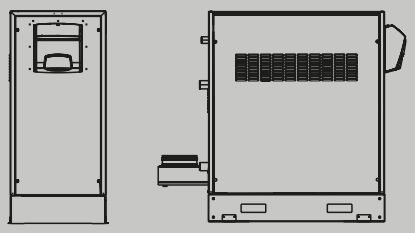
02/2024
27003090 – rev. 5

ALU PRO POWER

Indoor gas condensing floor-standing modules

Complies with Directive 2009/125/EC
Modular condensing heating units with body in special aluminum and silicon alloy characterized by wide modulation ranges (up to 1 to 40) and extremely compact dimensions
In combination with a RIELLO plate heat exchanger, the boiler body benefits from the conventional warranty up to 6 years



RIELLO
Energy For Life

A Carrier Company

ALU PRO POWER

PRODUCT DESCRIPTION

The generator is based on a cascade of independent 75 kW furnace thermal modules, managed in cascade sequence, which guarantees maximum adaptability to the required thermal load and guarantees continuity of service.
The continuous total premix burner in stainless steel guarantees stable, silent, high-performance combustion with low polluting emissions, making the heating unit in Class 5 NOx (according to UNI EN 297).
Complete with climate thermoregulation set up for the management of a modulating circulator for the primary ring.
The use of RIELLOtech regulation then allows the cascade management of up to 8 boilers.

- Low body pressure losses
- Wide range of accessories to ensure simple, fast, flexible and complete installation
- Prepared for outdoor installation with the use of special kits that make the thermal unit IPX5D
- The compact dimensions, reduced weight and base make it easy to transport and position.

TECHNICAL DATA

Model		ALU PRO 115 POWER	ALU PRO 150 POWER	ALU PRO 225 POWER	ALU PRO 300 POWER	ALU PRO 349 POWER	ALU PRO 375 POWER	ALU PRO 450 POWER	ALU PRO 525 POWER	ALU PRO 600 POWER
Equipment		ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM
Efficiency class		≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn	≥93 + 2 log Pn
Fuel		NG-LPG	NG-LPG	NG-LPG	NG-LPG	NG-LPG	NG-LPG	NG-LPG	NG-LPG	NG-LPG
Test room temperature	°C	20	20	20	20	20	20	20	20	20
Max. rated heat output at furnace (LCV)	kW	115	150	225	300	349	375	450	525	600
Min. rated heat output at furnace (LCV)	kW	15	15	15	15	15	15	15	15	15
Max. rated heat output (80-60°C)	kW	112,1	146,3	220,1	294	343,1	368,6	442,4	516,1	589,8
Min. rated heat output (80-60°C)	kW	14,7	14,7	14,7	14,7	14,7	14,7	14,7	14,7	14,7
Max. rated heat output (50-30°C)	kW	119,6	156,0	234,0	312,0	363,0	390,0	468,0	546,0	624,0
Min. rated heat output (50-30°C)	kW	15,75	15,75	15,75	15,75	15,75	15,75	15,75	15,75	15,75
Efficiency at max. rated heat output (80-60°C)	%	97,5	97,5	97,8	98	98,3	98,3	98,3	98,3	98,3
Efficiency at min. rated heat output (80-60°C)	%	98	98	98	98	98	98	98	98	98
Efficiency at max. rated heat output (50-30°C)	%	104	104	104	104	104	104	104	104	104
Efficiency at min. rated heat output (50-30°C)	%	105	105	105	105	105	105	105	105	105
Useful efficiency at 30%	%	108,0	108,0	108,0	108,0	108,0	108,0	108,0	108,0	108,0
Heat loss in standby mode	%	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Chimney losses with burner on at P.max	%	0,7	0,7	0,6	0,5	0,4	0,4	0,4	0,4	0,4
Chimney losses with burner on at P.min	%	0,9	0,9	1,1	1,2	1,4	1,4	1,4	1,4	1,4
Shell losses with average t 70°C and burner on	%	1,8	1,8	1,6	1,5	1,3	1,3	1,3	1,3	1,3
Shell losses with average t 70°C and burner off	%	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Flue gas temperature at max. and min. power 80-60°C	°C	70-65	70-65	70-65	70-65	70-65	70-65	70-65	70-65	70-65
Flue gas temperature at max. and min. power 50-30°C	°C	45-40	45-40	45-40	45-40	45-40	45-40	45-40	45-40	45-40
Air excess at P. max	%	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Air excess at P. min	%	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Max-min mass flue gas flow rate	kg / s	0,056-0,007	0,073-0,007	0,110-0,007	0,147-0,007	0,165-0,007	0,184-0,007	0,220-0,007	0,257-0,007	0,294-0,007
Flue gas residual head	Pa	100	100	100	100	100	100	100	100	100
NOx	mg/kWh	<80	<80	<80	<80	<80	<80	<80	<80	<80
Water-side pressure losses with ΔT20°C	mbar	30	50	60	70	80	80	90	100	150
Water-side pressure losses with ΔT10°C	mbar	210	240	275	300	330	330	360	370	470
Water content	l	30	30	40	55	65	65	78	88	100
Maximum working pressure	bar	6	6	6	6	6	6	6	6	6
Power supply voltage	V/Hz	230-50	230-50	230-50	230-50	230-50	230-50	230-50	230-50	230-50
Electrical boiler consumption at P. max	W	300	300	440	580	720	720	860	1000	1140
Electrical consumption with boiler at min. power	W	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Electrical consumption with pumps at max. power	W	130*	210*	400*	400*	620*	620*	800*	800*	800*
Electrical consumption with pumps at min. power	W	20*	20*	20*	20*	50*	0,05*	50*	50*	50*
Flue gas discharge diameter	mm	150	150	200	250	250	250	300	300	300
Empty weight	kg	240	240	310	395	470	470	565	640	735
Category according to UNI 10642		B23	B23	B23	B23	B23	B23	B23	B23	B23
Noise (a)	dB(A)	< 48	<48	< 48	<48	< 49	< 49	< 49	<49	<49

* The absorption of the circulators refers to the electronic Vega RMDA 40-80 and 65-90 with operation at constant ΔT(10÷15°C depending on the models) of the boiler board.
The following safety accessories are present (supplied as standard) in the boiler:
- 6 bar safety valve
- minimum pressure switch with intervention at 1.2 bar
- safety thermostat with manual reset calibrated at 99°C.

(a) Measured in free field at 1 meter.

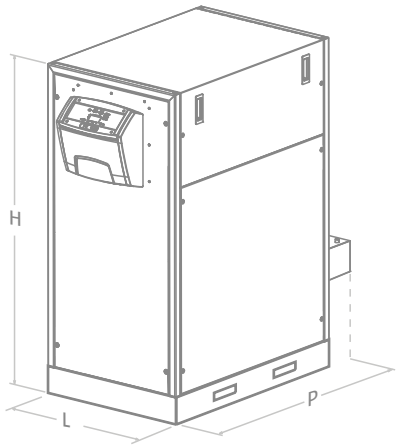
ERP TECHNICAL DATA

PARAMETER	SYMBOL	UNIT	ALU 115 PRO POWER	ALU 150 PRO POWER	ALU 225 PRO POWER	ALU 300 PRO POWER	ALU 349 PRO POWER
Seasonal efficiency class in central heating mode							
Seasonal efficiency class in water heating							
Useful (rated) heat output	Pn	kW	115	150	225	300	349
Seasonal efficiency class in room heating mode	ηS	%	-	-	-	-	-
USEFUL HEAT OUTPUT							
At useful heat output and at high temperature capacity (*)	P4	kW	115,0	150,0	225,0	300,0	349,0
At 30% of useful heat output and at low temperature capacity (**)	P1	kW	34,5	45,0	67,5	90,0	104,7
EFFICIENCY							
At useful heat output and at high temperature capacity (*)	η4	%	87,8	87,8	88,0	88,2	88,5
At 30% of useful heat output and at low temperature capacity (**)	η1	%	97,2	97,2	97,2	97,2	97,2
AUXILIARY ELECTRICAL CONSUMPTION							
At full load	elmax	W	0,3	0,3	0,44	0,58	0,72
At partial load	elmin	W	0,09	0,09	0,132	0,174	0,216
In standby mode	PSB	W	0,02	0,02	0,02	0,02	0,02
OTHER PARAMETERS							
Thermal losses in Stand-by mode	Pstby	W	1,15	1,5	2,25	3	3,49
Pilot flame energy consumption	Pign	W	-	-	-	-	-
Yearly energy consumption	QHE	GJ	-	-	-	-	-
Noise level, indoor (sound power)	LWA	dB	62	63	63	64	65
Nitrogen oxide emissions (NOx)	NOx	mg/kWh	32,1	35,1	37,8	35,1	45,0
FOR COMBINED HEATING UNITS							
Declared load profile		-	-	-	-	-	-
Energy efficiency class in water heating	ηwh	%	-	-	-	-	-
Daily electrical energy consumption	Qelec	kWh	-	-	-	-	-
Daily fuel consumption	Qfuel	kWh	-	-	-	-	-
Annual electrical energy consumption	AEC	kWh	-	-	-	-	-
Annual fuel consumption	AFC	GJ	-	-	-	-	-

