

Unical

BAHR'UNO



LOW PRESSURE STEAM BOILER, THREE PASS REVERSE FLAME EFFICIENCY UP TO 97%

OUTPUT RANGE	from 838 kW (1250 kg/h) to 2683 kW (4000 kg/h)							
TYPE	OR		HPO			HP		
	smooth pipe		ESA pipe			ESALU pipe		
FUEL	gas, light & heavy oil			gas, light oil			gas	
DESIGN PRESSURE	1.0 bar							
DESIGN TEMPERATURE	119.9°C							
MODELS	1250	1500	1750	2000	2500	3000	3500	4000

DESCRIPTION

Low pressure steam generator, three pass reverse flame type, with efficiency from 91% up to 97% ⁽¹⁾ according the installed smoke tubes (OR , HPO or HP type).

BAHR'UNO series is a family of packaged smoke tube type, low-pressure steam generators, three pass reverse flame, wet back. It is dedsigned for a standard safety pressure up to 0.98 bar. The range includes models with a steam production capability from 140 to 4000 kg/h. In compliance to the current laws, each steam boiler undergoes a conformity assessment, carried out by a Notified Body. The conformance to the essential safety requirements of European Directive 2014/68/UE (PED) of the body pressure vessel is guaranteed by the CE PED marking.

General features:

The flame inversion generator consists of a cylindrical furnace, with a wet bottom, in which the flame develops and where the inversion of the combustion gases takes place. The fumes then enter the tube bundle at the front tube plate and are conveyed towards the rear tube plate from which they exit through the smoke chamber.

The appliance is designed to ensure low heating loads in the combustion chamber and low superficial loads.

■ **Boiler body:** is made up of a cylindrical outer shell, a furnace with wet bottom and flat tube plates in quality steel, in compliance with current technical standards. The materials used are accompanied by manufacturing certificates certifying the chemical and mechanical characteristics and the controls during the production cycle and therefore their suitability for use. The welding seams are carried out by qualified personnel in compliance to certified procedures and are subjected to Non-Destructive Tests, in accordance to an internal "Manufacturing and Control" program. Once the boilers have been manufactured they are subjected to hydraulic testing in accordance to the requirement 7.4 – Annex I, laid down in the Directive 2014/68/UE (PED).

■ **The smoke pipes:** making up the quality steel tube bundle are welded to the tube plates by means of qualified automatic procedures. Finally, the pipes are headed by counterbore eliminating the protrusions from the plate. The smoke pipes are equipped of turbulators or inserts according to the type of pipe used.

■ **Front door:** is made of welded steel sheet, internally lined with a layer of insulating material and a layer of high-thickness refractory material. It is mounted on hinges that allow it to be opened quickly and is equipped with a self-cleaning flame sight glass, suitably positioned to check the correctness of the combustion in operation. The burner attachment plate is bolted onto it and can be set up for the type of burner indicated by the customer.

■ **Rear smoke chamber:** made of welded steel sheet, it is fixed to the rear tube plate by means of bolts to allow removal. It is equipped with a suitable cleaning door and flue gas connection with horizontal axis (vertical on request), with a diameter suitable for the power of the generator. The smoke chamber is designed to house an integrated extractable economizer.

■ **Base:** it consists of a frame in steel sections, electro-welded to the tube plates and closed with welded steel sheets.

■ **Service walkway:** positioned on the top part of the generator, it consists of a steel section frame, covered with checkered plate on the walkway floor and completed, on request, by a parapet with handrail.

■ **Insulation of the outer shell and the front upper part:** the thermal insulation is obtained with a 100 mm thick rock wool mattress, bonded with high-density thermosetting resins, supported and covered externally by the 10/10 mm thick painted steel sheet casing. The front upper part of the generator is also insulated with rock wool covered externally by a metal box.

