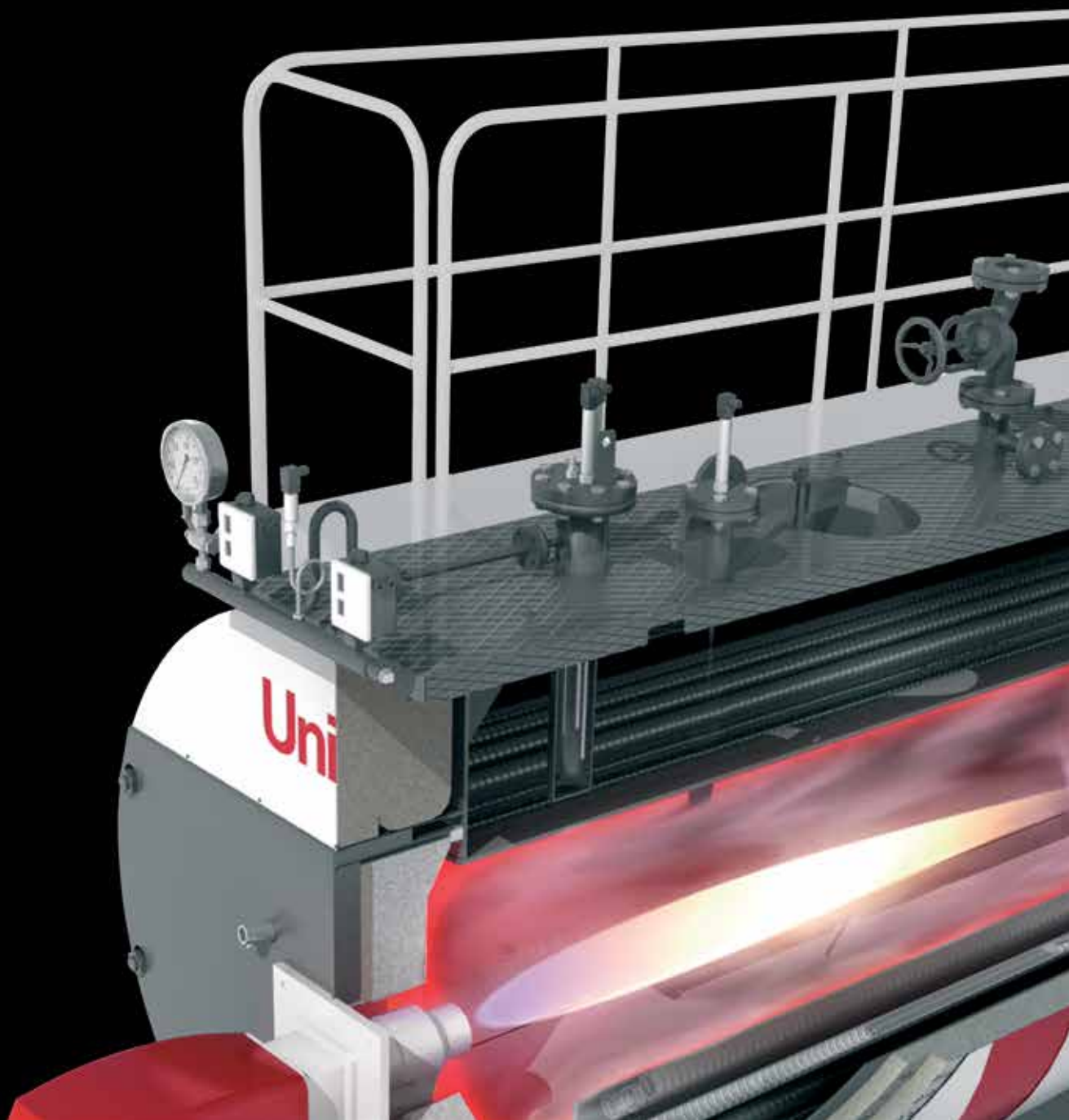


INDUSTRIAL RANGE



CONTENTS

■ Three pass, hot water, industrial boilers	TERNOX 2S (STD-Low NO_x-Low NO_x E) ____ pag. 3
■ Reversed flame, superheated water boilers	SŪHR' _____ pag. 13
■ Three pass superheated water boilers	TRYSŪHR' _____ pag. 17
■ Reversed flame steam generators	BAHR'UNO OR _____ pag. 21 BAHR'UNO (STD-HPO-HP) _____ pag. 25 BAHR'12 OR _____ pag. 29 BAHR'12 (STD-HPO-HP) _____ pag. 33
■ Three pass steam generators	TRYPASS' (STD-Low NO_x-Low NO_x E) _____ pag. 37
	PANEL BOARDS _____ pag 42
■ Optional equipments for steam generators	KIT _____ pag. 46
■ Condensates collecting tank	SRC _____ pag. 57
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PRESSURIZED STEEL BOILER 3 SMOKE PASS TYPE

RANGE

from 1800 to 10200 kW

EFFICIENCY CLASS

★ C E (vers. STD e Low NO_x) / ★★ C E (vers. Low NO_x E)

WORKING TEMPERATURE

minimum return temperature 50°C

OPERATION WITH

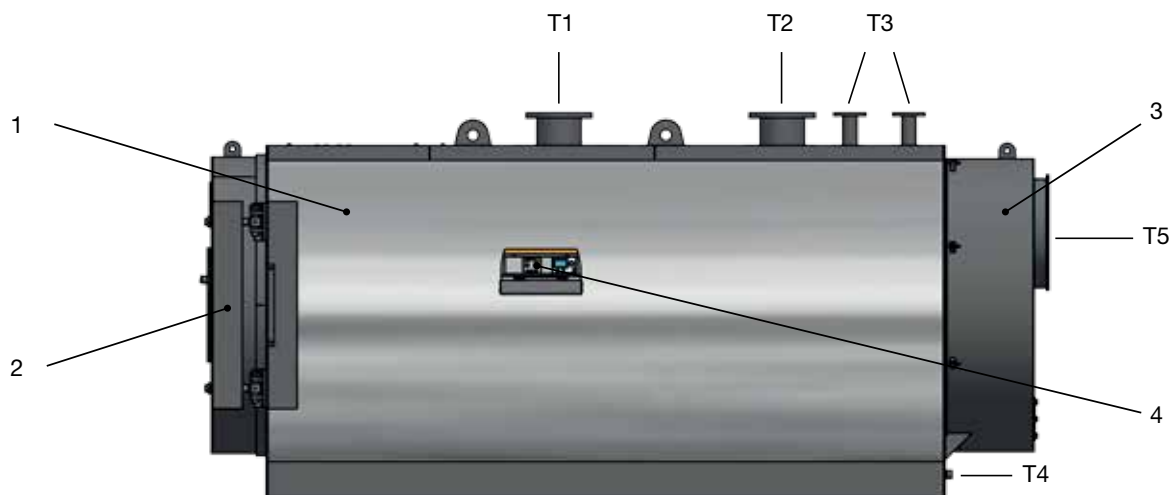
natural gas - LPG - light oil - heavy oil pressure jet burners

STD version MODELS	2500	3500	4500	5800	7000	8500	10200	12500	15000
Low NO _x version MODELS	2200	3050	3800	5000	6300	7500	9500	11300	14000
Low NO _x E version MODELS	1800	2350	3000	4000	5100	5700	8400	10100	12200

CERTIFICATION IN OUTPUT RANGE/Low NO_x emissions

DESCRIPTION

- | | |
|-----------------------|---------------------------------|
| 1. Boiler body | T1. C.H. flow |
| 2. Front door | T2. C.H. return |
| 3. Rear smoke chamber | T3. Expansion vessel connection |
| 4. Panel board | T4. Boiler drain |
| | T5. Chimney connection |



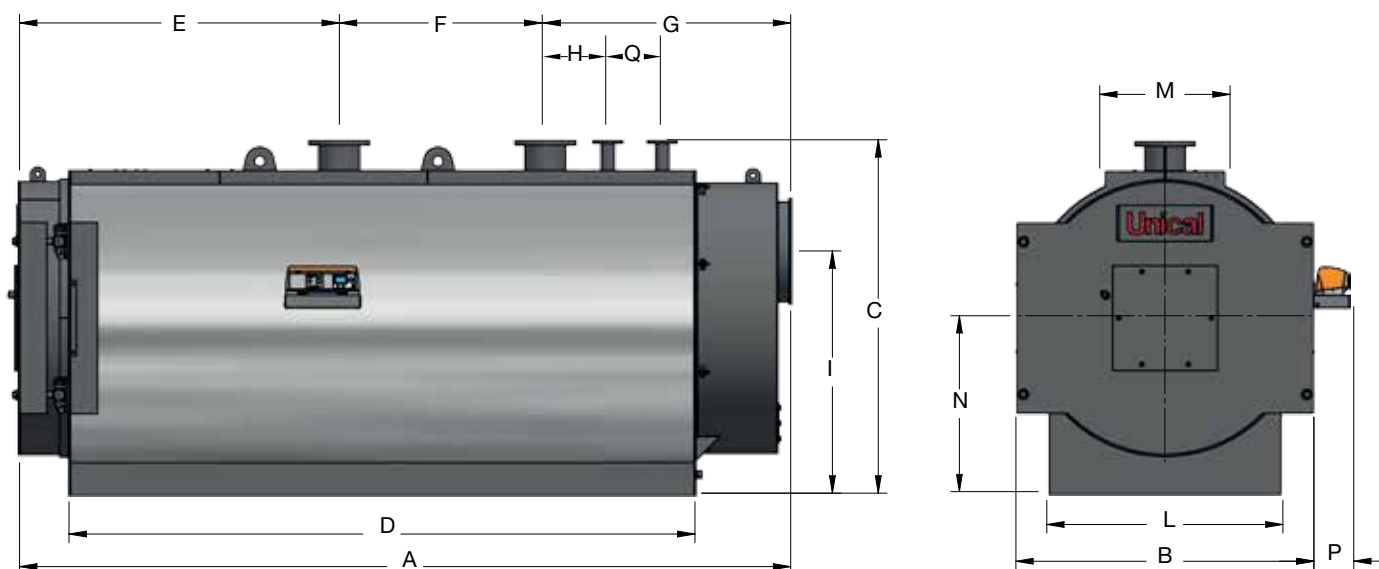
TECHNICAL DATA

Model TERNOX 2S	Nominal output	Nominal input	Efficiency at full load	Efficiency at part load (30%)	Water content	ΔP smoke side	Smoke side pressure	Weight drop	CONNECTIONS (Ø)			
									T1/T2	T3	T4	T5
	kW	kW	%	%	lt	mbar	bar	kg	ø mm	ø mm	ø mm	ø mm
1800 Low NO _x E	1800	1951	92,25	94,25	3790	3,8	6	5500	200	50	1"1/2	570
2200 Low NO _x	1800÷2200	1951÷2406	92,25÷91,45	94,25÷93,45	3790	3,8÷5,7	6	5500	200	50	1"1/2	570
2500 STD	1800÷2500	1951÷2753	92,25÷90,8	94,25÷92,8	3790	3,8÷7,5	6	5500	200	50	1"1/2	570
2350 Low NO _x E	2350	2537	92,64	94,64	4750	3,5	6	7000	200	65	1"1/2	620
3050 Low NO _x	2350÷3050	2537÷3329	92,64÷91,62	94,64÷93,62	4750	3,5÷6,0	6	7000	200	65	1"1/2	620
3500 STD	2350÷3500	2537÷3848	92,64÷90,95	94,64÷92,95	4750	7,5÷8,0	6	7000	200	65	1"1/2	620
3000 Low NO _x E	3000	3239	92,62	94,62	6400	3,6	6	8200	250	80	1"1/2	660
3800 Low NO _x	3000÷3800	3239÷4144	92,62÷91,7	94,62÷93,7	6400	3,6÷6,0	6	8200	250	80	1"1/2	660
4500 STD	3000÷4500	3239÷4950	92,62÷90,9	94,62÷92,9	6400	3,6÷8,5	6	8200	250	80	1"1/2	660
4000 Low NO _x E	4000	4324	92,5	94,5	8060	4,4	6	10000	250	80	1"1/2	660
5000 Low NO _x	4000÷5000	4324÷5457	92,5÷91,62	94,5÷93,62	8060	4,4÷6,9	6	10000	250	80	1"1/2	660
5800 STD	4000÷5800	4324÷6381	92,5÷90,9	94,5÷92,9	8060	4,4÷9,5	6	10000	250	80	1"1/2	660
5100 Low NO _x E	5100	5528	92,25	94,25	9760	4,9	6	11500	250	100	1"1/2	720
6300 Low NO _x	5100÷6300	5528÷6892	92,25÷91,41	94,25÷93,41	9760	4,9÷7,6	6	11500	250	100	1"1/2	720
7000 STD	5100÷7000	5528÷7705	92,25÷90,85	94,25÷92,85	9760	4,9÷9,5	6	11500	250	100	1"1/2	720
5700 Low NO _x E	5700	6169	92,4	94,4	11480	4,8	6	13500	250	100	1"1/2	820
7500 Low NO _x	5700÷7500	6169÷8215	92,4÷91,3	94,4÷93,3	11480	4,8÷8,4	6	13500	250	100	1"1/2	820
8500 STD	5700÷8500	6169÷9377	92,4÷90,65	94,4÷92,65	11480	4,8÷11	6	13500	250	100	1"1/2	820
8400 Low NO _x E	8400	9128	92,02	94,02	14960	8,3	6	17300	300	100	1"1/2	820
9500 Low NO _x	8400÷9500	9128÷10377	92,02÷91,55	94,02÷93,55	14960	8,3÷10,7	6	17300	300	100	1"1/2	820
10200 STD	8400÷10200	9128÷11192	92,02÷91,14	94,02÷93,14	14960	8,3÷12,5	6	17300	300	100	1"1/2	820
10100 Low NO _x E	10100	11012	91,71	93,71	24100	8,9	6	25500	300	125	60	820
11300 Low NO _x	10100÷11300	11012÷12390	91,71÷91,2	93,71÷93,2	24100	8,9÷11,3	6	25500	300	125	60	820
12500 STD	10100÷12500	11012÷13789	91,71÷90,65	93,71÷92,65	24100	8,9÷14,0	6	25500	300	125	60	820
12200 Low NO _x E	12200	13251	92,07	94,07	27300	9,7	6	30000	350	125	60	1000
14000 Low NO _x	12200÷14000	13251÷15294	92,07÷91,54	94,07÷93,54	27300	9,7÷12,9	6	30000	350	125	60	1000
15000 STD	12200÷15000	13251÷16458	92,07÷91,14	94,07÷93,14	27300	9,7÷15,0	6	30000	350	125	60	1000

SURPLUS PRODUCT VALUES

- **USE FLEXIBILITY**
thanks to the certification in output range
- **LOW EMISSIONS $\text{NO}_x < 70 \text{ mg/kWh}$**
thanks to the reduction of the specific thermal load
(according to the versions)
- **FURNACE BOTTOM**
completely wet
- **JUST ONE FRONT DOOR**
(up to the model 10200)
with self centring closing system completely adjustable
- **TWO FRONT DOORS**
(from model 12500) tube bundles cleaning facility
- **DOOR INTERNAL INSULATION**
in super light recyclable refractory concrete
- **BODY INSULATION**
with anti-tearing mineral wool mattress
- **PANNEL BOARD**
thermo-mechanical or electronic
- **POSSIBLE COMBINATION**
with one/two stage or modulating burners, operated on gas/LPG,
light oil or heavy oil
- **EASY TRANSPORTATION**
thanks to the upper hooks and the strong frame side members

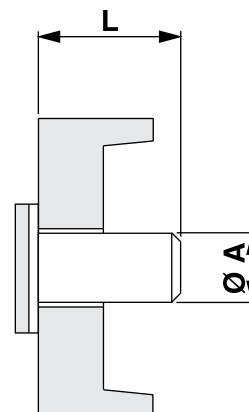
DIMENSIONS



Model TERNOX 2S	A	B	C	D	E	F	G	H	I	L	M	N	P	Q
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1800 Low NO_x E / 2200 Low NO_x / 2500 STD	4225	1710	2010	3370	1940	820	1465	420	1400	1350	800	1030	250	230
2350 Low NO_x E / 3050 Low NO_x / 3500 STD	4711	1830	2120	3824	1954	1140	1617	570	1480	1450	800	1080	250	250
3000 Low NO_x E / 3800 Low NO_x / 4500 STD	5134	1980	2360	4174	2017	1380	1737	550	1620	1550	800	1180	250	300
4000 Low NO_x E / 5000 Low NO_x / 5800 STD	5639	2180	2580	4626	2451	1400	1788	600	1780	1710	800	1300	250	300
5100 Low NO_x E / 6300 Low NO_x / 7000 STD	5875	2320	2700	4840	2505	1510	1860	550	1870	1850	880	1350	250	350
5700 Low NO_x E / 7500 Low NO_x / 8500 STD	6424	2400	2870	5350	2035	2590	1795	480	1980	1900	880	1460	250	350
8400 Low NO_x E / 9500 Low NO_x / 10200 STD	6772	2650	3080	5632	1406	3450	1916	550	2080	2080	1000	1560	250	350
10100 Low NO_x E / 11300 Low NO_x / 12500 STD	7211	3210	3715	6236	1318	3500	2068	650	2700	2400	1470	1970	250	400
12200 Low NO_x E / 14000 Low NO_x / 15000 STD	7761	3320	3910	6736	1318	4000	1568	650	2750	2500	1470	2050	250	400

BURNER BLAST TUBE DIMENSIONS

BOILER TYPE	øA mm	L (min/max) mm
1800 Low NO _x E / 2200 Low NO _x / 2500 STD	400	370/520
2350 Low NO _x E / 3050 Low NO _x / 3500 STD	400	370/520
3000 Low NO _x E / 3800 Low NO _x / 4500 STD	500	410/560
4000 Low NO _x E / 5000 Low NO _x / 5800 STD	500	410/560
5100 Low NO _x E / 6300 Low NO _x / 7000 STD	500	410/560
5700 Low NO _x E / 7500 Low NO _x / 8500 STD	500	450/650
8400 Low NO _x E / 9500 Low NO _x / 10200 STD	500	450/650
10100 Low NO _x E / 11300 Low NO _x / 12500 STD	650	450/650
12200 Low NO _x E / 14000 Low NO _x / 15000 STD	650	450/650



SHUNT PUMP

The TERNOX 2S boilers must always operate in forced circulation hot water systems and with a minimum return temperature of 50 °C.

So, it is suggestible to adopt a shunt pump, having also an anti-condensation purpose, installed between the flow and return connections, upstream an eventual 3 or 4 way mixing valve.

This pump will be sized according to the following formula:

$$Q = P \times 22$$

where

Q = Water flow rate in litre/h

P = Boiler nominal output in kW

and the manometric head will be approximately 1 to 2 m w.g.

CONNECTION TO THE CHIMNEY

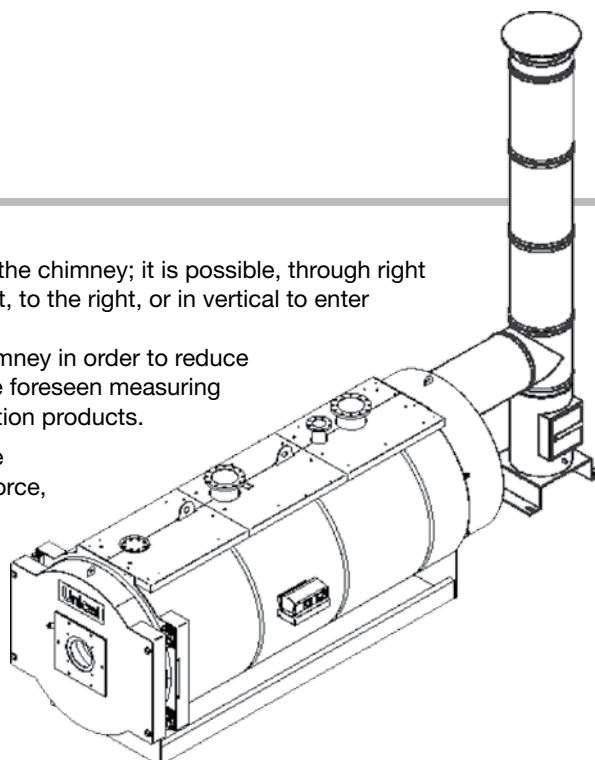
The TERNOX 2S are suitable for different connection solutions to the chimney; it is possible, through right pipelines or curves, to connect the chimney to the back, to the left, to the right, or in vertical to enter the chimney in a higher position.

It is advisable to insulate the pipe connecting the boiler to the chimney in order to reduce the heat losses and the noisiness. In this connecting pipe must be foreseen measuring points for the smoke temperature and the analysis of the combustion products.

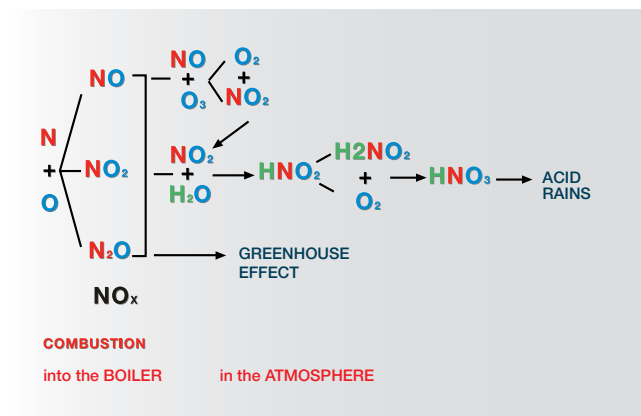
The smoke channel and the connection to the chimney have to be performed in conformity with the Norms and to the legislation in force, with rigid ducts, resistant to the temperature, to the condensates, to the mechanical stresses and must be sealed.

The chimney has to guarantee the minimum draught foreseen by the Norms in force.

Inadequate or wrongly executed chimneys and smoke channels can widen the combustion noisiness, produce condensation problems and negatively influence the combustion parameters.



VERSIONS AND THERMAL LOAD

**What are NO_x?**

Among the main atmospheric pollutants, produced by the heating systems through the combustion, there are the Nitrogen Oxides, whose chemical formula is NO_x.

With the name “nitric oxides” and the formula NO_x, are normally indicated an association of three different kinds:

NO (nitric monoxide),

NO₂ (nitrogen dioxide),

N₂O (protoxide or nitrous oxide).

In the detail, the NO combination is the prevailing one inside the boiler (95% or more), while the NO₂ formation is significant only at low temperature, then after the emission in atmosphere.

Depending on their origin, it's possible to distinguish three different NO_x formation processes.

Thermal NO_x

They are constituted by the nitrogen present into the combustion air with flame temperatures higher than 1300°C.

NO_x ready

They are constituted by the combination of molecular oxygen present in the combustion air with hydrocarbons, produced by the fuels dissociation during the first combustion phases.

NO_x from fuel

This formation mechanism of nitric oxides is present into the combustion of oil and coal, not for natural gas, because the natural gas doesn't include nitrogen, with the air oxygen at combustion temperatures higher than 1000°C.

The quantity of N₂O is stable and remains in the atmosphere for many years: this, together with the CO₂ and other pollutants, contributes to the greenhouse effect

The nitric monoxide) NO is rapidly converted in NO₂ and O₂, through reactions with the Ozone O₃.

At the end the nitrogen dioxide NO₂ is removed from the atmosphere through the conversion in nitrous acid HNO₂ and subsequent oxidation that originates nitric acid HNO₃, contributing, in this way, to the formation of the acidic rains.

How to reduce the NO_x with TERNOX 2S

The NO_x formation process is strongly influenced by:

- flame temperature
- combustion gases permanence time into the high temperature zone;
- oxygen concentration

Unical, with TERNOX 2S, has adopted the following manufacturing solutions in order to reduce the NO_x formation:

- 3 smoke passages without reversed flame into the furnace

The furnace is no more with reversed flame, but of direct crossing; the burner flame results more compact and shorter, reducing in this way the permanence time into the high temperature zone; the flame reversion absence allows, furthermore, a better flame cooling by the wet surfaces of the furnace

- differentiation of the volumetric thermal load in three different models for each size of boiler.

The ratio between the combustion chamber volume and the thermal load (volumetric specific load of the furnace) has been calculated in three different levels, from which derive different ranges: STD, Low NO_x, Low NO_x E.

The Low NO_x and Low NO_x E versions have to be coupled with modern low NO_x burners, getting so an effective reduction of the emissions through:

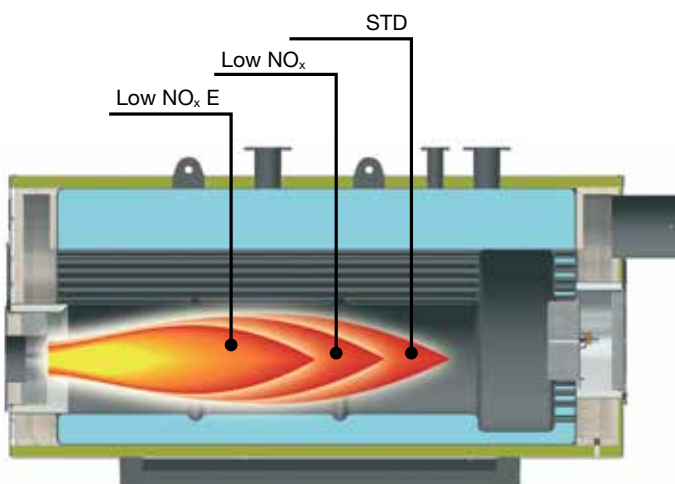
- smokes recirculation (re-burning): a part of the combustion gases is withdrawn and sent again in the combustion chamber together with the combustive air.
- reduction of the partial oxygen pressure, thanks to a diminution of the air excess.

Optimal choice with the TERNOX 2S boilers

The limit values of volumetric thermal load in the combustion chamber of the three models: STD - Low NO_x and Low NO_x E, are: STD version = Volumetric specific load of the combustion chamber ca. 1,5 MW/m³

Low NO_x version = Volumetric specific load of the combustion chamber ca. 1,3 MW/ m³

Low NO_x E version = Volumetric specific load of the combustion chamber ca. 1 MW/ m³



ECONOMIZER (optional)

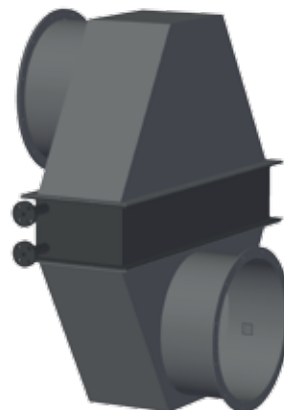
The economizers for the recuperation of the residual heat from the smokes at the outlet of the boiler, are available as optional kits.

Average efficiency recovery: 3 to 4%, with remarkable fuel saving.

Material: Carbon steel; on request stainless steel.

