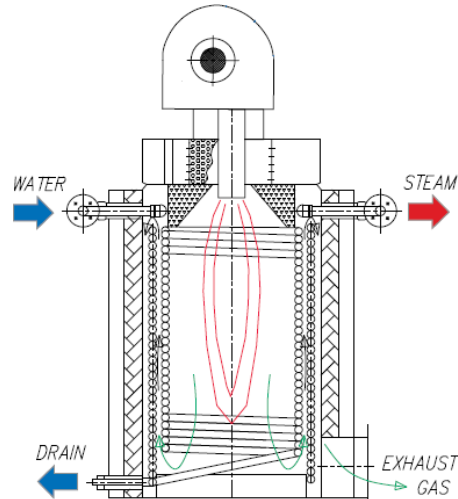




**Steam Generator – UM model
n.1 x 4,0 t/h @10 barg**

INTRODUCTION TO STEAM GENERATORS – UM SERIES

Flash coil steam generators are the best choice for instantaneous steam production; the boilers take just 2-3 minutes to start up and supply 100% of steam capacity at operating pressure. With the possibility of being exempted from licensed operators, UM Steam Generators are suitable for applications requiring small steam capacities with fast start-up, small footprint and compact design.



CHARACTERISTICS

ADVANTAGES

Flash coil steam generators with forced circulation consisting of a **multi-coil** 3-pass design installed in a cylindrical shell. They can be supplied both in vertical or horizontal orientation, fully packaged with all the necessary equipment to be connected with site utilities, also **containerized** version.

Steam capacity range 500 – 5.000 kg/h.
Design pressure range from 12 barg up to 80 barg for customized solutions to high pressure applications.

Excellent and uniform heat transfer for UM generators is ensured by the unique **tube bending equipment** used to manufacture the coils in our facility, explicitly designed for Cannon Bono.



Water forced by **piston pump** is circulated through pipes forming the heating surface, which is divided into three sections for: Preheating of feedwater; Conversion of water into steam; Slight superheating of steam to reduce water content.

Possibility to exempt licensed operators.

Small footprint and compact design, both in vertical and horizontal designs.

Quick steam output availability, suitable for **discontinuous applications**.

Customized solution according to specific customer requests, especially for high-pressure applications with **design pressure up to 80 barg**.

High efficiency thanks to a large heated surface with 3-pass design, that can be further improved by equipping the boilers with a **heat recovery system** (economizer).

Low NOx emissions, less than 80 mg/m³ due to its optimized combination with any market burner (according to BAT).

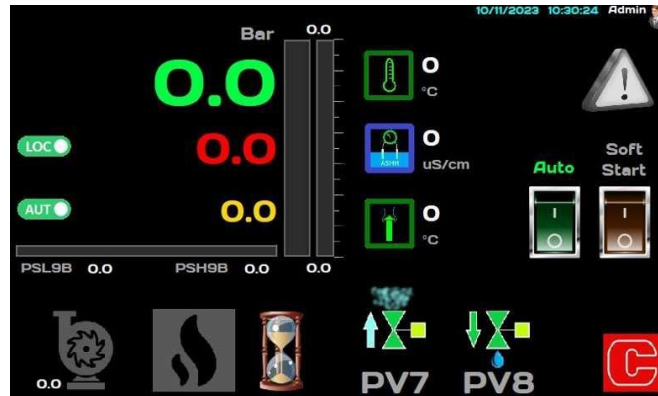
Combustion system suitable for **different fuels**.

UM equipment complies with international standards, including PED, ASME, SELO, GOST- R, RTH, IBR, JIS, etc.

Easy maintenance: the upper cover facilitates inspection and cleaning of the combustion chamber and the internal parts of the steam generator.

UNI Matic CONTROLLER

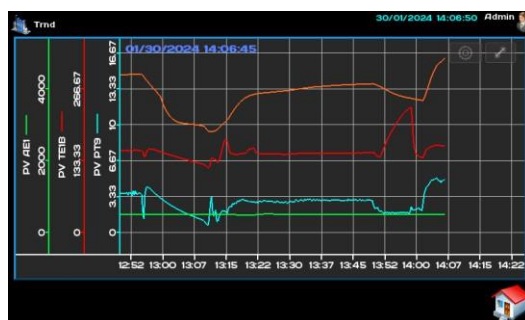
The UNI Matic Controller UMC is compact programmable device (DIN rail mounted), that is positioned inside the boiler control panel, with an operator 7" touch screen (HMI), connected to it through an Ethernet cable; it is possible to add an additional I/O expansion unit and a modem for remote connection (options).