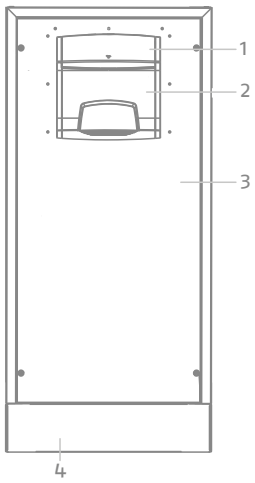
PARAMETER	SYMBOL	UNIT	ALU 375 PRO POWER	ALU 450 PRO POWER	ALU 525 PRO POWER	ALU 600 PRO POWER
Seasonal efficiency class in central heating mode						
Seasonal efficiency class in water heating						
Useful (rated) heat output	Pn	kW	375	450	525	60
Seasonal efficiency class in room heating mode	ηS	%	-	-	-	-
USEFUL HEAT OUTPUT						
At useful heat output and at high temperature capacity (*)	P4	kW	375,0	450,0	525,0	600,0
At 30% of useful heat output and at low temperature capacity (**)	P1	kW	112,5	135,0	157,5	180,0
EFFICIENCY						
At useful heat output and at high temperature capacity (*)	η4	%	88,5	88,5	88,5	88,5
At 30% of useful heat output and at low temperature capacity (**)	η1	%	97,2	97,2	97,2	97,2
AUXILIARY ELECTRICAL CONSUMPTION						
At full load	elmax	W	0,72	0,86	1	1,14
At partial load	elmin	W	0,216	0,258	0,3	0,342
In standby mode	PSB	W	0,02	0,02	0,02	0,02
OTHER PARAMETERS						
Thermal losses in Stand-by mode	Pstby	W	3,75	4,5	5,25	6
Pilot flame energy consumption	Pign	W	-	-	-	-
Yearly energy consumption	QHE	GJ	-	-	-	-
Noise level, indoor (sound power)	LWA	dB	65	66	67	68
Nitrogen oxide emissions (NOx)	NOx	mg/kWh	55,8	55,8	52,2	45,9
FOR COMBINED HEATING UNITS						
Declared load profile		-	-	-	-	-
Energy efficiency class in water heating	ηwh	%	-	-	-	-
Daily electrical energy consumption	Qelec	kWh	-	-	-	-
Daily fuel consumption	Qfuel	kWh	-	-	-	-
Annual electrical energy consumption	AEC	kWh	-	-	-	-
Annual fuel consumption	AFC	GJ	-	-	-	-

OVERALL DIMENSIONS

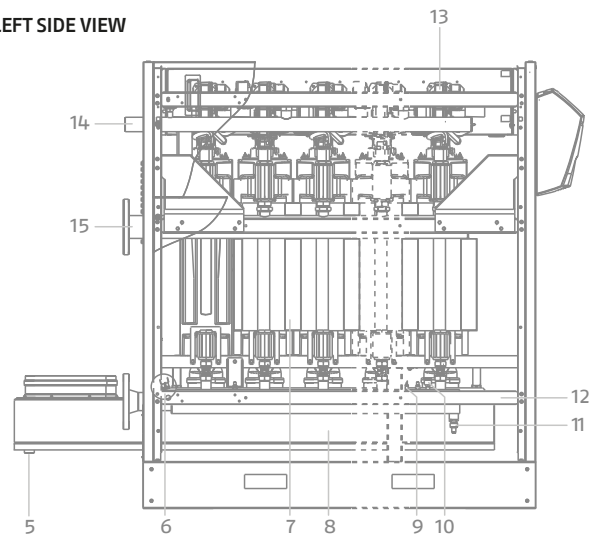
BOILER MODEL		115	150	225	300	349	375	450	525	600
L	mm	690	690	690	690	690	690	690	690	690
P	mm	1264	1264	1264	1654	1654	1654	2103	2103	2298
H	mm	1534,5	1534,5	1534,5	1534,5	1534,5	1534,5	1534,5	1534,5	1534,5
Net weight	kg	240	240	310	395	470	470	565	640	735



FRONT VIEW



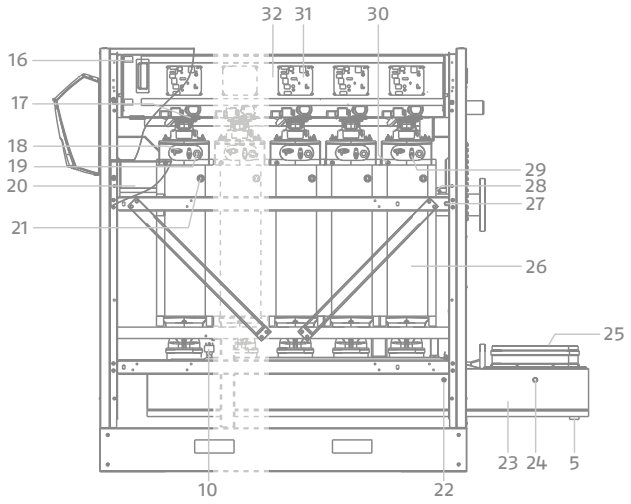
LEFT SIDE VIEW



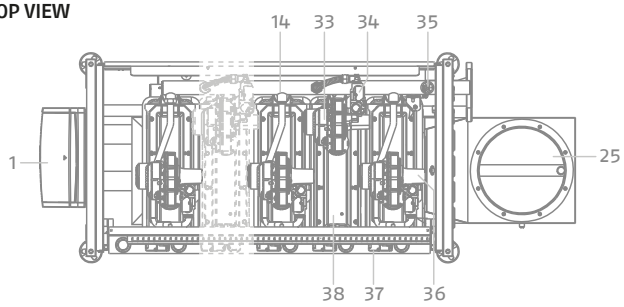
SYSTEM LAYOUT

1 Control panel
2 Control panel
3 Front panel
4 Base
5 Condensate drain
6 Flue thermostat
7 Modules insulation
8 Flue gas box
9 Return probe connection
10 Water pressure switch
11 Drain cock
12 Return manifold
13 Burner
14 Flues Gas
15 Flow manifold
16 Cover panel
17 Burner clapet
18 Ignition electrode
19 Flame inspection
20 Side panel
21 Thermal module safety thermostat
22 Exhaust flues probe
23 Flue gas box
24 Flue gas analysis outlet
25 FLUE GAS SYSTEMS
26 Aluminum boiler body
27 Delivery probe
28 Probe holder + Safety thermostat
29 Detection electrode
30 Thermal module delivery probe
31 Flame control boards
32 Card support
33 Fan motor
34 Gas valve
35 Return gas pressure switch
36 Fan
37 Ignition transformer
38 Thermal module cover

RIGHT SIDE VIEW

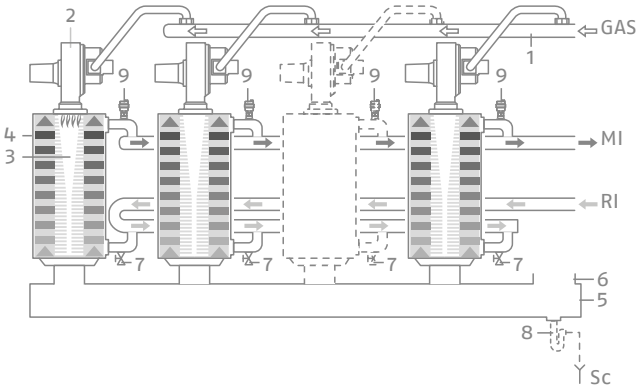


TOP VIEW



1 Control panel
2 Control panel
3 Front panel
4 Base
5 Condensate drain
6 Flue thermostat
7 Modules insulation
8 Flue gas box
9 Return probe connection
10 Water pressure switch
11 Drain cock
12 Return manifold
13 Burner
14 Flues Gas
15 Flow manifold
16 Cover panel
17 Burner clapet
18 Ignition electrode
19 Flame inspection
20 Side panel
21 Thermal module safety thermostat
22 Exhaust flues probe
23 Flue gas box
24 Flue gas analysis outlet
25 FLUE GAS SYSTEMS
26 Aluminum boiler body
27 Delivery probe
28 Probe holder + Safety thermostat
29 Detection electrode
30 Thermal module delivery probe
31 Flame control boards
32 Card support
33 Fan motor
34 Gas valve
35 Return gas pressure switch
36 Fan
37 Ignition transformer
38 Thermal module cover

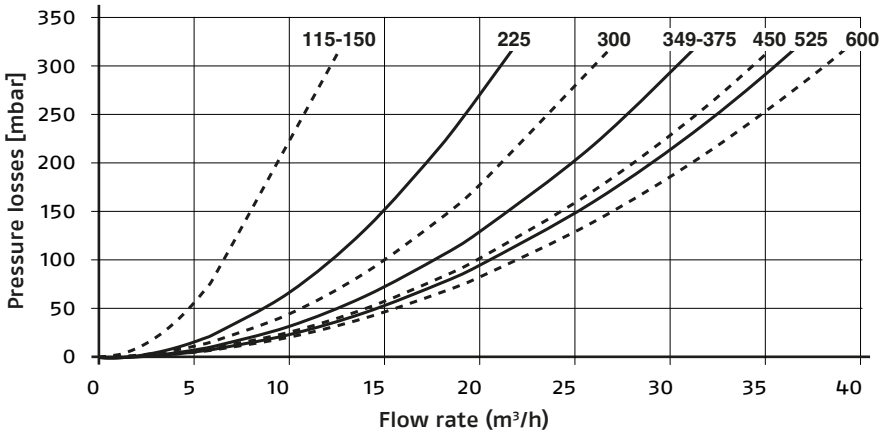
HYDRAULIC CIRCUIT



1 Flues gas inlet
2 Burner assembly
3 Combustion chamber
4 Heat exchange element
5 Flue gas box
6 Flue gas outlet connection
7 Boiler charging/discharging tap
8 Condensate drain siphon (not supplied)
9 Automatic vent valve
F Central heating flow
R Central heating return
GAS Fuel supply
Sc Discharge

PUMP

Choose a pump compatible with the hydraulic resistance of the boiler and system.
The graph below shows the resistance characteristics.