BOILER TYPE	ECONOMIZER TYPE
1800 Low NO _x E / 2200 Low NO _x / 2500 STD	Eco tipo 1
2350 Low NO _x E / 3050 Low NO _x / 3500 STD	Eco tipo 2
3000 Low NO _x E / 3800 Low NO _x / 4500 STD	Eco tipo 3
4000 Low NO _x E / 5000 Low NO _x / 5800 STD	Eco tipo 4
5100 Low NO _x E / 6300 Low NO _x / 7000 STD	Eco tipo 5
5700 Low NO _x E / 7500 Low NO _x / 8500 STD	Eco tipo 6
8400 Low NO _x E / 9500 Low NO _x / 10200 STD	Eco tipo 7
10100 Low NO _x E / 11300 Low NO _x / 12500 STD	Eco tipo 8
12200 Low NO _x E / 14000 Low NO _x / 15000 STD	Eco tipo 9

The TERNOX 2S boilers, in Low NO_x E version, belongs to the 3 stars efficiency class. ★★☆☆



CONSTRUCTIONAL FEATURES

Heat exchanger smoke / water with exchange battery with finned pipes suitable for operation with natural gas / LPG or light oil.

- Flanged connections for water inlet and outlet
- Box for connection boiler /chimney
- Connection for condensates drain
- Smoke temperature measuring point

The economizers are available in two versions:

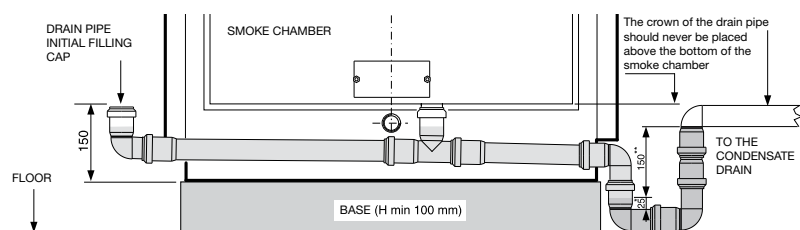
- Version for operation with pressure jet gas burners
- Version for operation with light oil or dual fuel (gas & oil) burners



CONDENSATES DRAIN WITH ECONOMIZER

The economizers are endowed with connection for condensate drain in sewage, that has to be:

- Realized in such way to prevent the spillage of the combustion products in the environment or in sewage;
- Installed in such way that the freezing of the condensate cannot take place under the foreseen operation conditions.
- Sized and realized so that to allow the correct evacuation of the condensates avoiding possible leakages;






* Minimum height of the siphon requested by the Standard






** Minimum height with the boiler operating at its maximum capacity.

In case in which was not possible to create a base of 100 mm, it is possible to position the boiler on the floor level and to create a sump at least 100 mm deep in order to lodge the siphon.






PANEL BOARDS (optional)

STANDARD cod. 21057	MASTERMODUL MASTERBISTADIO cod. 38779 cod. 37895	CASCATAMODUL CASCATABISTADIO cod. 37900 cod. 37901
 <p>The standard panel board is equipped with:</p> <ul style="list-style-type: none"> • Series of switches • Thermometer • Safety thermostat • Two stage working thermostat • Minimum temperature thermostat (for C.H. pump – inside the panel board) 	 <p>The panel boards MASTER MODUL and MASTERBISTADIO, for high temperature working, are equipped with:</p> <ul style="list-style-type: none"> • E8 controller • Lago Basic controller for burner • Outer temp. sensor • Boiler temp. sensor • D.H.W. storage tank temperature sensor • C.H. flow temp. sensor • Primary circuit temperature sensor • Series of switches • Safety thermostat 	 <p>The panel boards CASCATAMODUL e CASCATABISTADIO are equipped with:</p> <ul style="list-style-type: none"> • Lago Basic controller for burner • Boiler temperature sensor • Series of switches • Safety thermostat

For TERNOX 2S boilers equipped with **MODULANTING BURNERS**

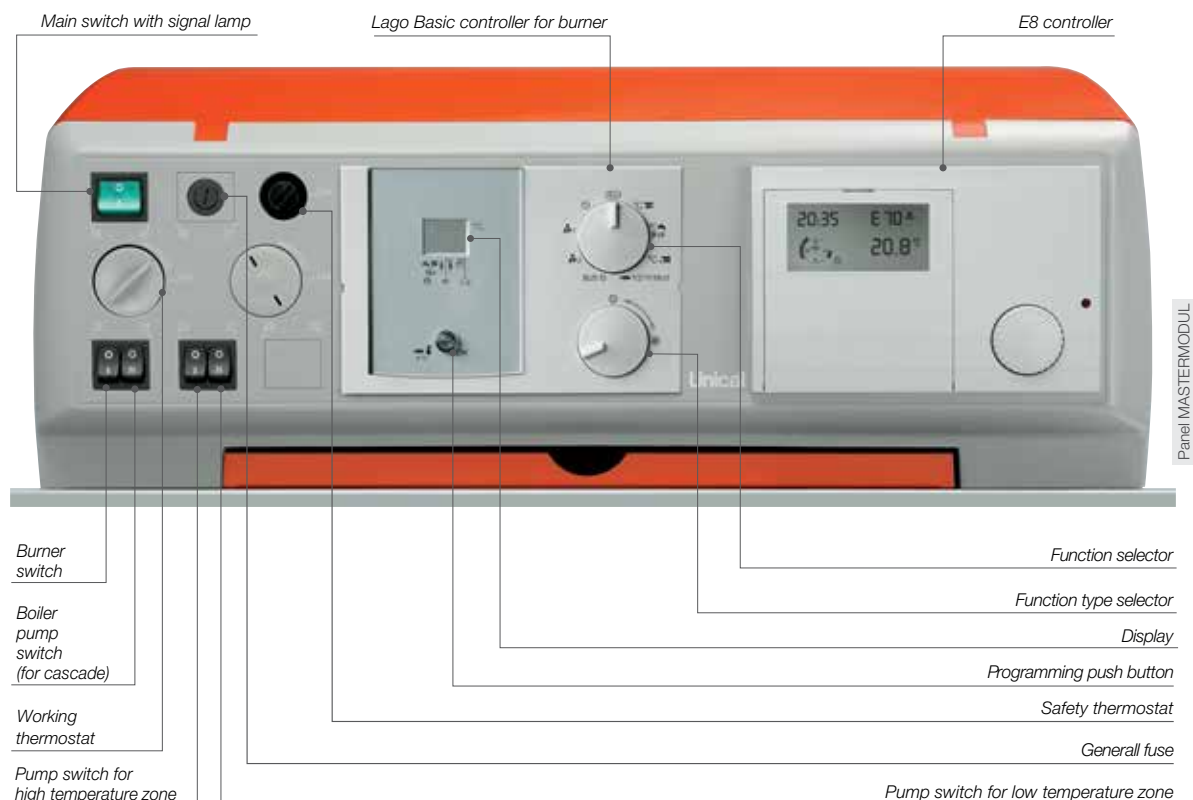
How many boilers are foreseen for the installation?	Which panel board has to be ordered?		CODE
Just ONE BOILER	1 Panel board MASTERMODUL		38779
2 TERNOX 2S in cascade	1 Panel board MASTERMODUL 1 Panel board CASCATAMODUL	 + 	38779 37900
(n) TERNOX 2S in cascade (maximum 8 boilers)	1 Panel board MASTERMODUL (n-1) P. board CASCATAMODUL	 + (n-1) x 	38779 37900

For TERNOX 2S boilers equipped with **TWO STAGE BURNERS**

How many boilers are foreseen for the installation?	Which panel board has to be ordered?		CODE
Just ONE BOILER	1 Panel board MASTERBISTADIO		37895
2 TERNOX 2S in cascade	1 Panel board MASTERBISTADIO 1 Panel board CASCATABISTADIO	 + 	37895 37901
(n) TERNOX 2S in cascade (max 8 boilers)	1 Panel board MASTERBISTADIO (n-1) P. board CASCATABISTADIO	 + (n-1) x 	37895 37901

For the control of boilers in cascade and for panel board with safety thermostat at 110°C, get in touch with our pre-sale office.

PANEL BOARDS WITH E8 CONTROLLER (optional) code 38779 - 37895



E8 CONTROLLER

System optimization



Boiler heating optimization

The heating controller, on the basis of the timer/heating programme set by the user, once the system's characteristics have been evaluated, will activate the function for automatically bringing forward the heating ignition time so as to ensure that the set temperature is reached at the time requested by the user.



Fast set temperature

This is obtained by calculating the optimum ignition start-up time. This calculation can be carried out taking into consideration the outdoor temperature or the room temperature.



Overheating protection

The boiler's safety temperature is controlled via the pump's overrun time, in order to get rid of any thermal inertia.



Self-adaption

Through the elaboration of data transmitted by the room sensor, this function adjusts the boiler's output to the building's characteristics, ensuring a constant monitoring of the indoor temperature on the basis of the variation of the outdoor temperature, keeping in consideration the building's thermal inertia and the contribution of "free" heat (solar radiation, internal heat sources etc).



Slope offset (heating slope distance)

The boiler temperature that is required for a mixed circuit is calculated by adding to the calculated temperature setting for the heating circuit temperature the heating slope distance. The heating slope distance compensates for sensor tolerances and heat loss up to the mixer.



Valve opening time

Based on the characteristics of the servomotor.



Number of burner ignitions

It stabilizes the number of ignitions of each burner.



Burner run hours

It stabilizes the run hours of each burner.



Frost protection mode

The frost protection operation mode prevents the CH system from freezing by automatically switching heating operation on. In the frost protection mode, the room temperature for all the heating circuits is set to 5°C and the storage tank sensor frost protection is activated when the temperature drops below 10°C.



D.H.W. control



Domestic hot water production

There are many programmes which control the domestic hot water production. You can choose from the maximum of comfort to the maximum fuel saving. In order to permit the storage cylinder to supply hot water rapidly, the heating controller brings the boiler's temperature to the maximum set value.



Antilegion

Every 20th heating start-up or once a week on Saturday at 01:00 hrs, the storage tank is heated up to 60°C. This function will eliminate any eventual pathogens which have formed in the DHW.



DHW optimization (loading pump)

The DHW loading pump is switched on only if the boiler temperature exceeds by 5°C the storage tank temperature. It is deactivated when the boiler temperature drops below the storage tank temperature or if the storage tank temperature is higher than the nominal temperature.

Setting



Programme setting

The heating programmes can be set daily or weekly, with more than one On-Off firing times or temperature reductions during the arch of the day.



Multiple zone control

With the same heating control device you can control 2 independent circuits with different characteristics, though having ensured all the described functions, including the deep sliding temperature function.



Management of up to 15 mixed circuits

controlled by the outdoor sensor



0-10 volt signal

the great flexibility of the E8 also permits the MODULEX EXT set point to be controlled by an external control signal. This will enable, having at disposal an even more complex system, to exploit all the heating control's functions..



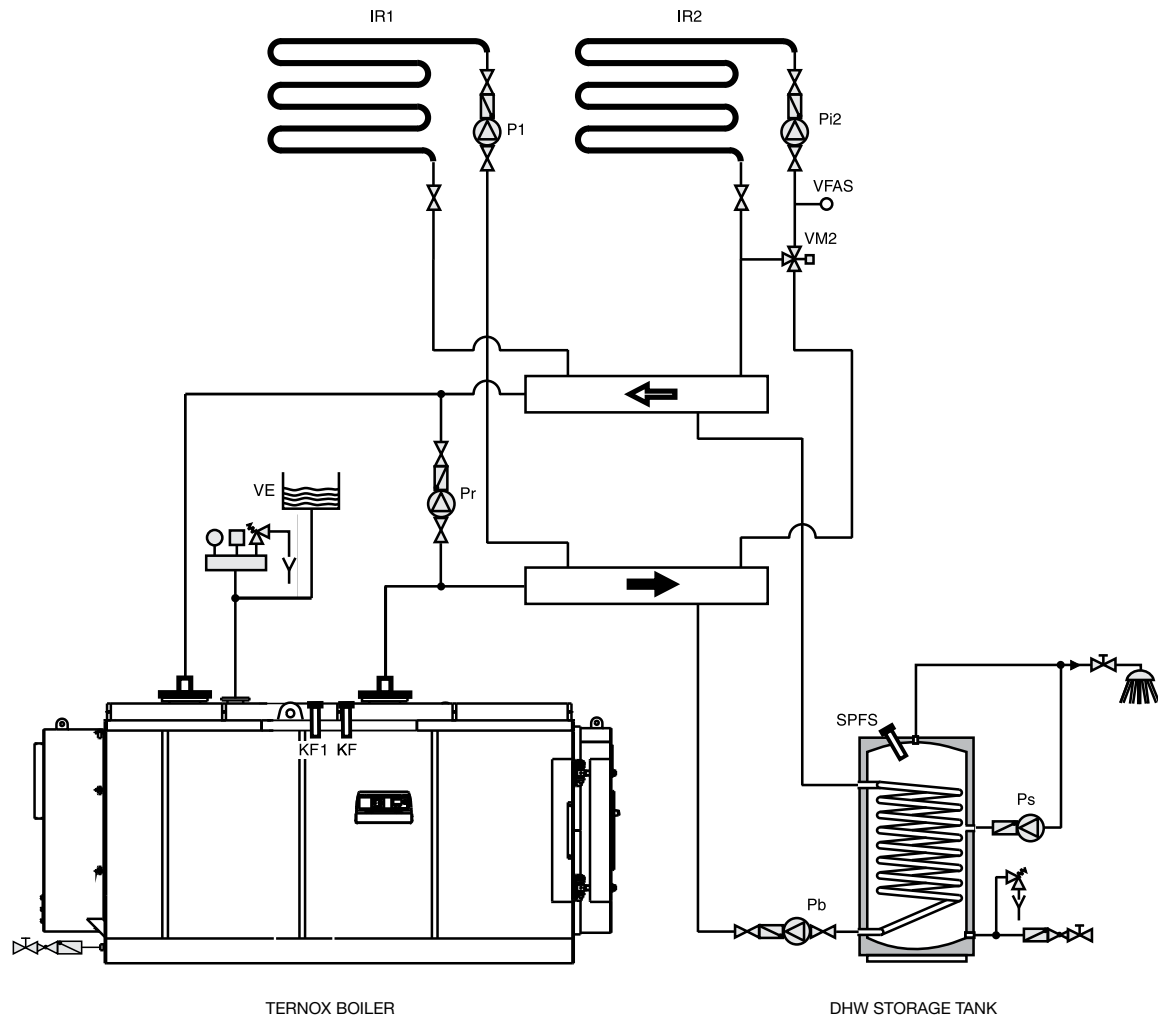
Energy sources control

Integration with renewable energy sources

As for example: solar systems and/or solid fuel fired boilers.

HYDRAULIC AND ELECTRIC CONNECTION OF THE INSTALLATION

In the following figures, is shown a typical connection diagram of the boiler to the heating circuit, constituted by 2 zones, of which one with motorized mixing valve. It will be possible, besides, to manage the production of D.H.W. Remember that the TERNOX 2S boilers must work with forced circulation.



Key:

Pr = Recirculation pump

VM2 = Mixing valve for L.T. zone

Pi1 = High temperature zone C.H. pump

Pi2 = Low temperature zone C.H. pump

VE = Expansion vessel

IR1 = Distribution of the heating circuit for H.T. zone

IR2 = Distribution of the heating circuit for L.T. zone

Ps = D.H.W. recirculation pump

Pb = D.H.W. storage tank loading pump

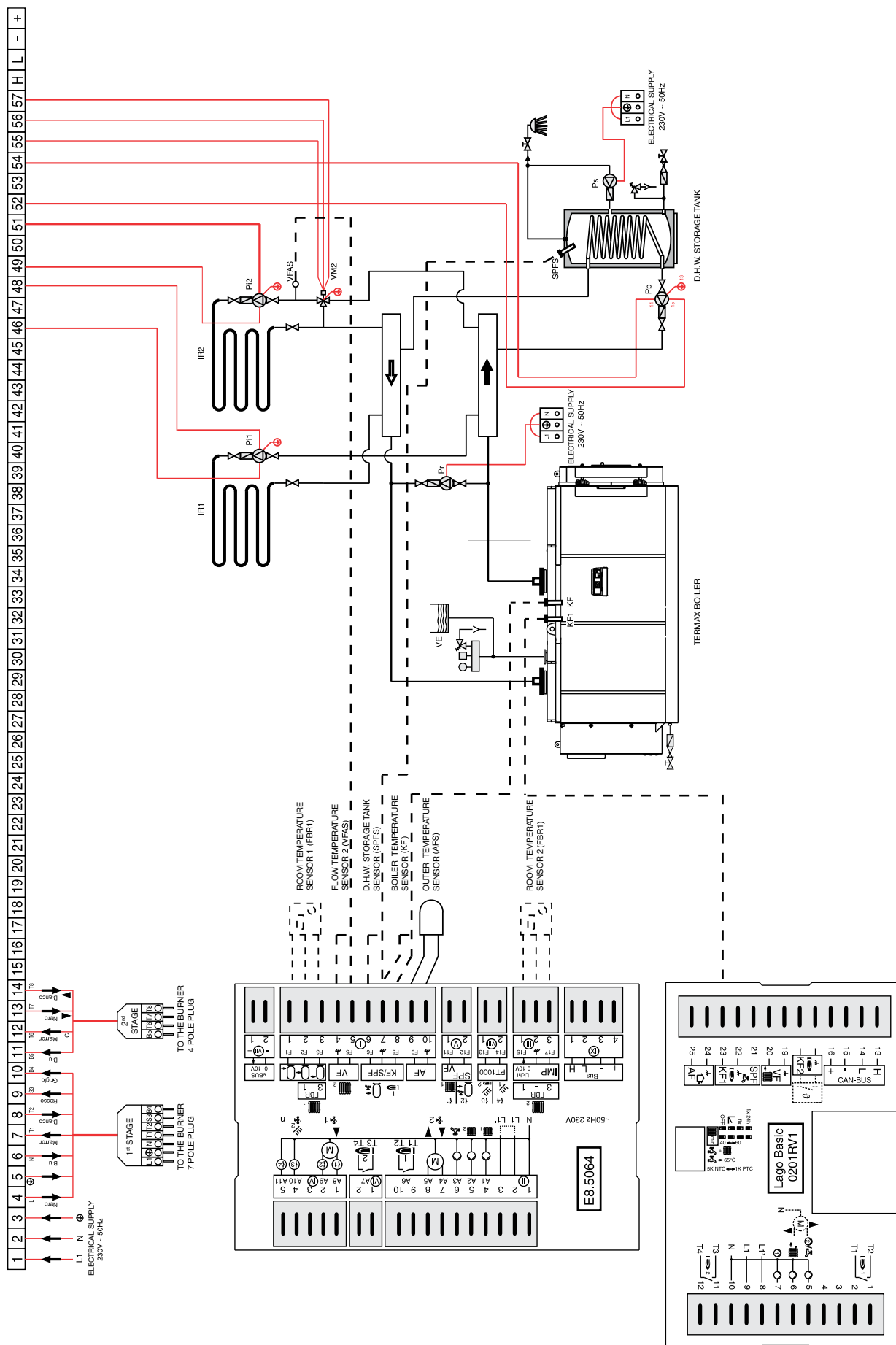
SPFS = D.H.W. storage tank temperature sensor

KF = Boiler temperature sensor (E8 controller)

KF1 = Boiler temperature sensor (Lago Basic controller)

VFAS = Flow temperature sensor 2

HYDRAULIC AND ELECTRIC CONNECTION OF THE INSTALLATION





MEAN AND HIGH PRESSURE, REVERSED FLAME TYPE, SUPERHEATED WATER BOILERS

RANGE

from 140 to 2900 kW

WORKING
PRESSURE

4,9 bar (SUHR' 5) / 9,8 bar (SUHR' 10)

WORKING
TEMPERATURE

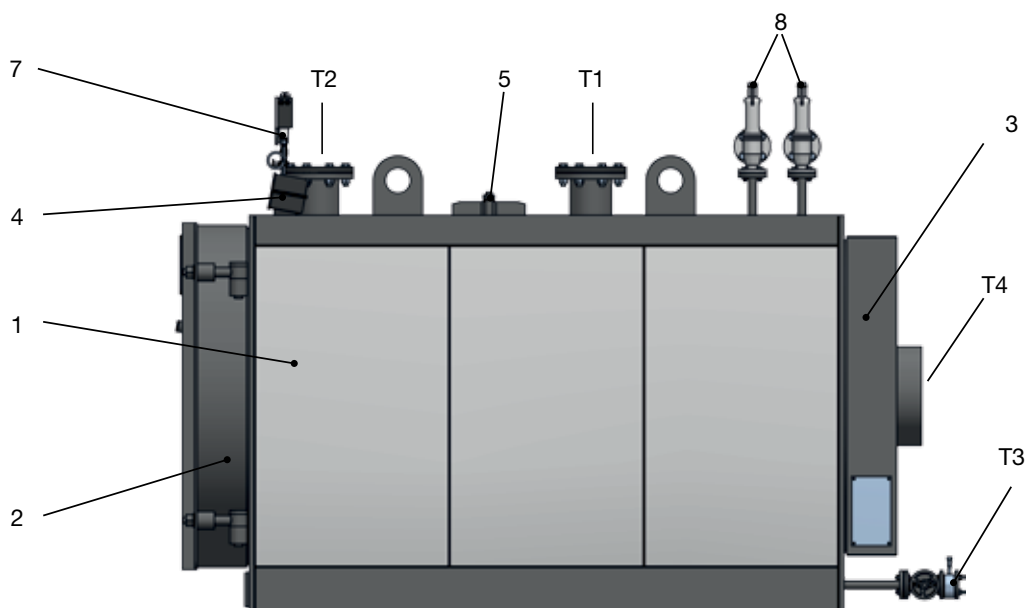
158,1°C (SUHR' 5) / 183,2°C (SUHR' 10)

MODELS

140	210	270	370	465	580	700
930	1160	1400	1750	2050	2300	2900

DESCRIPTION

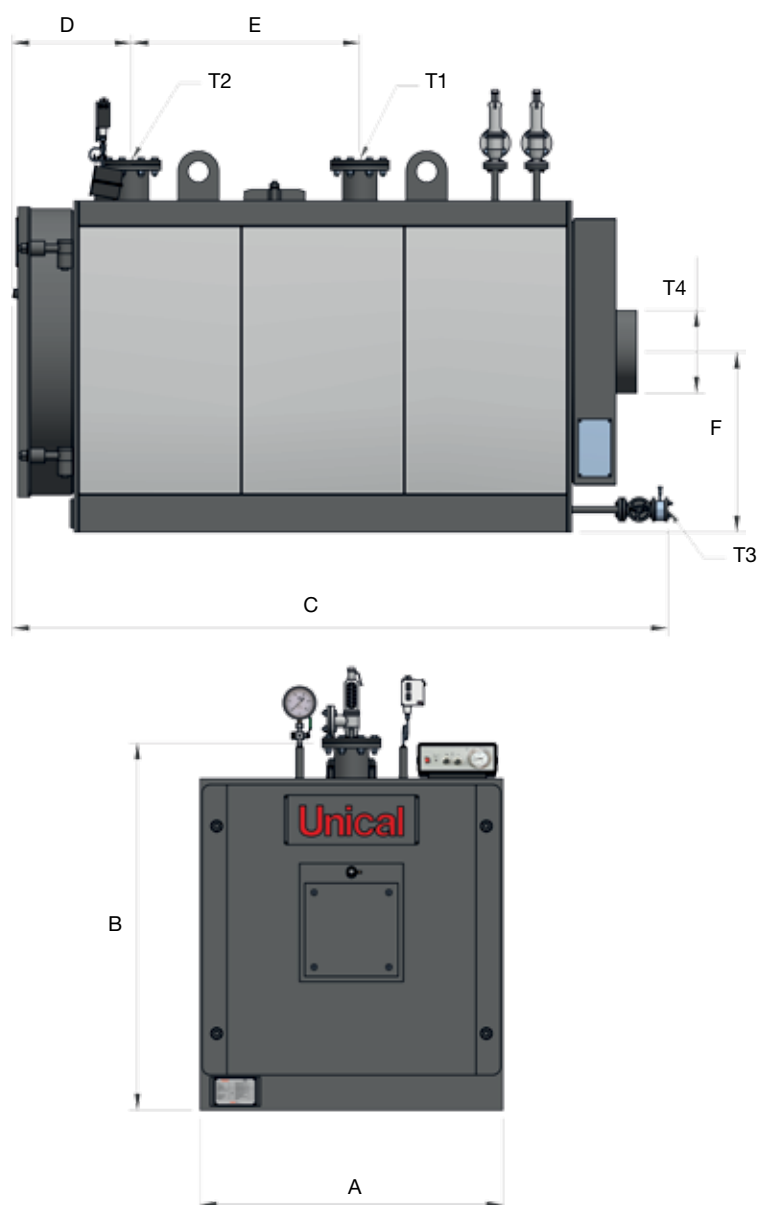
- | | |
|-----------------------------|---|
| 1. Boiler body | 7. Manometer with 3 way cock for calibration purposes |
| 2. Front door | 8. Safety valves |
| 3. Rear smoke chamber | T1. C.H. flow |
| 4. Panel board | T2. C.H. return |
| 5. Inspection with man hole | T3. Boiler drain |
| 6. Safety pressure switch | T4. Chimney connection |



TECHNICAL DATA

Model	Nominal output	Nominal input	Smoke side pressure drop	Water content	Water side pressure drop (ΔT 15°C)	Dry weight (4,9 bar)
	kW	kW	mbar	l	mbar	kg
140	140	157	2,0	335	3,7	760
210	210	235	2,5	410	8	1080
270	268	300	3,0	410	13	1080
370	372	418	4,2	780	11	1540
465	465	523	4,5	780	17	1540
580	581,5	653	5,0	875	12	1675
700	700	784	6,0	964	18	2060
930	930	1046	6,5	1189	20	2350
1160	1163	1307	7,0	1485	30	2930
1400	1396	1568	7,0	1696	24	3500
1750	1745	1960	8,0	2455	37	4240
2050	2035	2287	8,2	2750	30	4790
2300	2325	2613	9,0	3100	40	5870
2900	2907	3267	9,5	4200	45	7000

DIMENSIONS



Model	A	B	C	D	E	F	T1 - T2	T3	T4
	mm	mm	mm	mm	mm	mm	DN	DN	Ø mm
140	950	1235	1550	375	700	580	65	25	220
210	950	1225	1970	425	950	580	65	25	220
270	950	1225	1970	425	950	580	65	25	220
370	1140	1430	2280	477	1060	680	80	25	250
465	1140	1430	2280	477	1060	680	80	25	250
580	1210	1510	2350	487	1100	725	100	25	250
700	1210	1510	2550	487	1360	725	100	25	250
930	1350	1670	2635	578	1200	805	125	25	350
1160	1350	1670	3135	578	1700	805	125	25	350
1400	1460	1770	3060	568	1600	835	150	40	400
1750	1640	1940	3400	570	1800	950	150	40	450
2050	1740	2050	3400	685	1700	1008	200	40	450
2300	1780	2080	3600	695	1886	1020	200	40	500
2900	1890	2190	4200	720	2380	1075	200	40	500

