

# Unical

## TRISTAR 2S



BREVETTO  
**Unical**  
PATENT

multi-fin pipes

### PRESSURIZED CARBON STEEL BOILER WITH REVERSED FLAME FURNACE

OUTPUT RANGE

from 80 to 6100 kW

OPERATION TEMPERATURE

minimum return temperature 55°C

SUPPLY

Natural Gas or LPG fed pressure jet burners

MODELS

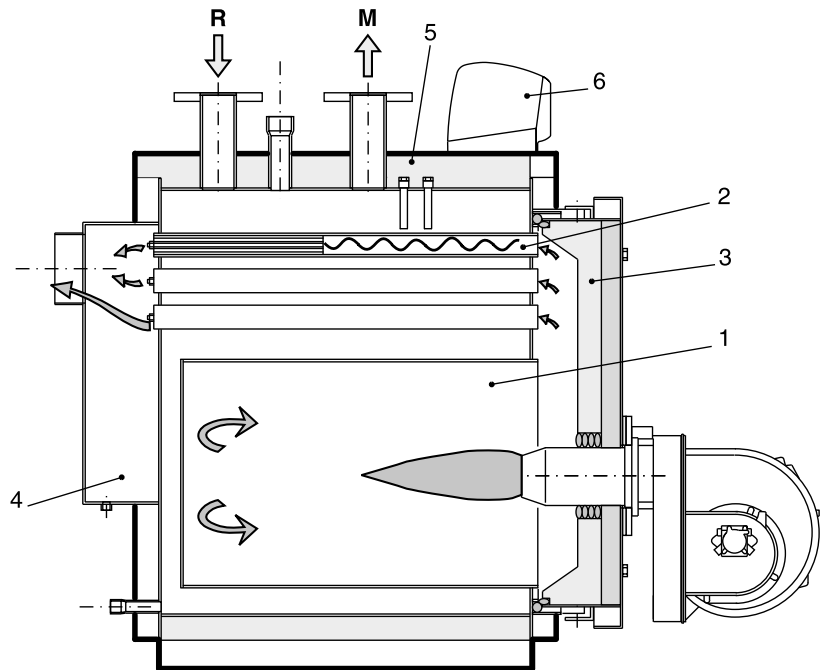
80 <sup>(*)</sup>	120 <sup>(*)</sup>	160 <sup>(*)</sup>	200 <sup>(*)</sup>	250 <sup>(*)</sup>	300 <sup>(*)</sup>	370 <sup>(*)</sup>	450	560	680	780	870	1000	1180
1400	1650	2000	2350	2700	3100	3500	3900	4400	4800	5200	5700	6100	-

Certified in OUTPUT RANGE

Special patented smoke pipes with aluminium profiles – Floating furnace

## MAIN COMPONENTS

1. Furnace
2. Special smoke pipes EASY STREAM PIPE with turbulators
3. Door with flame control warning light
4. Smoke chamber
5. Body insulation
6. Panel board

