after removal of the jumper

Parameter TA (optional)



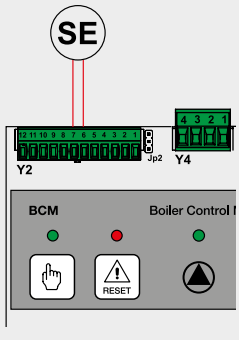
Remove the jumper and connect the cables as indicated (Y2 11 & Terminal strip M2)

Additional safety connection



Remove the jumper and connect the cables as indicated (Y2 10 & Terminal strip M2)

Connection of Flow switch FL



Predisposto alla morsettiera, BCM (Y2 6-7)

Connection of Outer sensor (optional)

TECHNICAL DATA

ELECTRICAL, HYDRAULIC, INSTALLATION DIAGRAMS AND CONTROLLERS can be unloaded from the web site www.unical.eu at the page of the product

SPK		150	230	300	348	400	500	600	1000
Boiler category		II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}	II_{2H3P}	I_{2H}
Modulation ratio		1:4.0	1:4.3	1:4.3	1:3.9	1:4.2	1:3.9	1:4.4	1:2
Rated heat output on P.C.I. Qn	kW	140	214	280	348	380	450	550	940
Minimum heat output on P.C.I. Qmin	kW	35	50	65	90	90	115	125	470
Rated useful power (Tr 60 / Tm 80 °C) Pn	kW	136.36	209.29	274.54	341.42	373.01	441.95	540.32	923.2
Minimum useful power (Tr 60 / Tm 80 °C) Pn min	kW	32.52	48.25	63.57	87.67	87.80	111.09	118.53	460.1
Rated useful power (Tr 30 / Tm 50 °C) Pcond	kW	145.88	226.84	292.88	363.31	399.00	472.2	581.19	1006
Minimum useful power (Tr 30 / Tm 50 °C) Pcond min	kW	36.54	54.60	70.01	99.09	97.20	124.09	135.88	508
Rated power performance (Tr 60 / Tm 80°C)	%	97.4	97.8	98.05	98.11	98.16	98.21	98.24	98.2
Minimum power performance (Tr 60 / Tm 80°C)	%	92.92	96.5	97.8	97.41	97.55	96.6	94.82	97.9
Rated power performance (Tr 30 / Tm 50°C)	%	104.2	106	104.6	104.4	105	104.9	105.67	107
Minimum power performance (Tr 30 / Tm 50°C)	%	104.4	109.2	107.7	110.1	108	107.9	108.7	108.1
Performance at 30% of the load (Tr 30°C)	%	107.7	107.2	108.9	108.4	108.8	108.9	106.5	108
Combustion efficiency at nominal load	%	97.8	97.9	98.2	98.2	98.2	98.2	98.3	98.4
Combustion efficiency with reduced load	%	98.38	98.32	98.40	98.34	98.31	98.43	98.42	98.7
Casing heat loss with burner operating (Qmin)	%	5.46	1.82	0.60	0.93	0.76	1.83	3.60	0.81
Casing heat loss with burner operating (Qn)	%	0.4	0.1	0.1	0.1	0.1	0.03	0.04	0.19
Net flue gas temperature tf-ta (min)(*)	°C	32.3	33.6	32	33.2	33.7	31.3	31.5	25.1
Net flue gas temperature tf-ta (max)(*)	°C	44.2	42.7	36.7	35.6	35.4	35.5	34.3	31.0
Maximum permitted temperature	°C	100	100	100	100	100	100	100	100
Maximum operating temperature	°C	90	90	90	90	90	90	90	95
Flue gas mass flow rate (min)	kg/h	57	82	106	147	147	188	204	790
Flue gas mass flow rate (max)	kg/h	229	350	458	569	621	735	899	1581
Excess air	%	25.53	25.53	25.53	25.53	25.53	25.53	25.53	29.54
Heat loss at chimney with burner on (min)	%	1.62	1.68	1.60	1.66	1.69	1.57	1.58	1.29
Heat loss at chimney with burner on (max)	%	2.21	2.14	1.84	1.78	1.77	1.78	1.72	1.60
Minimum heating circuit pressure	bar	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Maximum heating circuit pressure	bar	6	6	6	6	6	6	6	6
Water content	l	153	210	270	340	340	340	425	1413
Methane gas consumption G20 (pow.sup. 20 mbar) at Qn	m^3/h	14.80	22.63	29.61	36.80	40.18	47.58	58.15	99.4
Methane gas consumption G20 (pow.sup. 20 mbar) at Qmin	m^3/h	3.70	5.29	6.87	9.52	9.52	12.16	13.22	49.7
Propane gas consumption (pow. sup. 37/50 mbar) at Qn	kg/h	10.87	16.61	21.73	27.01	29.50	34.93	42.69	-
Propane gas consumption (pow. sup. 37/50 mbar) at Qmin	kg/h	2.72	3.88	5.05	9.70	6.99	8.93	8.70	-
Chimney base maximum pressure available	Pa	100	100	100	100	100	100	100	100
Max condensate production	kg/h	11.5	13.7	15.8	29.1	28.5	28.8	31.0	158
Emissions									
CO at maximum heat output with 0% of O_2	mg/kWh	13.73	18.05	28.08	25.27	18.25	22.46	22.1	2
NO_x at maximum heat output with 0% of O_2	mg/kWh	54	43	53	49	50	48	50	46
NO_x Class		6	6	6	6	6	6	6	6
Electrical data									
Power supply voltage/frequency	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50	230/50	230/50-400/50
Fuse on the power supply	A (R)	6	6	6	6	6	6	6	6
Protection rating	IP	X4D	X4D	X4D	X4D	X4D	X4D	X4D	20