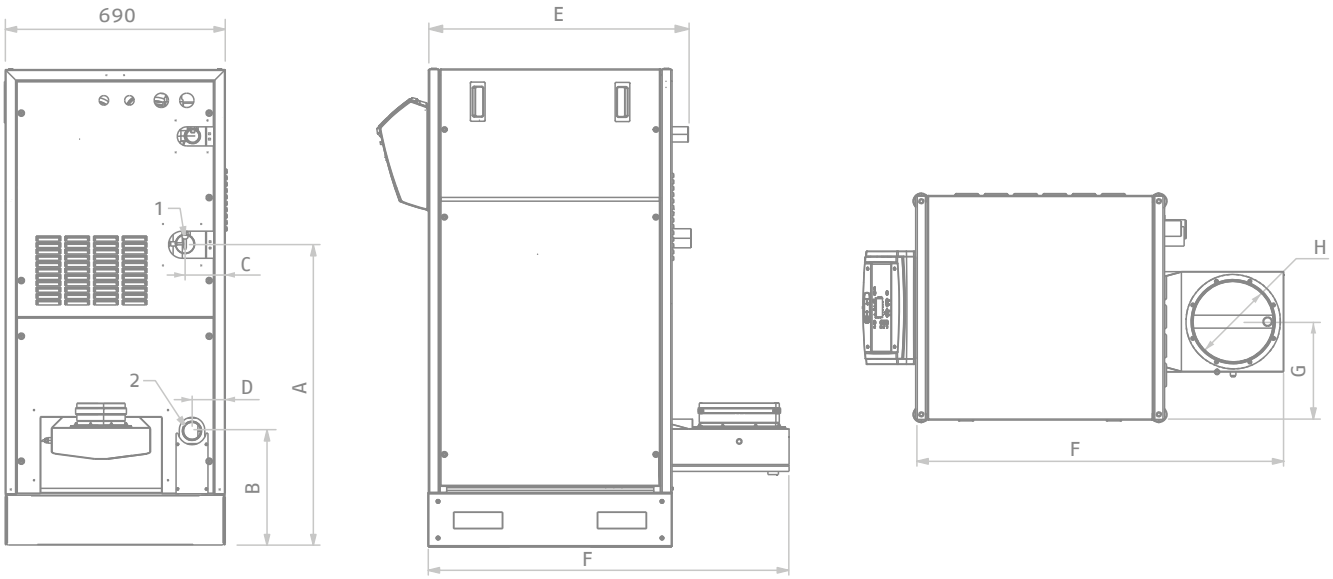


At first start-up and at least every year it is useful to check the rotation of the circulator shaft as, especially after long periods of non-operation, deposits and/or residues can prevent free rotation. Before loosening or removing the circulator closing cap, protect the underlying electrical devices from any water leakage.
It is forbidden to operate the pumps without water.

HYDRAULIC CONNECTIONS

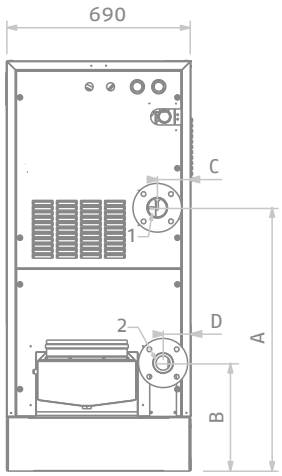
The ALU PRO POWER are designed and manufactured to be installed on heating systems and, if combined with a remote boiler, for the production of hot water.
The characteristics of the hydraulic connections are as follows:

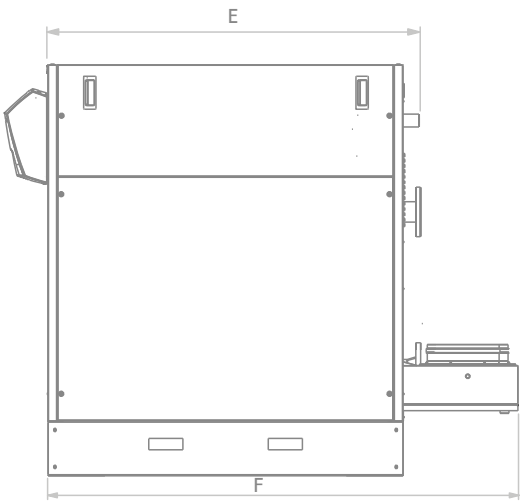
ALU 150 ÷ 375 PRO POWER



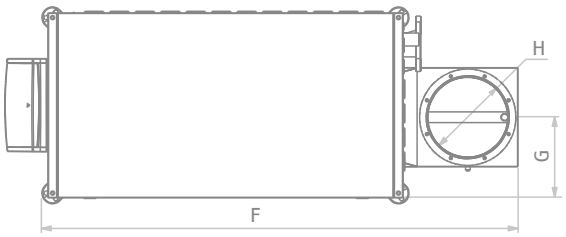
BOILER MODEL		115	150	225	300	349	375
A	mm	987,5	987,5	987,5	985,5	985,5	985,5
B	mm	402	402	402	402	402	402
C	mm	126	126	126	126	126	126
D	mm	104	104	104	104	104	104
E	mm	947	947	947	1337	1337	1337
F	mm	1264	1264	1264	1654	1654	1654
G	mm	301	301	301	300	300	300
Ø H	mm	150	150	200	250	250	250
1 - Flow system		Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G
2 - Return system		Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G	Ø 2" G

ALU 450 ÷ 600 PRO POWER



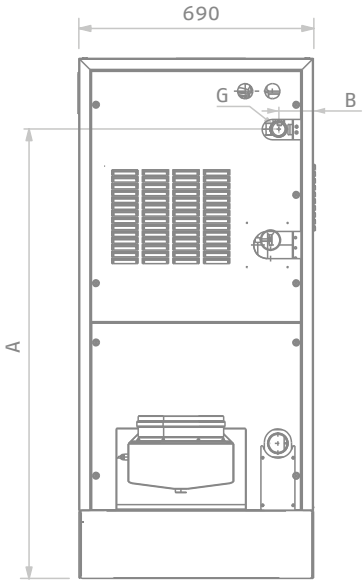


BOILER MODEL		450	525	600
A	mm	985	985	982
B	mm	404	404	401
C	mm	126	126	126
D	mm	104	104	104
E	mm	1735	1735	1938
F	mm	2103	2103	2298
G	mm	300	300	300
Ø H	mm	300	300	300
1 - Flow system		PN10 DN65 flange	PN10 DN65 flange	PN10 DN65 flange
2 - Return system		PN10 DN65 flange	PN10 DN65 flange	PN10 DN65 flange

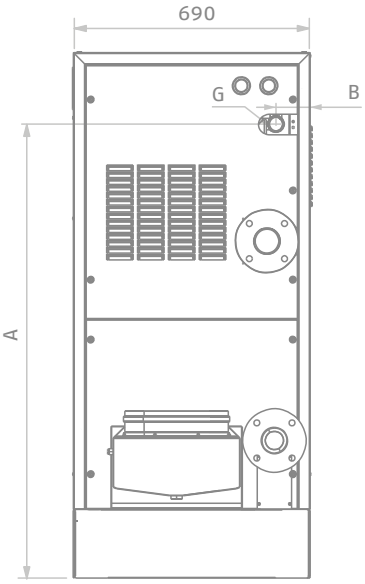


GAS CONNECTIONS

ALU 115 ÷ 375 PRO POWER



ALU 450 ÷ 525 PRO POWER

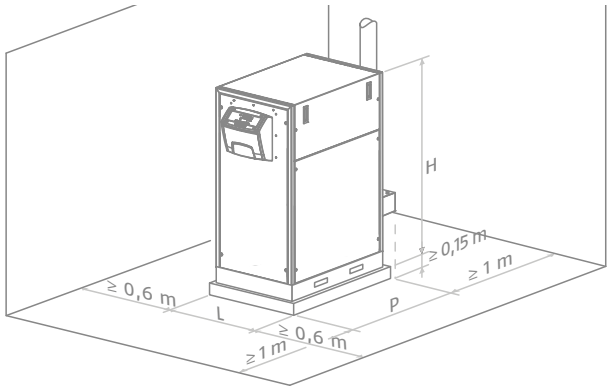


BOILER MODEL		115	150	225	300	349	375	450	525	600
A	mm	1326	1326	1326	1326	1326	1326	1326	1326	1326
B	mm	102	102	102	102	102	102	100	100	100
G - Gas connection		Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G	Ø 1" 1/2 G

The connection of the Riello ALU PRO POWER to the gas supply must be carried out in compliance with the current installation regulations.
Before connecting you must make sure that:
- The type of gas is the one for which the appliance is designed
- The pipes are carefully clean and free of processing residues.
The installation of an appropriately sized filter is recommended.
The gas supply system must be adequate for the flow rate of the heating unit and must be equipped with all the safety and control devices required by current regulations.
Once installation has been completed, check that the joints made are leak-proof.