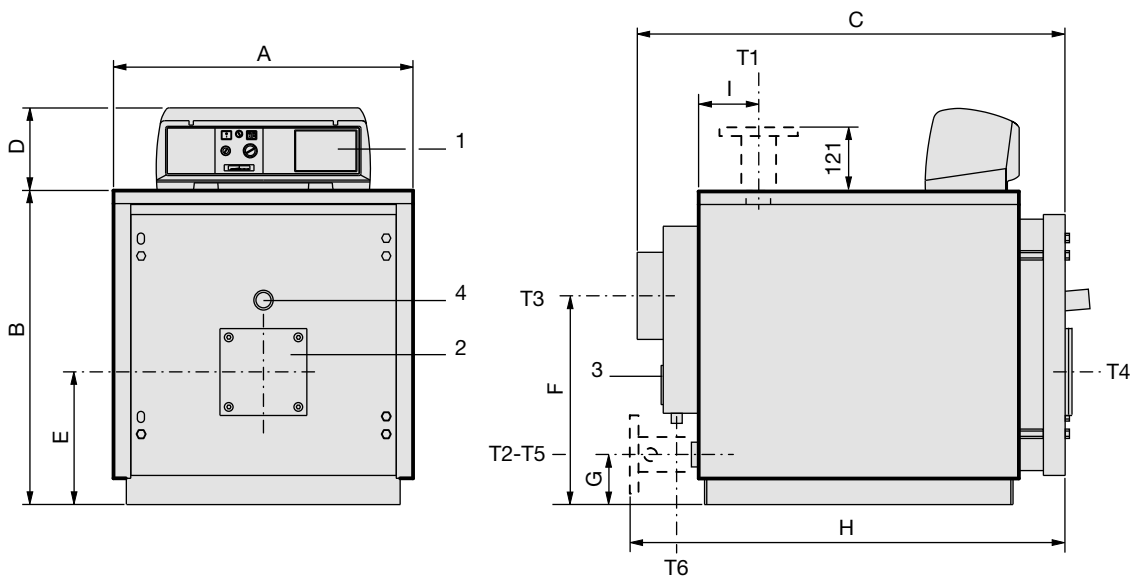


## PRODUCT PLUS VALUES

- **OUTER SHELL OF ELLIPTIC SHAPE** (up to the model 870 kW) that creates the following advantages:
  - small dimensions in width
  - positioning of most of the tube bundle above the furnace, with drastic reduction of the possible formation of condensate
- **FLOATING FURNACE** from model 680 and on, in order to reduce the mechanical stress due to the different dilatations of the furnace, smoke pipes and outer shell.
- **FURNACE BOTTOM** with heat recovering plates welded on the water side for efficiency increase and as stiffeners of the bottom itself.
- **MULTI-FIN, PATENTED, BIMETALLIC PIPES** with high efficiency
- **OPTIMIZATION OF THE HEAT EXCHANGE** thanks to:
  - special helical turbulators in the front part of the smoke pipes
  - guided water way inside the boiler
- **FRONT DOOR** with self-centring closing, adjustable in vertical / axial and transversal way, with bolts separated from the hinges to avoid mechanical stresses
- **INTERNAL DOOR INSULATION** in recyclable super light concrete
- **OUTER PROTECTING CASING** in steel sheet panels, with insulating mattress in mineral wool protected with anti-tearing fabric foil, rounded directly on the boiler body. Thickness of 50-60-80-100 mm according to the output.
- **SMOKE CHAMBER** with condensate drain connection
- **BOARD PANEL** thermostatic type (std) or electronic type (optional)
- **EASY HANDLING** thanks to the upper hooks and strong base longitudinal members



DIMENSIONS TRISTAR 2S 80÷250



- 1 Panel board
- 2 Burner connection flange
- 3 Smoke chamber cleaning door
- 4 Flame control warning light

- T1 Heating flow
- T2 Heating return
- T3 Chimney connection
- T4 Burner connection

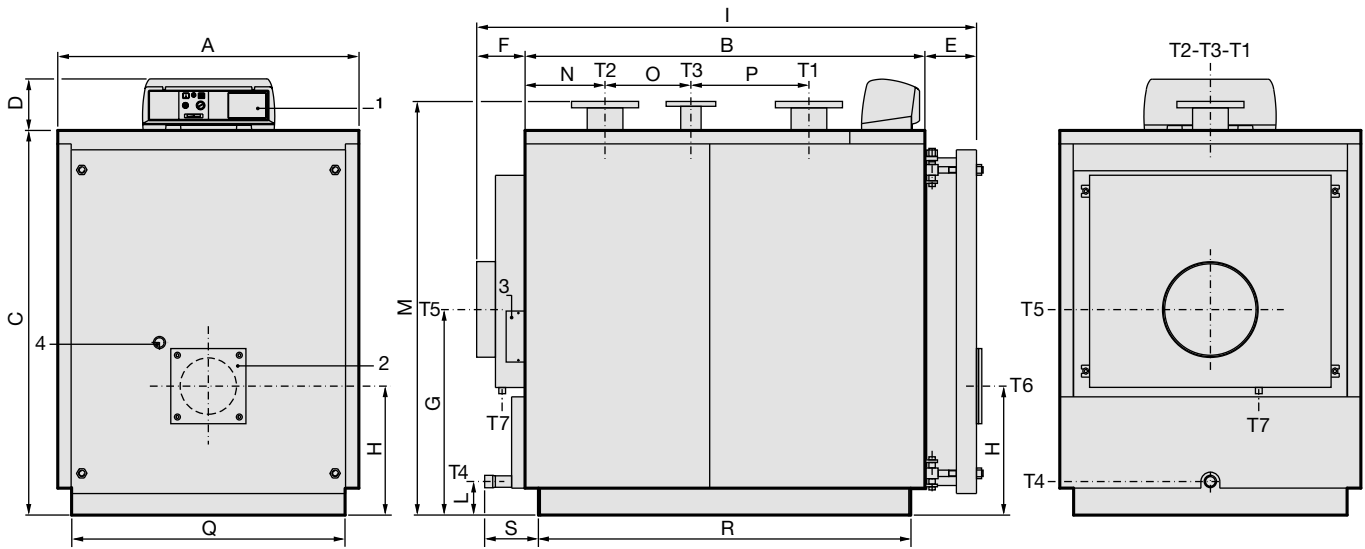
- T5 Boiler drain
- T6 Condensation drain

