

Unical

TERNOX 2S



STEEL PRESSURIZED GENUINE THREE-PASS HOT WATER BOILER

OUTPUT RANGE

from 2200 to 10200 kW

WORKING TEMPERATURE

up to 110°C (safety temperature)

FUEL

natural gas, LPG, light oil, heavy oil jet burners

Low NO_x
version MODELS

2200

3050

3800

5000

6300

7500

9500

STD
version MODELS

2500

3500

4500

5800

7000

8500

10200

CERTIFICATION IN OUTPUT RANGE / Low NO_x emissions

DESCRIPTION

Genuine three-pass hot water boiler with wet bottom, horizontal design.

TERNOX 2S series is a family of packaged smoke tube hot water boilers, designed for a maximum safety pressure up to 6 bar (higher pressure available on request). The range includes different models with an output from 2200 to 10200 kW.

General features:

The generator with 3 effective smoke passes is made up of a cylindrical furnace with a wet bottom, in which the flame develops and runs through the furnace (1st smoke pass) and, at the bottom, through the inversion chamber, enters the tube bundle of the 2nd smoke pass. The fumes return to the front where they enter the tube bundle of the 3rd smoke pass. Exiting the tube bundle, the fumes are collected in the rear chamber and conveyed to the chimney.

■ **Boiler body:** the components of the boiler body, outer shell, furnace, inversion chamber, tube plates and tube bundle are made of quality steel in accordance with current regulations. 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 inversion chamber is made with flat tube plates. The welded joints are carried out according to procedures approved by suitably qualified personnel. Once manufacturing is complete, each pressure carrying part is subjected to testing by carrying out the hydraulic test.

■ **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.

■ **Front door:** made of steel sheet, hermetically sealed against fumes leakage, is internally lined with refractory insulating concrete.

■ **Rear smoke chamber:** made of steel sheet, is insulated by casting of suitable material, it is complete with horizontal flanged connection for flue gas evacuation and with inspection and cleaning doors.

■ **Base:** it consists of a frame in steel profiles electro-welded to the tube plates.

■ **Insulation of the outer shell:** thermal insulation is ensured by a mineral wool mattress, externally protected by an aluminum foil (stainless steel on request).

Composition of the standard supply: ⁽¹⁾

- Plate for burner mounting, complete with sight flame (with drilling on request).
- Lifting eyebolts
- Document envelope containing:
 - Installation, Use and Maintenance Manual.
 - Data sheet relating to the quality of the 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).

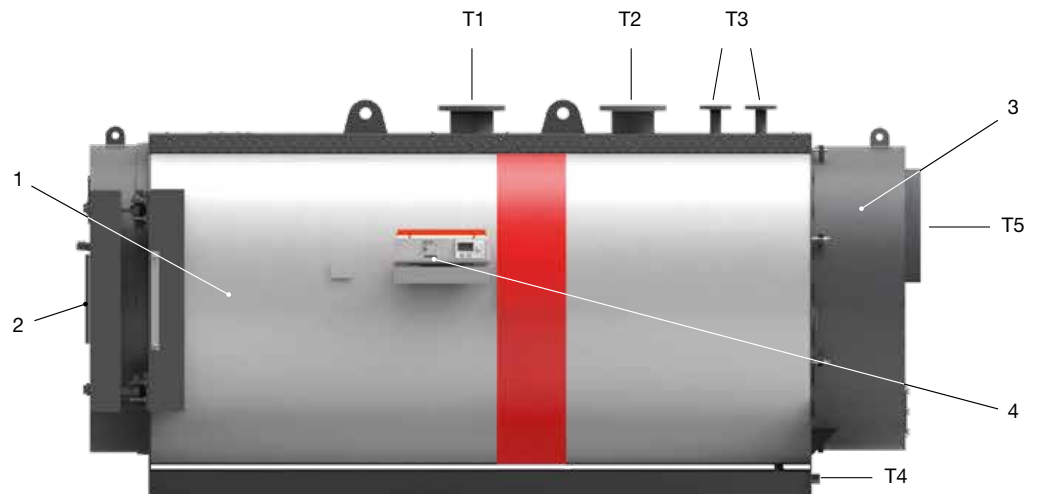
(1) The quantity and the model may vary according to the offered configuration.

Optional components:

- Economizers for the recovery of the residual heat of the fumes leaving the boiler, available in the versions for gas or light oil.
- Condensers for the recovery of the latent heat of the fumes leaving the boiler, available only in the gas versions.