Room Temperature = 20°C. (*) Temperatures detected with the unit in operation (Tr 60 / Tm 80°C)

Seasonal Efficiency ηs according to Directive 2009/125/EC for Outputs < = 400 kW. See Erp Table

Standstill heat losses at Δt 30K – P_{stby} - See Erp Table

Standstill electrical consumption – P_{sb} - See Erp Table

TECHNICAL DATA ACCORDING TO ErP DIRECTIVE

ELECTRICAL, HYDRAULIC, INSTALLATION DIAGRAMS AND CONTROLLERS can be unloaded from the web site www.unical.eu at the page of the product

SPK			150	230	300	348	400	500	600	1000
EFFECTIVE NOMINAL OUTPUT	P_n	kW	136	209	274	341	371	442	540	923
SEASONAL ENERGY EFFICIENCY TO HEAT THE ROOM	η_s	%	93	92	94	93	94	94	92	92
SEASON EFFICIENCY CLASS TO DISCHARGE			**A**	**A**	**A**	**A**	**A**	*	*	*
FOR BOILERS TO HEAT THE ROOM AND MIXED BOILERS: USEFUL HEAT OUTPUT										
USEFUL HEAT OUTPUT with high temperature capacity (Tr 60 °C / Tm 80 °C)	P_4	kW	136.3	209.3	274.5	341.4	373.0	441.9	540.3	923.2
RATED HEAT OUTPUT EFFICIENCY with high temperature capacity (Tr 60 °C / Tm 80 °C)	η_4	%	87.8	88.1	88.3	88.4	88.4	88.5	88.5	88.5
USEFUL POWER AT 30% OF THE RATED HEAT OUTPUT with low temperature capacity (Tr 30 °C)	P_1	kW	45.2	68.8	91.5	113.2	124.0	147.1	175.7	304.6
PERFORMANCE AT 30% OF THE RATED HEAT OUTPUT with low temperature capacity (Tr 30 °C)	η_1	%	97.0	96.6	98.1	97.7	98.0	98.2	96.0	97.3
BOILER WITH OUTPUT RANGE ADJUSTMENT: YES / NO			NO	NO	NO	NO	NO	NO	NO	NO
AUXILIARY ELECTRICITY CONSUMPTION										
WITH A FULL LOAD	el_{max}	kW	0.190	0.195	0.210	0.270	0.425	0.555	0.590	2.120
WITH A PARTIAL LOAD	el_{min}	kW	0.042	0.040	0.032	0.036	0.051	0.053	0.088	1.060
STANDBY MODE	P_{SB}	kW	0.005	0.005	0.005	0.005	0.005	0.004	0.007	0.005
OTHER ELEMENTS										
HEAT DISPERSION ON STANDBY	P_{stby}	kW	0.32	0.39	0.34	0.95	0.95	0.95	1.34	2.15
NITROGEN OXIDES EMISSIONS referred to NCV & (GCV)	NO_x	mg/kWh	53	51	53	49	50	48	50	40
NO_x CLASS			6	6	6	6	6	6	6	6
CONSUMPTION OF ANNUAL ELECTRICITY	Q_{HE}	GJ	424	653	844	1054	1148	1358	1694	2887