TRISTAR 2S	CONNECTIONS					Weight kg
	T1 - T2 UNI 228 UNI 2278 PN16	T3 Øe mm	T4 Øi mm	T5 UNI 228	T6 Øe mm	
80	G 1½	200	130	G ¾	40	221
120	G 2	200	180	G ¾	40	325
160	G 2	200	180	G ¾	40	366
200	DN 65	250	180	G ¾	40	505
250	DN 65	250	180	G ¾	40	583

TRISTAR 2S	A	B	C	D	E	F	G	H	I
	mm	mm	mm	mm	mm	mm	mm	mm	mm
80	690	722	995	190	305	480	115	--	147
120	760	812	1210	190	350	500	130	--	157
160	760	812	1390	190	350	500	130	--	157
200	860	937	1442	190	421	580	165	1487	258
250	860	937	1692	190	421	580	165	1737	258

(\*) In the TRISTAR 200 2S and TRISTAR 250 2S models, the T1 and T2 connections are flanged.

DIMENSIONS TRISTAR 2S 300÷870



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

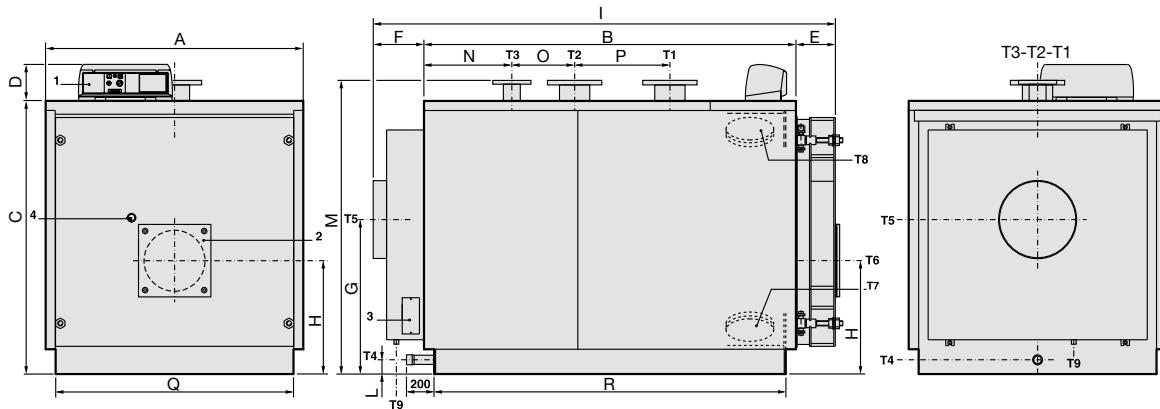
TRISTAR 2S	CONNECTIONS						Weight kg
	T1 - T2	T3	T4	T5 Øi	T6 Ø	T7 Øe	
	UNI2278 PN16	UNI2278 PN16 UNI228	UNI228	mm	mm	mm	
300	DN 80	G 2	G ¾	250	220	40	665
370	DN 100	G 2	G ¾	250	220	40	845
450	DN 100	G 2	G ¾	250	220	40	986
560	DN 100	G 2	G ¾	300	220	40	1119
680	DN 125	DN 65	G 1¼	350	270	40	1435
780	DN 125	DN 65	G 1¼	350	270	40	1557
870	DN 125	DN 65	G 1¼	350	270	40	1656