MAIN COMPONENTS

- 1. Boiler body
- 2. Front door
- 3. Rear smoke chamber
- 4. Board panel
- T1. Flow
- T2. Return
- T3. Expansion vessel connection
- T4. Boiler drain
- T5. Chimney connection



TECHNICAL DATA (STD version)

| TERNOX 2S STD | Nominal output | Nominal input | Efficiency at full load | Efficiency at part load (30%) | Water content | ΔP smoke side | Design pressure | Empty Weight | CONNECTIONS (\emptyset) | | | |
|------------------|-------------------|------------------|----------------------------|-------------------------------------|------------------|--------------------------|--------------------|-----------------|-----------------------------|----------------------|----------------------|----------------------|
| | kW | kW | % | % | lt | mbar | bar | kg | T1/T2 \emptyset mm | T3 \emptyset mm | T4 \emptyset mm | T5 \emptyset mm |
| 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 | 574 |
| 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 | 624 |
| 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 | 664 |
| 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 | 664 |
| 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 | 724 |
| 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 | 824 |
| 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 | 824 |

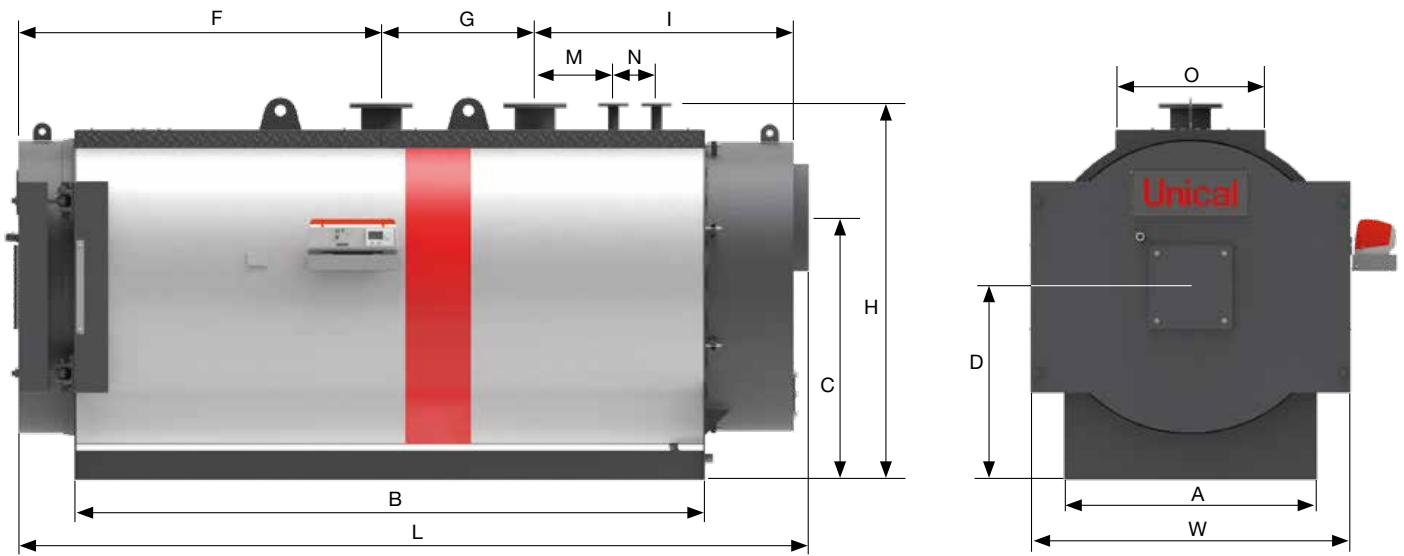
TECHNICAL DATA (Low NOx version)