Composition of the standard supply: ⁽²⁾

- n. 1 steam outlet shut-off flow valve.
- n. 1 weight-lever safety valve ⁽³⁾
- n. 2 reflective level indicators, with threaded connections and shut-off and drain valves.
- Electric panel for automatic operation, IP55 400V-3+N-50Hz complete with:
 - n. 1 large dial pressure gauge with 3-way tap for calibration
 - n. 1 safety pressure switch with manual reset, homologation. CE PED approved
 - n. 1 limit pressure switch
 - n. 1 pressure switch for regulation of two-stage burner (high / low flame) or pressure probe for modulating burners
 - n. 2 low water level safety probes, with self-diagnosis, with manual reset on the control panel, CE certified
 - n. 2 water level probes for pump/s ON-OFF
- n. 1 centrifugal electric pump for water loading
- Water loading line circuit with pipes and shut-off valve
- n. 1 group of water drain / sludge discharge with quick opening manual valve
- Manhole with cover and two steel forged brackets
- Moisture separator on the main steam outlet, for high-titer steam without dripping
- Turbulators (for OR version) or high efficiency inserts (for HPO & HP versions)
- Standard documentation supplied ⁽⁴⁾:
 - EC declaration of conformity of:
 - pressure equipment (boiler body)
 - pressure equipment safety valve(s).
 - pressure equipment safety pressure switch
 - pressure equipment minimum level safety probe
 - electrical panel (if supplied)
 - feed pump/s (if supplied)
 - economizer (if provided)
 - economizer safety valve (if supplied)
 - assembly with assessment according to Modules B+D
 - warranty
 - manufacturer's declaration concerning the operation of the pressure equipment
 - installation, use and maintenance manual for the boiler and any accessories provided
 - drawing of the steam generator completely equipped
 - wiring diagram of the electrical panel (if supplied)

(1) This value is intended with economizer and may change according working pressure and load conditions.

(2) The quantity, types and the model may vary according to the offered configuration.

(3) 2 safety valves for the models over 2000 kg/h. On the request spring operated safety valves.

(4) The above documentation will be provided in electronic format, except for the use and maintenance manual which will be supplied in paper format together with the equipment

OPTIONAL ACCESSORIES AND SPECIAL VERSIONS

Opzionali:

- "Second boiler water feed pump" kit
- "Feed water inlet filter" kit
- EC kit: integrated economiser, extractable from the side (instrument side) to further increase the value the efficiency of the generator, without affecting the dimensions, equipped with connection pipes and downstream thermometer.
The EC economizer kit is specific to each model and is available for both, gas and diesel versions.
Upon request: pressure gauges upstream and downstream of the economizer, upstream thermometer, wafer type ball valves of shut-off and by-pass, safety valve.
- "Maximum level safety" kit
- "TDS" kit
- "Automatic bottom drain" kit
- Burner plate drilled according to burner requirements
- Burner

