

# Unical

## TRISTAR 3G 2S



BREVETTO  
**Unical**  
PATENT

smoke pipes

### PRESSURIZED CARBON STEEL BOILER WITH THREE REAL SMOKE PASS

OUTPUT RANGE

from 65 to 3000 kW

OPERATION TEMPERATURE

minimum return temperature 50°C

SUPPLY

Natural Gas or LPG fed pressure jet, two stage or modulating burners  
The models 2300 - 2650 - 3000 can be fed also with light oil

MODELS

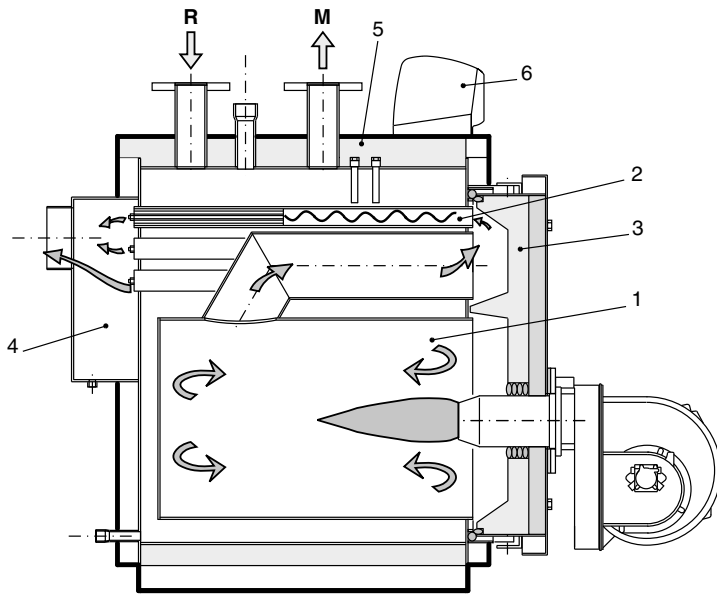
65 <sup>2S (*)</sup>	85 <sup>2S (*)</sup>	110 <sup>2S (*)</sup>	150 <sup>2S (*)</sup>	185 <sup>2S (*)</sup>	225 <sup>2S (*)</sup>	300 <sup>2S (*)</sup>	380 <sup>2S (*)</sup>	500 <sup>2S</sup>	630 <sup>2S</sup>
730 <sup>2S</sup>	840 <sup>2S</sup>	1100 <sup>2S</sup>	1320 <sup>2S</sup>	1600 <sup>2S</sup>	1900 <sup>2S</sup>	-	2300	2650	3000

Certified in OUTPUT RANGE

Special patented smoke pipes with aluminium profiles – Floating furnace

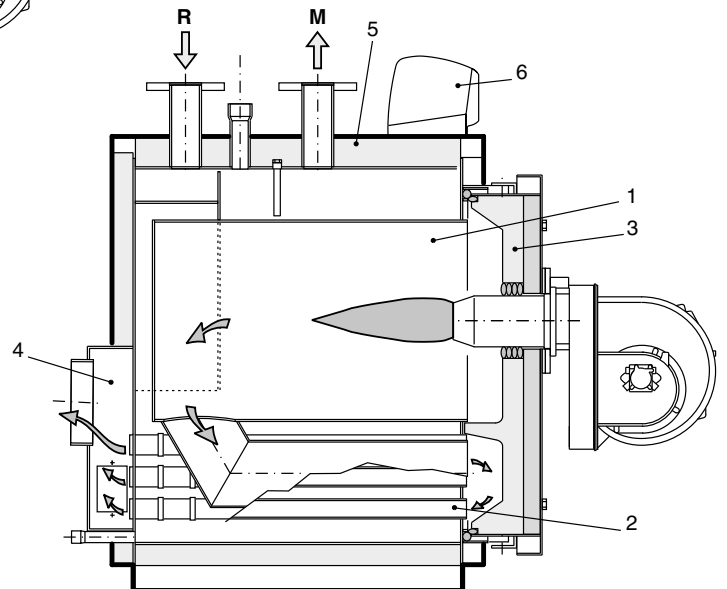
MAIN COMPONENTS

Mod. 65÷1900



- 1. Furnace
- 2. Smoke pipes with smoke diverters
- 3. Door with flame sight glass
- 4. Smoke chamber
- 5. Body insulation
- 6. Panel board