SURPLUS PRODUCT VALUES

■ FRONT DOOR

Fitted on hinges, with reversible opening. It is in welded steel sheet, with the inside completely insulated with refractory concrete. Complete with burner plate and flame sight glass

■ REAR SMOKE CHAMBER

Made of steel sheet and complete of horizontal smoke spigot for chimney connection and cleaning openings

■ BASEMENT

In steel profiles

■ THERMAL INSULATION

Made from a mineral wool mattress, externally protected by painted steel panels

■ DELIVERY

Is complete with panel board, safety and control devices

STANDARD-PRODUCTION EQUIPMENT

- Casing in insulated steel panels
- Turbulators
- Spring actuated safety valve(s)
- Manual draining group
- N. 1 dial type thermometer
- N. 1 dial type manometer with 3 way cock for calibration purposes
- N. 2 working thermostats
- N. 1 manual reset safety thermostat
- N. 1 manual reset safety pressure switch

OPTIONAL EQUIPMENT

- A 3rd working thermostat
- Pre-drilled burner plate according to burner type
- Higher working pressures
- Ladder and gang way
- Smoke thermostat
- Recirculation pump with thermostat
- Burner
- Kit for exemption from continuous surveillance for 24 / 72 hr, composed of:



■ Panel board for 24/72 hr exemption



■ Safety minimum level sensor



■ Safety maximum pressure switch



■ Electrical conductivity sensor TDS (72 hr)



■ Safety minimum pressure switch



■ Automatic discharging group for desludging (72 hr)



ENBLOC, REVERSED FLAME, HIGH PERFORMANCES, LOW PRESSURE STEAM GENERATOR

RANGE

from 870 to 10000 kW

WORKING
PRESSURE

9,8 bar

WORKING
TEMPERATURE

183,2°C

MODELS

870

1160

1400

1800

2300

2900

3500

4650

5800

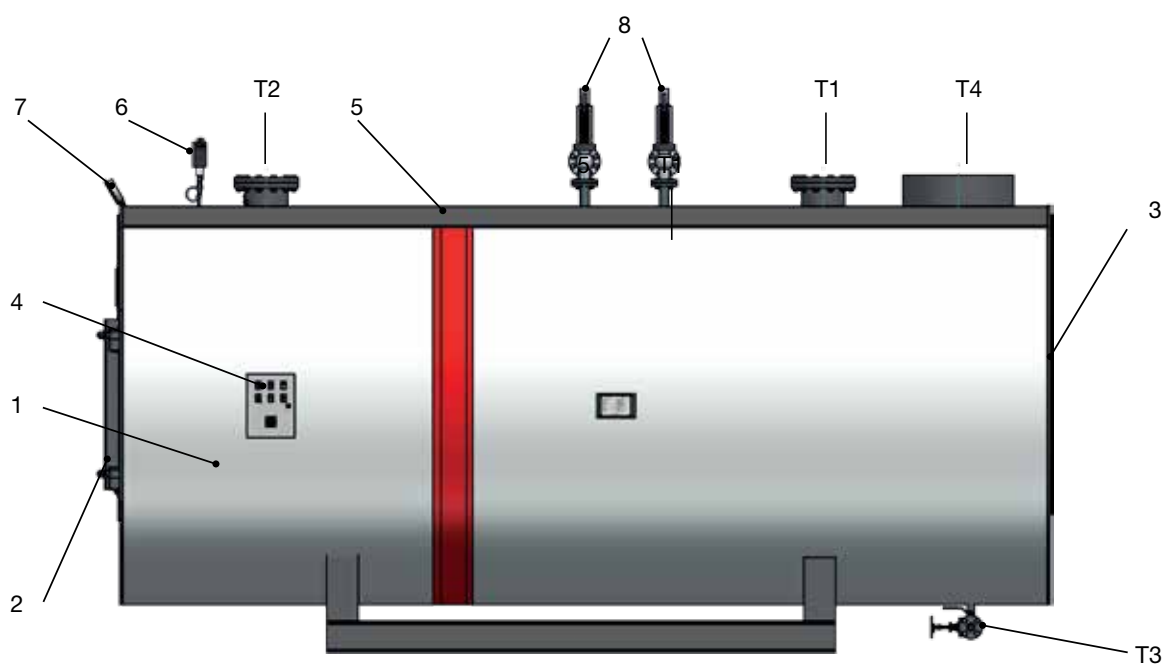
7000

8300

10000

DESCRIPTION

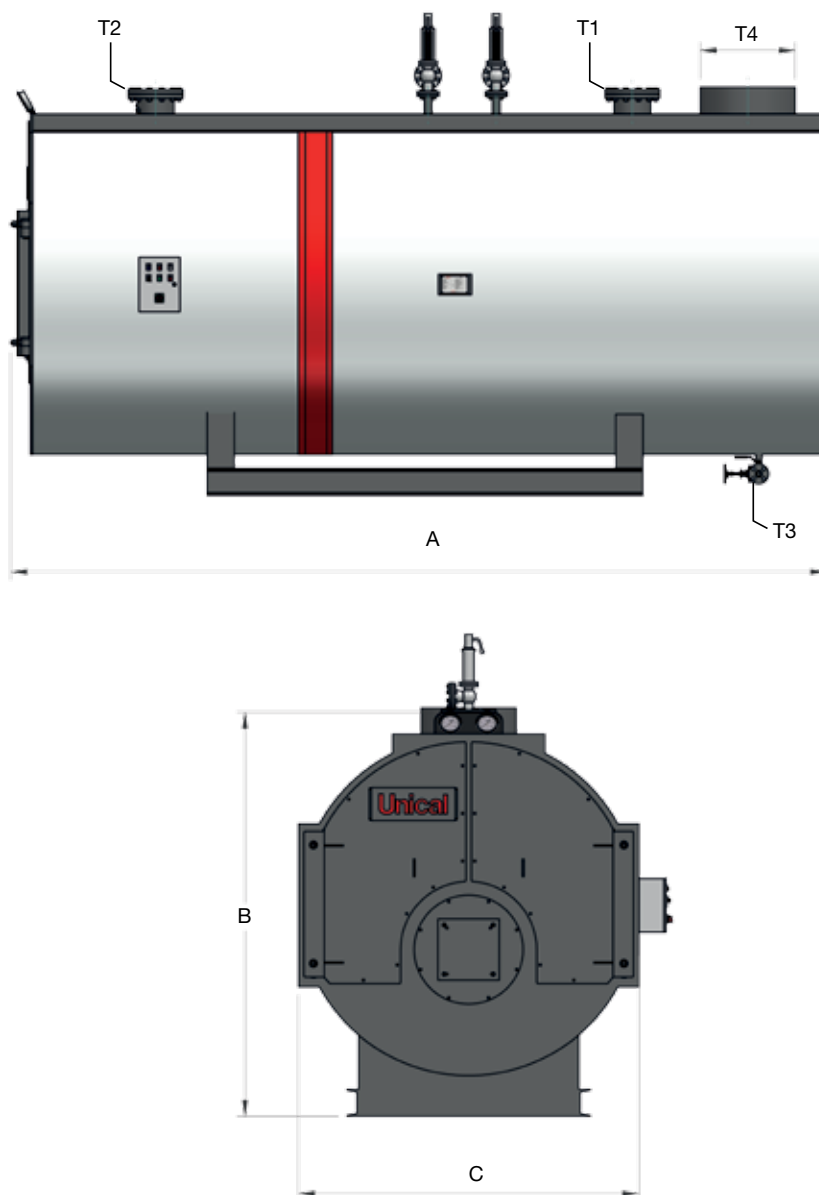
- | | |
|-----------------------------|---|
| 1. Boiler body | 7. Manometer with 3 way cock for calibration purposes |
| 2. Front door | 8. Safety valves |
| 3. Rear smoke chamber | T1. C.H. flow |
| 4. Panel board | T2. C.H. return |
| 5. Inspection with man hole | T3. Boiler drain |
| 6. Safety pressure switch | T4. Chimney connection |



TECHNICAL DATA

Model	Nominal output	Nominal input	Smoke side pressure drop	Water content	Burner plate drilling	Burner blast tube Min/max length	Dry weight (9,8 bar)
	kW	kW	mbar	l	mm	mm	kg
870	870	960	3,0	2800	According to burner manufacturer	According to burner manufacturer	4150
1160	1160	1280	5,6	2870			6100
1400	1395	1550	6,7	3600			6800
1800	1750	1940	5,4	3980			7400
2300	2300	2550	3,5	8250			9200
2900	2900	3220	6,0	9200			10600
3500	3500	3880	7,5	10840			14300
4650	4650	5160	7,0	11400			15000
5800	5800	6440	5,8	12520			17600
7000	7000	7740	10,0	14700			19200
8300	8300	9220	10,0	16800			24350
10000	10000	11100	11,0	19000			28400

DIMENSIONS



Model	A	B	C	T1/T2	T3	T4
	mm	mm	mm	DN	DN	Ø mm
870	3500	1800	1480	100	25	300
1160	3600	2150	1660	125	25	350
1400	3900	2150	1660	150	40	350
1800	3900	2340	1850	150	40	400
2300	4970	2650	2160	150	40	450
2900	5370	2650	2160	200	40	450
3500	5300	2900	2410	200	40	550
4650	5770	2990	2470	200	40	600
5800	6370	3000	2500	250	40	700
7000	6870	3000	2500	250	40	700
8300	7320	3210	2710	250	40	800
10000	7500	3590	2900	300	40	900

SURPLUS PRODUCT VALUES

- **FRONT AND REAR DOOR**
placed on both sides to get access to the tube bundles.
They can be opened without the removal of the burner and the chimney for an easy service
- **LOW EMISSIONS $\text{NO}_x < 70 \text{ mg/kWh}$**
thanks to the reduction of the specific thermal load
(according to the versions)
- **FURNACE BOTTOM**
completely wet
- **POSSIBLE COMBINATION**
with one /two stage or modulating burners, operated with natural gas, LPG, light oil or heavy oil
- **EASY TRANSPORTATION**
thanks to the upper hooks and the strong frame side members
- **DELIVERY**
Is complete with panel board, safety and control devices

STANDARD- PRODUCTION EQUIPMENT

- Rock wool insulation covered with an aluminium foil
- Panel board for two stage operation burner
- N. 2 spring actuated safety valves
- Draining group with quick lever operated desludging valve
- N. 1 dial type thermometer
- N. 1 dial type manometer with 3 way cock for calibration purposes
- N. 2 working thermostats
- N. 1 manual reset safety pressure switch

OPTIONAL EQUIPMENT

- A 3rd working thermostat
- Pre-drilled burner plate according to burner type
- Higher working pressures
- Ladder and gang way
- Smoke thermostat
- Recirculation pump with thermostat
- Burner
- Kit for exemption from continuous surveillance for 24 / 72 hr, composed of:



■ Panel board
24/72



■ Safety minimum
level sensor



■ Safety maximum
pressure switch



■ Electrical conductivity
sensor TDS (72 hr)



■ Safety minimum
pressure switch



■ Automatic discharging group
for desludging (72 hr)

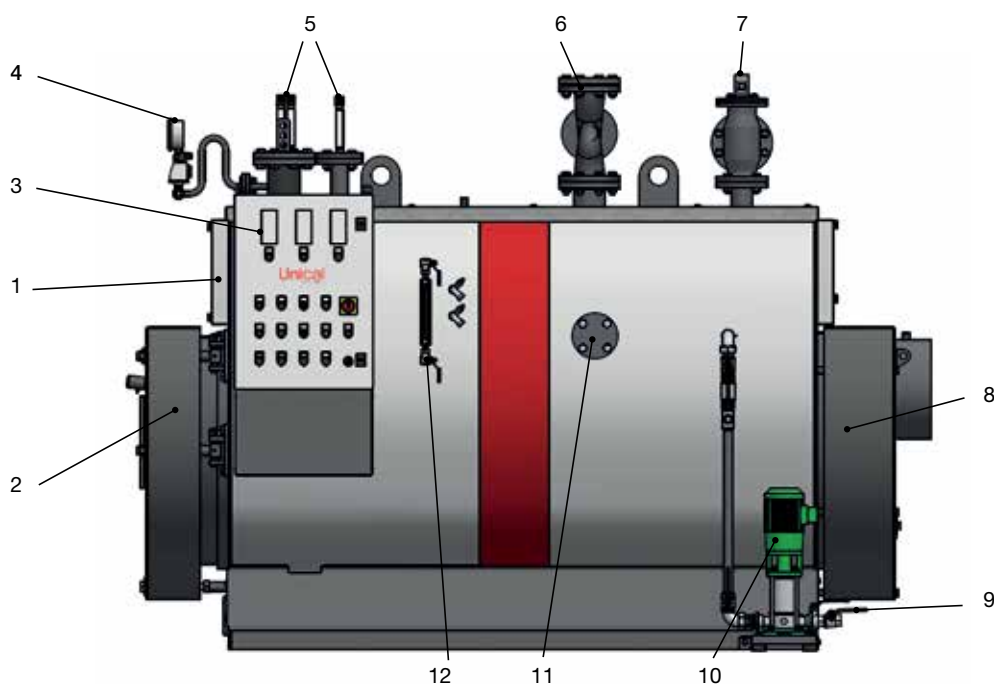


**ENBLOC, REVERSED FLAME, HIGH PERFORMANCES,
LOW PRESSURE STEAM GENERATOR**

RANGE	from 94 kW (140 kg/h) to 2012 kW (3000 kg/h)							
TYPE	OR smooth pipe							
FUEL	gas, light & heavy oil							
DESIGN PRESSURE	0,98 bar							
DESIGN TEMPERATURE	119,6°C							
MODELS	140	160	200	300	400	500	600	800
	1000	1250	1500	1750	2000	2500	3000	-

DESCRIPTION

- | | |
|-------------------------|------------------------|
| 1. Boiler body | 7. Safety valve |
| 2. Front door | 8. Rear smoke chamber |
| 3. Panel board | 9. Drain |
| 4. Instruments assembly | 10. Pump feeding group |
| 5. Level safety sensors | 11. TDS connection |
| 6. Steam throttle | 12. Level gauge |



TECHNICAL DATA

Model	Steam production	Nominal output*	Nominal input OR	ΔP smoke side	Max. working pressure**	Water content at level	Total volume	Burner head min. length	Burner head max. dia.
	kg/h	kW	kW	mbar	bar	l	l	mm	mm
140	140	94	106	2,0	0,98	310	410	340	210
160	160	107	121	2,3	0,98	310	410	340	210
200	200	134	151	2,6	0,98	310	410	340	210
300	300	201	226	2,2	0,98	568	730	340	210
400	400	268	301	2,6	0,98	568	730	340	210
500	500	335	376	2,8	0,98	814	1040	340	240
600	600	402	452	3,5	0,98	814	1040	340	240
800	800	537	603	3,8	0,98	1160	1545	340	240
1000	1000	671	754	4,2	0,98	1160	1545	340	240
1250	1250	838	942	4,5	0,98	1663	2250	370	280
1500	1500	1006	1130	5,1	0,98	1663	2250	370	280
1750	1750	1174	1319	5,5	0,98	2140	2890	370	280
2000	2000	1341	1507	6,0	0,98	2140	2890	370	280
2500	2500	1677	1884	6,8	0,98	2970	4060	370	360
3000	3000	2012	2261	7,0	0,98	2970	4060	370	360

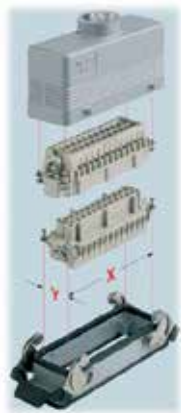
*with feeding water temperature = 70°C and pressure = 1 bar

** safety valves setting value

PRODUCT SURPLUS VALUES



High thickness insulation



Fast coupling connectors

- **EFFICIENT THERMAL INSULATION**
given by:
 - high total thickness, made by joining two rock wool
 - layers with aluminium foil
 - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **REVERSIBLE DOOR OPENING**
hinges and closing bolts adjustment in all directions
- **GANGWAY**
in checker plate, placed in the upper part
- **SIMPLIFIED ELECTRICAL CONNECTION**
via fast coupling connectors
- **PANEL BOARDS**
electromechanical and electronic, expandable (optional)
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS**
boiler and panel board designed for the integration of optional kits, also with boiler already installed



IML Panel board (optional)



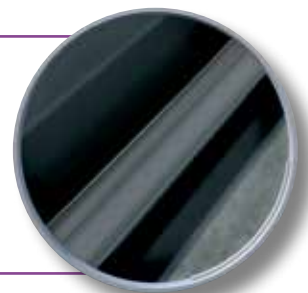
Adjustable door hinges

SMOOTH PIPES

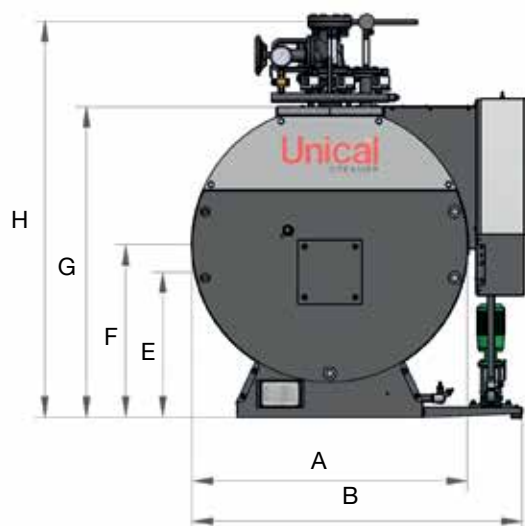
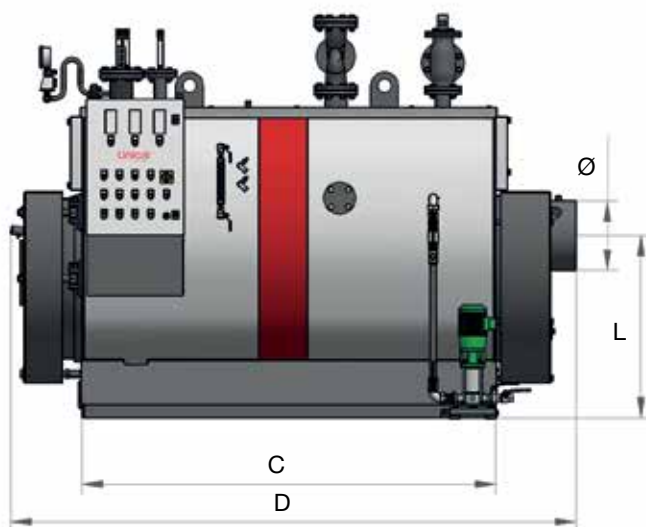
The smooth smoke pipes, suitable for gas, light and heavy oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, helical turbulators.

They are standard supplied for gas, light and heavy oil operation.



DIMENSIONS



Model	A	B	C	D	E	F	G	H	L	ø	Dry weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
140	1030	1360	1100	2350	580	695	1220	1485	725	219	1030
160	1030	1360	1100	2350	580	695	1220	1485	725	219	1030
200	1030	1360	1100	2350	580	695	1220	1485	725	219	1030
300	1150	1480	1550	2550	635	755	1340	1630	1167	219	1350
400	1150	1480	1550	2550	635	755	1340	1630	1167	219	1350
500	1270	1600	1750	2960	685	815	1460	1800	1266	219	1700
600	1270	1600	1750	2960	685	815	1460	1800	1266	219	1700
800	1410	1740	2120	3437	745	885	1600	1980	1379	258	2260
1000	1410	1740	2120	3437	745	885	1600	1980	1379	258	2260
1250	1555	1885	2527	3740	860	1005	1790	2220	1417	308	2950
1500	1555	1885	2527	3740	860	1005	1790	2220	1417	308	2950
1750	1680	2010	2750	3860	905	1070	1920	2350	1482	358	3670
2000	1680	2010	2750	3860	905	1070	1920	2350	1482	358	3670
2500	1950	2280	2830	4370	1080	1265	2250	2725	1677	408	5210
3000	1950	2280	2830	4370	1080	1265	2250	2725	1677	408	5210



**ENBLOC, REVERSED FLAME, HIGH PERFORMANCES,
LOW PRESSURE STEAM GENERATOR**

RANGE da 94 kW (140 kg/h) a 2012 kW (3000 kg/h)

TYPE	STD	HPO	HP
	smooth pipe	ESA pipe	ESALU pipe

FUEL gas, light & heavy oil gas & light oil gas

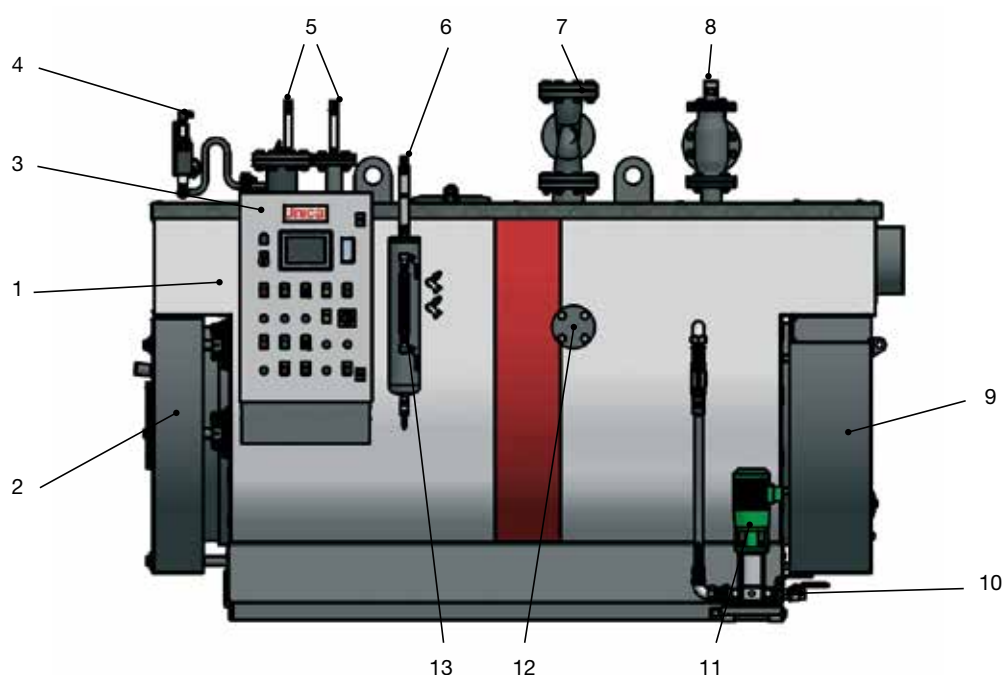
DESIGN PRESSURE 0,98 bar

DESIGN TEMPERATURE 119,6°C

MODELS	140	160	200	300	400	500	600	800
	1000	1250	1500	1750	2000	2500	3000	-

DESCRIPTION

1. Boiler body
2. Front door
3. Panel board
4. Instruments assembly
5. Level safety sensors
6. Capacitive level transmitter
7. Steam throttle
8. Safety valve
9. Rear smoke chamber
10. Drain
11. Pump feeding group
12. TDS connection
13. Level gauge



TECHNICAL DATA

Model	Steam production	Nominal output*	Nominal Input STD	Nominal Input HPO	Nominal Input HP	Max. working pressure**	Water content at level	Total volume	ΔP smoke side	Burner head min. length	Burner head max. dia.
	kg/h	kW	kW	kW	kW	bar	l	l	mbar	mm	mm
140	140	94	106	102	99	0,98	310	410	2,6	340	210
160	160	107	121	117	112	0,98	310	410	2,8	340	210
200	200	134	151	146	141	0,98	310	410	3,0	340	210
300	300	201	226	218	212	0,98	568	730	3,7	340	210
400	400	268	301	291	282	0,98	568	730	4,2	340	210
500	500	335	376	364	353	0,98	814	1040	4,5	340	240
600	600	402	452	487	423	0,98	814	1040	5,1	340	240
800	800	537	603	584	565	0,98	1160	1545	5,1	340	240
1000	1000	671	754	729	706	0,98	1160	1545	5,8	340	240
1250	1250	838	942	911	882	0,98	1663	2250	5,9	370	280
1500	1500	1006	1130	1093	1059	0,98	1663	2250	6,7	370	280
1750	1750	1174	1319	1276	1236	0,98	2140	2890	6,7	370	280
2000	2000	1341	1507	1458	1412	0,98	2140	2890	7,6	370	280
2500	2500	1677	1884	1823	1765	0,98	2970	4060	7,6	370	360
3000	3000	2012	2261	2187	2118	0,98	2970	4060	8,6	370	360

* with feeding water temperature = 70°C and pressure = 1 bar

** safety valves setting value

PRODUCT SURPLUS VALUES

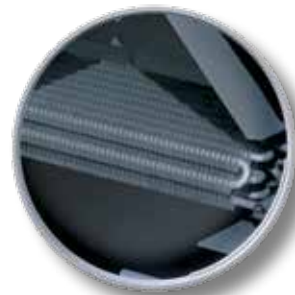


High thickness insulation



Door hinges adjusting

- **EXCELLENT WATER EFFICIENCY**
up to 98% with special ESALU and economiser
- **SMOKE CHAMBER PREARRANGEMENT**
for possible economiser integration , also with the boiler already installed
- **EFFICIENT THERMAL INSULATION**
given by:
 - high total thickness, made by joining two rock wool layers with aluminium foil
 - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **REVERSIBLE DOOR OPENING**
hinges and closing bolts adjustment in all directions
- **GANGWAY**
in checker plate, placed in the upper part
- **SIMPLIFIED ELECTRICAL CONNECTION**
via fast coupling connectors
- **PANEL BOARDS**
electromechanical and electronic, expandible (optional)
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS**
boiler and panel board designed for the integration of optional kits, also with boiler already installed
- **FAST COUPLING CONNECTORS**



Integral economizer



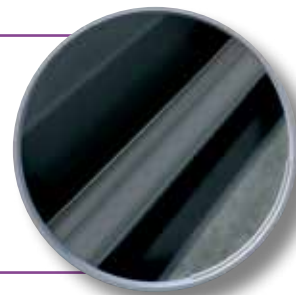
IML (Industrial Multi Logic) panel board (optional)

SMOOTH PIPES

The smooth smoke pipes, suitable for gas, light and heavy oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, helical turbulators.

They are standard supplied for gas, light and heavy oil operation.



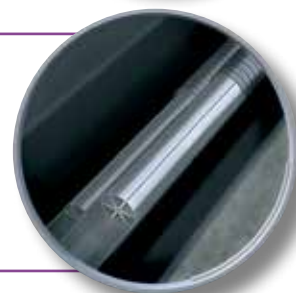
ESA PIPES

The ESA smoke pipes (UNICAL patent), suitable for gas and light oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, six 60° sectorial pipes.

The adoption of the ESA pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

They are standard supplied for gas and light oil operation.