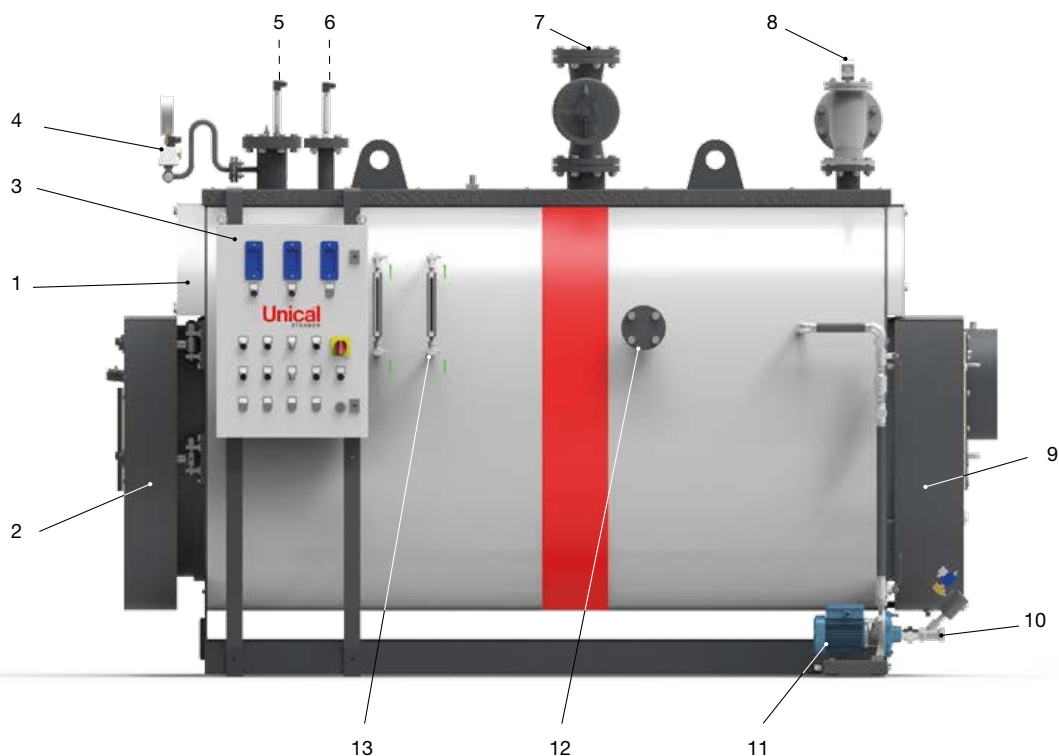
Special versions

BAHR'UNO 24 hr / 72 hr

- equipped with dedicated panel and "24 hr KIT" to obtain the certification to operate "without continuous supervision" up to a maximum of 24 hours
- equipped with dedicated panel and "72 hr KIT" to obtain certification to operate "without continuous supervision" up to a maximum of 72 hours

MAIN COMPONENTS

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

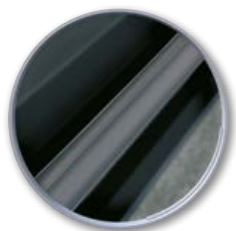


TECHNICAL DATA

Model	Steam production	Nominal output *	Nominal Input OR **	Nominal Input HPO **	Nominal Input HP **	Water content at level	Total volume	ΔP smoke side OR	ΔP smoke side HPO	ΔP smoke side HP	Burner head min. length	Burner head max. dia.
	kg/h	kW	kW	kW	kW	l	l	mbar	mbar	mbar	mm	mm
1250	1250	838	931.1	910.9	882.1	1663	2250	4.5	5.2	5.9	400	280
1500	1500	1006	1117.8	1093.5	1058.9	1663	2250	5.1	5.9	6.7	400	280
1750	1750	1174	1304.4	1276.1	1235.8	2140	2890	5.5	6.1	6.7	420	280
2000	2000	1341	1490.0	1457.6	1411.6	2140	2890	6.0	6.8	7.6	420	280
2500	2500	1677	1863.3	1822.8	1765.3	2970	4060	6.8	7.2	7.6	420	360
3000	3000	2012	2235.6	2187.0	2117.9	2970	4060	7.0	7.8	8.6	420	360
3500	3500	2347	2607.8	2551.1	2470.5	3490	4770	7.6	8.5	9.5	450	400
4000	4000	2683	2981.1	2916.3	2824.2	4155	5780	8.6	9.8	11.0	450	400

*with feeding water temperature = 70°C and pressure = 1 bar ** According working pressure and load conditions

TYPE OF PIPES



SMOOTH PIPES

The smooth smoke pipes, constituting the tube bundle, suitable for gas, light and heavy oil operation, increase the thermal exchange and allow the removal of the residual combustion products. They are formed by pipes with, inside, helical turbulators.

Efficiency up to 91%

in function of working pressure of the boiler.



ESA PIPES

The ESA smoke pipes (UNICAL patent), constituting the tube bundle, suitable for gas and light oil operation, 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.

Efficiency up to 93%

in function of working pressure of the boiler.