Mod. 2300÷3000



SPECIAL SMOKE PIPES

Steel tube with three extruded aluminum profiles inside, in a 120° sector, pushed against the internal wall of the tube by a central screw to ensure contact with the surface of the tube itself so that all the heat, accumulated by the profiles, is transmitted to the steel pipe, and therefore to the water, and thus increase the efficiency of the boiler.



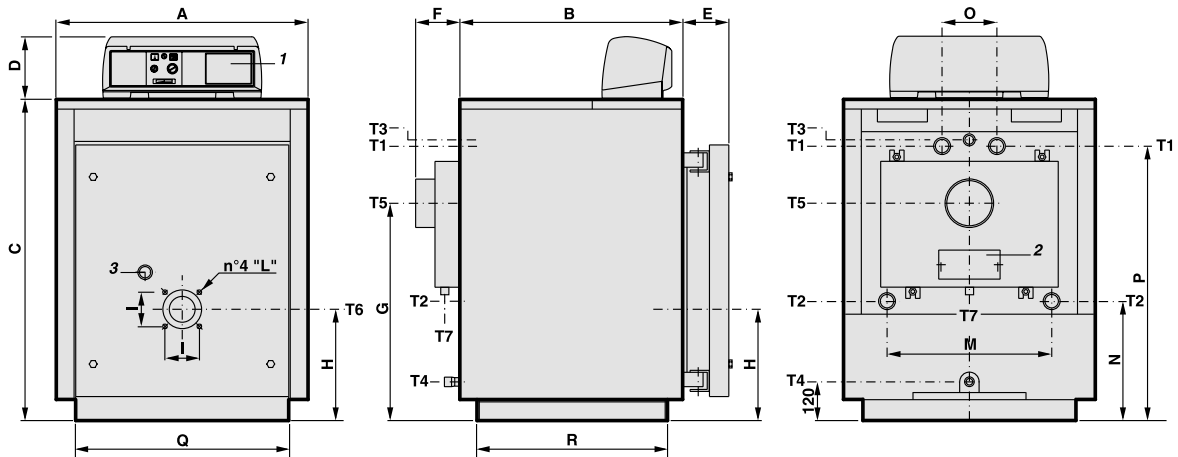
## PRODUCT PLUS VALUES

- **UTILISATION FLEXIBILITY**  
thanks to the certification in ranged output
- **REDUCED NO<sub>x</sub> EMISSIONS: < 100 mg/kWh**  
thanks to the reduction of the specific thermal load
- **ELLIPTIC SHAPE OF THE OUTER SHELL**  
(up to mod. 840 kW): reduced width making easier access through the doors
- **OTTIMIZZAZIONE SCAMBIO TERMICO**  
through driven and braked run of the water within the boiler
- **SMOKE PIPES EASY STREAM PIPE Ø 1"1/2**
- **FLOATING CYLINDRICAL FURNACE** without thermomechanical stresses from 500 kW to 3000 kW
- **FURNACE BOTTOM**  
with stiffening and heat dissipating plates
- **FRONT DOOR**  
with self centering closing system
- **INSIDE DOOR INSULATION**  
in special ceramic fibre up to 300 kW and in refractory concrete over 300 kW
- **HELICOIDAL STEEL TURBOLATORS**
- **BOILER BODY INSULATION** with a 80 mm thick tearing resistant mineral wool mattress up to 85 kW and 100 mm over 85 kW
- **CONTROL PANEL BOARD**  
of thermomechanical or electronic type
- **POSSIBLE INSTALLATION**  
of one/two/three stage or modulating oil or gas pressure jet burners
- **EASY HANDLING**  
thanks to the upper hooks and the strong I profiles of the base