INSTALLATION ROOM

The ALU PRO POWER, developing a power greater than 35 kW, must be installed in a thermal power plant in compliance with the Technical Regulations currently in force. It will also be necessary to provide an adequate system for collecting condensate and lo flue gas discharge.
For Belgium, boilers must be installed according to NBN D51.003, NBN B61.002 (output < 70 kW), NBN B61.001 (output > 70 kW).
Take into consideration the space required for accessibility to safety and adjustment devices and for carrying out maintenance operations.
Check that the degree of electrical protection of the heating unit is adequate for the characteristics of the installation room.
Thermal units cannot be installed outdoors because they are not designed to operate outdoors. This type of use is only possible with the installation of the "outdoor kit" available as an accessory to be ordered separately.



Non-mandatory recommended distances.

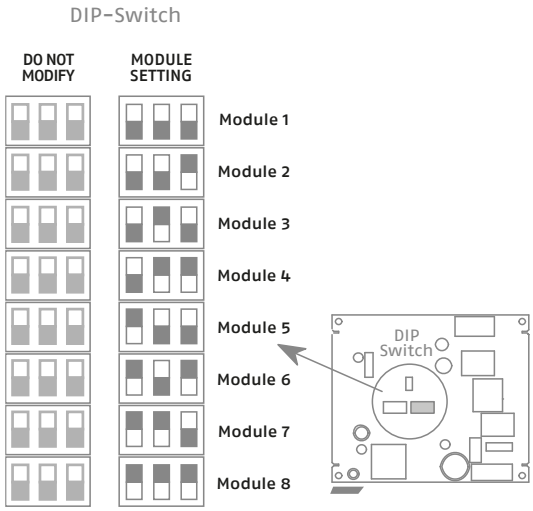
SYSTEM ANTIFREEZE PROTECTION

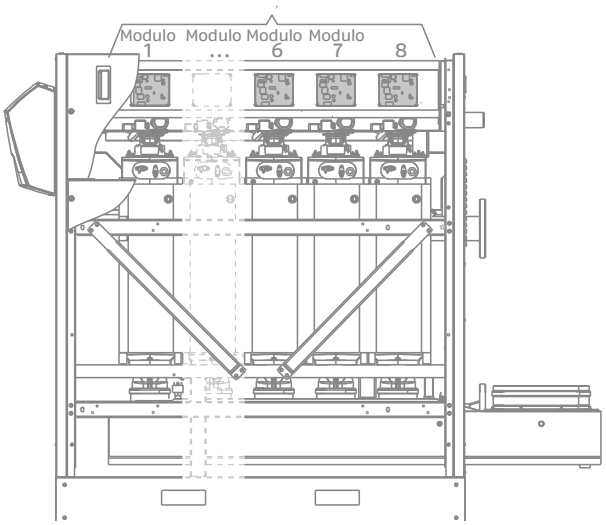
Alu Pro Power condensing thermal units are equipped with electronics that provide frost protection.
Such electronics, in fact, causes the thermal unit to start operating below a minimum temperature threshold.
It is therefore not necessary to make use of special antifreeze fluids, except for applications with prolonged total shutdowns.
If antifreeze liquids are used, check that they are not aggressive to aluminum.

INSTALLATION ON OLD SYSTEMS OR TO BE MODERNIZED

When the boiler is installed on old or modernized systems, check that:
- The flue is able to withstand the temperature of the combustion gases and that it has been designed and made in compliance with applicable standards. The flue must also be as straight as possible, sealed, insulated and not blocked or choked.
- The chimney must be equipped with a condensate evacuation connection.
- The electrical system be made in accordance with the
Specific standards and by qualified personnel.
- The flow rate, head and direction of the of the circulation pumps is appropriate.
- The fuel supply line and tank, if any, are made according to the Specific Standards.
- Make sure that expansion vessels are big enough to contain the additional volume generated by thermal expansion.
Make sure that the central heating circuit has been flushed out to remove all sludge and lime scale, and that it has been bled and seal tested.
We recommend the use of a hydraulic circuit breaker or heat exchanger to separate the primary and secondary circuits.

THERMAL MODULE SETTINGS DIAGRAM

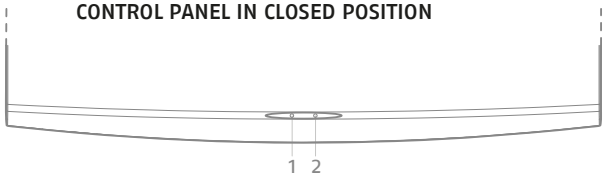




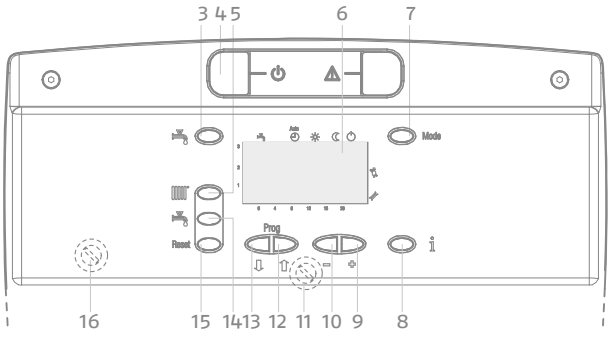
CONTROL PANEL

Primary information / command interface

CONTROL PANEL IN CLOSED POSITION



CONTROL PANEL IN OPEN POSITION



1 Power supply signal (green).
Lights up to indicate the presence of power supply.

2 Burner block signal (red).
It lights up if a burner lockout occurs.

3 DHW mode ON/OFF button.
If activated, the icon appears on the display

4 Main switch

5 Heating temperature or setpoint adjustment button
Room temperature

6 Display

7 Button for selecting the operating mode.
A bar is placed at the icons:
- Automatic: according to the set program
- Continuous: continuous regime
- Reduced: reduced regime
- Stand-by

8 Information button

9-10 Buttons for changing parameter value

11 Fuse (accessible by turning the control panel slightly)

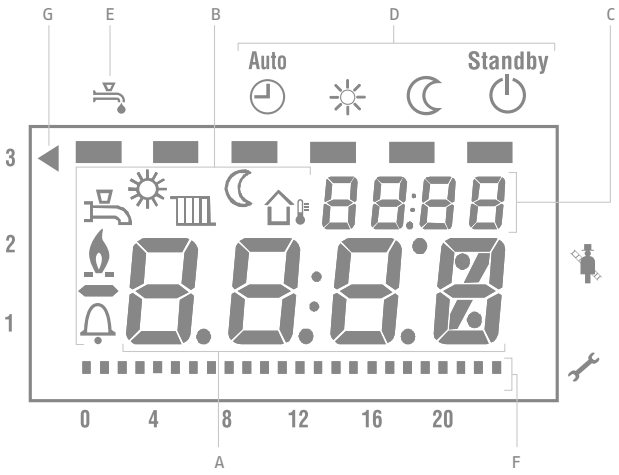
12-13 Buttons for parameter selection

14 DHW temperature adjustment button

15 RESET button: allows operation to be restored after a fault stop

16 Manual reset safety thermostat (accessible by slightly rotating the control panel)

Secondary information / display view



A Large numeric display.
Current value display, non-volatile errors

B Display symbols:
- DHW temperature or mode active
- Boiler or room setpoint, or heating mode active
- Outdoor temperature
- Nominal regime
- Reduced regime
- Presence of flame
- Error

C Small numeric display
Time display, parameter or error code setting, combustion module view

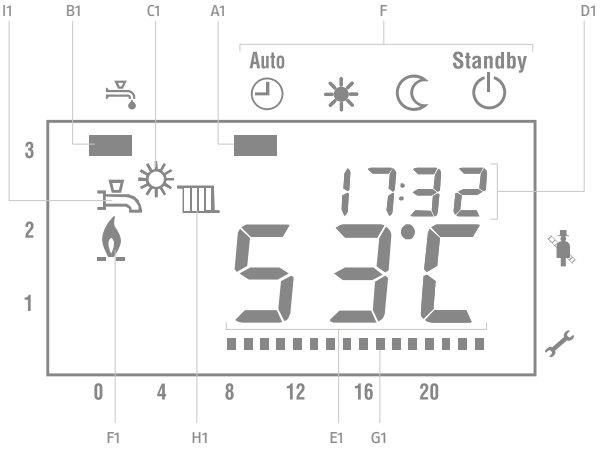
D Heating circuit operating modes:
- Automatic: according to the set program
- Continuous: nominal regime
- Reduced: reduced regime
- Stand-by

E DHW operating mode: ON or OFF

F Current time reporting

G Indication of device operation 0-10 V

Standard display view



A1 Operation mode.
By pressing the " Mode " button, the bar will be positioned below the corresponding mode icon.