ESALU PIPES

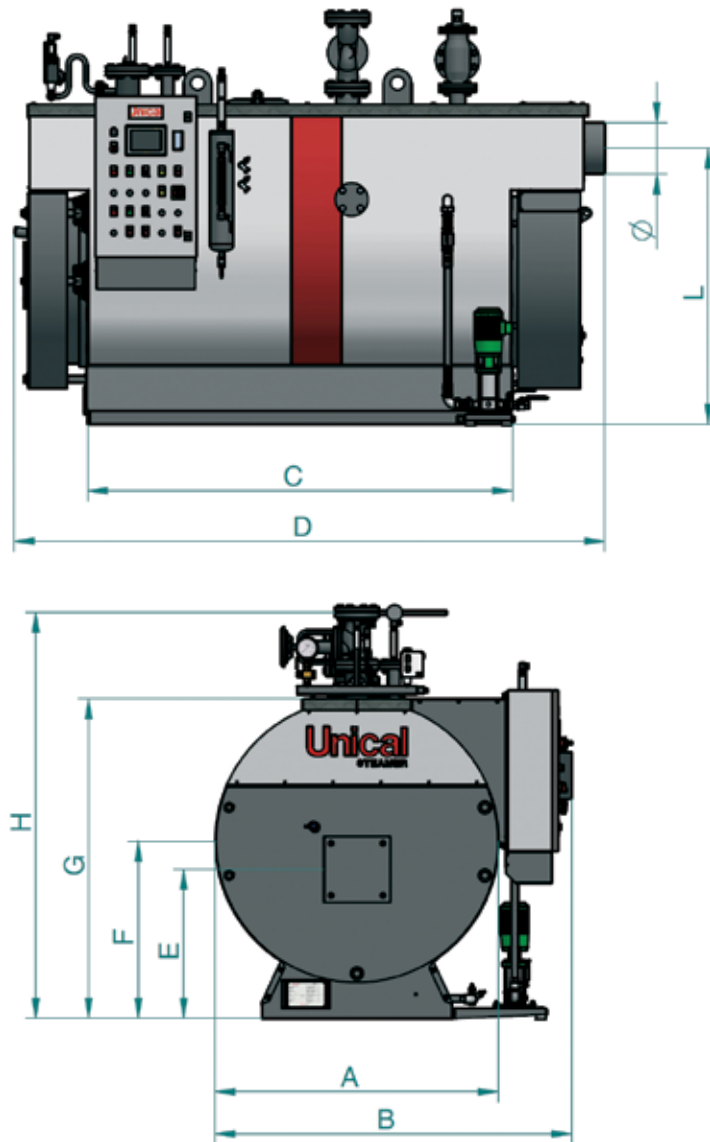
The ESALU smoke pipes (UNICAL patent), suitable for gas, constituting the tube bundle, allow to reach a very high thermal exchange. They are formed by pipes with, inside, special inserts of different types and shapes.

The adoption of the ESALU pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

They are standard supplied for gas operation.



DIMENSIONS



Model	A	B	C	D	E	F	G	H	L	ø	Dry weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
140	1030	1360	1100	2350	580	695	1220	1485	725	219	1060
160	1030	1360	1100	2350	580	695	1220	1485	725	219	1060
200	1030	1360	1100	2350	580	695	1220	1485	725	219	1060
300	1150	1480	1550	2550	635	755	1340	1630	1167	219	1380
400	1150	1480	1550	2550	635	755	1340	1630	1167	219	1380
500	1270	1600	1750	2960	685	815	1460	1800	1266	219	1730
600	1270	1600	1750	2960	685	815	1460	1800	1266	219	1730
800	1410	1740	2120	3437	745	885	1600	1980	1379	258	2290
1000	1410	1740	2120	3437	745	885	1600	1980	1379	258	2290
1250	1555	1885	2527	3740	860	1005	1790	2220	1417	308	2990
1500	1555	1885	2527	3740	860	1005	1790	2220	1417	308	2990
1750	1680	2010	2750	3860	905	1070	1920	2350	1482	358	3710
2000	1680	2010	2750	3860	905	1070	1920	2350	1482	358	3710
2500	1950	2280	2830	4370	1080	1265	2250	2725	1677	408	5250
3000	1950	2280	2830	4370	1080	1265	2250	2725	1677	408	5250



**ENBLOC, REVERSED FLAME, HIGH PERFORMANCES,
HIGH PRESSURE STEAM GENERATOR**

RANGE from 204 kW (300 kg/h) to 4089 kW (6000 kg/h)

TYPE

OR

smooth pipe

FUEL

gas, light & heavy oil

DESIGN PRESSURE

12 bar (on request 14,7 bar)

DESIGN TEMPERATURE

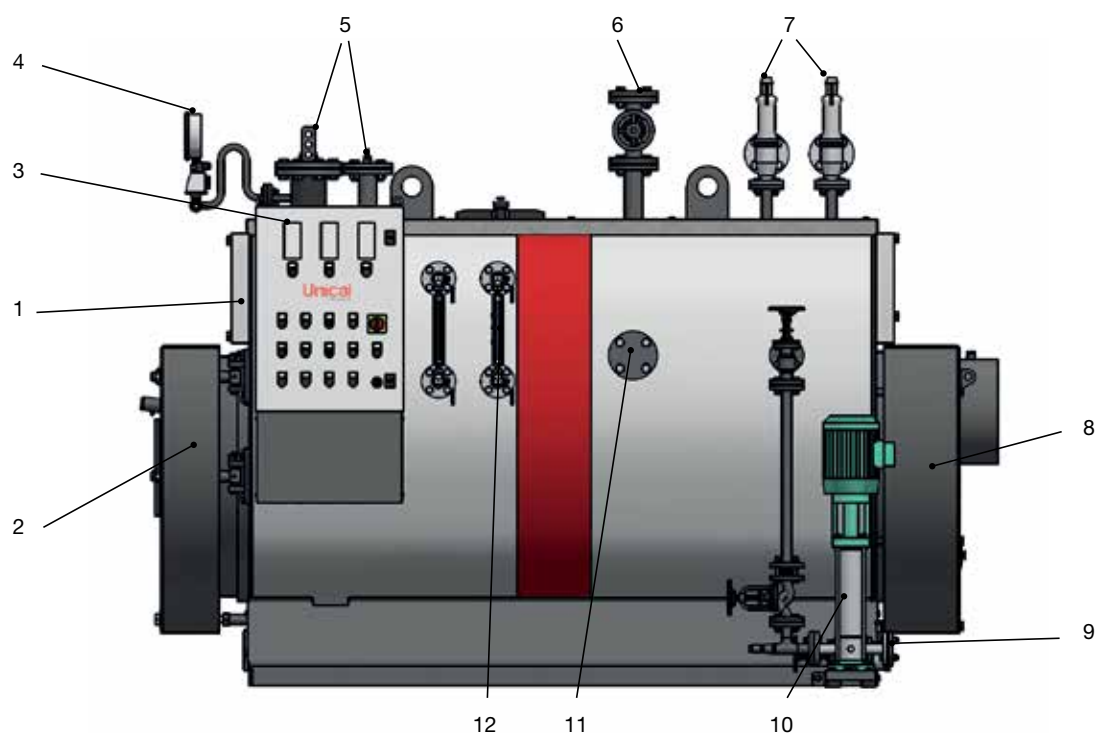
191,7°C

MODELS

300	400	500	600	800	1000	1250	1500
1750	2000	2500	3000	4000	5000	6000	-

DESCRIPTION

1. Boiler body
2. Front door
3. Panel board
4. Instruments assembly
5. Level safety sensors
6. Steam throttle
7. Safety valves
8. Rear smoke chamber
9. Drain
10. Pump feeding group
11. TDS connection
12. Level gauge



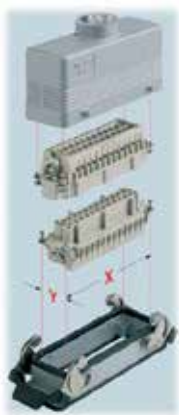
Model	Steam production	Nominal output*	Nominal input OR	ΔP smoke side	Max. working pressure**	Water content at level	Total volume	Burner head min. length	Burner head max. dia.
	kg/h	kW	kW	mbar	bar	l	l	mm	mm
300	300	204	234	2,2	12 – 14,7	525	710	340	210
400	400	273	314	2,6	12 – 14,7	525	710	340	210
500	500	341	392	2,8	12 – 14,7	760	1015	340	240
600	600	409	470	3,5	12 – 14,7	760	1015	340	240
800	800	545	626	3,8	12 – 14,7	1080	1500	340	240
1000	1000	682	784	4,2	12 – 14,7	1080	1500	340	240
1250	1250	852	979	4,5	12 – 14,7	1555	2195	370	280
1500	1500	1022	1175	5,1	12 – 14,7	1555	2195	370	280
1750	1750	1193	1371	5,5	12 – 14,7	2005	2810	370	280
2000	2000	1363	1597	6,0	12 – 14,7	2005	2810	370	280
2500	2500	1704	1959	6,8	12 – 14,7	2890	3950	370	360
3000	3000	2045	2351	7,0	12 – 14,7	2890	3950	370	360
4000	4000	2726	3133	8,0	12 – 14,7	4155	5780	370	400
5000	5000	3408	3917	8,8	12 – 14,7	5800	7730	370	400
6000	6000	4089	4700	8,8	12 – 14,7	6760	8600	370	420

* with feeding water temperature = 80°C and pressure = 12 bar ** Safety valves setting value

PRODUCT SURPLUS VALUES



High thickness insulation



Fast coupling connectors

- **EFFICIENT THERMAL INSULATION**
given by:
 - high total thickness, made by joining two rock wool layers with aluminium foil
 - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **REVERSIBLE DOOR OPENING**
hinges and closing bolts adjustment in all directions
- **GANGWAY**
in checker plate, placed in the upper part
- **SIMPLIFIED ELECTRICAL CONNECTION**
via fast coupling connectors
- **PANEL BOARD**
electromechanical and electronic, expandible (optional)
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS**
boiler and panel board designed for the integration of optional kits, also with boiler already installed
- **FAST COUPLING CONNECTORS**



IML Panel board (optional)



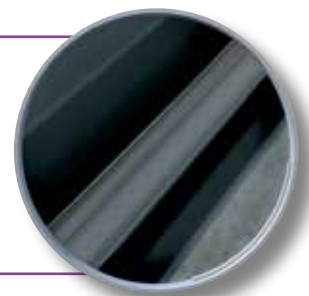
Adjustable door hinges

SMOOTH PIPES

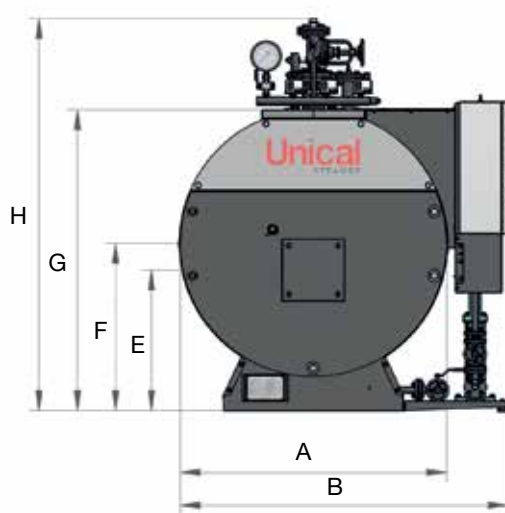
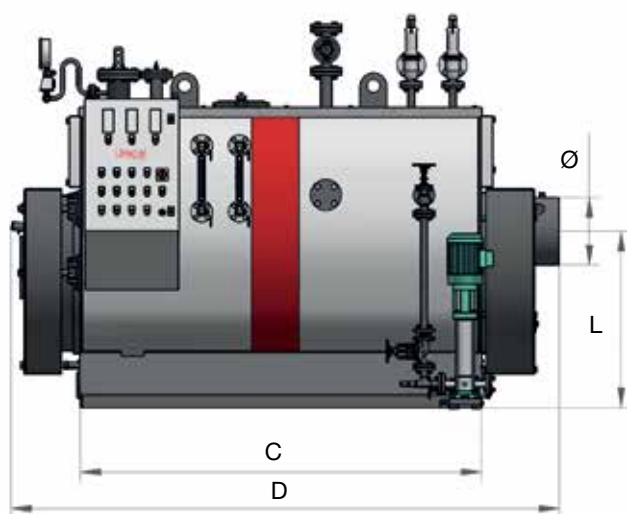
The smooth smoke pipes, suitable for gas, light and heavy oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, helical turbulators.

They are standard supplied for gas, light and heavy oil operation.



DIMENSIONS



Model	A	B	C	D	E	F	G	H	L	Ø	Dry weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
300	1150	1480	1550	2350	635	755	1340	1555	1167	219	1620
400	1150	1480	1550	2350	635	755	1340	1555	1167	219	1620
500	1270	1600	1750	2550	685	815	1460	1725	1266	219	2010
600	1270	1600	1750	2550	685	815	1460	1725	1266	219	2010
800	1410	1740	2120	2960	745	885	1600	1870	1379	258	2830
1000	1410	1740	2120	2960	745	885	1600	1870	1379	258	2830
1250	1555	1885	2527	3437	860	1005	1790	2095	1417	308	3710
1500	1555	1885	2527	3437	860	1005	1790	2095	1417	308	3710
1750	1680	2010	2750	3740	905	1070	1920	2225	1482	358	4610
2000	1680	2010	2750	3740	905	1070	1920	2225	1482	358	4610
2500	1950	2280	2830	3860	1080	1265	2250	2595	1677	408	6560
3000	1950	2280	2830	3860	1080	1265	2250	2595	1677	408	6560
4000	2180	2510	3300	4370	1170	1380	2480	2865	1792	458	8980
5000	2280	2610	3800	4940	1195	1405	2555	2990	1817	508	10540
6000	2350	2680	4000	5220	1210	1440	2620	3320	2330	508	11750



**ENBLOC, REVERSED FLAME, HIGH PERFORMANCES,
HIGH PRESSURE STEAM GENERATOR**

RANGE from 204 kW (300 kg/h) to 4089 kW (6000 kg/h)

TYPE	STD	HPO	HP
	smooth pipe	ESA pipe	ESALU pipe

FUEL gas, light & heavy oil gas & light oil gas

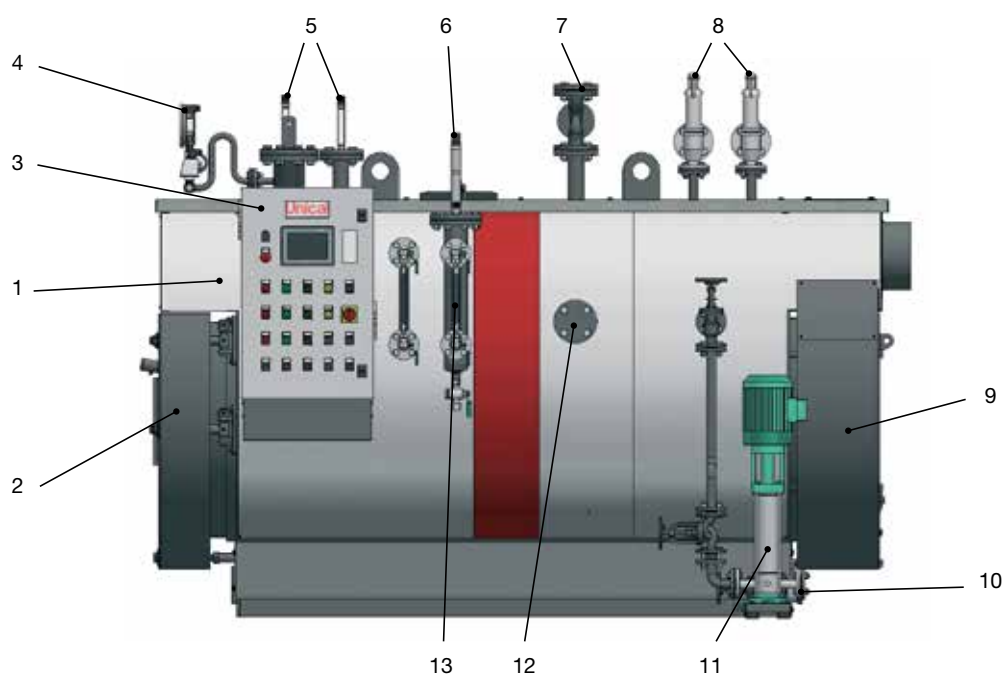
DESIGN PRESSURE 12 bar (on request 14,7 bar)

DESIGN TEMPERATURE 191,7°C

MODES	300	400	500	600	800	1000	1250	1500
	1750	2000	2500	3000	4000	5000	6000	-

DESCRIPTION

1. Boiler body
2. Front door
3. Panel board
4. Instruments assembly
5. Level safety sensors
6. Capacitive level transmitter
7. Steam throttle
8. Safety valve
9. Rear smoke chamber
10. Drain
11. Pump feeding group
12. TDS connection
13. Level gauge



Model	Steam production kg/h	Nominal input* kW	Nominal output STD kW	Nominal output HPO kW	Nominal output HP kW	Max. working pressure** bar	Water content at level l	Total volume l	ΔP smoke side mbar	Burner head min. length mm	Burner head max. dia. mm
300	300	204	234	227	222	12 – 14,7	525	710	3,7	340	210
400	400	273	314	303	297	12 – 14,7	525	710	4,2	340	210
500	500	341	392	379	371	12 – 14,7	760	1015	4,5	340	240
600	600	409	470	454	445	12 – 14,7	760	1015	5,1	340	240
800	800	545	626	606	592	12 – 14,7	1080	1500	5,1	340	240
1000	1000	682	784	758	741	12 – 14,7	1080	1500	5,8	340	240
1250	1250	852	979	947	926	12 – 14,7	1555	2195	5,9	370	280
1500	1500	1022	1175	1136	1111	12 – 14,7	1555	2195	6,7	370	280
1750	1750	1193	1371	1326	1297	12 – 14,7	2005	2810	6,7	370	280
2000	2000	1363	1597	1514	1482	12 – 14,7	2005	2810	7,6	370	280
2500	2500	1704	1959	1893	1852	12 – 14,7	2890	3950	7,6	370	360
3000	3000	2045	2351	2272	2223	12 – 14,7	2890	3950	8,6	370	360
4000	4000	2726	3133	3029	2963	12 – 14,7	4155	5780	9,6	370	400
5000	5000	3408	3917	3787	3704	12 – 14,7	5800	7730	10,4	370	400
6000	6000	4089	4700	4543	4445	12 – 14,7	6760	8600	11,8	370	420

*with feeding water temperature = 80°C and pressure = 12 bar

**safety valves setting value

PRODUCT SURPLUS VALUES

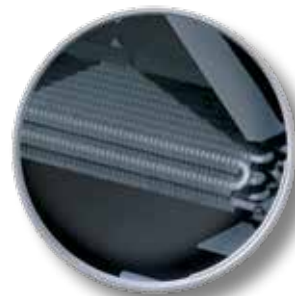


High thickness insulation



Door hinges adjusting

- **EXCELLENT WATER EFFICIENCY**
up to 98% with special ESALU and economiser
- **SMOKE CHAMBER PREARRANGEMENT**
for possible economiser integration , also with the boiler already installed
- **EFFICIENT THERMAL INSULATION**
given by:
 - high total thickness, made by joining two rock wool layers with aluminium foil
 - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **REVERSIBLE DOOR OPENING**
hinges and closing bolts adjustment in all directions
- **GANGWAY**
in checker plate, placed in the upper part
- **SIMPLIFIED ELECTRICAL CONNECTION**
via fast coupling connectors
- **PANEL BOARDS**
electromechanical and electronic, expandable (optional)
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS:**
boiler and panel board designed for the integration of optional kits, also with boiler already installed.



Integral economizer



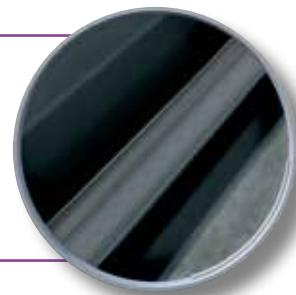
IML (Industrial Multi Logic) panel board (optional)

SMOOTH PIPES

The smooth smoke pipes, suitable for gas, light and heavy oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, helical turbulators.

They are standard supplied for gas, light and heavy oil operation.



ESA PIPES

The ESA smoke pipes (UNICAL patent), suitable for gas and light oil operation, constituting the tube bundle, increase the thermal exchange and allow the removal of the residual combustion products.

They are formed by pipes with, inside, six 60° sectorial pipes.

The adoption of the ESA pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

They are standard supplied for gas and light oil operation.



ESALU PIPES

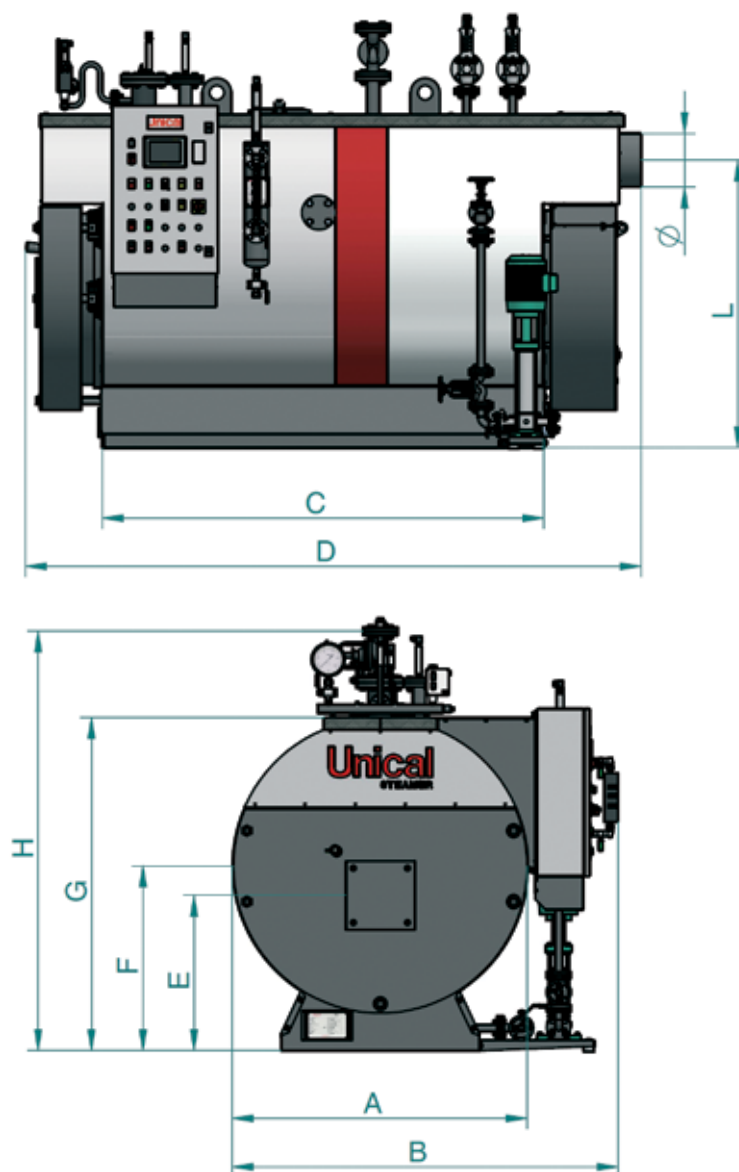
The ESALU smoke pipes (UNICAL patent), suitable for gas, constituting the tube bundle, allow to reach a very high thermal exchange. They are formed by pipes with, inside, special inserts of different types and shapes.

The adoption of the ESALU pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

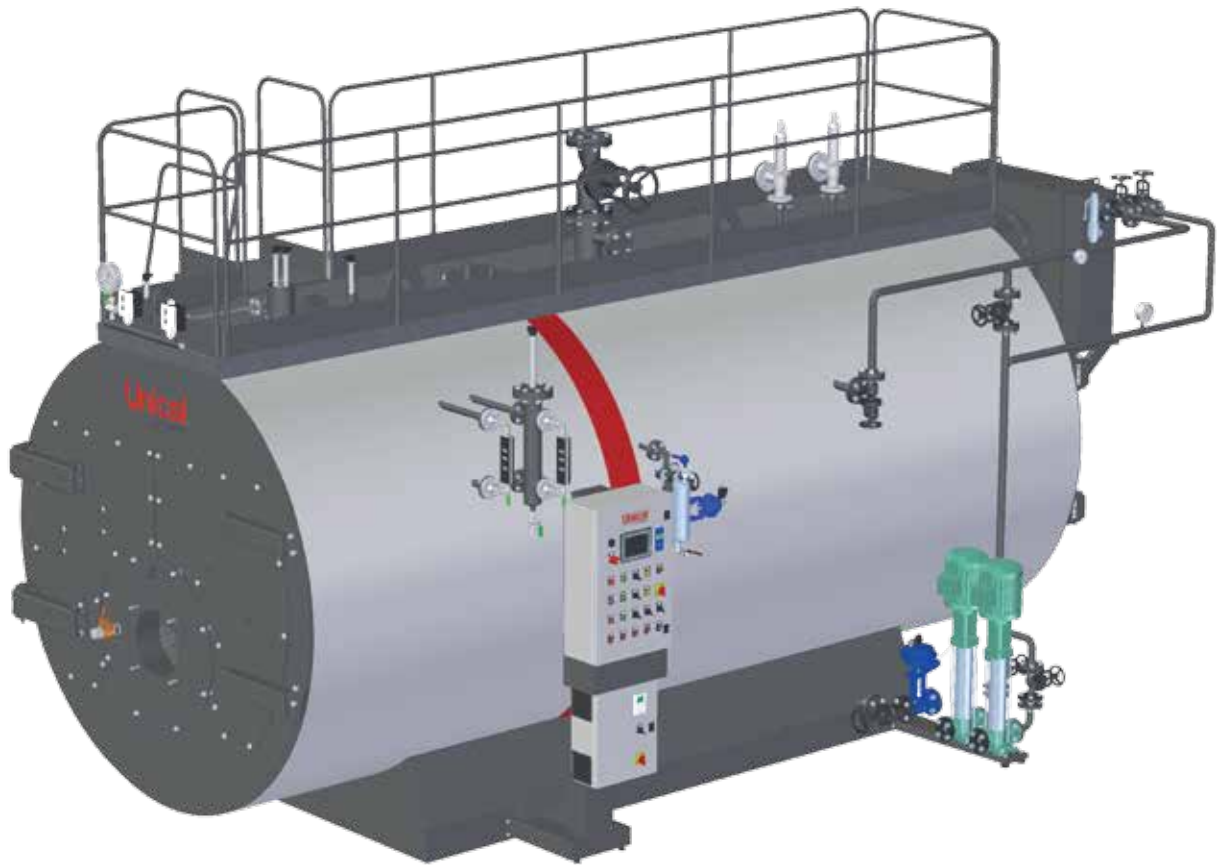
They are standard supplied for gas operation.