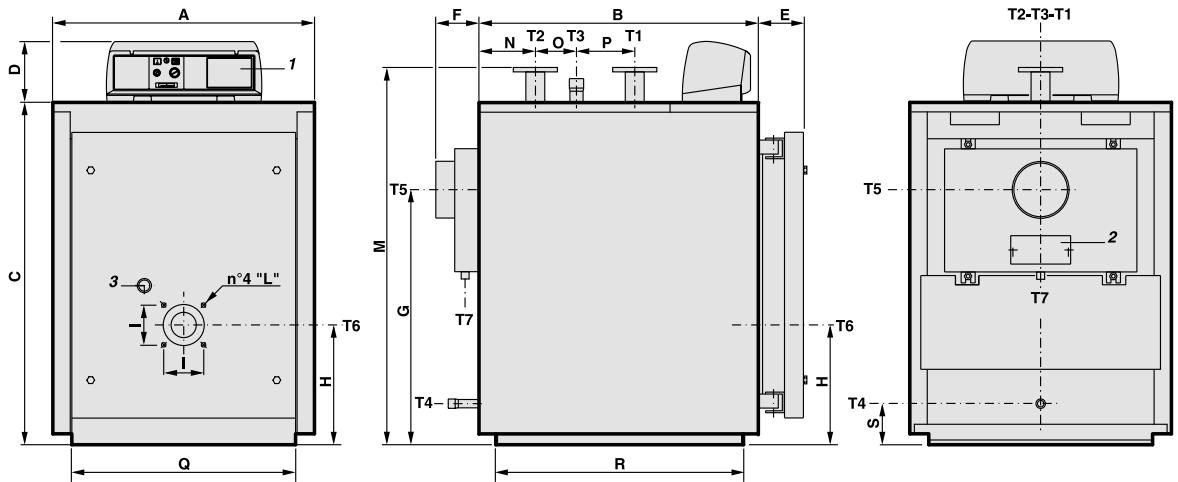


DIMENSIONS TRISTAR 3G 2S 65÷380

TRISTAR 3G 2S 65÷85



TRISTAR 3G 2S 110÷380



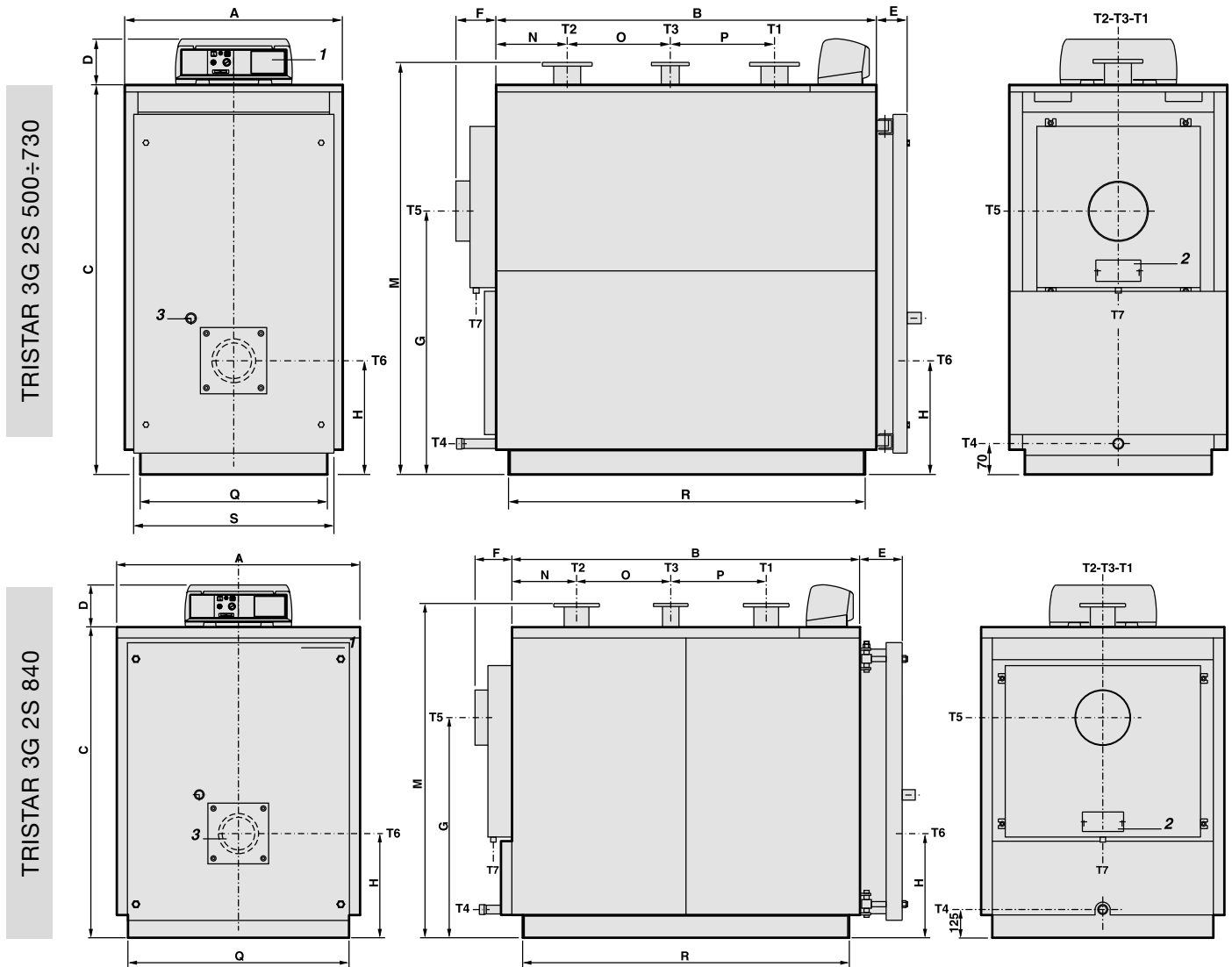
- 1 Panel board
- 2 Smoke chamber cleaning door
- 3 Flame sight glass
- T1 Central Heating flow
- T2 Central Heating return
- T3 Expansion vessel connection
- T4 Boiler drain
- T5 Chimney connection
- T6 Burner connection
- T7 Condensation drain

TRISTAR 3G 2S	CONNECTIONS						Weight kg
	T1 T2	T3	T4	T5 Øi	T6 Ø	T7 Øe	
65	ISO 7/1 UNI 2278 PN16 Rp 1½	ISO 7/1 Rp 1	ISO 7/1 Rp ¾	mm 150	mm 132	mm 40	315
85	Rp 1½	Rp 1	Rp ¾	150	132	40	355
110	DN 50	Rp 1¼	Rp ¾	180	132	40	435
150	DN 50	Rp 1¼	Rp ¾	180	132	40	515
185	DN 65	Rp 1½	Rp ¾	180	180	40	580
225	DN 65	Rp 1½	Rp ¾	180	180	40	640
300	DN 80	Rp 2	Rp ¾	225	180	40	840
380	DN 80	Rp 2	Rp ¾	225	180	40	935

TRISTAR 3G 2S	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q*	R*	S
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
65	740	690	950	190	140	145	660	345	120	M8	470	310	190	846	660	590	--
85	740	950	950	190	140	145	660	345	120	M8	470	310	190	846	660	850	--
110	820	885	1082	190	140	145	748	380	120	M 8	1210	175	130	185	710	786	130
150	820	1145	1082	190	140	145	748	380	120	M 8	1210	175	390	185	710	1046	130
185	860	1080	1182	190	140	145	828	400	--	--	1310	215	210	250	750	981	130
225	860	1210	1182	190	140	145	828	400	--	--	1310	215	340	250	750	1111	130
300	890	1275	1352	190	140	145	928	440	--	--	1485	255	285	315	780	1177	125
380	890	1470	1352	190	140	145	928	440	--	--	1485	255	480	315	780	1372	125