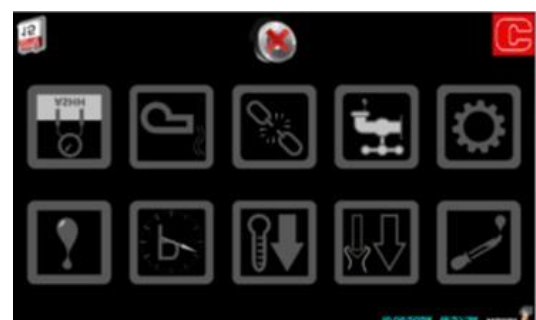
The main functions, that may change depending on boiler configuration and options, included in the PLC are the following:

- Burner status and burner load;
- Steam pressure control loop through burner modulation;
- Feed water cascade control through modulating pump speed inverter;
- Indication of main boiler variables (steam pressure, water flow rate, water conductivity, flue gas temperature, steam temperature, etc.);
- Start, stop, standby sequences control;
- Remote standby sequence control;
- Ongoing lockout alarms display;
- Ongoing no locking alarms display;
- Alarm log display;
- Trend display of: steam pressure, steam temperature, water conductivity;
- Digital signals available to the boiler user;
- MODBUS communication for remote reading of operating variables through LAN connection;

TREND DISPLAY



ALARM DISPLAY



DESIGN DATA

This quotation has been prepared based on the following data:

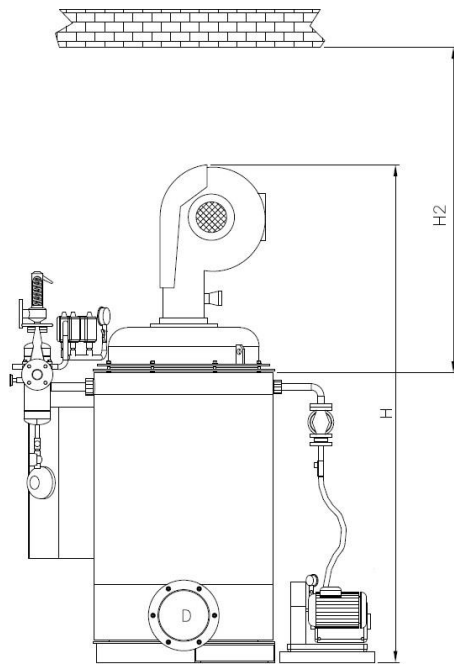
Country of destination	Greece
Electrical data	230/400V – 50 Hz – 3 phase
Area of installation	Indoors, boiler room, free of frost, dust, and sand.
Area classification	Safe area, no classification
Elevation	< 600 m.a.s.l.
Type of fluid	Saturated Steam
Required Steam capacity	4.000 kg/h
Design pressure	11,0 bar(g)
Maximum Operating pressure	9,5 bar(g)
Main fuel	Natural Gas Gaseous 200-250mbar stabilized
Emissions @3%O ₂ _dry	NO _x < 100 mg/Nm ³ CO < 50 mg/Nm ³
Feed water quality	According to EN 12952

CODES AND STANDARDS

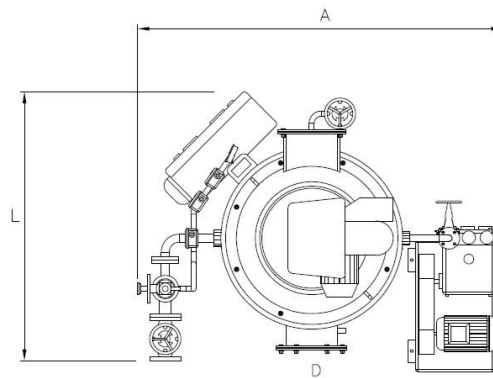
Pressure parts certification	European Directive 2014/68/EU (PED)
Mechanical equipment	Machinery Directive 2006/42/EC
Electrical equipment	CEI – IEC
Ladders, walkways, supporting structure	CANNON BONO standards
Electrical protection degree	IP 54 – IP 55 (where applicable)
Alarms sequence	ISA
Electrical protection	Standard, Non-hazardous area
Gaseous fuels and BMS	EN 676
Liquid fuel and BMS	EN 267