DIMENSIONS



Model	A	B	C	D	E	F	G	H	L	Ø	Dry weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
300	1150	1480	1550	2350	635	755	1340	1555	1167	219	1650
400	1150	1480	1550	2350	635	755	1340	1555	1167	219	1650
500	1270	1600	1750	2550	685	815	1460	1725	1266	219	2040
600	1270	1600	1750	2550	685	815	1460	1725	1266	219	2040
800	1410	1740	2120	2960	745	885	1600	1870	1379	258	2860
1000	1410	1740	2120	2960	745	885	1600	1870	1379	258	2860
1250	1555	1885	2527	3437	860	1005	1790	2095	1417	308	3750
1500	1555	1885	2527	3437	860	1005	1790	2095	1417	308	3750
1750	1680	2010	2750	3740	905	1070	1920	2225	1482	358	4650
2000	1680	2010	2750	3740	905	1070	1920	2225	1482	358	4650
2500	1950	2280	2830	3860	1080	1265	2250	2595	1677	408	6600
3000	1950	2280	2830	3860	1080	1265	2250	2595	1677	408	6600
4000	2180	2510	3300	4370	1170	1380	2480	2865	1792	458	9030
5000	2280	2610	3800	4940	1195	1405	2555	2990	1817	508	10590
6000	2350	2680	4000	5220	1210	1440	2620	3320	2330	508	11800



ENBLOC, THREE PASS TYPE, HIGH PERFORMANCES, HIGH PRESSURE STEAM GENERATOR

RANGE from 886 kW (1300 kg/h) to 14721 kW (21600 kg/h)

FUEL gas & light oil

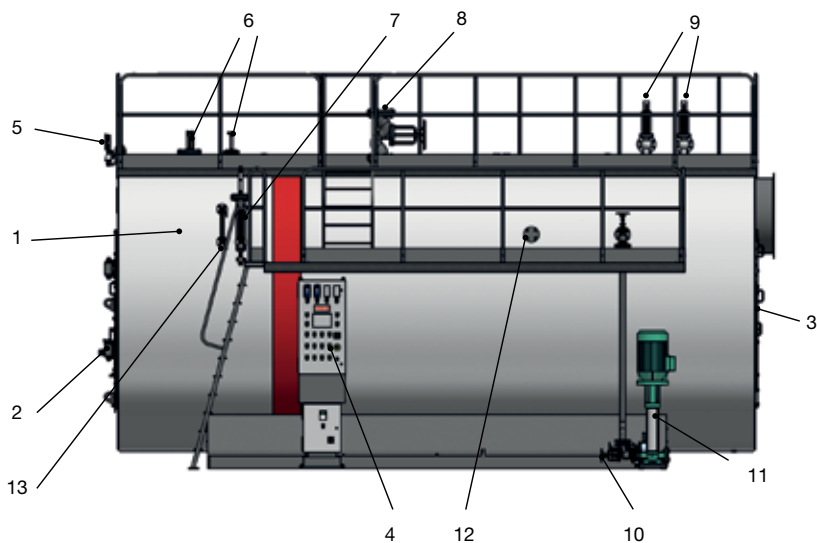
DESIGN PRESSURE 12 bar (on request 14,7 bar)

DESIGN TEMPERATURE 191,7°C

MODELS STD VERSION	2000	3200	4700	6300	7900	9400	12500	15700	18000	21600
MODELS Low NO _x VERSION	1700	2500	3750	5000	6250	7500	10000	12500	14400	17250
MODELS Low NO _x E VERSION	1300	2000	3000	4000	5000	6000	8000	10000	12000	15000

DESCRIPTION

1. Boiler body
2. Front doors
3. Rear doors
4. Panel board
5. Instruments assembly
6. Level safety sensors
7. Capacitive level transmitter (IML)
8. Steam throttle
9. Safety valves
10. Drain
11. Pump feeding group
12. TDS connection
13. Level gauge

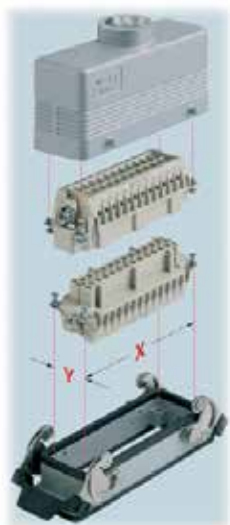


TECHNICAL DATA

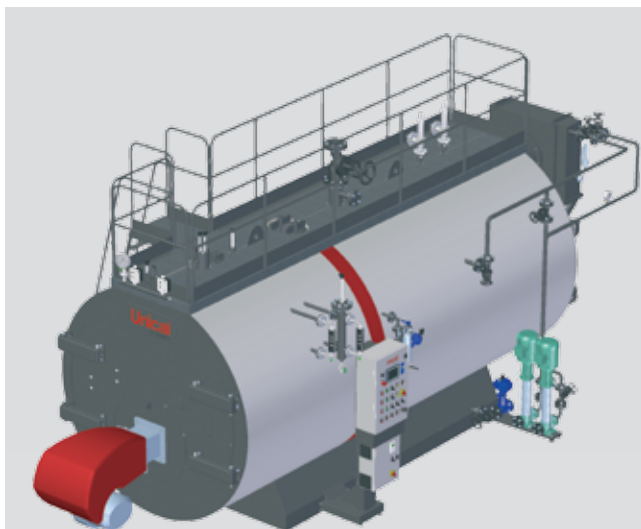
Model	Steam production	Nominal output*	Nominal input	Δp smoke side	Max. working pressure**	Water content at level	Total volume	Exchange surface	Burner head min. length
	kg/h	kW	kW	mbar	bar	lt	lt		mm
1300 Low NO_x E	1300	886	996	4,5	12	4620	5350	55	450
1700 Low NO_x	1700	1159	1317	7	12	4620	5350	55	450
2000 STD	2000	1363	1558	13	12	4620	5350	55	450
2000 Low NO_x E	2000	1363	1531	5,5	12	6060	7360	55	450
2500 Low NO_x	2500	1704	1936	8	12	6060	7360	55	450
3200 STD	3200	2181	2493	13	12	6060	7360	55	450
3000 Low NO_x E	3000	2045	2285	6	12	7810	9195	84	500
3750 Low NO_x	3750	2534	2847	10	12	7810	9195	84	500
4700 STD	4700	3176	3589	15	12	7810	9195	84	500
4000 Low NO_x E	4000	2726	3080	6	12	9890	12215	117	500
5000 Low NO_x	5000	3408	3873	9	12	9890	12215	117	500
6300 STD	6300	4393	4934	15	12	9890	12215	117	500
5000 Low NO_x E	5000	3408	3808	7,5	12	11700	14550	140	500
6250 Low NO_x	6250	4259	4785	11,5	12	11700	14550	140	500
7900 STD	7900	5384	6118	18	12	11700	14550	140	500
6000 Low NO_x E	6000	4089	4569	9	12	12800	15900	160	550
7500 Low NO_x	7500	5111	5743	15	12	12800	15900	160	550
9400 STD	9400	6406	7238	22	12	12800	15900	160	550
8000 Low NO_x E	8000	5452	6058	11	12	16500	20100	228	550
10000 Low NO_x	10000	6815	7572	16	12	16500	20100	228	550
12500 STD	12500	8519	9572	24	12	16500	20100	228	550
10000 Low NO_x E	10000	6815	7572	13	12	20170	25150	265	600
12500 Low NO_x	12500	8519	9466	20	12	20170	25150	265	600
15700 STD	15700	10700	11955	32	12	20170	25150	265	600
12000 Low NO_x E	12000	8178	9087	16	12	22400	28800	306	600
14400 Low NO_x	14400	9814	10904	23	12	22400	28800	306	600
18000 STD	18000	12267	13706	35	12	22400	28800	306	600
15000 Low NO_x E	15000	10223	11359	21	12	25800	33300	360	700
17250 Low NO_x	17250	11756	13435	27	12	25800	33300	360	700
21600 STD	21600	14721	16448	28	12	25800	33300	360	700

*with feeding water temperature = 80°C and pressure = 12 bar **safety valves setting value

PRODUCT SURPLUS VALUES



Fast coupling connections



- **EXCELLENT WATER EFFICIENCY**
thanks to the three real smoke passes
- **LOW NO_x EMISSIONS**
Thanks to the reduction of the specific thermal load according to the different versions
- **EFFICIENT THERMAL INSULATION**
given by:
 - high total thickness, made by joining two rock wool layers with aluminium foil
 - insulation between the casing and the hot parts of the boiler body for thermal bridges elimination
- **CLEANING DOORS**
front and rear doors for inspection and cleaning of the exchange tube bundles
- **UPPER GANGWAY**
- **SIMPLIFIED ELECTRICAL CONNECTION**
via fast coupling connectors
- **PANEL BOARDS**
electromechanical and electronic, expandable with options
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS:**
boiler and panel board designed for the integration of optional kits, also with boiler already installed.

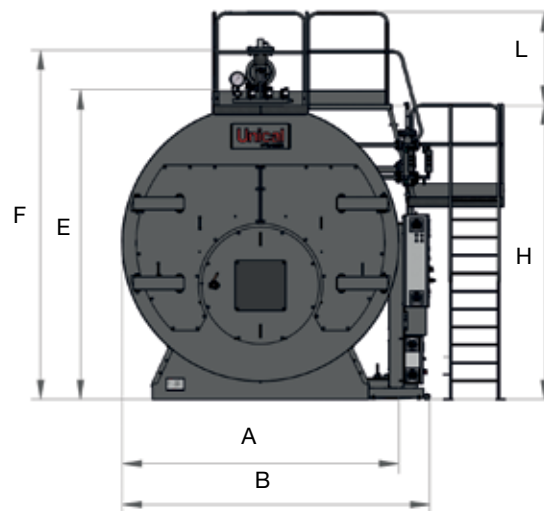
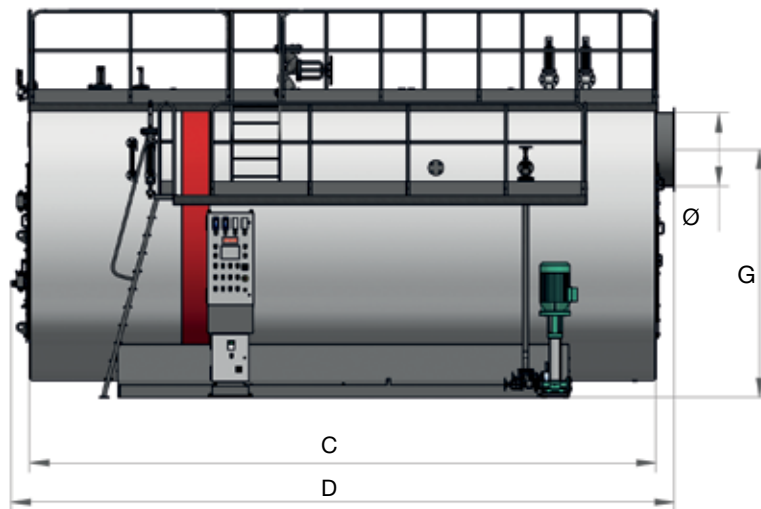


IML Panel board (optional)



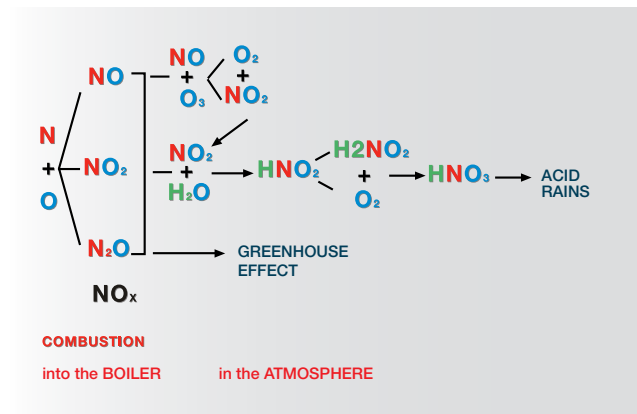
High thickness insulation

DIMENSIONS



Model	A	B	C	D	E	F	G	H	L	ø	Weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
1300 Low NO _x E / 1700 Low NO _x / 2000 STD	1950	2310	3970	4360	2470	2785	1925	2230	1000	408	9000
2000 Low NO _x E / 2500 Low NO _x / 3200 STD	2100	2460	4520	4910	2620	2935	2075	2380	1000	408	10500
3000 Low NO _x E / 3750 Low NO _x / 4700 STD	2250	2610	5020	5410	2775	3130	2110	2530	1000	508	12000
4000 Low NO _x E / 5000 Low NO _x / 6300 STD	2450	2810	5370	5760	2975	3375	2280	2730	1000	558	13500
5000 Low NO _x E / 6250 Low NO _x / 7900 STD	2600	2960	5620	6010	3120	3610	2475	2880	1000	608	16500
6000 Low NO _x E / 7500 Low NO _x / 9400 STD	2680	3040	5820	6210	3200	3685	2530	2960	1000	658	19500
8000 Low NO _x E / 10000 Low NO _x / 12500 STD	2850	3210	6620	7010	3325	3810	2560	3080	1000	708	22500
10000 Low NO _x E / 12500 Low NO _x / 15700 STD	3000	3360	7020	7410	3370	3855	2640	3200	1000	808	25500
12000 Low NO _x E / 14400 Low NO _x / 18000 STD	3200	3560	7220	7610	3470	4070	2750	3350	1000	858	28500
15000 Low NO _x E / 17250 Low NO _x / 21600 STD	3450	3810	7420	7810	3700	4300	2960	3580	1000	908	32000

VERSION CHOICE

**What are NO_x?**

Among the main atmospheric pollutants, produced by the heating systems through the combustion, there are the Nitrogen Oxides, whose chemical formula is NO_x.

With the name “nitric oxides” and the formula NO_x, are normally indicated an association of three different kinds:

NO (nitric monoxide),
NO₂ (nitrogen dioxide),
N₂O (protoxide or nitrous oxide).

In the detail, the NO combination is the prevailing one inside the boiler (95% or more), while the NO₂ formation is significant only at low temperature, then after the emission in atmosphere.

Depending on their origin, it's possible to distinguish three different NO_x formation processes.

Thermal NO_x

The nitrogen oxides are constituted by the nitrogen present into the combustion air with flame temperatures higher than 1300 C.

NO_x ready

The nitrogen oxides are constituted during the first combustion phases.

NO_x from fuel

The nitrogen oxides are formed in the combustion of oil and coal, not of natural gas, because the natural gas doesn't include nitrogen.

The quantity of N₂O is stable and remains in the atmosphere for many years: this, together with the CO₂ and other pollutants, contributes to the greenhouse effect

The nitric monoxide NO is rapidly converted in NO₂ and O₂, through reactions with the Ozone O₃.

At the end the nitrogen dioxide NO₂ is removed from the atmosphere through the conversion in nitrous acid HNO₂ and subsequent oxidation that originates nitric acid HNO₃, contributing, in this way, to the formation of the acidic rains.

How to reduce the NO_x with TRYPASS

The NO_x formation process is strongly influenced by:

- Flame temperature
- Combustion gases permanence time into the high temperature zone;
- Oxygen concentration

Unical, with TRYPASS, has adopted the following manufacturing solutions in order to reduce the NO_x formation:

■ 3 smoke passages without reversed flame into the furnace
The furnace is no more with reversed flame, but of direct crossing; the burner flame results more compact and shorter, reducing in this way the permanence time into the high temperature zone; the flame reversion absence allows, furthermore, a better flame cooling by the wet surfaces of the furnace

■ differentiation of the volumetric thermal load on three different values for each size of boiler.

The ratio between the combustion chamber volume and the thermal load (volumetric specific load of the furnace) has been calculated in three different levels, from which derive different ranges: STD, Low NO_x, Low NO_x E.

The Low NO_x and Low NO_x E versions have to be coupled with modern low NO_x burners, getting so an effective reduction of the emissions through:

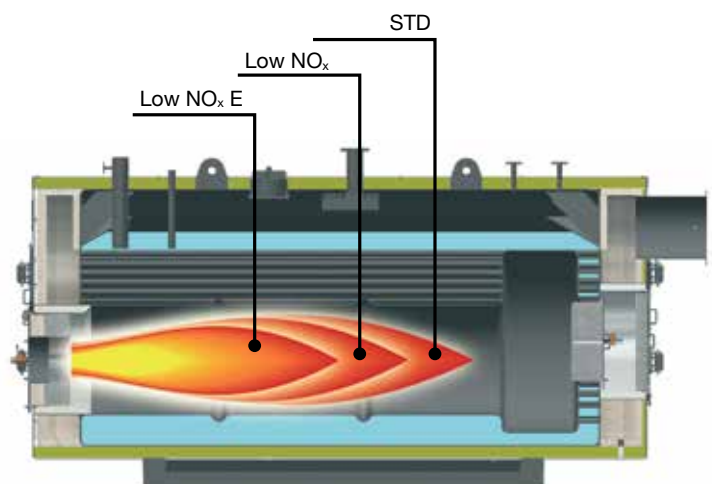
- smokes recirculation (re-burning): a part of the combustion gases is withdrawn and sent again in the combustion chamber together with the combustive air.
- reduction of the partial oxygen pressure, thanks to a diminution of the air excess.

Optimal choice with the TRYPASS boilers

The limit values of volumetric thermal load in the combustion chamber of the three models: STD - Low NO_x and Low NO_x E, are: STD version = Volumetric specific load of the combustion chamber ca. 1,5 MW/m³

Low NO_x version = Volumetric specific load of the combustion chamber ca. 1,3 MW/ m³

Low NO_x E version = Volumetric specific load of the combustion chamber ca. 1 MW/ m³



MAIN FUNCTIONS OF THE PANEL BOARD

BASIC

- One and two stage burner regulation
- ON / OFF level regulation
- N. 2 safety level switches on low level
- N. 1 PED safety level switch on low level
- Terminal strip on fast coupling connectors
- Expandability through optional kits
- Electrical protection degree IP 55



IMC

- One and two stage burner regulation
- ON / OFF level regulation
- N. 2 PED safety level switches on low level
- Terminal strip on fast coupling connectors
- Expandability through optional kits
- Electrical protection degree IP 55



IML

- Regulation PLC
- Touch screen 7" display with graphic interface
- One, two, three stage or modulating burner
- ON / OFF or modulating level regulation with valve or with inverter
- N. 2 PED safety level switches on low level
- Terminal strip on fast coupling connectors
- Expandability through optional kits
- Electrical protection degree IP 55



BASIC PANEL BOARD

Regualtion simplicity

The boiler regulation is committed to a panel board with electromechanical components that allows to obtain numerous advantages, among which:

- Simple use;
- Kit fitting:
 - high level
 - management of a second water feeding pump

Installation

The panel board is supplied with fast multi-pole connections that simplify the installation on to the boiler.

Safety

- The panel board allows the automatic regulation of the steam generator;
- On the panel board are fitted the components that allow, if necessary, the manual operation of the steam generator.



IMC (Industrial Multi Cabling) PANEL BOARD

Simplicity and functionality

The boiler regulation is committed to a panel board with electromechanical components that allows to obtain numerous advantages, among which:

- simple use;
- complete control of all the requested functionalities;
- mounting of numerous optional kits.

The "IMC" system is made with components that allow a modular management. The harness is so designed that the system can operate in many configurations.

Installation

The panel board is supplied with fast multi-pole connections that simplify the installation on to the boiler.

Safety

- The panel board allows the automatic regulation of the steam generator.
- It is configured for the alarms signalling; the management of the boiler safety devices is designed according to the rules in force.
- On the panel board are fitted the components that allow, if necessary, the manual operation of the steam generator.



IML (Industrial Multi Logic) PANEL BOARD

Simplicity and functionality

The boiler regulation is committed to a panel board with electromechanical components that allows to obtain numerous advantages, among which:

- operation with multiple logic;
- simple use;
- efficient regulation;
- complete control of all the requested functionalities;
- approval for 24/72 hr operation w/o continuous surveillance.

The “IML” system is made with components that allow a modular management. The harness is so designed that the system can operate in many configurations.

The main aesthetic novelty is the matching of the signalling bulbs for the operation and safety, with a touch-screen display and the synoptic representation of the boiler.

The use of a programmable electronic device through PLC, allows to attain a high complexity in the boiler operation logic, guaranteeing a more intelligent and complete management.

The electronic unit is endowed of several inputs and outputs that can control, at the same time, several boiler functions and in a more articulated manner, if compared with an electromechanical panel board.

The panel board manages completely all the operational and safety parameters during the operation periods, without continuous surveillance up to a maximum of 72 hrs.

User interface with touch-screen display

The use of a graphic display allows to show, on the main page of the menu, the steam generator in operation with the scheme of the main control devices. The touch-screen display allows to use virtual direct access keys to the setting and regulation pages. So, the graphic representation through symbols, results intuitive and of easy use.

Hardware and system expandability

The basic system is composed of:

- central unit (CPU)
- user interface (display)
- module of additional inlets

The display is the user interface and acts both, as an output device (visualization and signalling) and an input (commands entering).

The central unit is prearranged for the connection to additional expansion units.

The expansion allows:

- to perform boiler cascade systems (with master-slave logic);
- to connect the steam generator to a supervision system (SCADA);
- to connect the control via GSM for the remotation of alarm signals;
- to control other devices present in the system (with more additional modules);
- to update the software per “upgrading” or modifications to the system.



Modulation

The IML panel board allows the management of the modulating burner without the need of the burner modulating kit; furthermore, it allows the level modulation through the signal coming from the capacitive sensor factory fitted.

Service

The IML panel board allows the function of the “guided service” (SAFE SERVICE) for performing the routine controls by the person authorised to the operation, at the expiring of the without surveillance operation period. The controls results are stored in an internal database, transferable on an archives through USB port on the L.H. side panel.

Installation

The panel board is supplied with fast multi-pole connections, that make easy the installation on to the steam generator.

Safety

- The electronic regulator replaces only the regulation components;
- The panel board is set for the alarm signalling on the display; the management of the boiler safety devices remains of electromechanical type.
- On to the panel board are also fitted the components that allow, if necessary, the manual operation of the steam generator.

PANEL BOARD COMPARISON TABLE

FUNCTION DESCRIPTION			BASIC	IMC	IML
Elettromechanical components for regulation and safeties			•	•	•
Regulation with PLC			-	-	•
Graphical user interface with 7" touch screen display			-	-	•
Fast connection terminal			•	•	•
Electrical prearrangement for kits mounting			-	•	•
Forced and thermostat controlled cooling system			-	•	•
Differentiated management of the boiler with economiser installed			-	-	•
First controlled water filling mode			-	-	•
Boiler starting mode from cold			-	-	•
Burner	Pressure transducer		-	-	•
	Pressure continuous visualization		-	-	•
	One stage		•	•	•
	Two stage		•	•	•
	Three stage		o	o	•
	Modulating (3 points)		- (1)	- (1)	•
	Modulating (analogic+feed back signal)		- (1)	- (1)	•
Level	Capacity sensor level transducer		-	o	•
	Continuous visualization of water level		-	-	•
	Pump manual operation function		•	•	•
	Water feeding pump ON/OFF regulation		•	•	•
	Modulating regulation with solenoid valve (3 points)	KIT MODUL V	-	o	•
	Modulating regulation with pneumatic valve (analogic+feed back signal)	KIT MODUL V	-	o	•
	Two stage regulation with inverter	KIT INVERTER	-	-	o
	Modulating regulation with inverter	KIT INVERTER	-	-	o
	Second water feeding pump control	Kit 2nd POMPA	o	o	o
	Automatic changeover between 1st & 2nd pump for load & consumption sharing		-	-	o
	Pump 2 manual operation function		o	o	o
	1st safety low water level control, PED approved		•	•	•
	2nd safety low water level control, PED approved		•	•	•
	Software safety limit for high water level		-	-	•
	Safety basic level switch for high water level	KIT HWL std	o	o	o
	Safety PED approved level switch for high water level	KIT HWL	o	o	o
TDS	Adjusting and safety system for the salt quantity dissolved in the boiler water	KIT TDS1	-	o	o
	Adjusting and safety system for the salt quantity dissolved in the boiler water equipped with self cleaning sensor	KIT TDS2	-	o	o
Drain	Time controlled drains with desludging function	KIT BLOW DOWN	-	o (2)	o
Remote control	Alarm signal remotation	KIT REMOTE ALARM	-	o	o
	Via cable remote control system	KIT REMOTE CONTROL	-	-	o
	Via WEB remote control system	KIT WEB CONTROL	-	-	o
Service	Supervision for ordinary service works		-	-	•
	Supervision for extra-ordinary service works		-	-	•
Management	Exemption from continuous suveillance up to 24 hrs		-	-	o
	Exemption from continuous suveillance up to 72 hrs		-	-	o
	Total exemption (only for BAHR'UNO boilers)		-	o	o

KEY	
-	NOT AVAILABLE
o	OPTIONAL
•	STD. SUPPLIED

Notes:

- (1) Possible with external burner regulator
(2) Possible if in conjunction with KIT TDS2

KIT COMPOSITION

KIT HWL std high water level safety sensor

Kit Composition

- Nr. 1 electrode type sensor for high water level safety alarm

for	BAHR'UNO	BAHR'12	TRYPASS'
with	BASIC	IMC	IML



KIT HWL

“Fail safe”, safety maximum water level switch,
CE PED certified

Kit Composition

- Nr. 1 safety sensor 1/2” connection
- Nr. 1 sensor electrode in stainless steel
- Nr. 1 Safety regulator with self-diagnosis
- Electrical components

for	BAHR'UNO	BAHR'12	TRYPASS'
with	BASIC	IMC	IML



KIT COMPOSITION

KIT TDS 1

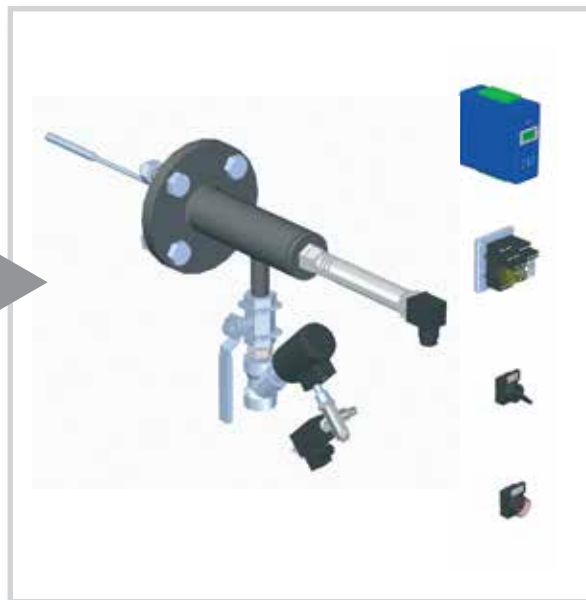
Salinity control group

for	BAHR'UNO	
with	IMC	IML

Kit Composition

Boiler water salinity control group through sensor for electrical water conductivity, made of:

- Conductivity sensor (CP30)
- Flanged connecting pipe
- Gate valve
- Surface drain valve pneumatically actuated on high salinity/conductivity values
- Gasket
- Electrical kit with selectors and basic electronic regulator (Spirax Sarco mod. BC3150)