(\*) Minimum dimensions for boiler room access

DIMENSIONS TRISTAR 3G 2S 500÷840



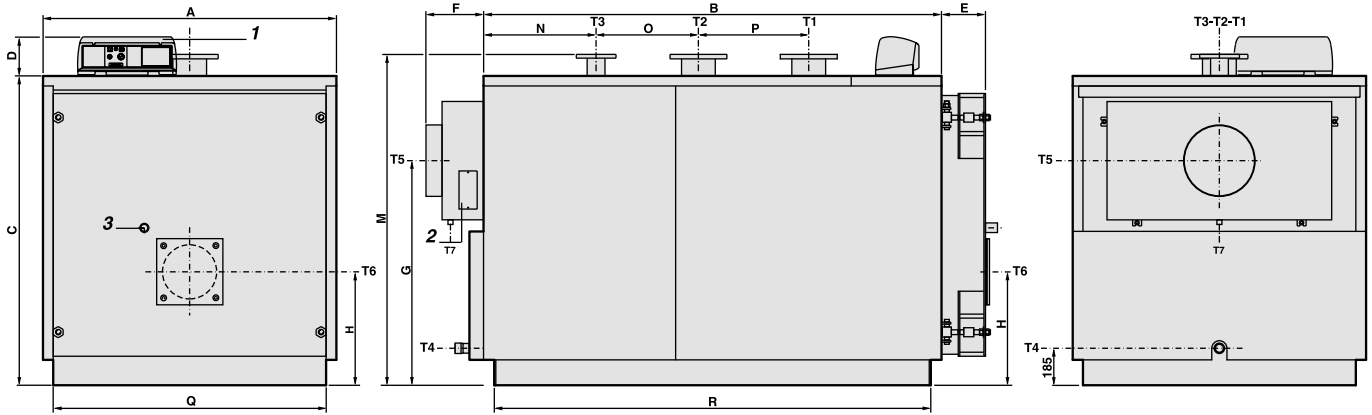
- 1 Panel board
- 2 Smoke chamber cleaning door
- 3 Flame sight glass
- T1 Central Heating flow
- T2 Central Heating return
- T3 Expansion vessel connection
- T4 Boiler drain
- T5 Chimney connection
- T6 Burner connection
- T7 Condensation drain

TRISTAR 3G 2S	CONNECTIONS							Weight kg
	T1 T2	T3	T4	T5 Øi	T6 Ø	T7 Øe		
500	UNI 2278 PN16 DN 100	UNI 2278 PN16 DN 65	ISO 7/1 Rp 1	mm 250	mm 220	mm 40	1260	
630	DN 100	DN 65	Rp 1	250	220	40	1375	
730	DN 100	DN 65	Rp 1	250	220	40	1510	
840	DN 100	DN 65	Rp 1¼	250	270	40	1650	

TRISTAR 3G 2S	A	B	C	D	E	F	G	H	M*	N	O	P	Q*	R*	S*
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
500	920	1605	1645	190	135	195	1110	480	1735	298	435	440	790	1505	860
630	920	1800	1645	190	135	195	1110	480	1735	298	630	440	790	1790	860
730	920	1995	1645	190	135	195	1110	480	1735	298	825	440	790	1895	860
840	1122	2115	1432	190	195	195	1025	480	1540	298	945	440	1020	2014	--

(\* Minimum dimensions for boiler room access)