TECHNICAL DATA SHEET

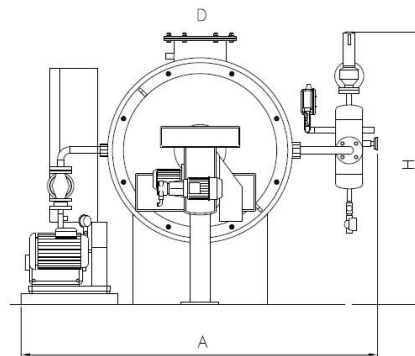
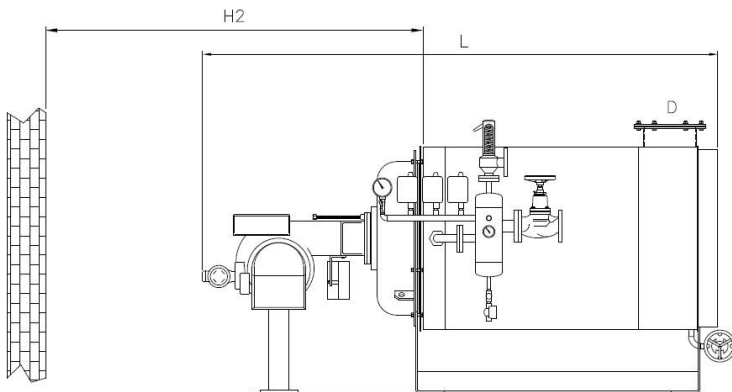
Model		UM 400/11/NG/24H/1P/UMC/Hor	
Nominal steam production		kg/h	4.000
Design Pressure		bar(g)	11,0
Max operating pressure		bar(g)	9,5
Feed water temperature		°C	80
Power Capacity		MW	2,8
Thermal efficiency (basic version) @100% _{load}		%	89 ± 1
Thermal efficiency (ECO version) @100% _{load}		%	93 ± 1
HORIZONTAL CONFIGURATION (basic version)	Length (burner included) (L)	mm	4.950
	Width (accessories included) (A)	mm	2.700
	Height (accessories included) (H)	mm	2.200
	Length (burner excluded)	mm	3.700
	Min dimension for coil extraction (H2)	mm	3.400
Empty weight		ton	4.5
Stack connection – base version (D)		mm	1.100 x 316 (i)



Vertical version (preliminary)



Horizontal version (preliminary)



ATTENTION

Preliminary drawing.

The overall dimensions necessary for handling the burner and coil take into account the dimensions of the two components, excluding the space required for lifting equipment.

The space indicated is as useful space.

FEED WATER QUALITY SPECIFICATION

A proper feed water treatment system is mandatory for the issuing and validity of the manufacturer's guarantee. Therefore, it is necessary to carry out a complete analysis of the raw feed water, to select the correct water treatment system. Equally important is the periodic analysis of feed water and boiler water. If the water treatment is not carried out properly, elements dissolved in the water such as calcium, magnesium or silica can deposit on the iron surfaces of the coil at higher temperatures, causing incrustations and blocking the pipes. In addition, if the feed water is rich in oxygen, the iron in contact with the water will suffer corrosion, leading to holes in the coil.

The values for the highest allowable concentrations of a number of impurities and for the maximum and minimum concentration of chemical agents which are added in order to minimize corrosion, sludge formation and deposits, shall be in accordance with the following extract of standard EN12952-12 with the main reference values and the frequency of the checks to be carried out. For generators whose operating pressure is higher than 20 bar, directly refer to the tables in the standard.

Parameters	Unit measure	Water values		Notes
		Limit	Frequency rate	
pH		10.5 to 12	T Y	
Total hardness (Ca+Mg)	mmol/l	0.02	T	Suggested value 0.01
Oxygen	mg/l	0.02	T	
Conductivity at 25°C	μS/cm	< 6000	T	
Iron	mg/l	0.05	Y	
Copper	mg/l	0.02	Y	
Total alkalinity	mmol/l	1 to 15	T	
Silicon (SiO ₂)		80	Y	
Phosphate (PO ₄)	mg/l	10 to 20	Y	
Oily substances	mg/l		T	According to the type of substance

T: every shift (control unit analysis) G: every day (control unit analysis) S: every week.