B1 DHW mode.
The mode is turned on/off by pressing the " " button (located above the display).

C1 Nominal operating regime

D1 Hour of the day

E1 Current value of the boiler temperature

F1 Presence of flame

G1 Current time reporting

H1 Current heating operation

I1 Current DHW operation.

FUNCTIONAL NOTE

The control panel of the ALU PRO POWER heating unit controls:

- The DHW priority function which provides that the demand for domestic hot water has priority over that of hot heating water.
- The antifreeze function:
  Boiler antifreeze function. If the boiler temperature is lower than P511 the burner turns on at maximum power until the boiler temperature reaches P512.
  System antifreeze function, active only with external probe connected. If the external temperature is lower than -5°C the pumps are activated; if the external temperature is between -5° and 1,5°C the pumps are activated for 10 minutes at 6 hour intervals; if the external temperature is higher than 1,5°C the pumps turn off.
- The heat disposal function: if for any reason the P515 limit temperature is reached, the heating unit switches off and the accumulated heat is disposed of by activating the system pump, if the last request was heating, or the domestic hot water pump, if the last request was health care.
- The cascade management function: using the regulator (accessory) it is possible to connect the thermal units in cascade up to a maximum of 16 generators.
- The on/off control function: to avoid repeated switching on and off, the heating unit remains off for a minimum time. However, if the difference between the setpoint and the current boiler temperature exceeds a pre-established threshold, the heating unit restarts.

OPERATION

HEAT DEMAND (WITH THE THREE SYSTEMS)

The Alu Pro Power regulation system makes three different types of calls available:
1 - with OT+ signal
2 - with external 0-10V control
3 - with room thermostat.

1 Heat request with OT+ signal
The OT+ input is enabled only by using the RVS communication kit available as an accessory to be ordered separately.
2 Temperature request with 0-10V control
The 0-10Vdc input is translated into a temperature setpoint.
• 0Vdc ÷ 1Vdc = no request;
• 1Vdc = request present with temperature setpoint at the minimum allowable value;
• 10Vdc = request present with temperature setpoint at maximum allowable value.
The 0-10V controllers provided are: 0-10V output RVS63.
The management of the 0-10V device is set through the selection of parameter C750, which can take the following values:
• 0 = no 0-10V device is connected to the system;
• 1 = 0-10V device is connected to the system; the minimum standby signal is 0.5V. If the input read by the sequencer is below this threshold, the request via TA is enabled; for higher values the TA input is disabled;
• 2 = 0-10V device is connected to the system; the minimum stand-by signal is 0.5V. The TA input is always disabled.
In case both an opentherm device and a 0-10V device are detected connected to the system at the same time (parameter C750 in cases 1 or 2), any requests from the latter will not be handled.
The display relating to the presence and operating status of the 0-10V input device is as follows:
• If C750 = 0: no signaling is activated;
• If C750 = 1 or 2, and the input signal is greater than 0.5Vdc: the symbol is steadily lit ◀ in the upper left corner of the LCD;
• If C750 = 1 or 2, and the input signal is less than 0.5Vdc: the symbol ◀ in the upper left corner of the LCD.
3 Function enabling request with TA The heating request with room thermostat is handled only in the case where no device connected to the opentherm bus nor to the 0-10V input of the system is detected (C750 = 0 or C750 = 1 with 0-10V input below the threshold of 0.5V). In the above cases, closing the thermostat generates a request with setpointimpostat from the interface keypad, if the outdoor probe is not present, or with setpoint calculated from the climate curves, if the outdoor probe is present.

NIGHT REDUCTION SYSTEMS

The night reduction function is active when the following conditions are all simultaneously met:
- parameter C806 = 1 (enable function);
- outdoor probe is present and active;
- no device is connected to the OpenTherm input;
- no device is connected to the 0-10Vdc input.
In this case, even outside the time scheduling bands, the closing of the Thermostat input
Environment generates a heat demand. The setpoint is that calculated from the climate compensation curves, decreased by a value given by parameter H507.

CLIMATE COMPENSATION

Climate compensation is activated if the outdoor temperature sensor is present; the flow temperature setpoint is calculated using the climate compensation curve, which is defined as follows:
- the slope of the compensation curve is set by parameter P532, so as to adjust the water flow temperature according to the outdoor temperature, when the compensation curve is on, the parameter T_SET (P505) is added to the value calculated from the climate curve, so that the curve can be translated vertically.

Outdoor temperature	Setpoint temperature
TE >= 0	TV = TRw + s(TRw - 8/9 TE) + Korr
TE < 0	TV = TRw + s(TRw - 0.7 TE) + Korr

TV = flow temperature setpoint
TRw = room temperature setpoint
TE = outdoor temperature
s = slope of climate curve
Korr = (20 - TRw) * (20 - TE) * s/120

The outdoor temperature used for climate compensation is the current temperature taken every 10 minutes and averaged over a 10-hour period. Based on the temperature parameter for summer/winter and winter/summer changeover, there is an automatic change of season. The setpoint flow temperature to be maintained is thus defined.

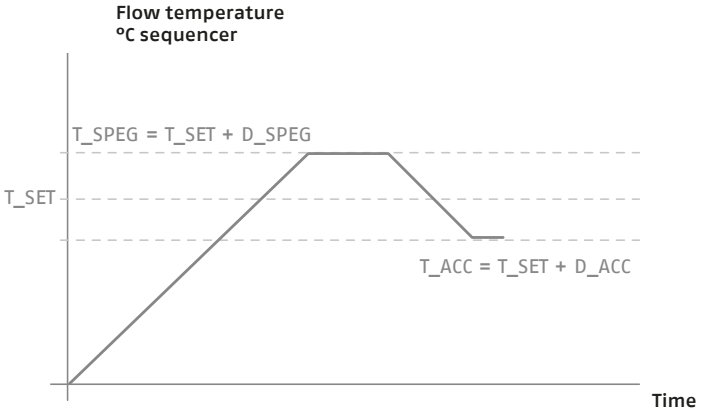
SEQUENCE CONTROL STRATEGIES

The sequence control controls the flame controls by sending a target power signal and operating with two different strategies selectable by operating on parameter P604:
- A Strategy = Simultaneous power on/off of all modules (P604=0)
- B Strategy = Independent power on/off (P604=1).

The output management command to the flame controls is adjustable in update frequency with parameter P607 (defines how many seconds the required power change command is sent every) and in change amount with parameter P608 (defines the maximum percentage of output change achievable at each update).

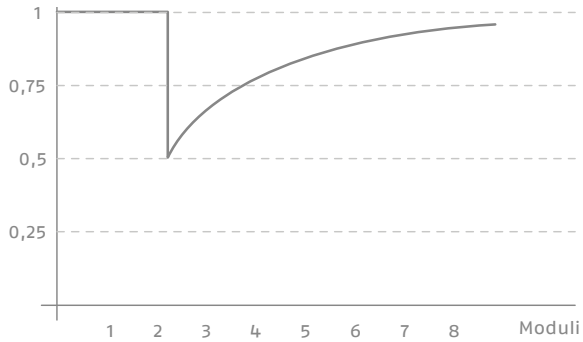
A Strategy

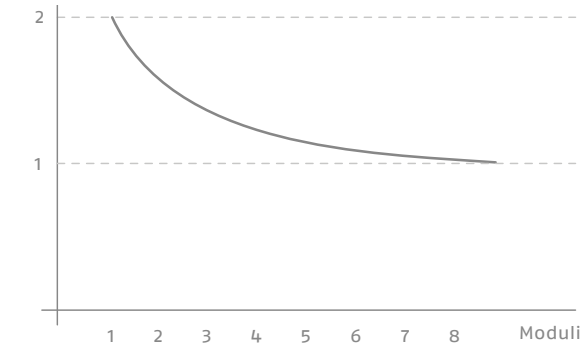
The burners, in this sequence management mode, work simultaneously as if they were a single burner, and the same control signal is passed to all of them at the same time.
They turn on and modulate together to try to keep the collector temperature at the set value.
Burner shutdown and ignition occur according to the logic presented in the diagram below operating on the basis of a deviation value on the flow set that can be set in parameter P606.
However, each module provides its own safety by working on the module probe in the following way:
if the water temperature exceeds the maximum value set in parameter P517, the effective output of the module is reduced from the value required by the heating unit. If there is no reduction in temperature and it exceeds the above set limit by a value equal to DELTA OFF, the flame control shuts off the burner.
The burner is then turned on again when the module water temperature has dropped by a value equal to DELTA ON below the value expressed at parameter P517.