DIMENSIONS TRISTAR 3G 2S 1100÷1900



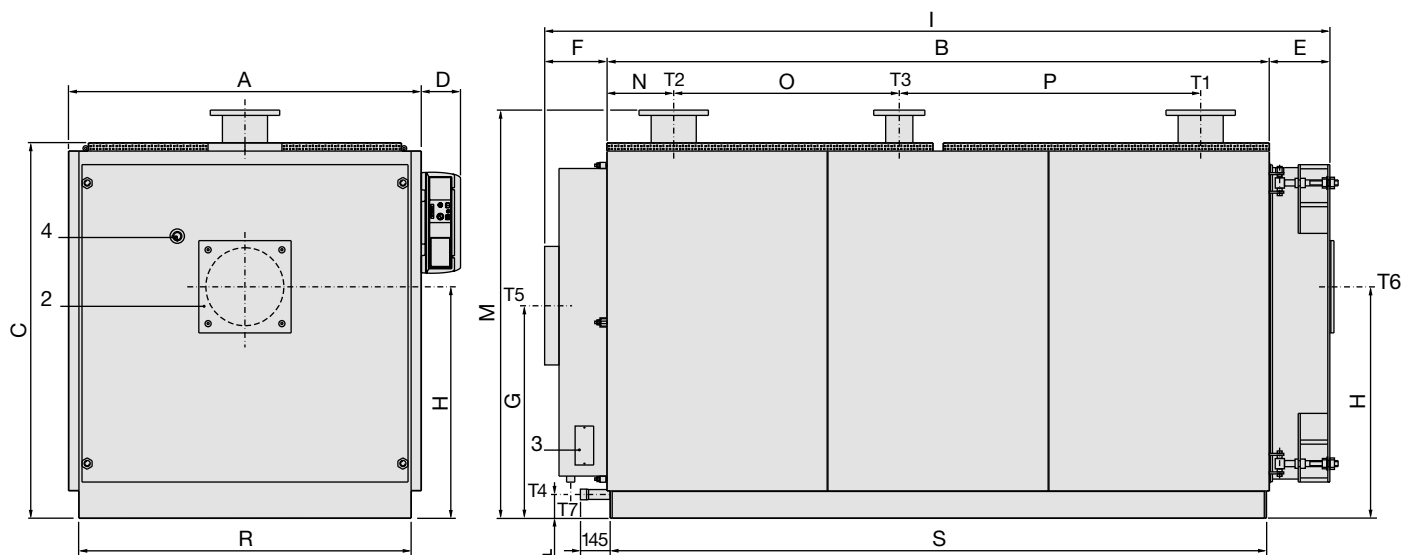
- 1** Panel board
- 2** Smoke chamber cleaning door
- 3** Flame sight glass
- T1** Central Heating flow
- T2** Central Heating return
- T3** Expansion vessel connection
- T4** Boiler drain
- T5** Chimney connection
- T6** Burner connection
- T7** Condensation drain

TRISTAR 3G 2S	CONNECTIONS						Weight kg
	T1 T2	T3	T4	T5 Øi	T6 Ø	T7 Øe	
	UNI 2278 PN16	UNI 2278 PN16	ISO 7/1	mm	mm	mm	
1100	DN 150	DN 80	Rp 1½	350	270	40	2530
1320	DN 150	DN 80	Rp 1½	350	270	40	3065
1600	DN 175	DN 100	Rp 1½	400	285	40	4005
1900	DN 175	DN 100	Rp 1½	400	285	40	4230

TRISTAR 3G 2S	A	B	C	D	E	F	G	H	M*	N	O	P	Q*	R*
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1100	1462	2282	1542	190	230	290	1120	565	1650	561	510	550	1360	2176
1320	1462	2652	1542	190	230	290	1120	565	1650	561	880	550	1360	2546
1600	1622	2692	1702	190	260	290	1245	605	1810	661	670	700	1520	2590
1900	1622	3014	1702	190	260	290	1245	605	1810	662	990	700	1520	2910

(\*) Minimum dimensions for boiler room access

DIMENSIONS TRISTAR 3G 2300÷3000



- 1 Panel board
- 2 Burner connection flange
- 3 Smoke chamber cleaning door
- 4 Flame control warming light
- T1 Heating flow
- T2 Heating return
- T3 Expansion vessel connection
- T4 Boiler drain
- T5 Chimney connection
- T6 Burner connection
- T7 Condensation drain