| TERNOX 2S Low NOx | Nominal output | Nominal input | Efficiency at full load | Efficiency at part load (30%) | Water content | ΔP smoke side | Design pressure | Empty Weight | CONNECTIONS (\emptyset) | | | |
|----------------------|-------------------|------------------|----------------------------|-------------------------------------|------------------|--------------------------|--------------------|-----------------|-----------------------------|----------------------|----------------------|----------------------|
| | kW | kW | % | % | lt | mbar | bar | kg | T1/T2 \emptyset mm | T3 \emptyset mm | T4 \emptyset mm | T5 \emptyset mm |
| 2200 Low NOx | 1800÷2200 | 1951÷2406 | 92.25÷91.45 | 94.25÷93.45 | 3790 | 3.8÷5.7 | 6 | 5500 | 200 | 50 | 1"1/2 | 574 |
| 3050 Low NOx | 2350÷3050 | 2537÷3329 | 92.64÷91.62 | 94.64÷93.62 | 4750 | 3.5÷6.0 | 6 | 7000 | 200 | 65 | 1"1/2 | 624 |
| 3800 Low NOx | 3000÷3800 | 3239÷4144 | 92.62÷91.7 | 94.62÷93.7 | 6400 | 3.6÷6.0 | 6 | 8200 | 250 | 80 | 1"1/2 | 664 |
| 5000 Low NOx | 4000÷5000 | 4324÷5457 | 92.5÷91.62 | 94.5÷93.62 | 8060 | 4.4÷6.9 | 6 | 10000 | 250 | 80 | 1"1/2 | 664 |
| 6300 Low NOx | 5100÷6300 | 5528÷6892 | 92.25÷91.41 | 94.25÷93.41 | 9760 | 4.9÷7.6 | 6 | 11500 | 250 | 100 | 1"1/2 | 724 |
| 7500 Low NOx | 5700÷7500 | 6169÷8215 | 92.4÷91.3 | 94.4÷93.3 | 11480 | 4.8÷8.4 | 6 | 13500 | 250 | 100 | 1"1/2 | 824 |
| 9500 Low NOx | 8400÷9500 | 9128÷10377 | 92.02÷91.55 | 94.02÷93.55 | 14960 | 8.3÷10.7 | 6 | 17300 | 300 | 100 | 1"1/2 | 824 |

PRODUCT PLUS VALUES

- **FLEXIBILITY**
thanks to the certification in output range
- **LOW EMISSIONS NO_x < 80 mg/kWh**
thanks to the reduction of the specific thermal load for Low NOx version and in combination with low-emission burners (available on request)
- **EMISSIONS NO_x < 50 mg/kWh**
in combination with burners equipped with flue gas recirculation (FGR)
- **SINGLE FRONT DOOR**
with self centring closing system completely adjustable
- **DOOR INTERNAL INSULATION**
in super light recyclable refractory concrete
- **BODY INSULATION**
with anti-tearing mineral wool mattress
- **BOARD PANEL OR ELECTRICAL CABINET**
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 lifting lugs and the strong frame side members

DIMENSIONS

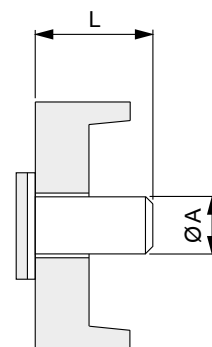


| TERNOX 2S STD | W | L | H | A | B | C | D | F | G | I | M | N | O |
|---------------|------|------|------|------|------|------|------|------|------|------|-----|-----|------|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| 2500 STD | 1710 | 4225 | 2010 | 1350 | 3370 | 1400 | 1030 | 1940 | 820 | 1465 | 420 | 230 | 800 |
| 3500 STD | 1830 | 4711 | 2120 | 1450 | 3824 | 1480 | 1080 | 1954 | 1140 | 1617 | 570 | 250 | 800 |
| 4500 STD | 1980 | 5134 | 2360 | 1550 | 4174 | 1620 | 1180 | 2017 | 1380 | 1737 | 550 | 300 | 800 |
| 5800 STD | 2180 | 5639 | 2580 | 1710 | 4626 | 1780 | 1300 | 2451 | 1400 | 1788 | 600 | 300 | 800 |
| 7000 STD | 2320 | 5875 | 2700 | 1850 | 4840 | 1870 | 1350 | 2505 | 1510 | 1860 | 550 | 350 | 880 |
| 8500 STD | 2400 | 6420 | 2870 | 1900 | 5350 | 1980 | 1460 | 2035 | 2590 | 1795 | 480 | 350 | 880 |
| 10200 STD | 2650 | 6772 | 3080 | 2080 | 5632 | 2080 | 1560 | 1406 | 3450 | 1916 | 550 | 350 | 1000 |