B Strategy

In this generator control strategy, the burners are turned on one after the other.
In case of heat demand, the first module (leader module) is turned on, and the second module is turned on when the percentage of power demanded by the leader module controller reaches the value of parameter P609 (P_ACC). After the second module is turned on, the total power demand is divided over the two modules.
When the two lit modules reach the power of parameter P609 (P_ACC), a third module is lit and the total power is divided among three modules and so on until all burners are lit.
Each time a module is turned on, the PID calculation is suspended until all modules have reached the common power set point, limited by F_SET (P607) and V_SET (P608).
From the moment all modules that make up the generator are turned on, the controller sends an equal power request (P_SET) to the modules until the maximum power is reached.
If the total power required by the controller decreases, then the power requests to the modules decrease proportionally and uniformly (as if it were a single generator) up to a shutdown power percentage that can be set at parameter P612.
From this point on, the modules are turned off back-to-back as soon as they reach the shutdown power, according to the "first on - last off" logic, and the total required power is divided proportionally on the modules that remain on.





The shutdown phase ends when the leader burner has gone out.
The latter turns off according to the logic expressed in figure 1.

NOTE:

1 If the difference between the setpoint temperature and the temperature of the flow manifold probe is greater than parameter P616 (Delta_T for turning on all modules with strategy B), then all modules will turn on at the same time (automatic switch to management as per strategy A) to speed up the system startup (rapid startup).
2 With the aim of reducing the number of idle ignitions, parameter P611 can be used, which expresses the minimum time that must elapse between a burner shutdown and its reignition.
Similarly with parameter P610, the minimum time between turning on and turning off is limited (start-stop limitation).

3 The first module turned on in strategy B is the "Leader" module; the modules are then turned on in ascending address order with the highest number of operating hours, and so on. When the leader module has reached a number of ignition hours equal to the parameter P618 (valid only for strategy B), the number of its operating hours is reset to zero, and the new leader is identified, which will be the one of higher address with the highest number of operating hours. (burner rotation).
4 A module is active if it is connected and is not in an anomaly state

DHW PRODUCTION

DHW demand is by temperature probe or by thermostat. The selection of the type is made with parameter P559:
- with P559=0 you have a heating-only boiler
- with P559=1 you have the tank probe
- with P559=2 you have the tank thermostat.

At the end of each request, the control performs post-circulation of the DHW circulator.
With thermostat, the request occurs when the contact is closed and ends when the contact reopens.
With DHW probe, a request occurs when the temperature read falls below the requested value by a quantity equal to parameter P617. The request stops if the temperature read by the probe exceeds the set by a value equal to parameter P617.
The DHW temperature has a maximum expressed by parameter P513.
With tank Probe, the anti-legionella function (P614) can be activated with the following modes:
P614 = 0 Antilegionella disengaged
P614 = 1 Weekly antilegionella
P614 = 2 Daily antilegionella
If it is set to weekly mode, the function is activated at 2:00 a.m. on Wednesday.
If it is set to daily mode, the function is activated at 2:00 a.m. every day.
If the clock does not work, the function is disabled.
The set value of the DHW temperature during the Antilegionella phase is 60°C (not changeable).
With 0T+ input enabled, the is disabled and control of the sanitary facility switches to the controller connected in 0T+.

GENERATOR SET POINT IN DHW PHASE

The generator flow temperature setpoint during DHW demand is calculated by adding a value equal to parameter P510 to the required DHW temperature.
The setpoint is between a minimum (P508) and maximum (P509) value.
NB. The boiler flow temperature setpoint in DHW operation cannot be higher than the maximum temperature value of individual modules P517.

DHW PUMP MANAGEMENT METHODS

Using parameter C805, the operation mode of the sanitary pump can be selected.
C805 = 0 - the DHW pump is operated upstream of the hydraulic circuit breaker: when DHW demand is present, the primary circulator is kept off;
C805 = 1 - the DHW pump is operated downstream of the hydraulic circuit breaker: when there is a DHW demand, the primary circulator is turned on together with the DHW circulator;
C805 = 2 - DHW pump is operated as a zone pump downstream of the hydraulic circuit breaker; DHW demand is not handled; when CH demand is present, both circulators (primary and DHW) are turned on.

ADDITIONAL FUNCTIONS

0-10V output (modulating pump)
The 0-10V analog output available on the heating unit is used for a system pump speed command, which is managed to keep the generator flow-return delta at the value set in parameter P605.
Signal outputs have the following meaning:
0V = pump shutdown
1V = minimum speed
10V = maximum speed
The modulation range is from 1 V to 10 V, but it is possible to limit this variation, should conditions require it, by imposing a minimum value that can be set with parameter P615. The value is in volts and limits the analog output above this value.
The modulating pump is controlled with pid logic.

Hourly scheduling
A weekly time schedule can be made for the heating circuit and one for the DHW circuit.
Up to 3 phases can be set for each day, during which the circuit is enabled to operate, while outside each phase any requests will be ignored.
By means of the preset parameters P900 for heating and P960 for DHW, it is possible to choose the validity interval of the entered schedule: for a single day, for all days of the week, for the Monday-Friday interval or for the Saturday-Sunday interval.
Default values can also be set via parameters P916 for heating and P976 for DHW.

Setpoint limitation with return probe
The water temperature setpoint is managed to maintain the flow/return delta at parameter P605 (Flow/return delta for power reduction). Therefore the temperature set point is limited to the value of the return probe + the flow/return delta.
The switch-off value remains that of the set setpoint + the switch-off value.

Example: Set = 80°C, flow = 40°C, return = 25°C; if the delivery/return delta = 20°C, then the set is limited to 25°C+20°C = 45°C; as the return temperature increases, the temperature set point is increased. The shutdown value remains at 80+delta_shutdown = 84°C.

Fuel shut-off valve
The ALU PRO POWER generator control allows an external fuel shut-off valve to be driven. The function is activated via parameter P613. When all modules are off, if P613 = 1 the fuel shutoff valve is not powered while if P613 = 0 the valve is always powered.

PROTECTION FUNCTIONS

1 **Limit Temperature Generator**
If the generator flow temperature reaches the limit value expressed at parameter P515, all modules are turned off and the system pump is turned on, if the heat demand previously came from the heating circuit, or the DHW pump, if the heat demand came from the DHW circuit. Post-circulation remains until the flow temperature falls 5°C below the value expressed by parameter P515.

2 **Safety temperature**
If the flow temperature reaches the safety value expressed in parameter P518, the generator goes into non-volatile lockout. All modules are turned off and there is no heat disposal.

3 **Flue temperature**
If the flue gas temperature exceeds the value set in parameter P593, all lit modules will go to the power expressed in parameter P612.
If, after this action, the flue gas temperature returns below parameter P593 -5°C, the modules return to normal operation (the controller restarts from the power expressed at parameter P612).
If the flue temperature exceeds the value set in parameter P592, all modules shut down and a temporary anomaly occurs. When the anomaly occurs, a 10-minute post-purge is activated (by all active modules). If after this action the flue gas temperature falls 5°C below the threshold expressed by parameter P592 the cascade resumes normal operation.

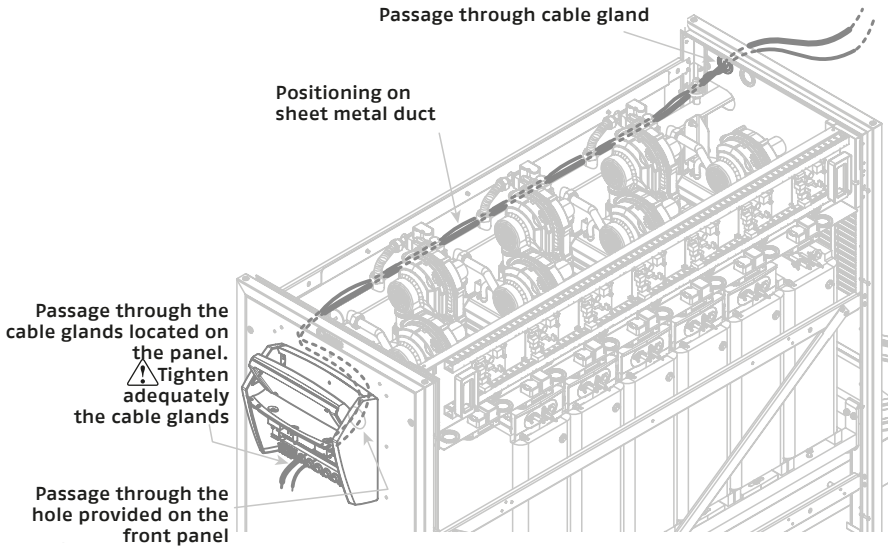
4 **Flow and return temperature control**
If the return water temperature exceeds the flow temperature, a temporary error message occurs; the modules are turned off and the pumps continue to run.
If the return temperature does not fall below the flow temperature within 10 minutes, non-volatile lockout occurs and the pumps are turned off.