KIT TDS 2

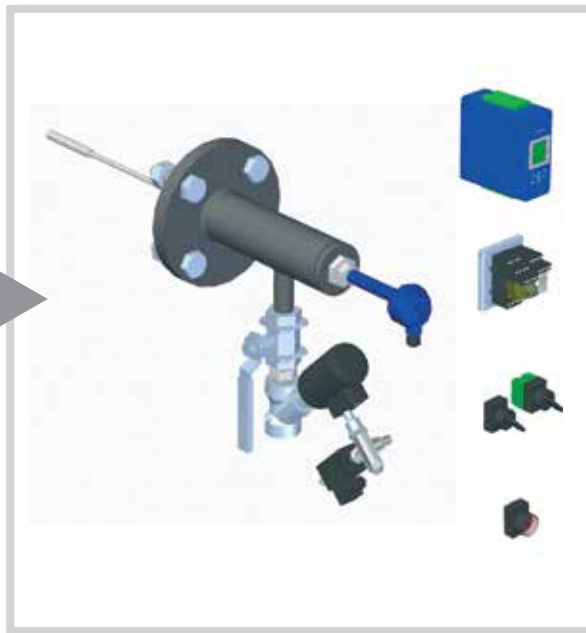
Salinity control group

for	BAHR'UNO	
with	IMC	IML

Kit Composition

Boiler water salinity control group through sensor for electrical water conductivity, made of:

- Self cleaning conductivity sensor (CP32) with temperature compensation for measurement of TDS
- Flanged connecting pipe
- Gate valve
- Surface drain valve pneumatically actuated on high salinity/conductivity values
- Gasket
- Electrical kit with selectors and evolved electronic regulator (Spirax Sarco mod. BC3250)



KIT COMPOSITION

KIT TDS 1

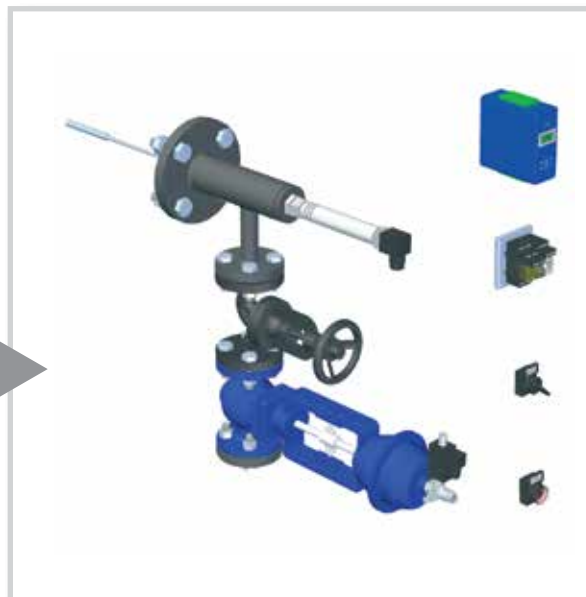
Salinity control group

Kit Composition

Boiler water salinity control group through sensor for electrical water conductivity, made of:

- Conductivity sensor (CP30)
- Flanged connecting pipe
- Gate valve
- Surface drain valve pneumatically actuated on high salinity/conductivity values
- Gaskets
- Counterflange
- Electrical kit with selectors and basic electronic regulator (Spirax Sarco mod. BC3150)

for	BAHR'12	TRYPASS'
with	IMC	IML



KIT TDS 2

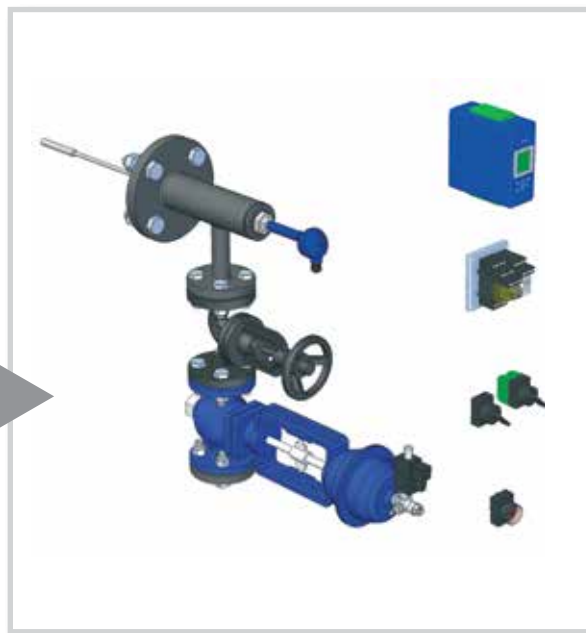
Salinity control group

Kit Composition

Boiler water salinity control group through sensor for electrical water conductivity, made of:

- Self cleaning conductivity sensor (CP32) with temperature compensation for measurement of TDS
- Flanged connecting pipe
- Gate valve
- Surface drain valve pneumatically actuated on high salinity/conductivity values
- Gaskets
- Counterflange
- Electrical kit with selectors and evolved electronic regulator (Spirax Sarco mod. BC3250)

for	BAHR'12	TRYPASS'
with	IMC	IML



KIT COMPOSITION

KIT BLOW DOWN

Boiler bottom automatic drain group

Kit composition

Automatic drain group, controlled by timer cycles with desliming function, made of:

- 90° gate valve
- Fast opening pneumatic valve
- Gaskets
- Counterflange
- Electrical kit (for IMC*)

*to be combined with KIT TDS 2

KIT BLOW DOWN

Boiler bottom automatic drain group

Kit composition

Automatic drain group, controlled by timer cycles with desliming function, made of:

- 90° gate valve
- Fast opening pneumatic valve
- Gaskets
- Counterflange
- Electrical kit (for IML)

KIT BLOW DOWN

Boiler bottom automatic drain group

Kit composition

Automatic drain group, controlled by timer cycles with desliming function, made of:

- 90° gate valve
- Fast opening pneumatic valve
- Gaskets
- Counterflange
- Electrical kit (for IMC*)

*to be combined with KIT TDS 2

KIT BLOW DOWN

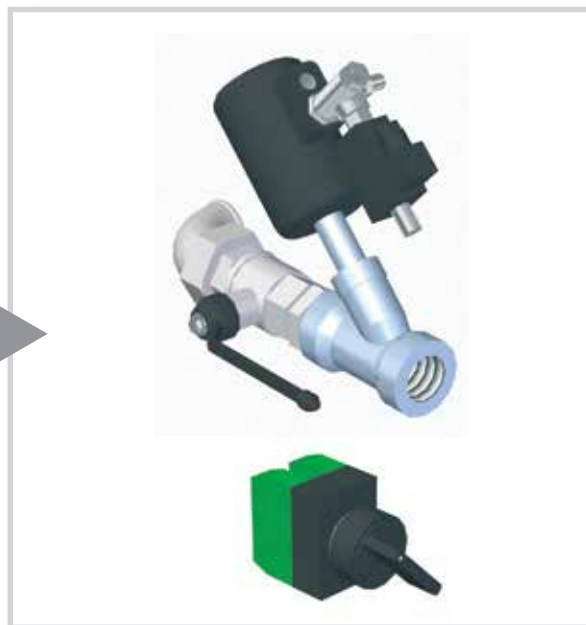
Boiler bottom automatic drain group

Kit composition

Automatic drain group, controlled by timer cycles with desliming function, made of:

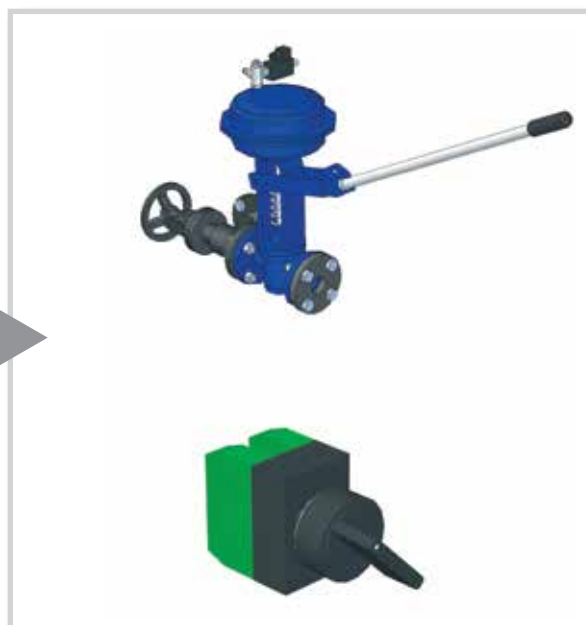
- 90° gate valve
- Fast opening pneumatic valve
- Gaskets
- Counterflange
- Electrical kit (for IML)

for	BAHR'UNO
with	IMC



for	BAHR'UNO
with	IML

for	BAHR'12	TRYPASS'
with	IMC	



for	BAHR'12	TRYPASS'
with	IML	

KIT COMPOSITION

for	BAHR'UNO		
with	BASIC	IMC	IML

KIT 2nd PUMP

Kit second boiler water feeding pump

Kit composition

- A 2nd three phase 400V / 50 Hz motor pump
- Basement with vibration-damping feet
- Check valve
- Gate valve
- Fitting pipe



for	BAHR'12		TRYPASS'	
with	BASIC	IMC	IML	

KIT 2nd PUMP

Kit second boiler water feeding pump

Kit composition

- A 2nd three phase 400V / 50 Hz motor pump
- Basement with vibration-damping feet
- Check valve
- Gate valve
- Fitting pipe
- Gaskets
- Counterflange for feeding water connection



KIT COMPOSITION

for	BAHR'UNO	
with	IMC	IML

KIT EC (gas) / KIT EC (light oil)

Economizer kit

Efficiency increase: +3%

Kit composition

- Exchange battery with carbon steel finned pipes
- Modulating valve
- Transformation piping
- Thermometer



for	BAHR'12	
with	IMC	IML

KIT EC (gas) / KIT EC (light oil)Economizer kit⁽¹⁾

Efficiency increase: +4%

Kit composition

- Exchange battery with carbon steel finned pipes
- Modulating valve (Inverter as per model 2000)
- Transformation piping
- Thermometer

⁽¹⁾ Inverter as per model 2000

for	TRYPASS'	
with	IMC	IML

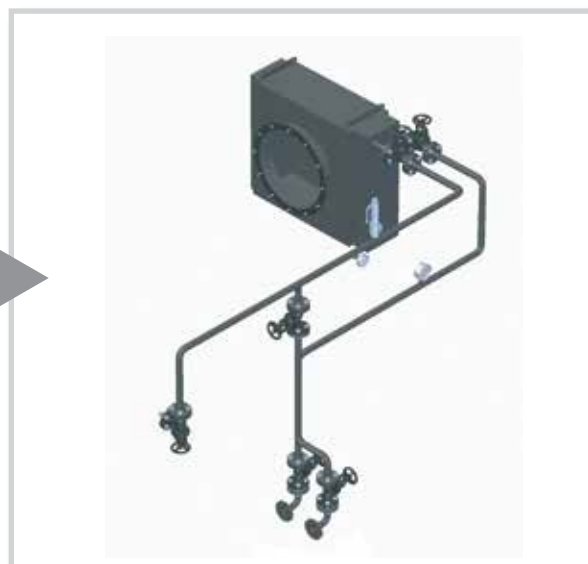
KIT EC (gas) / KIT EC (light oil)

External economizer kit

Efficiency increase: +5%

Kit composition

- Exchange battery with carbon steel finned pipes
- Kit Inverter (IML) / Kit Modul V (IMC)
- Transformation piping
- Thermometer



KIT COMPOSITION

for	BAHR'UNO
with	IMC

KIT MODUL V**Water level modulation***Kit composition*

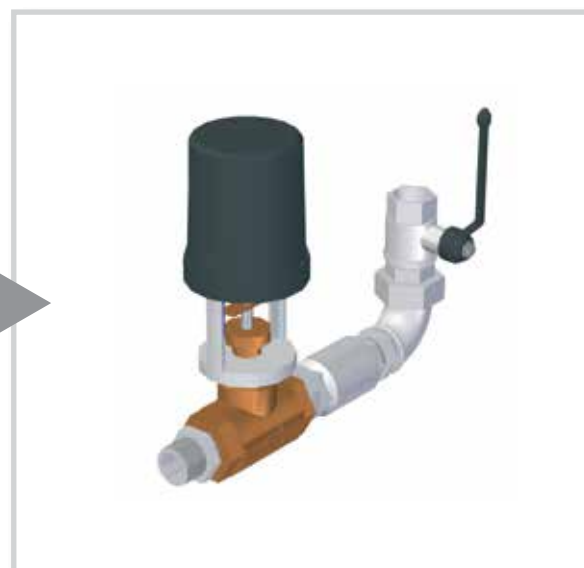
- Tank and level capacitive sensor
- Solenoid valve for flow rate adjustment
- Connection piping
- Electrical kit for IMC



for	BAHR'UNO
with	IML

KIT MODUL V**Water level modulation***Kit composition*

- Tank and level capacitive sensor
- Solenoid valve for flow rate adjustment
- Connection piping



KIT COMPOSITION

for	BAHR'12	TRYPASS'
with	IMC	

KIT MODUL V

Water level modulation

Kit composition

- Tank and level capacitive sensor
- Pneumatic valve for flow rate adjustment
- Connection piping
- Electrical kit for IMC



for	BAHR'12	TRYPASS'
with	IML	

KIT MODUL V

Water level modulation

Kit composition

- Tank and level capacitive sensor
- Pneumatic valve for flow rate adjustment
- Connection piping



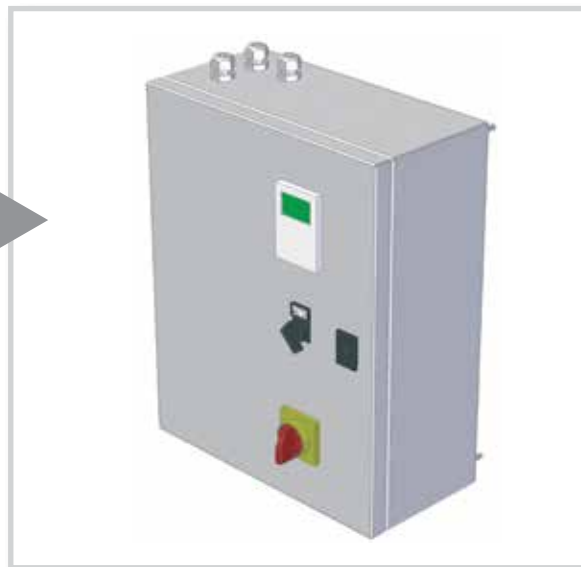
for	BAHR'12	TRYPASS'
with	IML	

KIT MODUL INVERTER

Water level modulation

Kit composition

- Additional inverter panel board



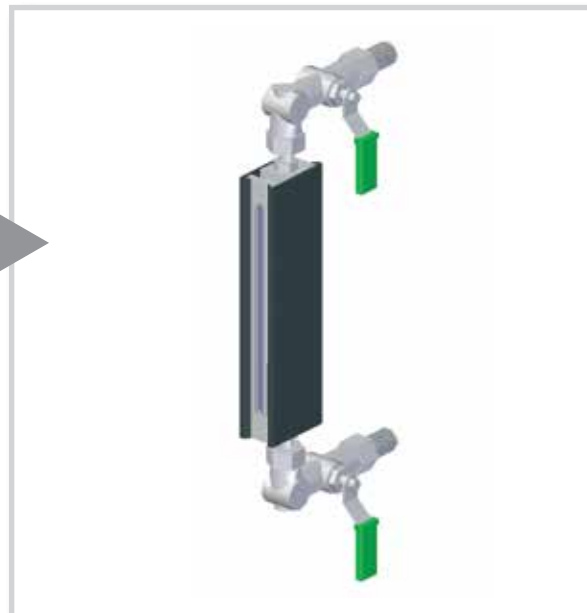
KIT COMPOSITION

2nd LEVEL GAUGE KIT*Kit composition*

- Reflexion type level gauge

for

BAHR'UNO'

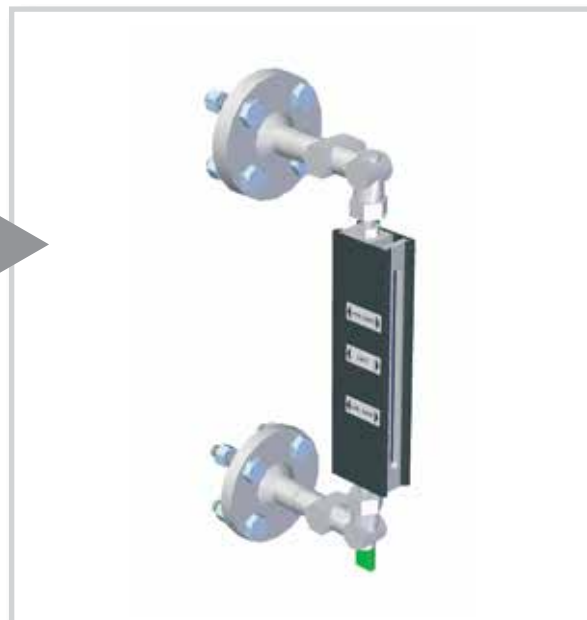
**LEVEL GAUGE KIT***Kit composition*

- Reflexion type level gauge
- Gaskets

for

BAHR'12

TRYPASS'



KIT COMPOSITION

for

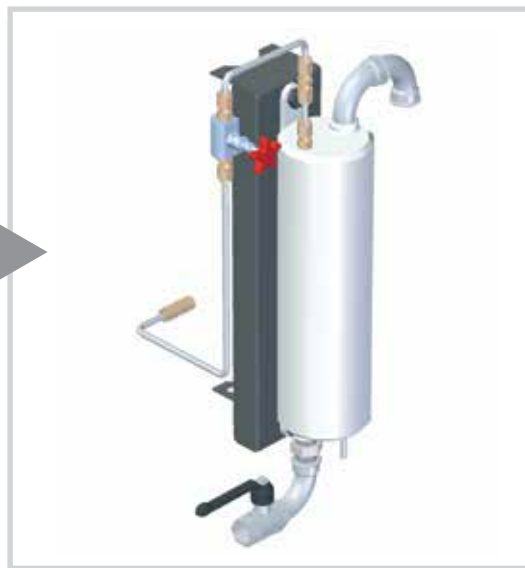
BAHR'12	TRYPASS'
---------	----------

KIT SAMPLE COOLER

Water samples cooling group

Kit composition

- Cooler of boiler water samples, made of:
- Cooler in stainless steel
- Water drawing tap
- Cooling calibration tap
- Connection piping



for

BAHR'12	TRYPASS'
---------	----------

with

IMC	IML
-----	-----

KIT DRY RUN PROTECTION

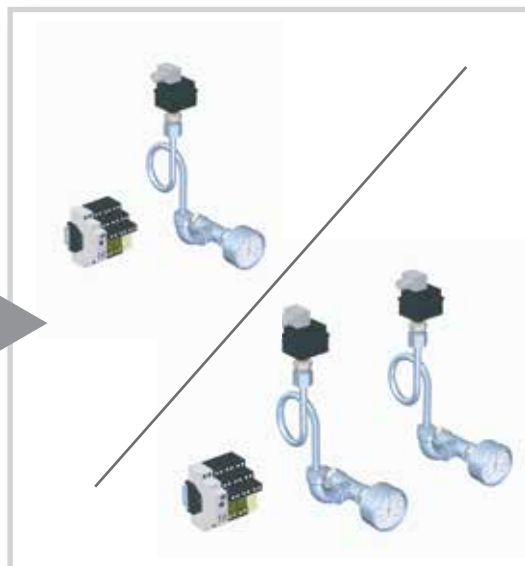
Protection against dry operation of the water pump

Kit composition for one pump

- Nr. 1 Pressure switch and fitting
- Electrical kit for IMC/IML

Kit composition for two pumps

- Nr. 2 Pressure switches and fittings
- Electrical kit for IMC/IML



for

BAHR'UNO	BAHR'12	TRYPASS'
----------	---------	----------

with

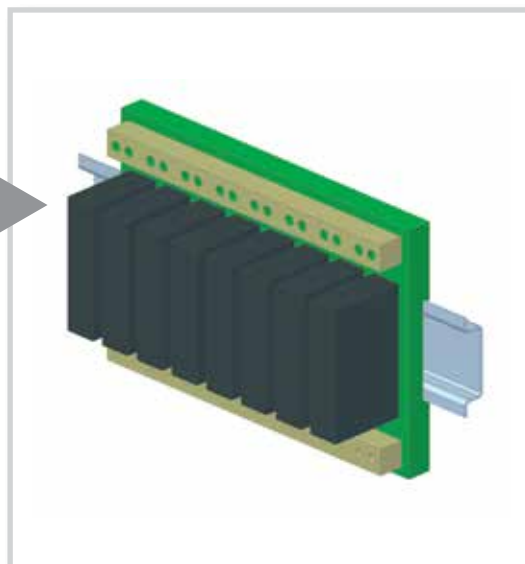
IMC	IML
-----	-----

KIT REMOTE ALARM

Alarms remotation

Kit composition

- Relay PCB with wiring harness interface

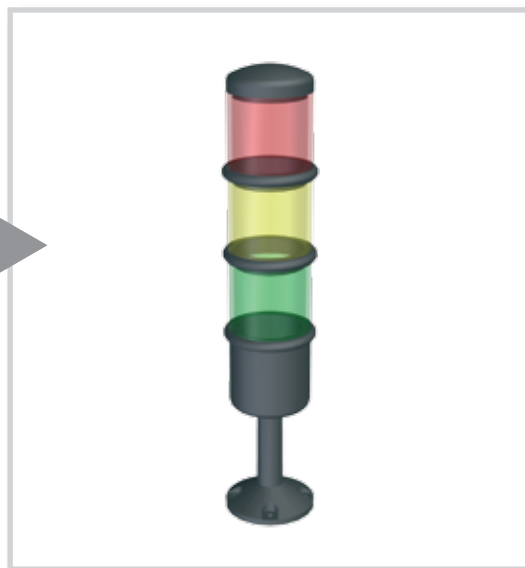


KIT COMPOSITION

for	BAHR'UNO	BAHR'12	TRYPASS'
with	IMC		IML

KIT SIGNAL TOWER*Kit composition*

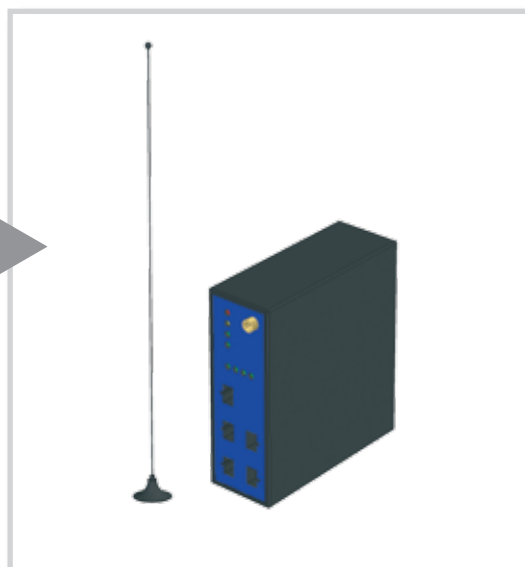
- Luminous signalling tower



for	BAHR'UNO	BAHR'12	TRYPASS'
with		IML	

KIT REMOTE WEB CONTROL 3G*Kit composition*

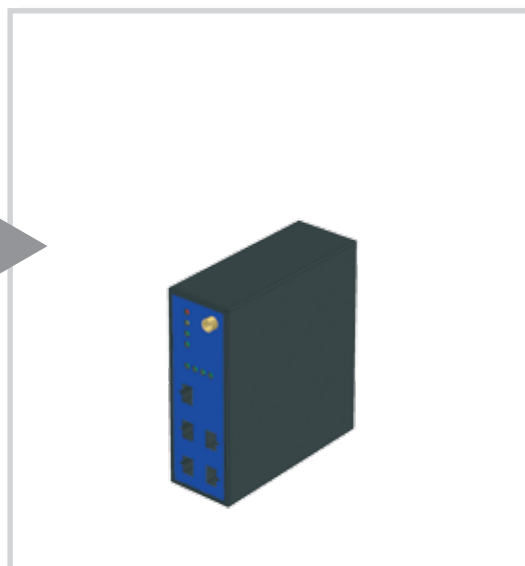
- Ethernet Router - 4 ports / modem 3G
- Antenna
- Connecting cables for touch-screen and PLC



for	BAHR'UNO	BAHR'12	TRYPASS'
with		IML	

KIT REMOTE WEB CONTROL ADSL*Kit composition*

- Ethernet Router - 4 ports / modem ADSL
- Connecting cables for touch-screen and PLC