The frequency of the analyses to be carried out upon every shift (T) and every day (G) can be reduced for generators operating in the "no boiler attendant present" mode up to 24 or 72 hours. However, if certain values can become hazardous throughout the absence of the boiler attendant, additional limiting switches must be set in advance, which intervene in the case of significant deviations of the water parameters by stopping the operation of the generator.

TECHNICAL SPECIFICATION

INSULATED BOILER BODY

UM steam coil boilers are package-type generators built to meet European Pressure Equipment Directive 2014/68/EU and Machinery Regulation 2023/1230/EU standards.

They are manufactured at the BONO workshop, where they undergo final hydraulic and functional tests.

The pressure parts are made from seamless, cylindrical steel pipe coils. The inner coil forms the combustion chamber, while the outer coils act as the convection section for thermal heat exchange.

The pressurized body includes additional metal structures:

- A skin casing that contains flue gas and channels it to the stack connection.
- A basement made of steel profiles and sheets for floor support.
- A cover lid that houses the burner.

Inside the boiler, refractory materials line the combustion chamber, and a thick layer of high-density mineral wool insulates the housing. This insulation is protected by stainless steel cladding. The heater can be oriented vertically (with Temporary support basement for transport) or horizontally (with support basement and additional insulation of the rear part in mineral wool).

The boiler features the removable lid for easy access to internal parts for inspection and cleaning. High-quality materials are used throughout the construction, and joints are accurately welded. The boiler is equipped with flanged inlet and outlet connections, as well as a drain. The outlet has a steam manifold with connections for the pressure safety valve (PSV) and other control instruments.

Note. Water Quality: It is critical to use high-quality water to prevent corrosion or local overheating of heat exchange surfaces. Poor water quality can lead to chemical attack (due to dissolved oxygen, improper pH) or the formation of insulating scale deposits.

Standard Design Pressure: 12 barg (11 barg from UM 300) Higher design pressure up to 100 bar available on request

Certification: CE stamp and certification, including third-party design supervision for Class III boilers and construction supervision for Class IV boilers.

ACCESSORIES AND INSTRUMENTS

The boiler is equipped with a range of accessories and safety instruments:

- N. 1 Steam outlet valve, PN 16
- N. 1 Pressure safety valve (PSV), PN 16
- N. 1 Instrument header drain valve (ball type) with a sight glass to indicate water filling.
- N. 1 Coil drain valve (ball type, for vertical versions only)
- N. 1 Feed water stop valve, installed on feed water inlet line (globe valve, PN 40)
- N. 1 Feed water check valve, installed on feed water inlet line (disk check valve, PN 40)
- N. 1 Pressure gauge, installed on steam header (steam pressure).
- N. 1 PSHH Pressure switch on the steam outlet for system interlock
- N. 1 TSHH Temperature switch installed on steam header (steam temperature)
- N. 1 TSHH Temperature switch installed on flue gas exit (flue gas temperature)
- N. 1 FSLL low flow switch installed on feed water line
- N. 1 pressure transmitter for burner control installed on steam header (modulating version)

24H UMNANNED OPERATION KIT

It includes the following SIL3-certified components for enhanced safety:

- N° 1 SIL3 safety temperature switch on steam outlet (insted of STD one)
- N° 1 SIL3 safety temperature switch on flue gases outlet (insted of STD one)
- N° 1 PED class IV pressure switch on steam outlet (insted of STD one)
- CE certification for unmanned operation.

72H UMNANNED OPERATION KIT (option)

In addition to 24h kit, it includes:

- TDS control on feed water inlet
- Burner suitable for 72 h unmanned operation
- N°1 signal for boiler interlock for water treatment fault CE

certification for unmanned operation

Note. The customer is responsible for a condensate and water treatment analysis and monitoring system. A risk analysis must determine if polluted condensate return (with oils, acids, organic substances, etc.) or feed water treatment fault is possible. If so, a monitoring system must be in place to divert polluted condensate or feedwater to a drain and trigger an immediate boiler lockout if contaminant limits are exceeded.

CONTROL PANEL

Electrical control panel CE-certified mounted on board, with IP 54 protection rating. It operates on 400V, 50Hz, 3Ph power.