5 **anti-blocking circulators**
If the system pump does not work for 24h, it is activated for 10s (system pump anti-blocking).
If the DHW pump does not work for 24h, it is activated for 10s (DHW pump anti-blocking).

6 **Module antifreeze protection**
When the flow temperature falls below the antifreeze activation temperature expressed in parameter P511, a heat request is activated to all modules until the temperature exceeds the antifreeze deactivation temperature set in parameter P512. The function is always active.

7 **System antifreeze protection**
The system's antifreeze protection is active if parameter P556 is set to 1 and the external temperature probe is present. The control logic is as follows:
- If the external temperature is between -5°C and 1,5°C, the system pump is turned on for 10 minutes every 6 hours;
- If the external temperature is less than -5°C, the system pump remains on continuously.

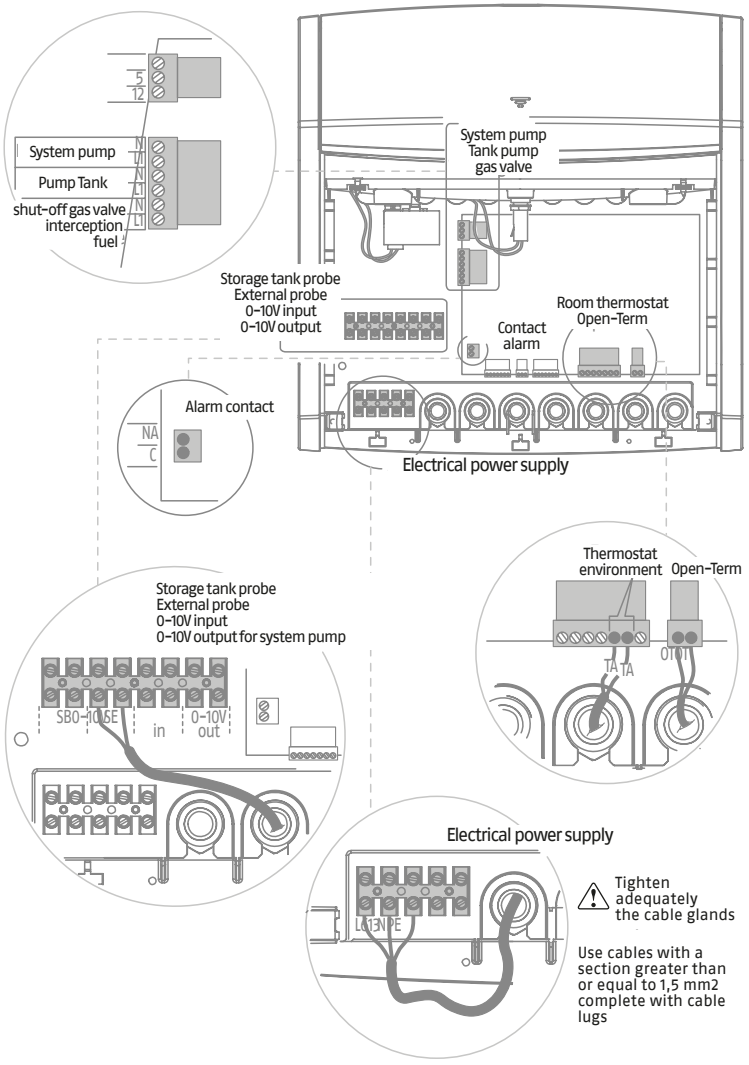
ELECTRICAL CONNECTIONS



IT IS MANDATORY:

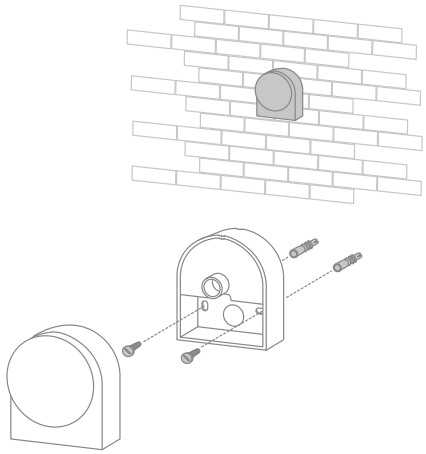
1 to use an omnipolar magnetothermic switch, a feeder disconnector, compliant with CEI-EN standards (contact opening of at least 3mm);
2 respect the L1 (Phase) - N (Neutral) - PE (earth) connection. Keep the earth conductor approximately 2 cm longer than the power conductors.
3 use cables with a section greater than or equal to 1.5 mm², complete with terminal ferrules;
4 refer to the electrical diagrams in this booklet for any electrical intervention.
5 connect the appliance to an effective earthing system.
6 the use of a 30 mA differential switch for the boiler.

It is forbidden to use gas and water pipes for grounding the unit.
It is forbidden to pass the power supply and room thermostat cables near hot surfaces (delivery pipes).
If contact with parts with temperatures above 50°C is possible, use a suitable type of cable.
The manufacturer is not responsible for any damage caused by the lack of earthing of the appliance and by failure to comply with what is shown in the electrical diagrams.



EXTERNAL PROBE CONNECTION

The probe must be placed in a smooth wall stretch; in the case of exposed bricks or irregular walls, a smooth contact area should be provided.
The connection cable between the external probe and the control panel must not have joints; if they are necessary, they must be tinned and adequately protected. The use of a shielded cable is recommended.
Any ducting of the connection cable must be separated from live cables (230V AC).



MATCHING TABLE

T (°C)	R(Ω)	T (°C)	R(Ω)	T (°C)	R(Ω)	T (°C)	R(Ω)
-50	43907	-15	5861	20	1218	55	345,3
-45	31840	-10	4574	25	1000	60	293,8
-40	23374	-5	3600	30	826,8	65	250,8
-35	17359	0	2857	35	687,5	70	214,9
-30	13034	5	2284	40	574,7	75	184,8
-25	9889	10	1840	45	482,8		
-20	7578	15	1492	50	407,4		

Temperature detected (°C)
Resistive value of the external probe (Ω).

WATER IN HEATING SYSTEMS

The treatment of the system water is a necessary condition for the proper functioning and guarantee of durability of the heat generator and all the components of the system.
Sludge, limestone and contaminants present in the water can lead to irreversible damage to the heat generator, even in short times and regardless of the quality level of the materials used.
Contrary to what often happens - where treatment is reserved only for old systems with a high presence of limestone, residues and sludge - water treatment is a necessary condition not only during interventions on existing systems, but also in new installations, in order to to preserve the life of the components and maximize their efficiency.
In this regard, for technical details, please refer to the following section, where you can find the analysis published by ANICA (National Association of Steel Boiler Industries) on the subject, and to the chapter "System water treatment", in the appendix, which contains an extract of the UNI 8065 standard "Water treatment of heating systems for civil use".
For additional information on the type and use of additives, contact the Technical Assistance Service.

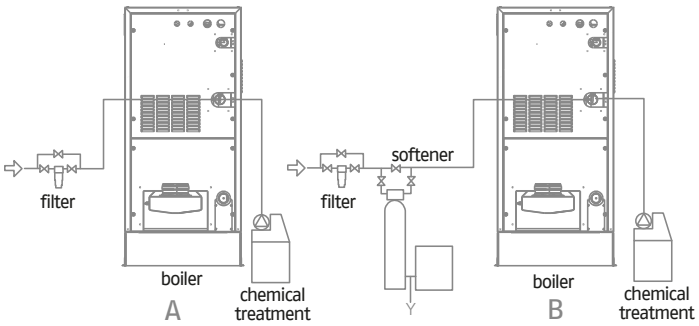
In cases where it is not possible to carry out correct treatment of the system water, in the presence of an uncontrolled automatic water loading, in the absence of barriers that prevent the oxygenation of the water and in the presence of open vessel systems it is necessary to hydraulically separate the generator from the system, through the use of an appropriate heat exchanger.
Water in heating systems. Indications for the design, installation and management of heating systems.

1. CHEMICAL-PHYSICAL FEATURES
Prescribed values and indications of the reference standard UNI-CTI 8065 "Water treatment in heating systems for civil use" (June 1989 edition).
The UNI-CT 8065 standard considers that the chemical-physical characteristics of water are similar to those of drinking water.
It establishes, in all systems, a chemical conditioning of the water for the protection of the system components and the filtration of the incoming water to avoid the introduction of suspended solids, possible corrosion vehicles and muddy deposits.

Diagram of the water treatments required by the UNI-CTI 8065 standard according to the overall thermal power of the system.

A) Necessary treatment scheme for systems:
- with heat output <350kW and feed water with hardness <35°fr
- with heat output >350kW and feed water with hardness <15°fr
- with heat output <350 kW the filter is recommended
- with heat output >350 kW the filter is mandatory

B) Necessary treatment scheme for systems:
- with heat output <350kW and feed water with hardness >35°fr
- with heat output >350kW and feed water with hardness >15°fr
- with heat output <350 kW the filter is recommended
- with heat output >350 kW the filter is mandatory.