TRISTAR 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
300	860	1210	1182	190	140	191	708	400	1541	130	1310	215	340	250	750	1112	100
370	890	1275	1352	190	140	191	748	440	1606	125	1485	255	285	315	780	1177	100
450	890	1470	1352	190	140	191	748	440	1801	125	1485	255	480	315	780	1372	100
560	890	1780	1352	190	141	192	748	440	2113	125	1485	255	790	315	780	1684	100
680	1122	1605	1432	190	195	190	765	480	1989	125	1540	298	435	440	1020	1504	200
780	1122	1800	1432	190	195	190	765	480	2184	125	1540	298	630	440	1020	1699	200
870	1122	1995	1432	190	195	190	765	480	2379	125	1540	298	825	440	1020	1894	200

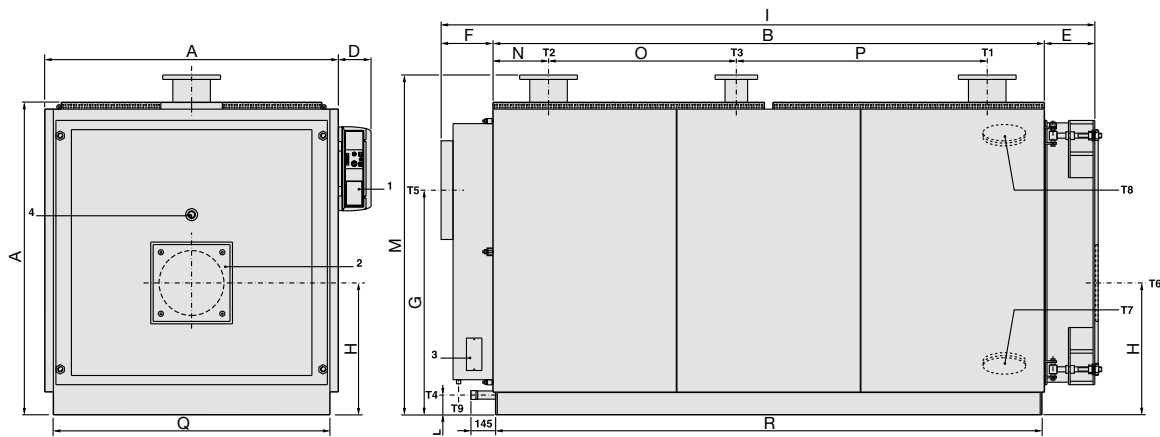
(\* Minimum dimensions for boiler room access.

DIMENSIONS TRISTAR 2S 1000÷3500

TRISTAR 2S 1000÷2350



TRISTAR 2S 2700÷3500



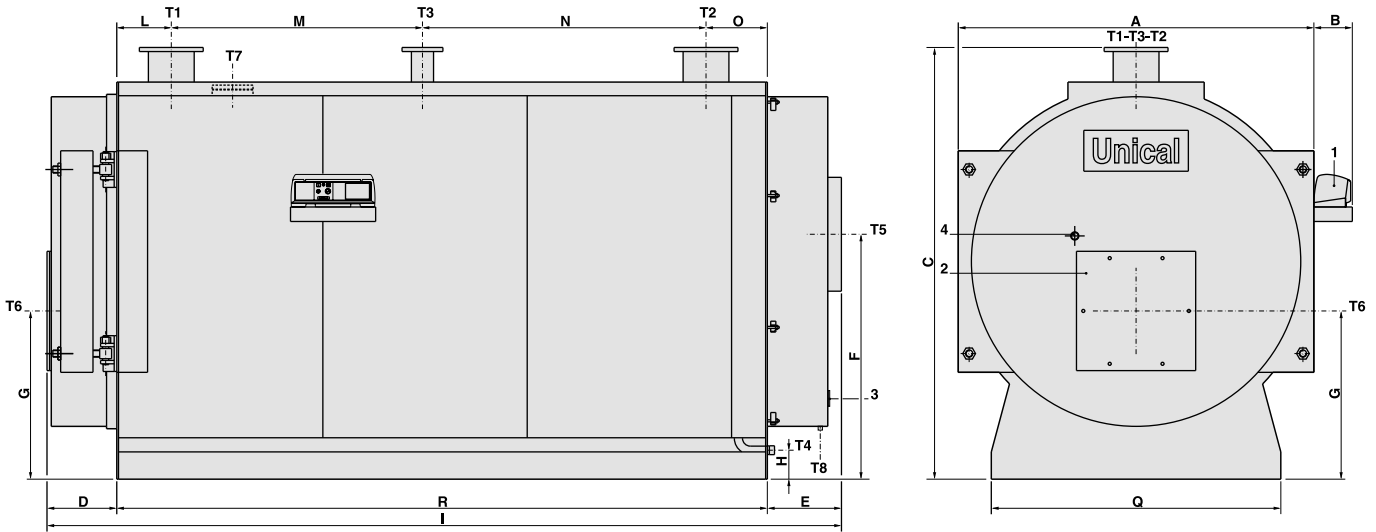
- 1 Panel board
- 2 Burner connection flange
- 3 Smoke chamber cleaning door
- 4 Flame sight glass
- T1 Heating flow
- T2 Heating return
- T3 Expansion vessel connection
- T4 Boiler drain
- T5 Chimney connection
- T6 Burner connection
- T7 Boiler air bleed
- T8 Inspection door
- T9 Condensation drain

