

# 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	0,98 bar							
DESIGN TEMPERATURE	119.6°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% <sup>(1)</sup> 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 designed 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: <sup>(2)</sup>

- n. 1 steam outlet shut-off flow valve.
- n. 1 weight-lever safety valve <sup>(3)</sup>

- 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)
- Documents envelope containing:
  - Declaration of Conformity by the Manufacturer in accordance with Annex VII of the PED Directive and related attachments of the checks and tests performed on each individual equipment during the manufacturing process.
  - Installation, Use and Maintenance Manual.
  - Certifications relating to the safety components installed (PED declarations of conformity, instruction booklets)
  - Diagram of the characteristic curves of the electric feed pump
  - Electrical diagram of the control panel and relative Declaration of Conformity
  - Instruction cards and electrical / functional diagrams of the installed regulation components and of the burner (installed on request)
  - Data sheet relating to the quality of supply / reinstatement and operating water, with the parameters that must be subjected to periodic checks, maximum and minimum limits of acceptability, frequency of checks and required interventions (information contained in the manual).
- Conformity of factory tested Assembly, according to B + D PED modules

### Options:

- "Second boiler water feed pump" kit
- "Feed water inlet filter" kit
- "Maximum level safety" kit
- "TDS" kit
- "Automatic bottom drain" kit
- "24 hr" or "72 hr" kit for standard generator
- EC kit (gas) / EC kit (oil) mounted internally the smoke chamber
- 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

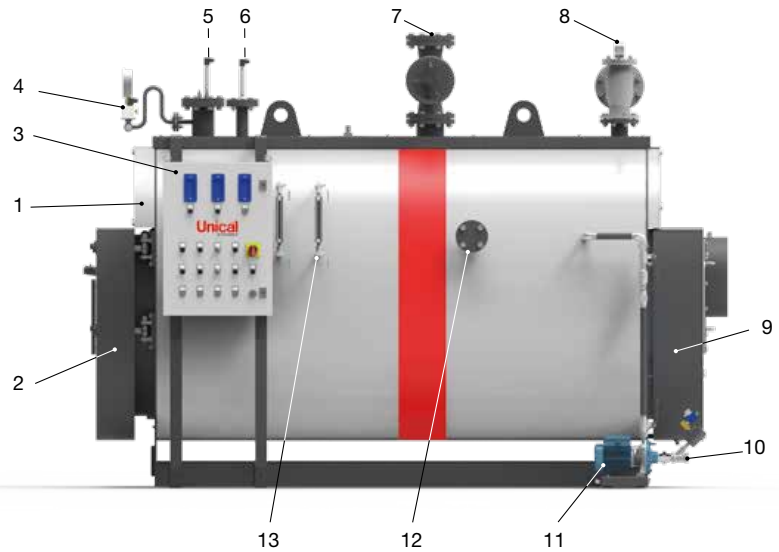
#### EC / HPOEC / HPEC versions

- To further increase the efficiency value of the generator, without affecting the size, the boilers are designed to be fitted with the EC economizer kit on request (already in the factory or at a later stage), which is specific for each model and is available for gas and oil versions

(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.

## MAIN COMPONENTS

1. Boiler body
2. Front door
3. Electric panel board
4. Instruments assembly
5. Level safety sensors
6. Capacitive level transmitter (IML)
7. Steam valve
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 OR **	Nominal Input HPO **	Nominal Input HP **	Max. working pressure	Water content at level	Total volume	$\Delta P$ smoke side OR	$\Delta P$ smoke side HPO	$\Delta P$ smoke side HP	Burner head min. length	Burner head max. dia.
	kg/h	kW	kW	kW	kW	bar	lt	lt	mbar	mbar	mbar	mm	mm
1250	1250	838	931.1	910.9	882.1	0.98	1663	2250	4.5	5.2	5.9	400	280
1500	1500	1006	1117.8	1093.5	1058.9	0.98	1663	2250	5.1	5.9	6.7	400	280
1750	1750	1174	1304.4	1276.1	1235.8	0.98	2140	2890	5.5	6.1	6.7	420	280
2000	2000	1341	1490.0	1457.6	1411.6	0.98	2140	2890	6.0	6.8	7.6	420	280
2500	2500	1677	1863.3	1822.8	1765.3	0.98	2970	4060	6.8	7.2	7.6	420	360
3000	3000	2012	2235.6	2187.0	2117.9	0.98	2970	4060	7.0	7.8	8.6	420	360
3500	3500	2347	2607.8	2551.1	2470.5	0.98	3490	4770	7.6	8.5	9.5	450	400
4000	4000	2683	2981.1	2916.3	2824.2	0.98	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