**CONDENSATE COLLECTOR TANK FOR STEAM GENERATOR
IN CARBON STEEL (in stainless steel on request)**

RANGE

from 500 to 16000 liters

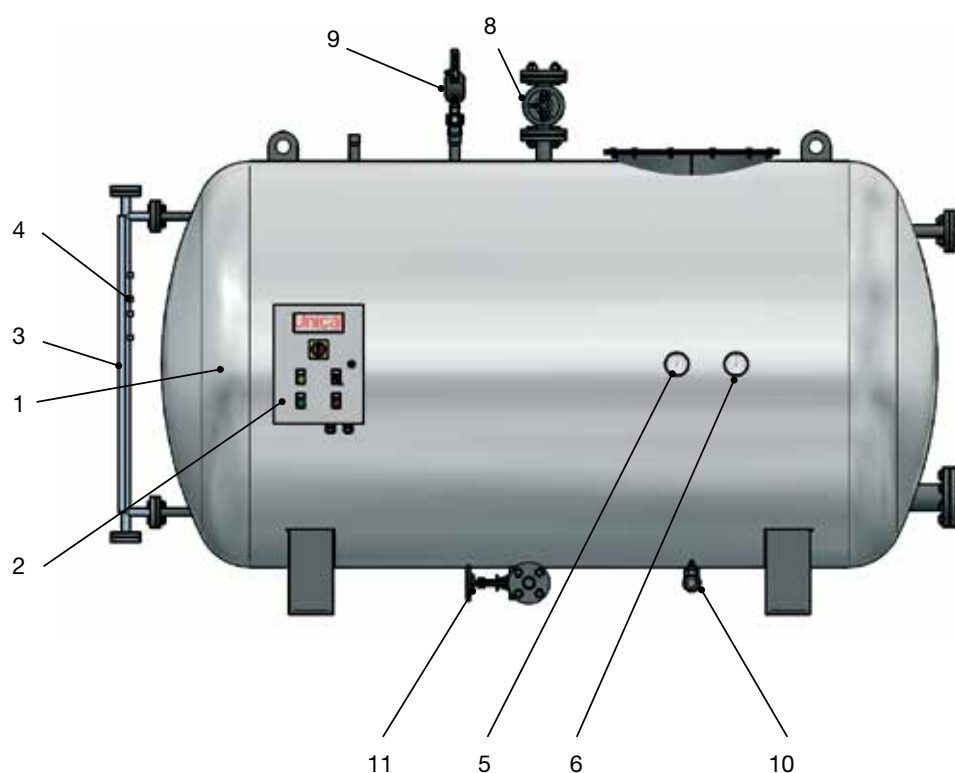
WORKING PRESSURE

atmospheric

MODELS	500	1000	1500	2000	2500	3000
	4000	5000	8000	10000	16000	-

DESCRIPTION

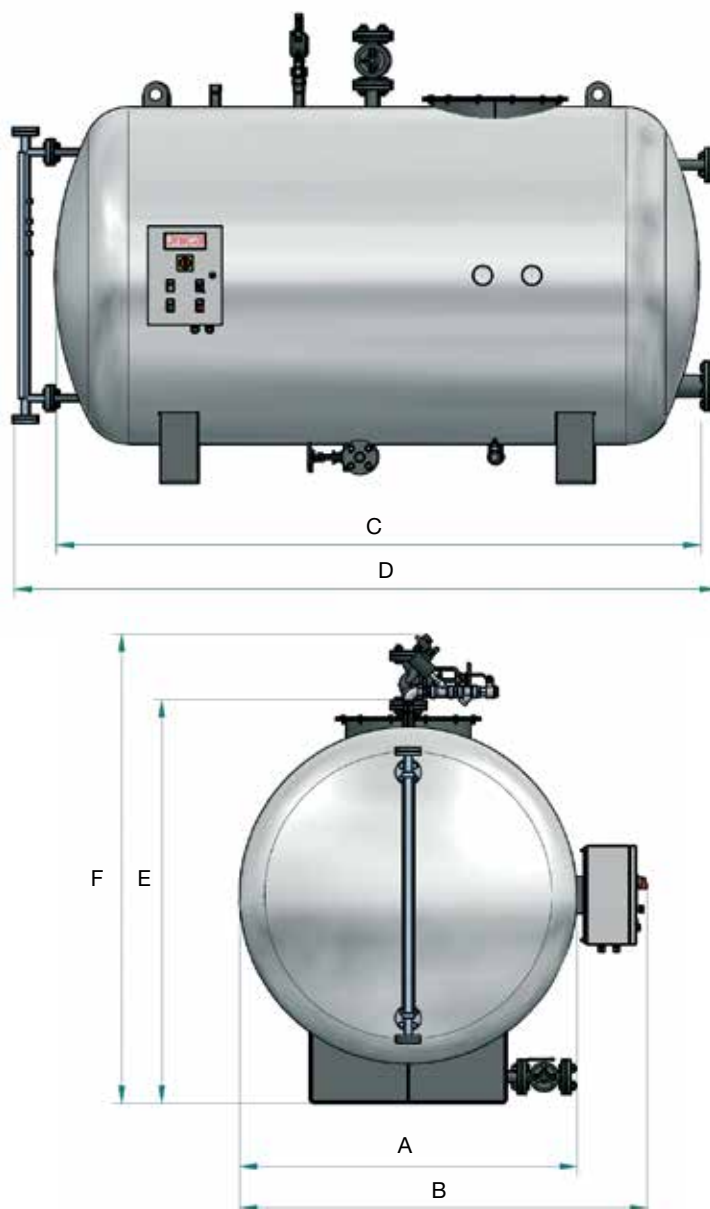
- | | |
|-----------------------------|---|
| 1. Degassing tank | 6. Manometer |
| 2. Panel board | 7. Steam injection thermoregulation group |
| 3. Level indicator | 8. Condensates return |
| 4. Level regulation sensors | 9. Reinstatement water inlet |
| 5. Thermometer | 10. Drain |



TECHNICAL DATA

Model	Water content at level		Total volume
	l		l
500	325		500
1000	650		1000
1500	975		1500
2000	1300		2000
2500	1625		2500
3000	1950		3000
4000	2800		4000
5000	3500		5000
8000	5600		8000
10000	7000		10000
16000	11200		16000

DIMENSIONS



Model	A	B	C	D	E	F	Dry weight
	mm	mm	mm	mm	mm	mm	kg
500	750	1030	4560	1970	1000	1330	330
1000	950	1230	2000	2400	1210	1440	460
1500	1200	1480	1900	2315	1460	1690	515
2000	1300	1570	1880	1935	1560	1845	560
2500	1300	1570	2530	2990	1560	1845	665
3000	1370	1650	2630	3080	1630	1915	765
4000	1500	1780	2610	3060	1760	2090	950
5000	1700	1980	2650	3130	2000	2300	1060
8000	1800	2070	4125	4750	2100	2420	1630
10000	1800	2070	4625	5215	2100	2500	1740
16000	2100	2370	5560	5960	2690	2810	2430

FEATURES

Reservoir of feeding water for steam generator, predisposed for the collection and the storage of the condensates, and for the possible reinstatement of the installation with treated water.

Execution in horizontal cylindrical shape, with convex bottoms.

Endowed with steel basement that allows the installation at a level higher than 5 meters from the axle of the boiler feeding pumps, to avoid the cavitation phenomenon.

The degassing tank is endowed with a water level management system, in mixing mode of the condensate return from the installation and the chemically treated reinstatement water.

Insulated with high-density rock wool and covered with embossed aluminium foil.

The SRC tank is composed by the following groups:

- Magnetic level indicator, with 4 bi-stable contacts, opportunely positioned for the ON-OFF control of the water level in the tank and for the alarms of low and high level.
- Pneumatic valve on the entry water line
- Degassed water drawing group
- Air vent
- Overflow
- Drain
- Panel board

PANEL BOARD

SRC

- ON/OFF regulation of water level in the reservoir
- Nr.1 low level signalling
- Nr.1 high level signalling
- Electrical protection degree IP55





**ATMOSPHERIC DE-AERATOR FOR STEAM GENERATORS
IN CARBON STEEL (in stainless steel on request)**

RANGE

from 500 to 16000 liters

WORKING PRESSURE

atmospheric

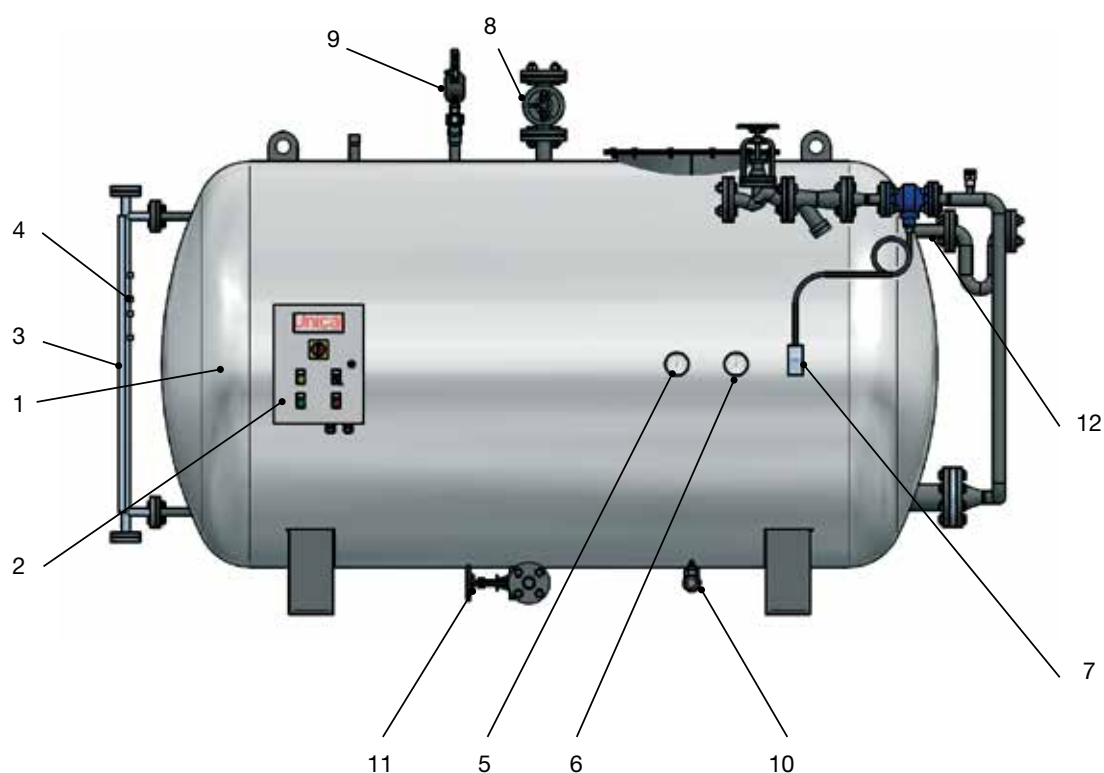
WORKING TEMPERATURE

90÷95°C

MODELS	500	1000	1500	2000	2500	3000
	4000	5000	8000	10000	16000	-

DESCRIPTION

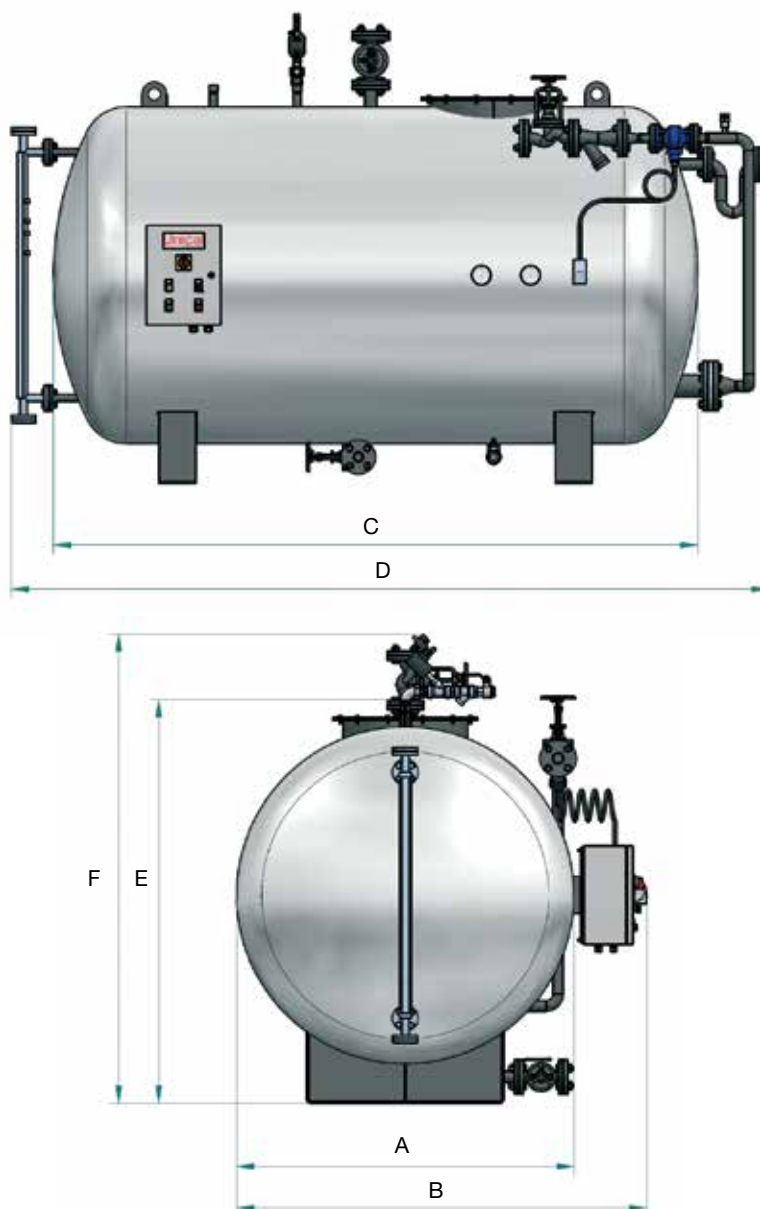
- | | |
|-----------------------------|---|
| 1. Degassing tank | 7. Steam injection thermoregulation group |
| 2. Panel board | 8. Condensates return |
| 3. Level indicator | 9. Reinstatement water inlet |
| 4. Level regulation sensors | 10. Drain |
| 5. Thermometer | 11. Hot water flow to the stem generator |
| 6. Manometer | 12. Overflow connection |



TECHNICAL DATA

Model	Water content at level	Total volume	Working temperature	Degassing capacity
	<i>l</i>	<i>l</i>	<i>°C</i>	<i>l/h</i>
500	325	500	90÷95	500
1000	650	1000	90÷95	1000
1500	975	1500	90÷95	1500
2000	1300	2000	90÷95	2000
2500	1625	2500	90÷95	2500
3000	1950	3000	90÷95	3000
4000	2800	4000	90÷95	4000
5000	3500	5000	90÷95	5000
8000	5600	8000	90÷95	8000
10000	7000	10000	90÷95	10000
16000	11200	16000	90÷95	16000

DIMENSIONS



<i>Model</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>Dry weight</i>
	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>mm</i>	<i>kg</i>
500	750	1045	4560	1970	1000	1330	350
1000	950	1245	2000	2400	1210	1440	480
1500	1200	1495	1900	2315	1460	1690	535
2000	1300	1585	1880	1935	1560	1845	580
2500	1300	1585	2530	2990	1560	1845	685
3000	1370	1665	2630	3080	1630	1915	785
4000	1500	1795	2610	3060	1760	2090	970
5000	1700	1995	2650	3130	2000	2300	1080
8000	1800	2085	4125	4750	2100	2420	1650
10000	1800	2085	4625	5215	2100	2500	1760
16000	2100	2385	5560	5960	2690	2810	2450

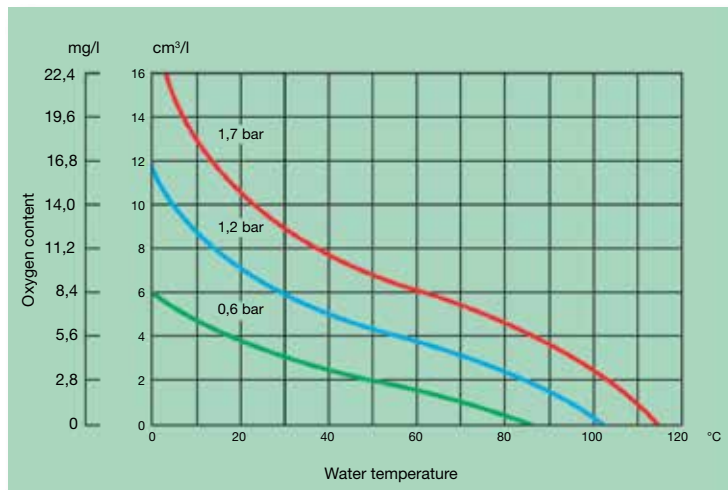
DEGASSING

The de-aerator has the function to reduce the concentration of the corrosive gases O_2 and CO_2 dissolved in the feeding water of the generator.

The dangerousness of these gases is, in fact, that combining themselves with other elements, such as the iron and other metals of the pressure vessel, can provoke corrosion. It is, therefore, fundamental to free the feeding water from these gases.

Since the solubility of the gases in the water reduces when the temperature increases, the problem's solution is to increase the feeding water temperature; the extreme case is represented by the water in evaporation, situation in which all the gases would be released (total de-aeration).

The following diagram shows the oxygen content dissolved in the water according to the pressure and the temperature. It can be noticed that at the boiling temperature of $105^\circ C$ for an absolute working pressure of 1.2 bar we are in a zone where the O_2 content in the water is practically void.



Atmospheric de-aerator (Partial de-aeration)

In the partial de-aeration the process happens under atmospheric pressure; the atmospheric de-aerator is connected to the atmosphere through a ventilation duct. It is the simplest thermal treatment form for the water de-aeration.

The "hot" steam, necessary to remove the gases, is introduced through injectors positioned in the low part of the reservoir. The vapour feeding is controlled, in the simplest form, by an electromechanical thermostat adjusted to the temperature of $95^\circ C$.

The topping up of the fresh water is checked through an electronic level regulator.

This simple system is normally used in low capacity and low pressure installations.

NOTE: the thermo-physical de-aeration must always be coupled with a chemical de-aeration.

The de-aerators of the DEAR series are de-aerators of the atmospheric type for the degassing of the feeding water of the steam generators. The appliance falls in the limits of application of the art. 3 par. 3 of the PED Directive 97/23/CE.

The water temperature is checked and maintained through the thermometric system that checks the steam injection in the reservoir.

Endowed with steel basement that allows the installation at a level higher than 5 meters from the axle of the boiler feeding pumps, thus avoiding the cavitation phenomenon.

The de-aerator is endowed with a water level management system, in mixing mode between the return condensates from the installation and the chemically treated reinstatement water.

The DEAR de-aerator is composed by the following groups:

- Steam feeding group interlocked with a thermometric system (regulation through a thermo-regulating valve for the holding of the planned temperature).
- Magnetic level indicator, with 4 bi-stable contacts, opportunely positioned for the ON-OFF control of the water level in the tank and for the alarms of low and high level.
- Pneumatic valve on the entry water line
- Degassed water drawing group
- Air vent
- Overflow
- Drain
- Panel board

PANEL BOARD

DEAR

- ON/OFF regulation of water level in the reservoir
- Nr.1 low level signalling
- Nr.1 high level signalling
- Electrical protection degree IP55





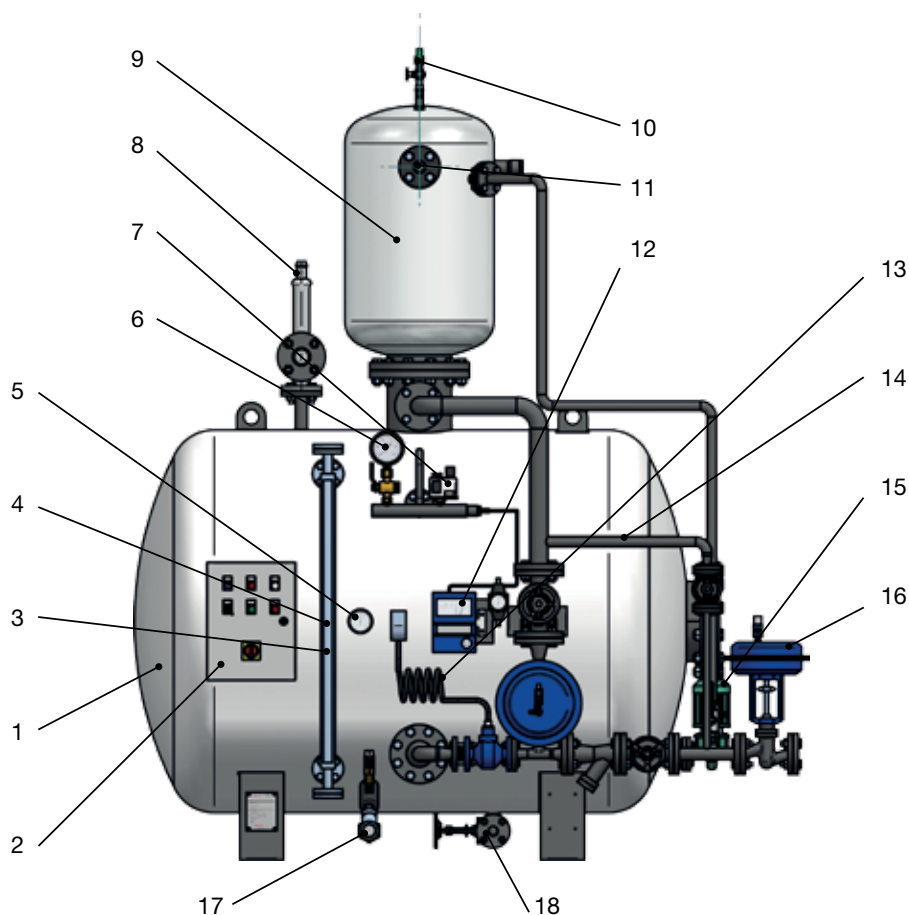
THERMO-PHISIC DEAERATOR FOR STEAM GENERATORS IN CARBON STEEL*

RANGE	from 1000 to 16000 liters						
DESIGN / WORKING PRESSURE	0,5 bar/0,4 bar						
WORKING TEMPERATURE	105°C						
MODELS	1000	2000	4000	6000	8000	10000	16000

*some of the internal components are made in stainless steel AISI 316 L

DESCRIPTION

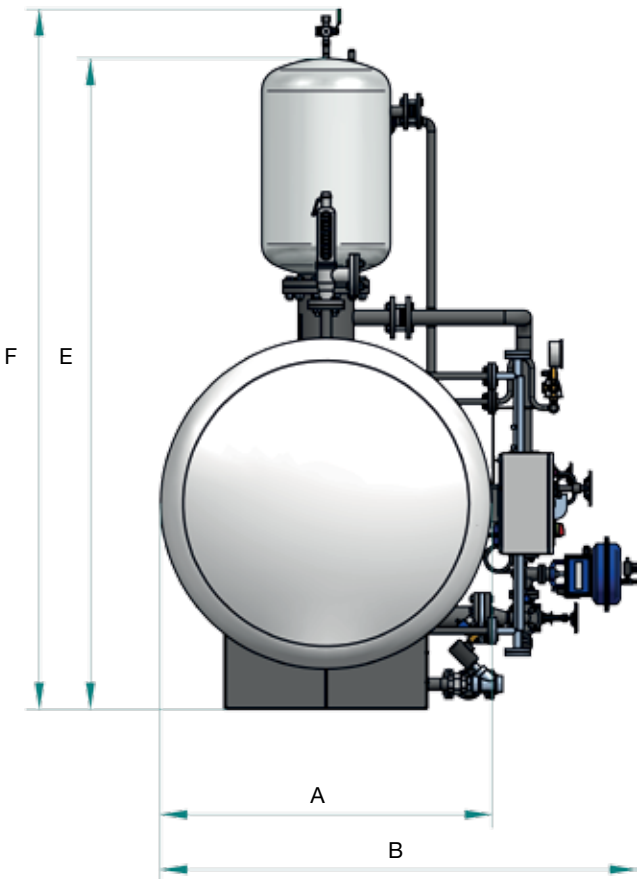
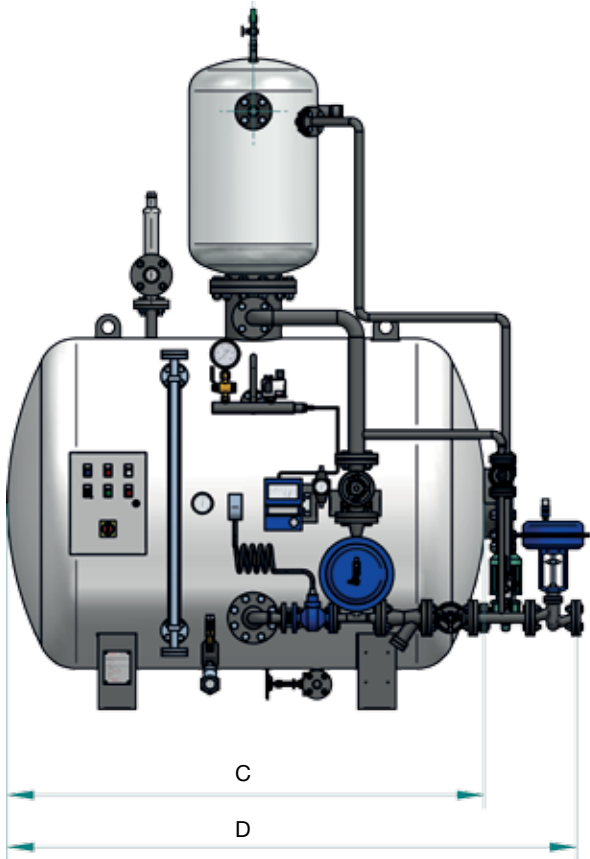
- | | |
|------------------------------|--|
| 1. De-aerator tank | 10. Steam vent |
| 2. Panel board | 11. Reinstatement water inlet |
| 3. Level indicator | 12. Pressure regulation group |
| 4. Level regulation sensors | 13. Steam injection thermoregulation group |
| 5. Thermometer | 14. Bypass |
| 6. Manometer testing cock | 15. Pump for water recirculation in the degassing tank |
| 7. Adjusting pressure switch | 16. Steam gate valve for high pressure |
| 8. Safety valve | 17. Drain |
| 9. Degassing tank | 18. Hot water flow to the stem generator |



TECHNICAL DATA

Model	Min. degassed water flow	Min. degassed water flow	Nominal volume	Total volume	Feeding water pressure	Design pressure	Degassed water temperature
	kg/h	kg/h	m ³	m ³	bar	bar	°C
1000	300	1500	700	1000	10÷12	0,5	105
2000	1750	3000	1400	2000	10÷12	0,5	105
4000	4000	5000	2800	4000	10÷12	0,5	105
6000	6000	8000	4200	6000	10÷12	0,5	105
8000	10000	12000	5600	8000	10÷12	0,5	105
10000	-	15000	7000	10000	10÷12	0,5	105
16000	-	22000	11200	16000	10÷12	0,5	105

TECHNICAL DATA

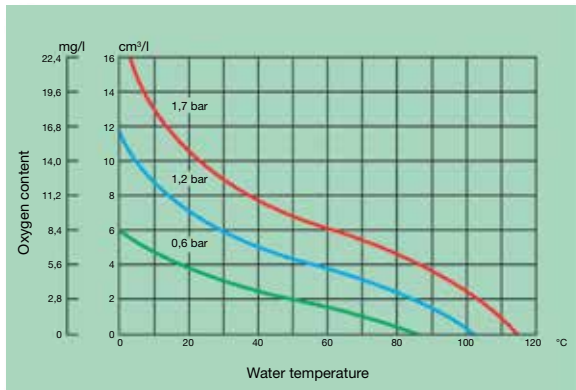


Model	A	B	C	D	E	F	Dry weight
	mm	mm	mm	mm	mm	mm	kg
1000	950	1550	2000	2420	2160	2280	890
2000	1300	1900	1880	2300	2610	2730	990
4000	1500	2100	2610	3030	2860	2980	1460
6000	1700	1300	2850	3270	3210	3330	1720
8000	1800	2400	4125	4545	3360	3480	1980
10000	1800	2400	4625	5045	3410	3530	2290
16000	1800	2400	5560	5980	3510	3630	3100

DEGASSING

The de-aerator has the function to reduce the concentration of the corrosive gases O_2 and CO_2 dissolved in the feeding water of the generator. The solubility of the gases in the water reduces when the temperature increases; the problem's solution is to increase the feeding water temperature.

The following diagram shows the oxygen content dissolved in the water according to the pressure and the temperature. It can be noticed that at the boiling temperature of $105^\circ C$ for an absolute working pressure of 1.2 bar we are in a zone where the O_2 content in the water is practically void.



Thermo-physical de-aerator (Total de-aeration)

In the thermo-physical de-aeration the process happens under positive pressure (0.3 – 0.4 bar).

The “hot” steam, necessary to remove the gases, is introduced through injectors positioned in the low part of the reservoir and, through a modulating valve, in the degassing tank.

The steam feeding is controlled by an electromechanical thermostat, adjusted at the temperature of $95^\circ C$, and by a pneumatic regulator acting on the modulating pneumatic valve.

The topping up of the fresh water is checked through a level regulator.

NOTE: The thermo-physical de-aeration must always be coupled with a chemical deaeration.

The de-aerators of the DETE series are de-aerators of the thermo-physical type for the degassing of the feeding water of the steam generators. The appliance falls in the limits of application of the art. 3 par. 3 of the PED Directive 97/23/CE.