TRISTAR 2S	CONNECTIONS						Weight kg
	T1 T2	T3	T4	T5 Øi	T6 Ø	T9 Øe	
	UNI2278 PN16	UNI2278 PN16	UNI228	mm	mm	mm	
1000	DN 150	DN 80	G 1½	400	320	40	1970
1180	DN 150	DN 80	G 1½	400	320	40	2175
1400	DN 175	DN 100	G 1½	450	320	40	2975
1650	DN 175	DN 100	G 1½	450	320	40	3465
2000	DN 200	DN 125	G 1½	520	380	40	4390
2350	DN 200	DN 125	G 1½	520	380	40	4700
2700	DN 200	DN 125	G 1½	570	380	-	5370
3100	DN 200	DN 125	G 1½	620	400	-	6990
3500	DN 250	DN 125	G 1½	620	400	-	7790

TRISTAR 2S	A	B	C	D	E	F	G	H	I	L	M*	N	O	P	Q*	R*
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1000	1352	1952	1432	190	207	187	810	595	2346	180	1540	461	330	500	1250	1846
1180	1352	2292	1432	190	207	187	810	595	2686	180	1540	461	670	500	1250	2186
1400	1462	2282	1542	190	227	272	880	640	2781	75	1650	561	510	550	1360	2176
1650	1462	2652	1542	190	227	272	880	640	3151	75	1650	561	880	550	1360	2546
2000	1622	2692	1702	190	259	274	950	690	3225	75	1810	661	670	700	1520	2590
2350	1622	3014	1702	190	258	273	950	690	3545	75	1810	662	990	700	1520	2910
2700	1720	3230	1830	190	295	310	1315	772	3835	115	1990	325	1100	1470	1620	3200
3100	1970	3194	2090	190	325	360	1535	915	3879	144	2271	377	1060	1420	1870	3164
3500	1970	3594	2090	190	325	360	1535	915	4279	144	2271	777	1060	1420	1870	3564

(\*) Minimum dimensions for boiler room access.

DIMENSIONS TRISTAR 2S 3900÷6100



- 1 Panel board
- 2 Burner connection flange
- 3 Smoke chamber cleaning door
- 4 Flame sight glass
- T1 Heating flow
- T2 Heating return
- T3 Expansion vessel connection
- T4 Boiler drain
- T5 Chimney connection
- T6 Burner connection
- T7 Inspection door
- T8 Condensation drain

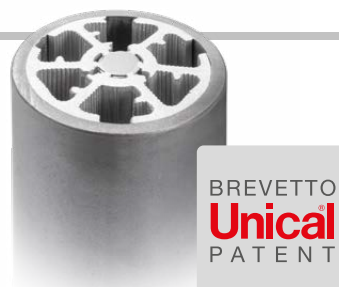
TRISTAR 2S	CONNECTIONS							Weight kg
	T1 - T2	T3	T4	T5 Øi	T6 Ø	T7 Ø	T8 Øe	
	UNI2278 PN16	UNI2278 PN16	ISO 7/1	mm	mm	mm	mm	
3900	DN 250	DN 125	Rp 1½	660	500	133	40	8630
4400	DN 250	DN 125	Rp 1½	660	500	133	40	8630
4800	DN 250	DN 125	Rp 1½	660	500	133	40	9675
5200	DN 250	DN 125	Rp 1½	660	500	133	40	9675
5700	DN 250	DN 125	Rp 1½	720	500	133	40	13060
6100	DN 250	DN 125	Rp 1½	720	500	133	40	13060