| TERNOX 2S Low NOx | W | L | H | A | B | C | D | F | G | I | M | N | O |
|-------------------|------|------|------|------|------|------|------|------|------|------|-----|-----|------|
| | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| 2200 Low NOx | 1710 | 4225 | 2010 | 1350 | 3370 | 1400 | 1030 | 1940 | 820 | 1465 | 420 | 230 | 800 |
| 3050 Low NOx | 1830 | 4711 | 2120 | 1450 | 3824 | 1480 | 1080 | 1954 | 1140 | 1617 | 570 | 250 | 800 |
| 3800 Low NOx | 1980 | 5134 | 2360 | 1550 | 4174 | 1620 | 1180 | 2017 | 1380 | 1737 | 550 | 300 | 800 |
| 5000 Low NOx | 2180 | 5639 | 2580 | 1710 | 4626 | 1780 | 1300 | 2451 | 1400 | 1788 | 600 | 300 | 800 |
| 6300 Low NOx | 2320 | 5875 | 2700 | 1850 | 4840 | 1870 | 1350 | 2505 | 1510 | 1860 | 550 | 350 | 880 |
| 7500 Low NOx | 2400 | 6420 | 2870 | 1900 | 5350 | 1980 | 1460 | 2035 | 2590 | 1795 | 480 | 350 | 880 |
| 9500 Low NOx | 2650 | 6772 | 3080 | 2080 | 5632 | 2080 | 1560 | 1406 | 3450 | 1916 | 550 | 350 | 1000 |

BURNER BLAST TUBE DIMENSIONS

| BOILER TYPE | øA mm | L (min/max) mm |
|--------------------------|-------|----------------|
| 2200 Low NOx / 2500 STD | 400 | 370/520 |
| 3050 Low NOx / 3500 STD | 400 | 370/520 |
| 3800 Low NOx / 4500 STD | 500 | 410/560 |
| 5000 Low NOx / 5800 STD | 500 | 410/560 |
| 6300 Low NOx / 7000 STD | 500 | 410/560 |
| 7500 Low NOx / 8500 STD | 500 | 450/650 |
| 9500 Low NOx / 10200 STD | 500 | 450/650 |



ECONOMIZER (optional)

The economizers for the recovery 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.

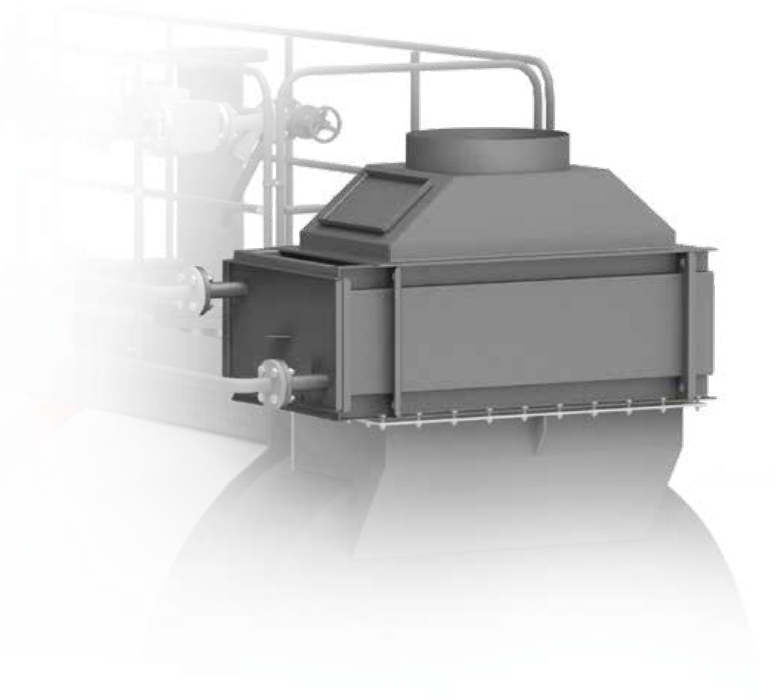
CONSTRUCTION CHARACTERISTICS OF ECONOMIZER

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 gaseous fuels
- Version for operation with light oil or dual fuel (gas & oil) burners



CONDENSER (optional)

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

Medium efficiency recovery: 6÷8% at 100% load, return temp. 60°C

Material: stainless steel, aluminium

Steel pressurised boilers TERNOX with condenser reach four stars of efficiency ★★★★★

The inlet temperature at the boiler return connection must be > 55°C in any working conditions.

CONSTRUCTION CHARACTERISTICS OF CONDENSER

Heat exchanger flue/water, realized in the tube bundle made of stainless steel AISI 316 L tubes:

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



BOARD PANELS (optional)

STANDARD



The standard board panel is equipped with:

- Series of switches
- Thermometer
- Safety thermostat
- Two stage working thermostat
- Minimum temperature thermostat (for C.H. pump – inside the board panel)

MASTERMODUL MASTERBISTADIO



The board panels MASTER MODUL and MASTERBISTADIO, for high temperature working, are equipped with:

- 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

CASCATAMODUL CASCATABISTADIO



The board panels CASCATAMODUL e CASCATABISTADIO are equipped with:

- Lago Basic controller for burner
- Boiler temperature sensor
- Series of switches
- Safety thermostat

THERMOREGULATION E8 (optional)



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.