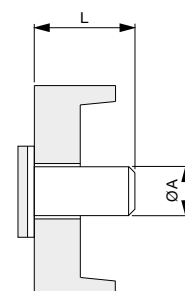
TRISTAR 3G	CONNECTIONS						Weight kg
	T1 T2	T3	T4	T5 Øi	T6 Ø	T7 Øe	
	UNI 2278 PN16	UNI 2278 PN16	ISO 7/1	mm	mm	mm	
2300	DN 200	DN 125	Rp 1½	570	320	40	5350
2650	DN 200	DN 125	Rp 1½	620	380	40	7070
3000	DN 200	DN 125	Rp 1½	620	380	40	7600

TRISTAR 3G	A	B	C	D	E	F	G	H	I	L	M*	N	O	P	R*	S
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2300	1720	3230	1830	190	295	310	1315	1225	3835	115	1990	325	1100	1470	1620	3200
2650	1970	3194	2090	190	325	360	1535	1450	3879	144	2271	377	1060	1420	1870	3164
3000	1970	3594	2090	190	325	360	1535	1450	4279	144	2271	777	1060	1420	1870	3564

(\* Minimum dimensions for boiler room access

BURNER BLAST TUBE DIMENSIONS

BOILER TYPE	øA mm	L mm	BOILER TYPE	øA mm	L mm
TRISTAR 3G 65÷85 2S	132	180	TRISTAR 3G 840 2S	270	280
TRISTAR 3G 110÷150 2S	132	180	TRISTAR 3G 1100÷1320 2S	270	320
TRISTAR 3G 185÷225 2S	180	180	TRISTAR 3G 1600÷1900 2S	285	350
TRISTAR 3G 300÷380 2S	180	200	TRISTAR 3G 2300	320	350
TRISTAR 3G 500÷730 2S	220	230	TRISTAR 3G 2650÷3000	380	400



Note: TRISTAR 3G 2S boilers are designed to operate with ON/OFF type GAS burners; alternatively, they can be equipped with a two-stage or modulating burner, provided that the minimum heat output in first flame, or in modulation, does not fall below 60% of the firebox load.

## TECHNICAL DATA

ELECTRICAL, HYDRAULIC, INSTALLATION DIAGRAMS AND CONTROLLERS can be unloaded from the web site [www.unical.eu](http://www.unical.eu) at the page of the product

TRISTAR 3G (Gas fired)		65 2S	85 2S	110 2S	150 2S	185 2S	225 2S	300 2S
Nominal heat output	kW	55÷65	72÷85	93÷109	127÷150	157÷185	191÷225	255÷300
Nominal heat input	kW	58.2÷69.2	76.1÷90.3	98.1÷115.6	133.6÷158.6	164.9÷195.3	200.2÷237.1	265.9÷314.4
Heat efficiency at nominal load (100%)	%	94.4÷93.9	94.6÷94.1	94.8÷94.3	95÷94.5	95.2÷94.7	95.4÷94.9	95.9÷95.4
Heat efficiency at 30% load	%	94.6÷94.1	94.8÷94.3	95÷94.5	95.2÷94.7	95.4÷94.9	95.6÷95.1	96.1÷95.6
Combustion efficiency at nominal load (100%)	%	95.9÷95.1	95.9÷95.2	96÷95.2	96÷95.3	96.1÷95.4	96.3÷95.6	96.3÷95.6
Boiler capacity	l	131	187	204	270	285	322	408
Heat loss at casing (min.- max.)	%	1.4÷1.2	1.3÷1.1	1.2÷0.9	0.9÷0.7	0.8÷0.6	0.9÷0.7	0.4÷0.2
Heat loss at chimney with burner on (min.-max.)	%	4.1÷4.9	4.1÷4.8	4÷4.8	4÷4.7	3.9÷4.6	3.7÷4.4	3.7÷4.4
Heat loss at chimney with burner off (min.-max.)	%	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1
Maximum boiler working pressure	bar	6	6	6	6	6	6	6
Water pressure drops (*)	m w.c.	0.04÷0.06	0.05÷0.07	0.06÷0.08	0.08÷0.10	0.10÷0.18	0.17÷0.20	0.22÷0.35
Flue gas pressure drop	mm w.c.	4.6÷6.4	5.4÷7.5	7÷9.7	11.2÷15.6	14÷19.4	16.6÷23.1	20.5÷28.4
Flue gas temperature tf-ta (min.-max.)	°C	85÷100	84÷99	83÷98	82÷97	80÷95	76÷91	75÷90
CO <sub>2</sub> content	%	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8
Flue gas mass flow rate (min.-max)	kg/h	87.6÷104	114.5÷135.8	147.5÷173.8	200.8÷238.5	247.8÷293.5	300.9÷356.4	399.7÷472.7