TRISTAR 2S	A	B	C*	D	E	F	G	H	I	L	M	N	O	Q*	R*
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3900	2088	226	2533	417	485	1437	987	170	4738	323	1475	1665	363	1700	3826
4400	2088	226	2533	417	485	1437	987	170	4738	323	1475	1665	363	1700	3826
4800	2214	240	2653	437	515	1550	1007	167	4928	323	1475	1815	363	1700	3976
5200	2214	240	2653	437	515	1550	1007	167	4928	323	1475	1815	363	1700	3976
5700	2380	240	2860	509	595	1650	1100	224	5484	325	2920	670	465	1850	4380
6100	2380	240	2860	509	595	1650	1100	224	5484	325	2920	670	465	1850	4380

(\*) Minimum dimensions for boiler room access.

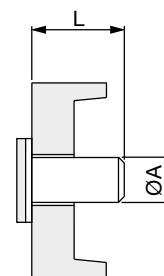
SPECIAL SMOKE PIPES

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.



## BURNER BLAST TUBE DIMENSIONS

BOILER TYPE	øA mm	L mm	BOILER TYPE	øA mm	L mm
TRISTAR 80 2S	130	150	TRISTAR 2000÷2350 2S	380	350
TRISTAR 120÷250 2S	180	170	TRISTAR 2700 2S	380	400
TRISTAR 300÷560 2S	220	250	TRISTAR 3100÷3500 2S	400	400
TRISTAR 680÷870 2S	270	270	TRISTAR 3900÷5200 2S	500	250
TRISTAR 1000÷1180 2S	320	300	TRISTAR 5700÷6100 2S	500	630
TRISTAR 1400÷1650 2S	320	320			



## 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 2S (Gas fired)		80	120	160	200	250	300	370
Nominal heat output	kW	60÷80	90÷120	120÷160	150÷200	187,5÷250	225÷300	277,5÷370
Thermal output of furnace	kW	63,3÷85,2	94,6÷127,4	125,8÷169,4	157÷211,3	195,8÷263,6	234,6÷315,8	288,8÷388,7
Heat efficiency at nominal load (100%)	%	94,7÷93,8	95,1÷94,2	95,4÷94,5	95,5÷94,6	95,7÷94,8	95,9÷95	96,1÷95,2
Heat efficiency at 30% load	%	94,9÷94,0	95,3÷94,4	95,6÷94,7	95,7÷94,8	95,9÷95	96,1÷95,2	96,3÷95,4
Combustion efficiency at nominal load (100%)	%	95,4÷94,6	95,7÷94,9	95,9÷95,1	96,1÷95,2	96,2÷95,4	96,4÷95,5	96,3÷95,4
Boiler capacity	l	86	126	151	203	247	298	398
Heat loss at casing (min.-max.)	%	0,6÷0,7	0,6÷0,6	0,5÷0,6	0,5÷0,6	0,5÷0,6	0,5÷0,5	0,2÷0,2
Heat loss at chimney with burner on (min.-max.)	%	4,6÷5,4	4,3÷5,1	4,1÷4,9	3,9÷4,8	3,7÷4,6	3,6÷4,5	3,7÷4,6
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.	0,08÷0,15	0,06÷0,11	0,11÷0,20	0,10÷0,17	0,12÷0,22	0,12÷0,22	0,08÷0,14
Flue gas pressure drop	mm w.c.	3,8÷6,8	6,1÷10,8	8,9÷15,8	11,1÷19,7	13,3÷23,6	15,9÷28,4	18,1÷32,2
Flue gas temperature tf-ta (min.-max.)	°C	94,9÷111,7	88,6÷105,7	84,4÷101,5	80,8÷97,9	77,2÷94,3	74,5÷91,9	76,6÷94,9
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	95÷128	142÷191	189÷255	236÷318	294÷396	353÷475	434÷584