* Appliances not covered by Directive 2009/125/CE

DETERMINATION OF THE PRIMARY CIRCUIT PUMP

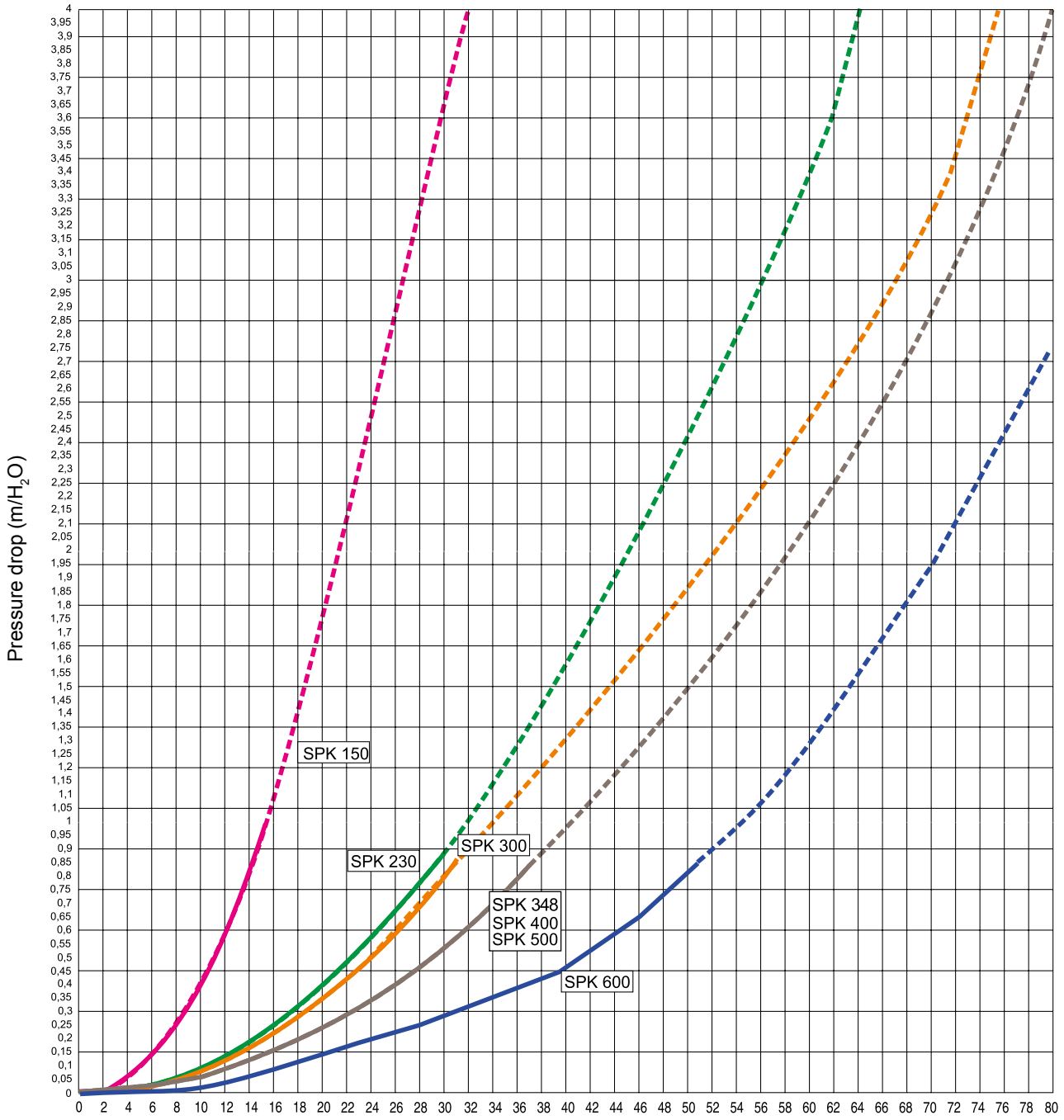
	SPK 150	SPK 230	SPK 300	SPK 348-400	SPK 500	SPK 600	SPK 1000
Maximum flow rate in l/h (Δt=8K)	14.655	22.495	29.426	39.883	47.300	57.405	-
Maximum flow rate in l/h (Δt=15K)	7.816	11.997	15.695	21.303	25.606	30.616	52.900
Requested rated output in l/h (Δt=20K)	5.862	8.998	11.772	15.997	19.203	22.962	39.700

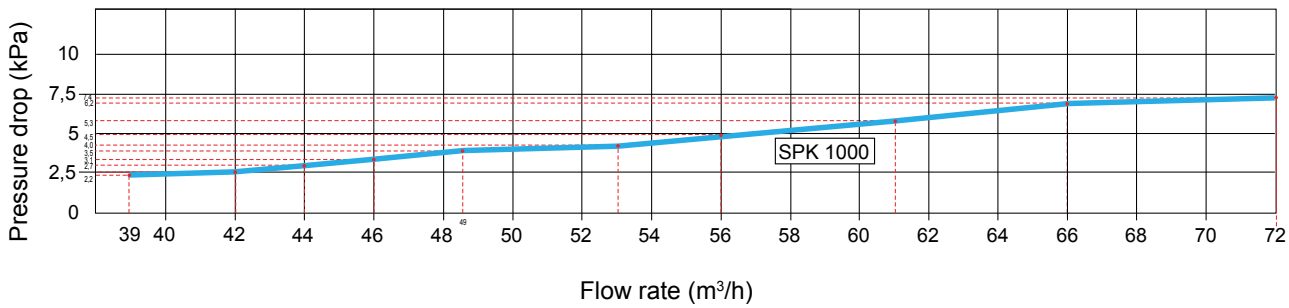
NOTE: The pumps must be determined by the installer or designer according to the boiler and system data.
The pump is not an integral part of the boiler. (See the installation manual)

MODULATING PUMP

TWIN MODULATING PUMP

WATER SIDE PRESSURE DROPS DIAGRAM





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