## PRODUCT PLUS VALUES

### ■ EXCELLENT EFFICIENCY

up to 97% 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

### ■ UPPER PLATFORM WALKWAY

### ■ ELECTRIC PANEL BOARD

electromechanical or electronic, expandable (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

## TYPE OF PIPES

### 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.

**Efficiency up to 91%** in function of working pressure of the boiler.



### 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.

**Efficiency up to 93%** in function of working pressure of the boiler.



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### ESALU PIPES

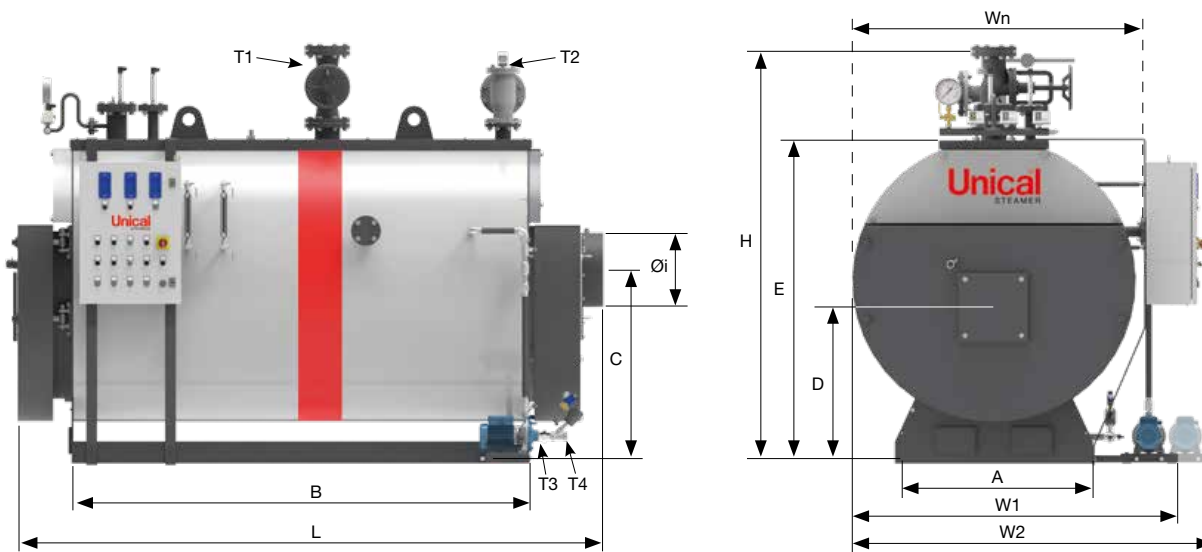
The ESALU smoke pipes (UNICAL patent), suitable for gas, constituting the tube bundle, allow to reach a very high thermal exchange. They are formed by pipes with, inside, special inserts of different types and shapes. The adoption of the ESALU pipes allowed to reach high performances in terms of efficiency,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

**Efficiency up to 95%** in function of working pressure of the boiler.



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## DIMENSIONS



Model	Wn	W1	W2	L	H	A	B	C	D	E	Øi	T1	T2	T3	T4	Empty weight	Total weight
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm					kg	kg
1250	1628	1804	2085	3322	2220	1090	2527	1125	860	1790	304	DN 125	DN 80	1"	1"	3190	4853
1500	1628	1804	2085	3322	2220	1090	2527	1125	860	1790	304	DN 125	DN 80	1"	1"	3190	4853
1750	1756	1934	2215	3545	2350	1200	2750	1195	905	1920	354	DN 125	DN 100	1"	1 1/2"	3970	6110
2000	1756	1934	2215	3545	2350	1200	2750	1195	905	1920	354	DN 125	DN 100	1"	1 1/2"	3970	6110
2500	2030	2100	2480	3625	2725	1470	2830	1460	1080	2250	404	DN 150	DN 80 (2x)	1"	1 1/2"	5640	8610
3000	2030	2100	2480	3625	2725	1470	2830	1460	1080	2250	404	DN 150	DN 80 (2x)	1"	1 1/2"	5640	8610
3500	2030	2100	2480	3950	2725	1470	3330	1460	1080	2250	404	DN 150	DN 100 (2x)	1"	1 1/2"	6390	9880
4000	2300	2400	2680	4260	3192	1700	3430	1700	1165	2473	454	DN 200	DN 150 (2x)	1 1/2"	1 1/2"	6890	11045

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.