TRISTAR 2S (Gas fired)		450	560	680	780	870	1000	1180
Nominal heat output	kW	337,5÷450	420÷560	510÷680	585÷780	652,5÷870	750÷1000	885÷1180
Thermal output of furnace	kW	351÷472,4	436,8÷587,9	530,4÷713,9	608,4÷818,9	678,6÷913,4	780÷1049,8	920,4÷1238,8
Heat efficiency at nominal load (100%)	%	96,1÷95,2	96,1÷95,2	96,1÷95,2	96,1÷95,2	96,1÷95,2	96,1÷95,2	96,1÷95,2
Heat efficiency at 30% load	%	96,3÷95,4	96,3÷95,4	96,3÷95,4	96,3÷95,4	96,3÷95,4	96,3÷95,4	96,3÷95,4
Combustion efficiency at nominal load (100%)	%	96,3÷95,5	96,3÷95,5	96,3÷95,5	96,3÷95,5	96,3÷95,5	96,3÷95,5	96,3÷95,5
Boiler capacity	l	462	565	671	753	836	1040	1242
Heat loss at casing (min.-max.)	%	0,2÷0,2	0,2÷0,2	0,2÷0,2	0,2÷0,2	0,2÷0,2	0,2÷0,2	0,2÷0,2
Heat loss at chimney with burner on (min.-max.)	%	3,7÷4,5	3,7÷4,5	3,7÷4,5	3,7÷4,5	3,7÷4,5	3,7÷4,5	3,7÷4,5
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.	0,11÷0,20	0,17÷0,30	0,12÷0,21	0,15÷0,27	0,19÷0,33	0,11÷0,19	0,15÷0,26
Flue gas pressure drop	mm w.c.	20,2÷35,8	23,7÷42,1	27,8÷49,4	30,7÷54,5	33÷58,6	35,9÷63,9	38,6÷68,6
Flue gas temperature tf-ta (min.-max.)	°C	75,4÷93,4	75,4÷93,4	75,4÷93,4	75,4÷93,4	75,4÷93,4	75,4÷93,4	75,4÷93,4
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	528÷710	657÷884	797÷1073	914÷1231	1020,1÷1372,9	1172÷1578	1383÷1862

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

## 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 2S (Gas fired)		1400	1650	2000	2350	2700	3100	3500
Nominal heat output	kW	1050÷1400	1237.5÷1650	1500÷2000	1762.5÷2350	2025÷2700	2325÷3100	2625÷3500
Thermal output of furnace	kW	1092÷1469.8	1287÷1732.3	1560÷2099.7	1833÷2467.1	2106÷2834.6	2418.1÷3254.5	2730.1÷3674.5
Heat efficiency at nominal load (100%)	%	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2
Heat efficiency at 30% load	%	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4
Combustion efficiency at nominal load (100%)	%	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5
Boiler capacity	l	1418	1617	2086	2324	2667	4142	4455
Heat loss at casing (min.-max.)	%	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2
Heat loss at chimney with burner on (min.-max.)	%	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5
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.	0.15÷0.26	0.20÷0.36	0.16÷0.28	0.21÷0.38	0.28÷0.50	0.37÷0.66	0.37÷0.65
Flue gas pressure drop	mm w.c.	42.1÷74.9	45.5÷80.9	40.5÷72	43.2÷76.9	45.6÷81	43.3÷76.9	50.4÷89.5
Flue gas temperature tf-ta (min.-max.)	°C	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4
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	1641÷22095	1935÷2609	2345÷3156	2755÷3708	3166÷4261	3635÷4892	4104÷5523

TRISTAR 2S (Gas fired)		3900	4400	4800	5200	5700	6100
Nominal heat output	kW	2925÷3900	3300÷4400	3600÷4800	3900÷5200	4275÷5700	4575÷6100
Thermal output of furnace	kW	3042.1÷4094.4	3432.1÷4619.3	3744.1÷5039.3	4056.1÷5459.2	4446.1÷5984.1	4758.1÷6404.1
Heat efficiency at nominal load (100%)	%	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2	96.1÷95.2
Heat efficiency at 30% load	%	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4	96.3÷95.4
Combustion efficiency at nominal load (100%)	%	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5	96.3÷95.5
Boiler capacity	l	6012	6012	7058	7058	7909	7909
Heat loss at casing (min.-max.)	%	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2	0.2÷0.2
Heat loss at chimney with burner on (min.-max.)	%	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5	3.7÷4.5
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.	0.28÷0.50	0.35÷0.63	0.42÷0.75	0.50÷0.88	0.59÷1.05	0.68÷1.21
Flue gas pressure drop	mm w.c.	44.4÷78.6	56.6÷100.5	50.5÷92.2	59.3÷105.4	49.5÷90.5	56.7÷100.7
Flue gas temperature tf-ta (min.-max.)	°C	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4	75.4÷93.4
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	4573÷6154	5159÷6943	5628÷7575	6097÷8206	6683÷8995	7152÷9626

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