The electrical panel includes:

- Electrical protections and a main switch
- Burner and pump controls
- Safety chains
- Alarms and indicators
- An emergency stop button
- Alarm status contacts (on request)
- PID modulating electronic regulator (modulating version)

Electrical wiring for the burner, pumps, and field instruments is routed through flexible conduits with an IP 65 protection rating.

For modulating version only:

- A UMC Uni Matic Controller PLC with a 7-inch touchscreen (HMI) and a MODBUS communication protocol

FEED WATER PUMPS

Both the main and second feedwater pumps are provided as a independent pump skid, hydraulically connected the boiler.

MAIN FEEDWATER PUMP

- N°1 alternative pump for high temperature water ($T_{\text{water}} < 100\text{ }^{\circ}\text{C}$)
- A 4-poles electrical motor
- Frequency converter for electric motor management (modulating version only)
- Mechanical transmission
- Steel basement

SECOND FEEDWATER PUMP (option)

Additional spare pump skid with all the above accessories for a quick replacement in case of maintenance of main pump.

BOOSTER PUMP

Additional pump necessary to ensure the required NPSH for the feedwater pump.

Stainless steel vertical pump (GRUNDFOS), coupled with IEC3 motor and the related electrical pump control mounted on boiler control panel.

ECONOMIZER (option)

Heat recovery system with economizer, which preheats feedwater using exhaust flue gases. It includes:

- N°1 carbon steel heat exchanger CE certified (finned tube type) mounted directly on flue gas exit, hydraulically connected to boiler.
- The box containing the heat exchange coils is fitted with openable covers for inspection and to clean the finned tubes
- Convergent and divergent flue gas ducts.
- Water modulating-level system for continuous economiser supplying
- Manual by-pass water side system that includes: Additional shut-off valves, drain valve, and a PSV for economizer water bypass.

COMBUSTION SYSTEM

It includes:

- Mono block burner suitable for Natural Gas with flame detector with 2 stage or modulating regulation.
Combustion air fan with motor.
O2 probe for combustion optimization.
Burner Management System (BMS) supplied by the burner manufacturer.
- Natural gas train according to EN 161 (safety pressure switches, block valves, leakage control of gas valves)
- Modulating regulation system (for burner and feed pump) mounted control panel front door

REQUIRED HEAD FOR FEED WATER PUMP

Flash coil steam boilers are fed by piston pumps that may create a vacuum in the feeding pipe. Therefore, the feed water pump must work under a pressure head. Always provide a filter and a check valve before the water pump. As the water pump is a reciprocating piston pump, never connect it to the feed water pipe through a rigid joint but always interpose a flexible pipe adequate for inlet water temperature.

The hotter the condensate, the greater the required head provided to the feed water pump. If the feed water tank cannot be raised sufficiently to obtain the necessary hydrostatic head, it is necessary to install a recirculation pump (booster) between the condensate drum and the feeding pump. The recirculation pump must start and stop together with the feeding pump.

Generator Steam Production (kg/h)	Connecting Pipe Diameter	Height of tank [meters]			Circulation Pump Capacity (m ³ / h)
		≤ 70 °C	80 ° C	≥ 90 ° C	
120	Ø 1"	1,50	2,00	2,50	0,30
200	Ø 1 ¼"	1,50	2,00	2,50	0,40
300	Ø 1 ½"	1,50	2,00	2,50	0,50
400	Ø 1 ½"	1,50	2,00	2,50	0,60
500	Ø 2"	1,50	2,00	2,50	0,80
600	Ø 2"	1,50	2,00	3,00	1,00
800	Ø 2"	1,50	2,50	4,50	1,20
1000	Ø 2 ½"	1,50	3,50	5,50	1,50
1200	Ø 2 ½"	2,00	3,50	6,00	2,00
1500	Ø 3"	2,00	3,50	4,50	2,00
1800	Ø 3"	2,00	3,50	5,00	2,50
2000	Ø 3"	2,00	3,50	6,00	2,50
2500	Ø 3"	2,00	3,50	6,00	3,50
3000	Ø 4"	2,00	3,50	4,50	4,00
4000	Ø 4"	2,00	3,50	6,00	6,00
5000	Ø 4"	2,00	3,50	6,50	6,50
6000	Ø 4"	2,00	4,00	7,50	7,00