TUBI ESALU

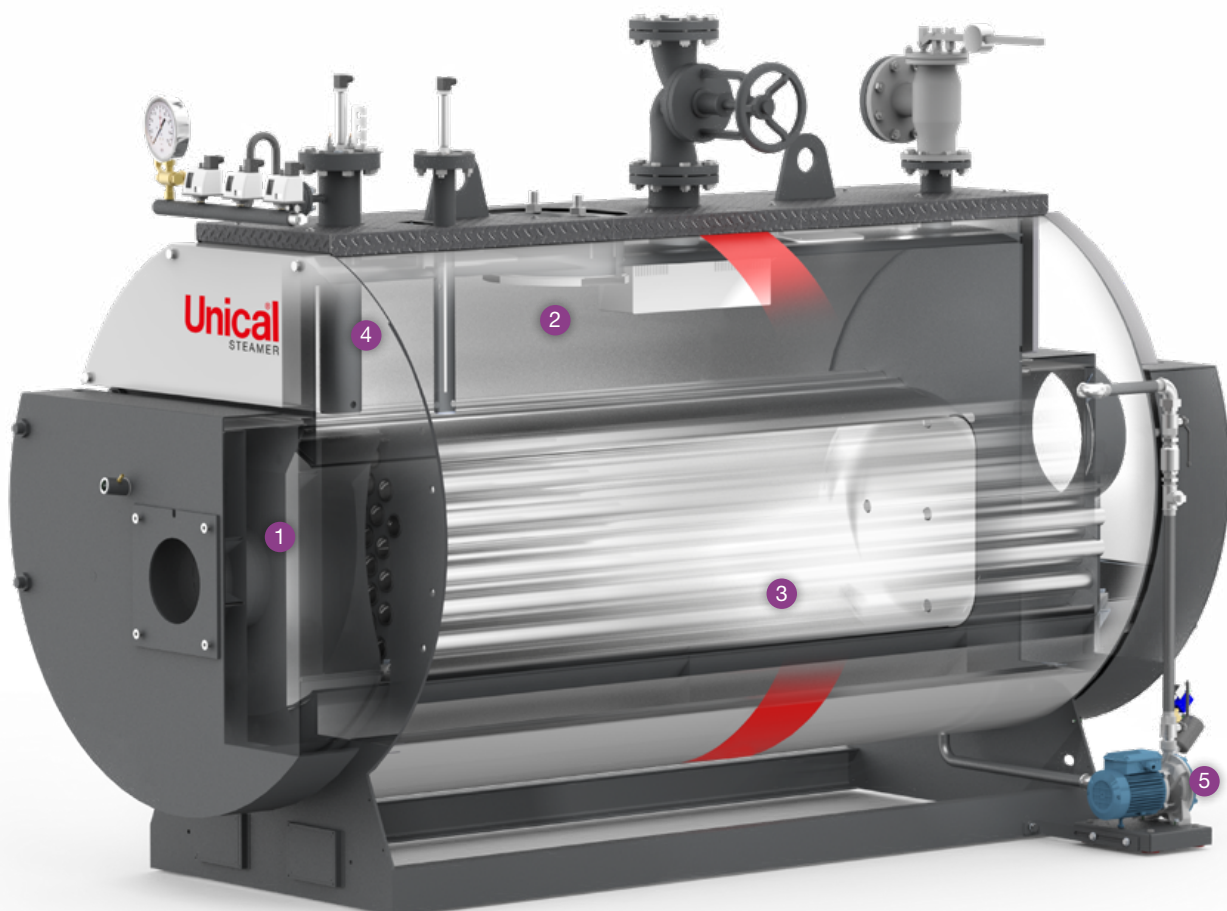
The ESALU smoke pipes (UNICAL patent), constituting the tube bundle, suitable for gas, allow to reach a very high thermal exchange. They are formed by pipes with, inside, special inserts of different types and shapes. The adoption of the ESALU pipes allowed to reach high performances in terms of efficiency, with important reduction in terms of running costs, fuel consumption and polluting emissions.

Efficiency up to 95%

in function of working pressure of the boiler.