The water temperature is checked and maintained through the thermometric system that checks the steam injection in the reservoir. The pressure inside the tank is checked by an adjuster that controls a pneumatic modulating valve, that allows the steam passage inside the degassing tank.

Endowed with steel basement that allows the installation at a level higher than 5 meters from the axle of the boiler feeding pumps, thus avoiding the cavitation phenomenon.

The de-aerator is endowed with a water level management system, in mixing mode between the return condensates from the installation and the chemically treated reinstatement water.

The DETE de-aerator is composed by the following groups:

- Steam feeding group interlocked with a thermometric system (regulation through a thermo-regulating valve for the holding of the planned temperature).
- Pressure regulating group interlocked with a pressure sensor for the control of a modulating pneumatic valve (regulation of the steam entrance in the degassing tank).
- Magnetic level indicator, with 4 bi-stable contacts, opportunely positioned for the ON-OFF control of the water level in the tank and for the alarms of low and high level.
- Pneumatic valve on the entry water line
- Degassed water drawing group
- Steam vent
- Overflow
- Pneumatic discharge valve automatically operated
- Safety valve
- Recirculation pump
- Safety pressure switch for the operation of the pneumatic gate valve of the steam entry line
- Panel board

PANEL BOARD

DETE

- ON / OFF type regulation of the water level in the reservoir
- Activation of automatic discharge valve due to high water level in the reservoir
- Pressure adjustment in the reservoir with pneumatic modulating valve, to allow the steam entry in the degassing tank
- Adjustment of the water temperature in the reservoir with thermometric system and regulation valve for steam injection
- Interception of steam entry line through pneumatic valve, due to high pressure in the reservoir
- Nr.1 selector of reservoir discharge operation (Auto / 0 / Man)
- Nr.1 selector of water feeding pump operation (Auto / 0 / Man)
- Nr.1 selector of water recirculation pump operation (Auto / 0 / Man)
- Nr.1 signalling of reinstatement water entry
- Nr.1 signalling of steam entry in the de-aerator
- Nr.1 signalling of discharge automatic valve activation due to high water level
- Nr.1 signalling of water loading pump operation / alarm
- Nr.1 signalling of water recirculation pump operation / alarm
- Nr.1 signalling of low water level
- Nr.1 signalling of tension ON (400 V / 3 Ph / 50 Hz) to the panel board
- Electrical protection degree IP55





**DISCHARGES COLLECTION COOLING TANK FOR STEAM GENERATORS
IN CARBON STEEL**

RANGE

from 100 to 1200 liters

WORKING PRESSURE

atmospheric

MODELS	100	300	500	800	1200
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DESCRIPTION

1. Cooling tank

2. Temperature adjustment system

3. Thermometer

4. Manometer

5. Cooling water entry group

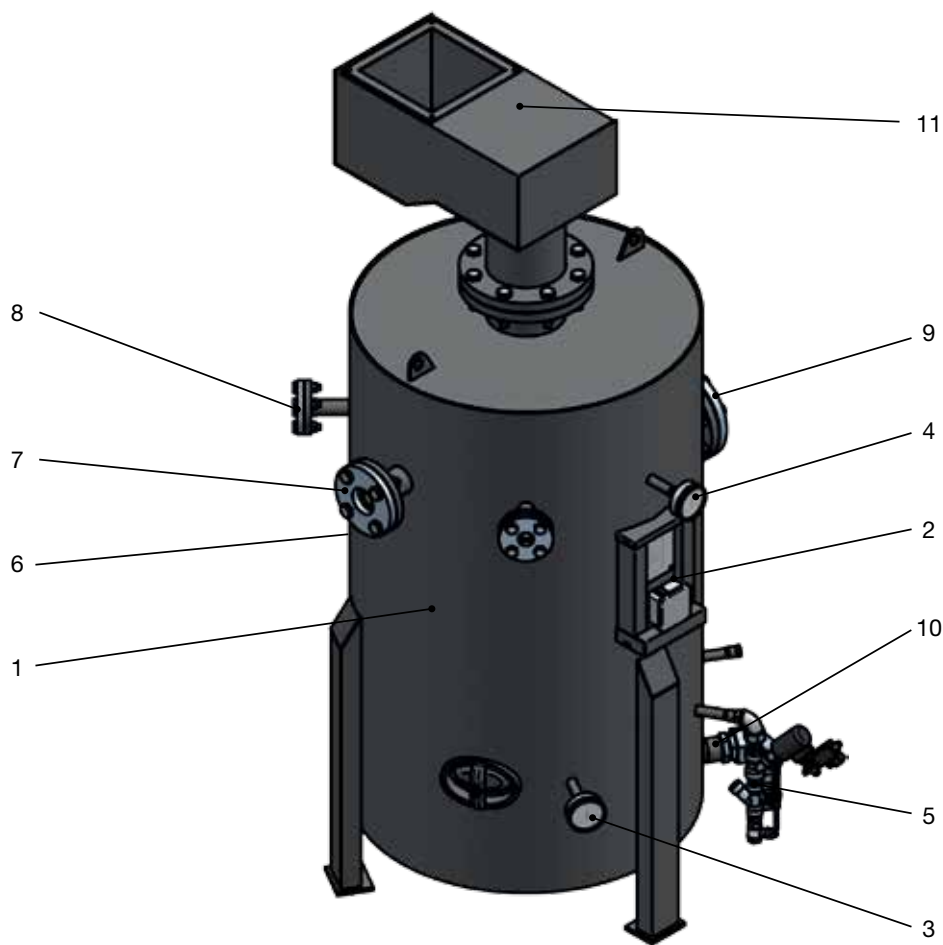
6. Discharges inlet 1
7. Discharges inlet 2

8. Discharges inlet 3

9. Connection for cooled water outlet

10. Drain

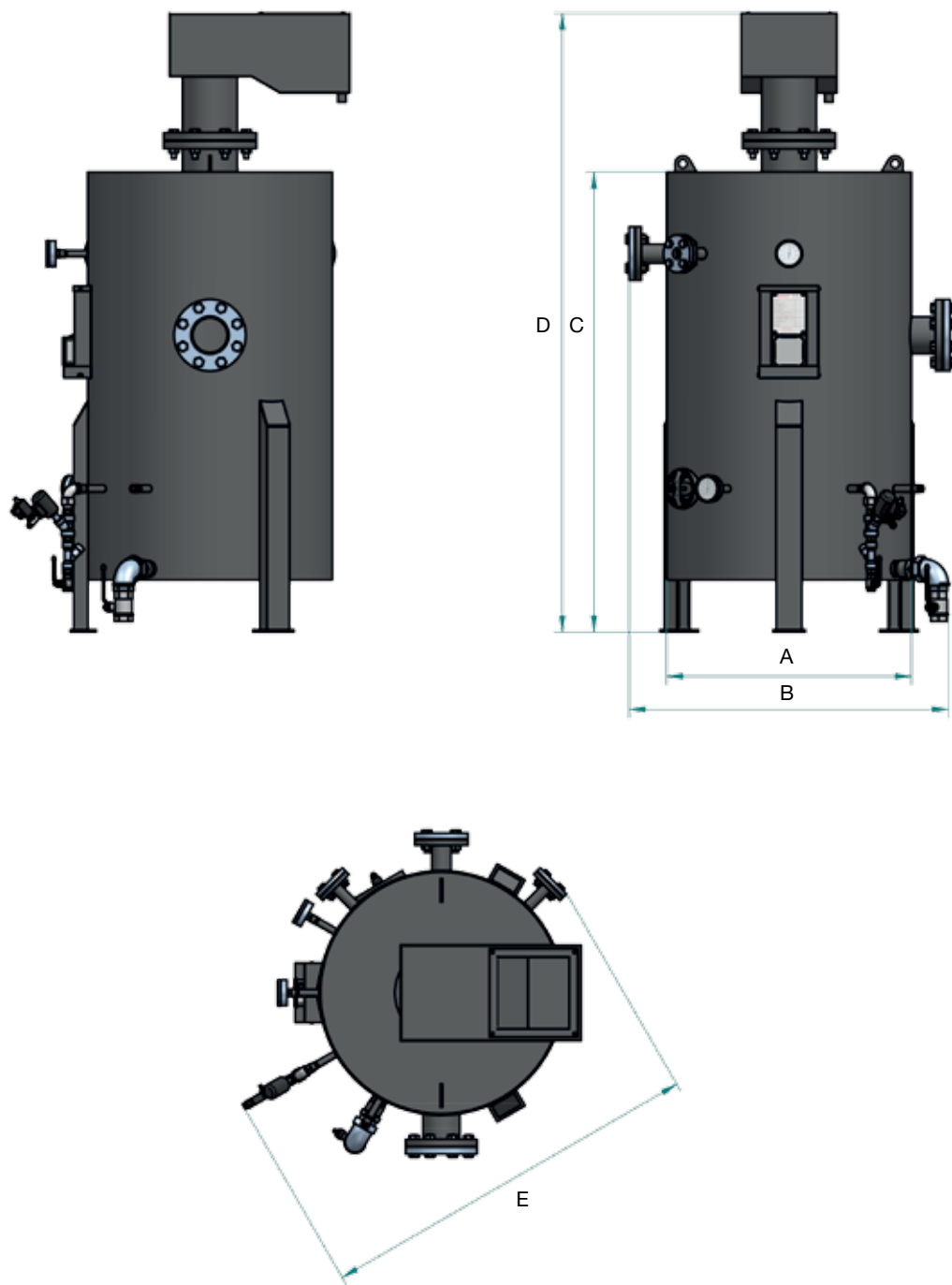
11. Vapours outlet with ventilation system



TECHNICAL DATA

Model	Water content at level	Total volume
	/	/
100	100	200
300	300	600
500	500	1000
800	800	1600
1200	1200	2400

DIMENSIONS



Model	A	B	C	D	E	Dry weight
	mm	mm	mm	mm	mm	kg
100	550	750	1010	1390	990	140
300	750	970	1410	1900	1190	210
500	850	1050	1800	2290	1290	270
800	1000	1250	2100	2680	1430	370
1200	1150	1420	2330	2910	1650	520

FEATURES

The reservoirs of drainage SERBHA are designed in conformity with the Directive PED 97/23/CEE.

They are suitable for the manually or automatically controlled bottom blow down, to lodge manually controlled valves for the continuous blow down, automatically controlled valves and control systems of the TDS, reservoirs, accessories and equipments for the heat recovery.

The cooling reservoirs SERBHA are built in vertical shape, in 5 models, in carbon steel externally painted.

Operation

The operation of the blow down reservoir is simple and not special operational instructions are necessary.

The reservoir allows the sure expansion of the hot water from high to low pressure, with consequent production of re-evaporated, and the water that it contains is mixed with the cold water from net to lower its temperature before the inlet in the sewage.

The reservoir SERBHA is composed by the following groups:



■ Temperature regulation system, with NTC sensor



■ Overflow water discharge toward the sewage



■ Cooling water inlet group



■ Manual discharge with ball valve



■ Upper connection with ventilation system



■ Control thermometer and manometer



THREE REAL PASS DIATHERMIC OIL BOILER

RANGE

from 116 to 5815 kW

THERMOCARRIER
FLUID

diathermic oil

WORKING
TEMPERATURE

280°C

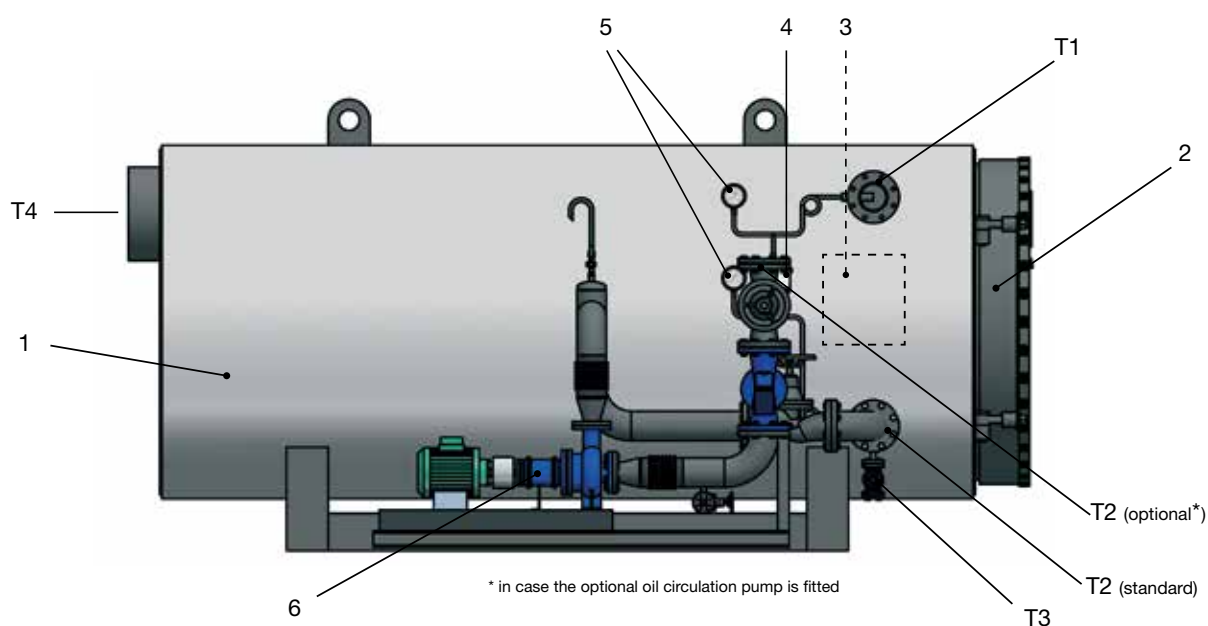
MODELS

120	230	350	465	700	930	1160
1500	1900	2300	2900	3500	4650	5800

DESCRIPTION

1. Boiler body
2. Front door
3. Panel board
4. Differential pressure switch
5. Manometers on flow and return manifolds
6. Oil circulation pump group (optional)

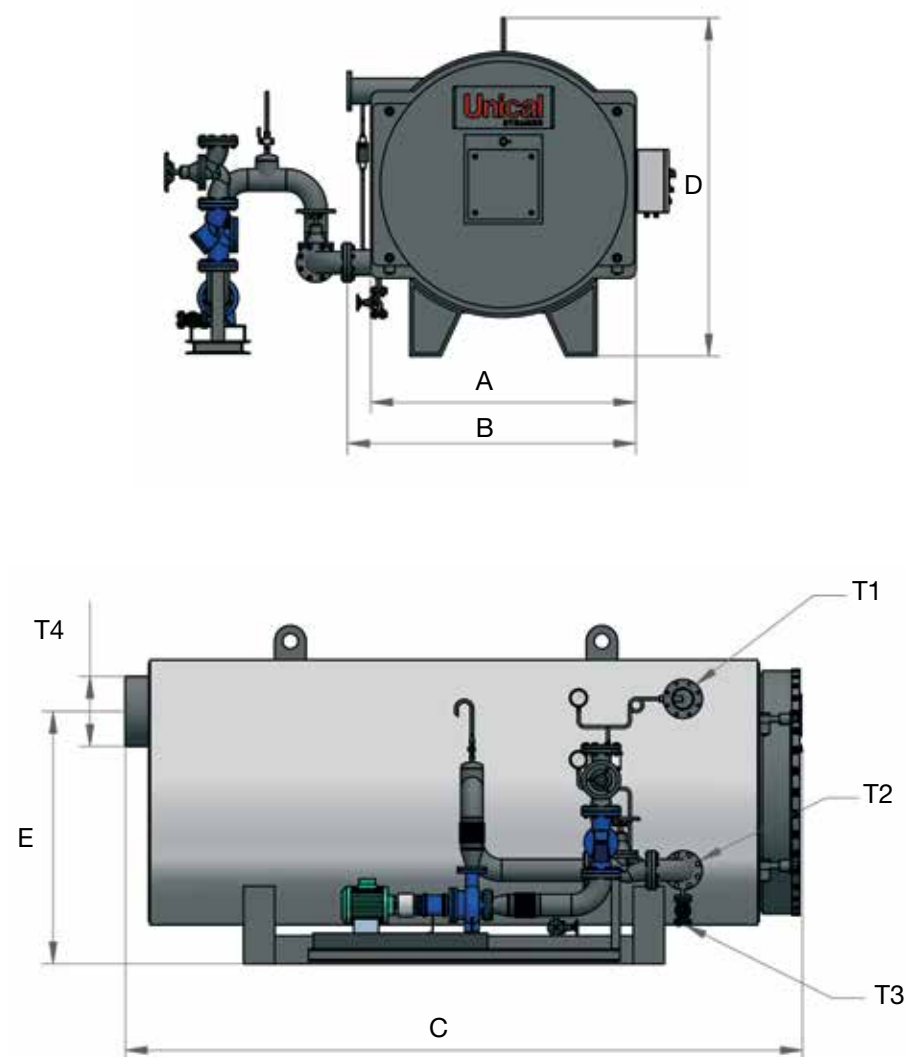
- T1. Flow connection
- T2. Return connection
- T3. Drain
- T4. Chimney connection



TECHNICAL DATA

Model	Nominal output	Nominal input	Δp smoke side	Oil pump flow rate	Delta T	Head pressure	Pump power	Burner head max. dia.	Burner head min. length	Dry weight
	kW	kW	mbar	m ³ /h	K	m.c.l.	kW	mm	mm	kg
120	116	134	1,5	6	35	45	3,0	150	150/200	530
230	232	267	2,0	10,6	40	49	5,5	180	190/250	780
350	348	401	2,5	15	42	48	5,5	180	220/300	1000
465	465	534	3,0	22	38	45	5,5	260	220/300	1520
700	697	802	3,4	30	42	45	7,5	260	220/300	1700
930	930	1069	3,5	42	40	40	7,5	270	220/300	2200
1160	1163	1337	3,8	50	42	46	11,0	270	220/300	2950
1500	1512	1738	4,0	69	40	42	11,0	310	220/300	3700
1900	1861	2139	4,2	81	42	50	15,0	310	220/300	4080
2300	2326	2673	4,5	101	42	49	15,0	340	220/300	5300
2900	2907	3342	4,5	126	42	60	30,0	380	250/300	7200
3500	3489	4010	5,0	159	40	56	30,0	380	250/300	8000
4650	4652	5347	6,0	202	42	58	37,0	400	250/300	12250
5800	5815	6684	7,0	252	42	58	45,0	400	250/300	14560

DIMENSIONS



Model	A	B	C	D	E	T1/T2	T3	T4
	mm	mm	mm	mm	mm	DN	DN	Ø mm
120	890	1045	1260	1200	750	32	20	200
230	1000	1150	1650	1330	850	40	20	250
350	1000	1150	2100	1330	850	50	25	250
465	1210	1335	2320	1570	1070	65	25	300
700	1210	1295	2570	1570	1070	65	25	300
930	1310	1375	2970	1680	1150	80	25	350
1160	1500	1590	3170	1910	1370	100	25	350
1500	1630	1685	3570	2040	1480	100	25	400
1900	1630	1685	3920	2040	1480	125	25	400
2300	1800	1800	4270	2210	1620	125	25	450
2900	2150	2150	4500	2560	1950	150	32	500
3500	2150	2150	5100	2560	1950	150	32	500
4650	2460	2600	6050	2910	2270	200	40	600
5800	2660	2800	6450	3160	2450	200	40	700

PRODUCT SURPLUS VALUES

■ **COIL**

two concentric coils with bottom screen, inserted in the outer shell, hermetically sealed to the smokes, formed by drawn up pipes of "seamless steel tubes" type, wound in spiral, in quality steel of suitable thickness

■ **BOTTOM**

of the boiler body boiler, bolted, insulated and endowed with cleaning door and smoke chamber connection to the chimney

■ **FURNACE**

with passing flame, accessible from the front door

■ **FRONT DOOR**

of wide dimensions to facilitate the operations of maintenance, hinged, insulated with refractory material and endowed with flame sight glass and burner plate

■ **EXTERNAL INSULATION**

formed by a double layer of high-density rock wool

■ **EXTERNAL CASING**

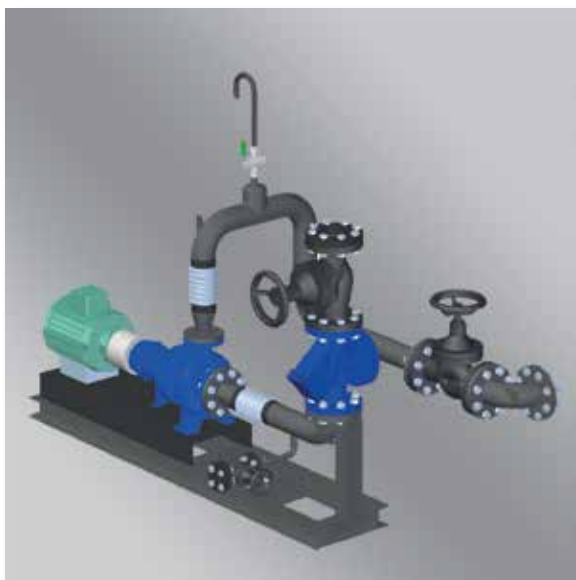
in aluminium

STANDARD DELIVERED EQUIPMENTS

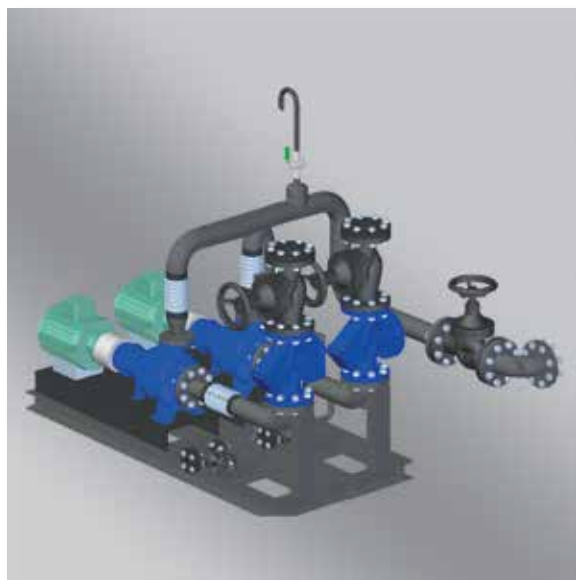
- Three smoke pass diathermic oil boiler
- Outer aluminium casing
- Insulating mattress for burner blast tube
- Group of gaskets, bolts and counter flanges for flanged connections
- Differential pressure switch
- n. 2 manometers in glycerine bath, on flow and return manifolds
- Drain valve

OPTIONAL EQUIPMENTS

- Outer casing in stainless steel
- Single pump oil circulation group
- Double pump oil circulation group
- Pre-drilling of the burner plate according to the burner model
- Panel board

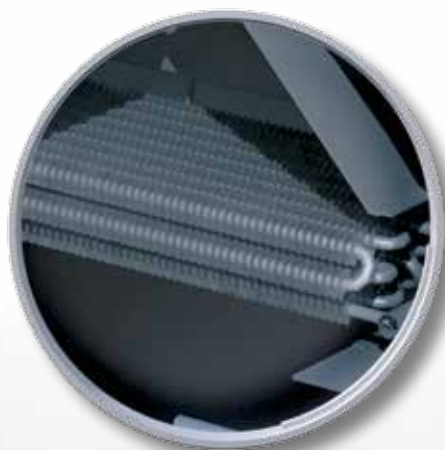
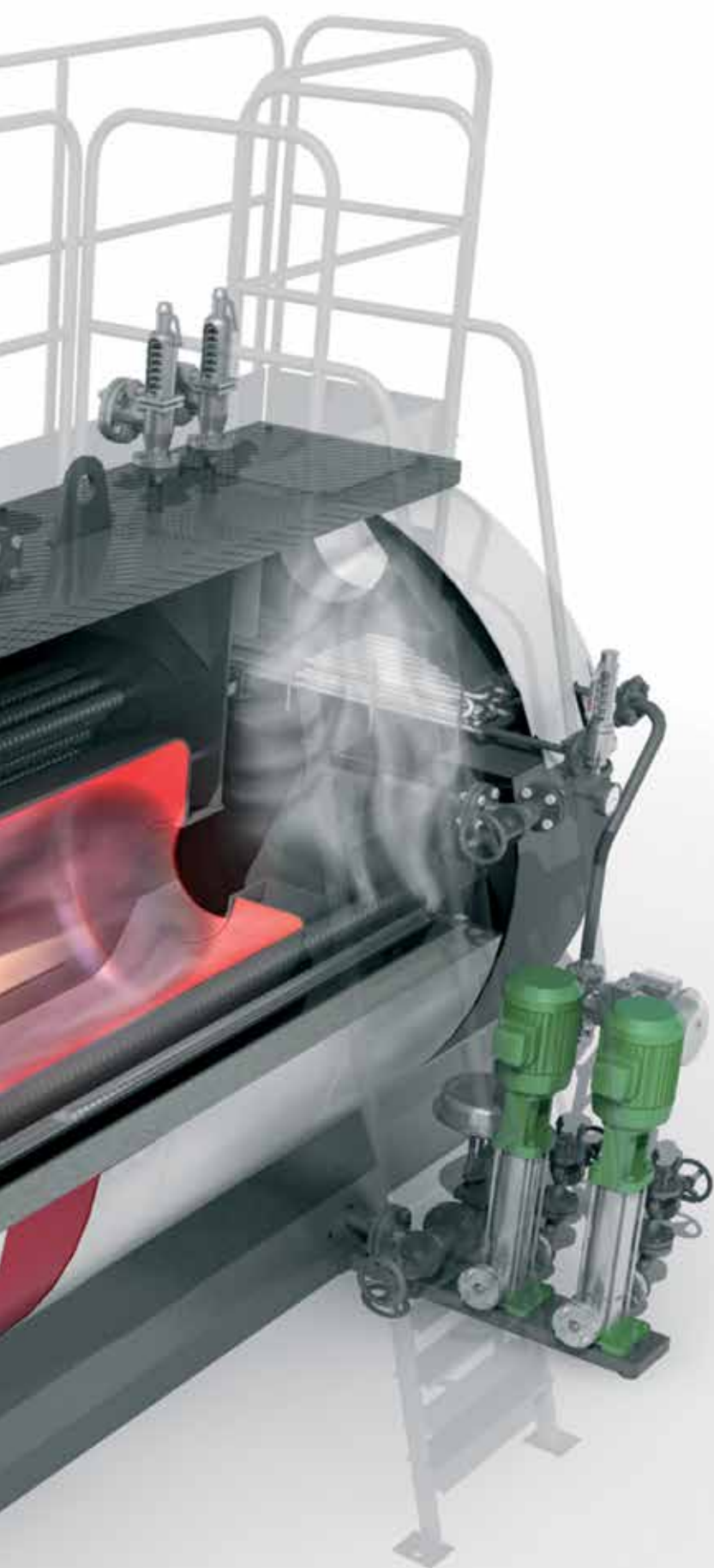


Single pump oil circulation oil group



Double pump oil circulation oil group





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ABSOLUTELY MADE IN ITALY

Unical AG S.p.A. 46033 casteldario - mantova - italy - ph. +39 0376 57001 - fax +39 0376 660556 - export@unical-ag.com - www.unical.eu

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