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.



0-10 VOLT SIGNAL

the great flexibility of the E8 also permits the TERNOX 2S 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.



MANAGEMENT OF UP TO 15 MIXED CIRCUITS

controlled by the outdoor sensor.

ENERGY SOURCES CONTROL



INTEGRATION WITH RENEWABLE ENERGY SOURCES

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

ELECTRICAL CABINET BASIC_W (optional)

- Management of boiler safety devices with signalling on the burner start terminal board and alarms (boiler safety devices + burner block cumulative)
- Possible anti-condensation pump management
- 3Ph - 400V - 50Hz Power supply; burner power supply, transformer for auxiliary burner power supply
- Metal containment cabinet with IP54 protection rating, size H=700, L=500, D=250, held up by ground support
- Digital control instrument for controlling operating temperatures on the panel, 0-10V or 4-20 mA input for generator set-point remote control
- Built according to European standards



ELECTRICAL CABINET IML_W (optional)

- Control PLC, 7" touch screen display (or superior) with graphic interface, remote communication via Modbus, 0-10V or 4-20 mA input for generator set-point control, etc.
- Single, two-stage and three-stage or modulating burner control
- Boiler safety devices management with alarm signals
- Possible anti-condensation pump management
- 3Ph - 400V - 50Hz Power supply; burner power supply, transformer for auxiliary burner power supply
- Metal containment cabinet with IP54 protection rating, size H=1000, L=500, D=250, held up by ground support
- Built according to European standards



BOILER SAFETY KIT (optional)

- Instrument wood log to be mounted on the boiler flow, complete with all connections required for the on-site safety and control instrumentation and in particular:
 - pressure gauge valve with test flange
 - large dial thermometer and pressure gauge of an adequate scale
 - minimum and maximum safety pressure switch
 - manifold with siphon to position the pressure gauge and pressure switches
 - 2 manually resettable safety thermostats
- Available upon request: EC approved safety valves with adequate calibration pressure, designed to discharge the total boiler power.



ANTICONDENSATION PUMP KIT (optional)

Composed of:

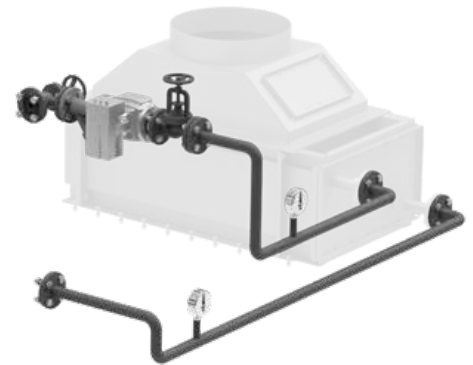
- n. 1 electric pump of the in-line type, of suitable flow rate
- n. 2 shut-off valves
- n. 1 non-return valve
- connection pipes
- power and operating logic inserted inside the boiler panel



ECONOMIZER CIRCULATION KIT (optional)

Composed of::

- n. 1 electric pump of the in-line type, of suitable flow rate
- n. 2 shut-off valves
- n. 1 non-return valve
- connection pipes
- power and operating logic inserted inside the boiler panel



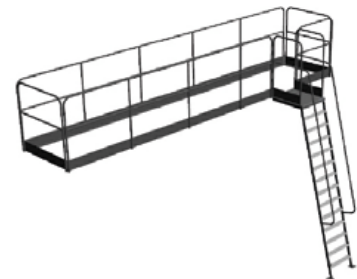
LADDER AND WALKWAY KIT (optional)

Ladder and walkway with carbon steel railing, painted with special rust-proof paint and welded by joints that ensure the correct coupling of every element.

Easy access to the boiler is guaranteed by:

- a handrail welded to the frame;
- steps with non-slip inserts.

The ladder position and handrail layout can be agreed upon at the time of order, to fit the installation site of the generator.



HIGH EFFICIENCY OPTION

Option to supply a generator with 94-95% efficiency levels.

An aluminium profile, bound by rolling, is positioned within the smoke pipes forming the tube bundle of the third flue gas pass, namely in the end section, to significantly increase efficiency. This allows you to increase the exchange surface without increasing the generator size or adding external devices, as a result of a higher pressure drops (counter pressure) of the boiler body.

BREVETTO
Unical
PATENT

Aluminium multiradial sheets

External steel pipe