PRODUCT PLUS VALUES

- **EXCELLENT EFFICIENCY**
up to 97% with special pipes ESALU and economiser
- **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
- **UPPER PLATFORM WALKWAY**
- **ELECTRIC PANEL BOARD**
electromechanical or electronic, expandible (optional)
- **POSSIBLE COMBINATION**
with one, two, three stage or modulating burners
- **IMPLEMENTABLE FUNCTIONS**
boiler and board panel designed for the integration of optional kits, also with boiler already installed



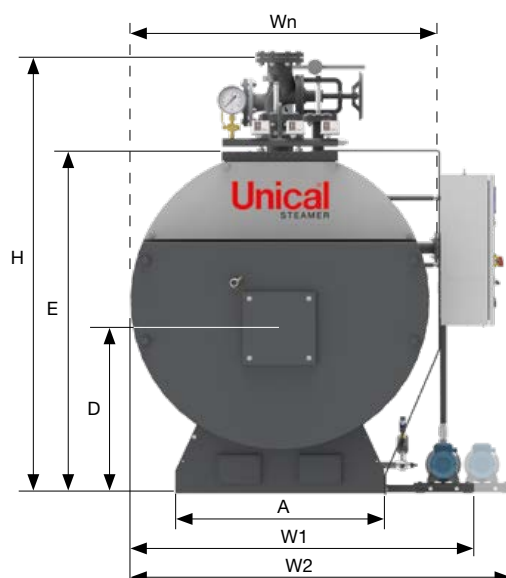
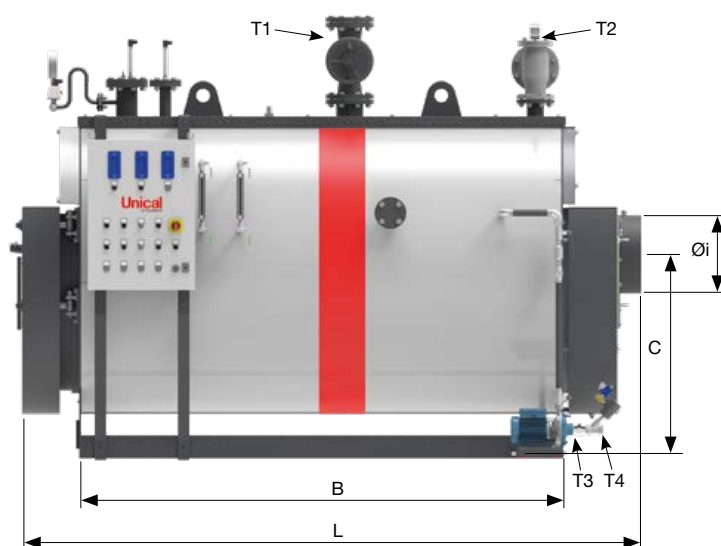
IML electric panel board



Very thick high quality insulation

- 1 Furnace
- 2 Evaporating chamber
- 3 Tube bundles
- 4 Still water pipe
- 5 Horizontal axis pump

DIMENSIONS



Model	Wn	W1	W2	L	H	A	B	C	D	E	Øi	T1	T2 IN/OUT	T3	T4	Empty Weight	Total weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN	DN			kg	kg
1250	1615	1880	2164	3230	2300	1090	2527	1105	860	1790	304	125	80/125 (1x)	1"	1"	2950	4613
1500	1615	1880	2164	3230	2300	1090	2527	1105	860	1790	304	125	80/125 (1x)	1"	1"	2950	4613
1750	1756	1934	2187	3504	2428	1200	2750	1010	905	1920	404	125	100/150 (1x)	1"	1 1/2"	4543	6683
2000	1756	1934	2187	3504	2428	1200	2750	1010	905	1920	404	125	100/150 (1x)	1"	1 1/2"	4543	6683
2500	2071	2025	2310	3570	2838	1470	2830	1445	1080	2250	404	150	80/125 (2x)	1"	1 1/2"	6376	8516
3000	2071	2025	2310	3570	2838	1470	2830	1445	1080	2250	404	150	80/125 (2x)	1"	1 1/2"	6376	8516
3500	2060	2150	2450	3980	2900	1470	2950	1445	1080	2250	402	200	100/150 (2x)	1"	1 1/2"	6455	9425
4000	2235	2400	2680	4260	3158	1700	3300	1700	1165	2473	454	200	100/150 (2x)	1 1/2"	1 1/2"	7425	11580

The company reserves the right to modify / adapt the technical and dimensional information of the products included in this catalog, even without notice, in order to improve the quality of the products themselves.