TRISTAR 3G (Gas fired)		380 2S	500 2S	630 2S	730 2S	840 2S	1100 2S
Nominal heat output	kW	323÷380	425÷500	535÷630	620÷730	714÷840	935÷1100
Nominal heat input	kW	336.8÷398.3	443.1÷524.1	557.8÷660.3	646.5÷765.2	744.5÷880.5	974.9÷1153
Heat efficiency at nominal load (100%)	%	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4
Heat efficiency at 30% load	%	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6
Combustion efficiency at nominal load (100%)	%	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6
Boiler capacity	l	475	656	737	807	932	1580
Heat loss at casing (min.- max.)	%	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2
Heat loss at chimney with burner on (min.-max.)	%	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4
Heat loss at chimney with burner off (min.-max.)	%	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1
Maximum boiler working pressure	bar	6	6	6	6	6	6
Water pressure drops (*)	m w.c.	0.32÷0.53	0.10÷0.15	0.16÷0.23	0.23÷0.33	0.35÷0.52	0.15÷0.21
Flue gas pressure drop	mm w.c.	23.6÷32.7	27.3÷37.8	33.5÷46.5	37.5÷52	41.4÷57.3	48.8÷67.5
Flue gas temperature tf-ta (min.-max.)	°C	75÷90	75÷90	75÷90	75÷90	75÷90	75÷90
CO <sub>2</sub> content	%	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8
Flue gas mass flow rate (min.-max)	kg/h	506.3÷598.7	666.1÷787.8	838.5÷992.6	971.7÷1150.2	1119.1÷1323.5	1465.5÷1733.1

TRISTAR 3G (Gas fired)		1320 2S	1600 2S	1900 2S	2300	2650	3000
Nominal heat output	kW	1122÷1320	1360÷1600	1615÷1900	1725÷2300	1987.5÷2650	2250÷3000
Nominal heat input	kW	1169.9÷1383.6	1418.1÷1677.1	1684÷1991.5	1798.7÷2410.8	2072.4÷2777.7	2346.1÷3144.5
Heat efficiency at nominal load (100%)	%	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4	95.9÷95.4
Heat efficiency at 30% load	%	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6	96.1÷95.6
Combustion efficiency at nominal load (100%)	%	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6	96.3÷95.6
Boiler capacity	l	1791	2297	2496	2875	4320	4817
Heat loss at casing (min.- max.)	%	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2	0.4÷0.2
Heat loss at chimney with burner on (min.-max.)	%	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4	3.7÷4.4
Heat loss at chimney with burner off (min.-max.)	%	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1	0.1÷0.1
Maximum boiler working pressure	bar	6	6	6	6	6	6
Water pressure drops (*)	m w.c.	0.21÷0.30	0.20÷0.28	0.27÷0.39	0.20÷0.35	0.19÷0.33	0.26÷0.45
Flue gas pressure drop	mm w.c.	53.7÷74.3	58.9÷81.6	63.6÷88.1	45÷80	41.3÷73.5	50.6÷90
Flue gas temperature tf-ta (min.-max.)	°C	75÷90	75÷90	75÷90	75÷90	75÷90	75÷90
CO <sub>2</sub> content	%	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8	9.8÷9.8
Flue gas mass flow rate (min.-max)	kg/h	1758.6÷2079.7	2131.6÷2520.9	2531.3÷2993.5	2703.7÷3623.8	3115.1÷4175.2	3526.5÷4726.7

(\*) Pressure drops corresponding to a thermal drop of 15 K.

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