Chemical-physical parameters of water required by the UNI-CT 8065 standard

Parameters	UoM	Filling water.	System water
PH value		-	7÷8
Total hardness ($CaCO_3$)	°FR	<15	-
Iron (Fe)**	mg/kg	-	<0,5
Copper (Cu)**	mg/kg	-	<0,1
appearance		clear	possibly clear

* the maximum limit of 8 applies in the presence of radiators with aluminum or light alloy elements
** Higher values are a sign of corrosive phenomena

Identification of the water treatments indicated in the UNI CTI 8065 standard.
The water softener is classified as the ion exchange resin type.
The filter can be with washable filter material or with a disposable filter element.
The appropriate chemical treatment consists of adding chemicals (conditioning) to the water to:
- Stabilize the hardness;
- Disperse incoherent deposits inorg. and organic;
- Deoxygenate the water and passivate the surfaces;
- Correct alkalinity and pH;
- Form a protective film on surfaces;
- Control biological growths;
- Protect from frost.

The chemical products used for treatments must be compatible with current laws on water pollution. The UNI-CTI 8065 standard, if correctly applied to a heating system, is a guarantee of operational safety, but everything can be nullified by system engineering or management errors, including excessive top-ups and the circulation of water in the open expansion.
In many cases the rule is disregarded; in particular, in existing systems, attention is not paid to the characteristics of the water and the need to adopt the relevant measures.

2. HEATING SYSTEMS

CORROSION AND SCALING PHENOMENA, POSSIBLE CAUSES.
Until a few twenty years ago, domestic heating was quite limited and implemented with systems that are now very outdated, so the problem of water was rarely felt.
The energy crisis, the widespread use of heating systems and the related standards have stimulated designers, boiler manufacturers and plant engineers to obtain systems with high thermal efficiency, with more sophisticated materials and more ingenious (but often more delicate) solutions, however, neglecting the "water" element for which the improvements in terms of performance obtained were very often nullified by the
presence of encrustations and corrosion.
In heating systems, the following can be found:
- breakages due to overheating of the heated surfaces due to thermal insulation caused by limescale deposits on the water side.
- oxygen corrosion
- underdeposition corrosion
- corrosion from vacant currents (very rare)
- widespread and localized acid corrosion (due to the aggressiveness of water with pH < 7).

2.1 LIMESCALE DEPOSITS

The formation of limescale occurs because calcium and magnesium bicarbonates, dissolved in water at room temperature, undergo a chemical transformation when the water is heated.
Calcium bicarbonate turns into calcium carbonate, water and carbon dioxide, while magnesium bicarbonate turns into magnesium hydrate and carbon dioxide.

Calcium bicarbonate $Ca(HCO_3)_2$ ----temperature increase----> $CaCO_3 + H_2O + CO_2$
Magnesium bicarbonate $Mg(HCO_3)_2$ ----temperature increase----> $Mg(OH)_2 + 2CO_2$
Calcium carbonate and magnesium hydrate precipitate, forming adherent and compact insoluble deposits (limestone), with a very high thermal insulating power: the heat exchange coefficient of a 3 mm layer of limestone is equal to that of a steel sheet 250 mm thick! It has been calculated that a generalized scale encrustation of 2 mm causes an increase in consumption of 25%! The
reactions that produce the formation of calcareous deposits accelerate as the temperature increases: normally the vast majority of our country's waters, which are particularly rich in calcium and magnesium salts (therefore "hard"), are able to produce calcareous encrustations already above 40° C temperature. The deposit of limestone in the boiler occurs mainly in the hottest areas and subjected to intense heating: for this reason it is very common to find encrustations localized only in certain points, in areas with a high thermal load.
A layer of limestone 1 hundredth of a millimeter thick begins to reduce the cooling of the underlying sheet metal.
A further increase in the thickness of the limestone causes the metal parts to overheat and break due to thermal stress. The calcium and magnesium bicarbonates contained in the initial filling volume of water are almost never sufficient to produce a quantity of limescale sufficient to jeopardize the integrity of the boiler: it is the continuous replenishment of water that causes the encrustation which leads to break.

2.2 UNDERDEPOSIT CORROSION

Underdeposition corrosion is an electrochemical phenomenon, due to the presence of foreign bodies within the mass of water (sand, rust, etc.). These solid substances generally settle at the bottom of the boiler (sludge).
At this point a chemical reaction of micro corrosion can be triggered due to the difference in electrochemical potential that is created between the material (steel) in contact with the impurity and the surrounding material.

2.3 STRAY CURRENT CORROSION

Corrosion from stray currents is very rare today, it can occur due to different electrical potentials between the boiler water and the metal mass of the boiler or pipe due to the cathode/anode effect.
It is therefore advisable to connect the various metal components to a good earth ground even if it is known that these corrosions manifest themselves with the passage of direct electric current which is no longer used today. The phenomenon leaves unmistakable traces, namely small regular conical holes.

2.4 DIFFUSE AND LOCALIZED ACID CORROSION

They are less obvious than other types of corrosion, but potentially just as dangerous because they affect the entire heating system and not just the boiler.
They are mainly due to the acidity of the water (pH <7) caused:
- from incorrect softening of the water and from the presence of carbon dioxide (which lowers the pH value). Carbon dioxide is released more easily in softened water and is also created in the process of limescale formation.
Corrosion is widespread and affects the entire system more or less uniformly;
- from a poorly conducted acid wash (e.g. without passivating agent).
In this case, localized perforation corrosion could occur due to the failure to remove the acid from some point of the system.
The presence of the corrosive process is easily detectable with a chemical analysis of the water: even a minimal iron content in the circuit water indicates that corrosion is taking place.

The technical indications in this section are expressly dedicated to civil and industrial hot water heating systems with operating temperatures up to 100°C.
In these systems (unlike steam and superheated water systems) potential malfunctions and damage caused by the lack of appropriate water treatments and system errors are often underestimated.
Unfortunately the result is almost always damage to the boiler and the entire system.
Law 46/90, relating to the treatment of water for drinking purposes, prescribes in article 7 that heating and domestic hot water production systems must be built in accordance with the relevant UNI and CEI standards (UNI 8065). During the design phase, depending on the characteristics of the raw water, the necessary treatment plants must be provided to bring it to the characteristics envisaged by the Standard.
The system manager must keep it within the expected characteristics with the necessary checks and consequent interventions.

NEW HEATING SYSTEMS

MISTAKES TO AVOID AND PRECAUTIONS.
From what has been highlighted, it is therefore important to avoid two factors that can lead to the phenomena mentioned, namely contact between the air and water of the system and the periodic replenishment of new water.
In conclusion, to eliminate the contact between air and water (and thus avoid oxygenation of the latter), it is necessary that:
- the expansion system is closed vessel, correctly sized and with the right pre-charge pressure (to be checked periodically);
- the system is always at a pressure greater than atmospheric pressure at any point (including the suction side of the pump) and in any operating condition (in a system, all the seals and hydraulic joints are designed to resist the pressure towards the 'external, but not to depression);
- the system has not been built with gas-permeable materials (for example plastic pipes for floor systems without anti-oxygen barrier).

The filling water and any top-up water in the system must always be filtered (filters with synthetic or metallic mesh with a filtering capacity of not less than 50 microns) to avoid deposits that can trigger the phenomenon of corrosion from under-deposit.
Leaks and related water replenishments can be caused not only by a leak in the system, but also by the incorrect sizing of the expansion vessel and the initial pre-charge pressure (the safety valve opens continuously because the pressure in the system increases due to the expansion effect beyond its calibration limit).

Once filled and deaerated, a heating system should not undergo more top-ups.
Otherwise it is clear that we are in the presence of dysfunctions attributable to what was previously described.
Any necessary top-up must be monitored (counter), carried out and recorded on the system booklet. Do not rely, for example, on the "reassuring" presence of the water softener combined with an automatic loading system.
Continuous replenishments of water in the system, even if softened water at 15° F, will in any case cause deposits/foulings of limescale in the boiler in a short time, particularly in the hottest areas.
During the first start up, the system must be slowly brought to the maximum operating temperature to ease deaeration (a temperature which is too low, would avoid gas from escaping).
If there are multiple boilers, they must all be in operation at the same time to evenly distribute the limited initial limescale deposit.

4. THE REDEVELOPMENT OF OLD HEATING SYSTEMS
MISTAKES TO AVOID AND WARNINGS.
The upgrading of a central heating plant for heating use, specifically the replacement of the old boiler, often takes place without the possibility of modifying the existing system.
Furthermore, not paying the right attention to the problem puts the integrity of the new boiler at risk in a very short time.
An old system has accumulated over the years of operation a black protective layer made up largely of magnetite (Fe304 due to the partial oxidation of iron) which has a good protective power against corrosion.
It follows that any installation in the circuit of new elements with clean metal surfaces, such as the boiler, will become the sacrificial anode of the entire heating system. In cases where leaks in the system cannot be repaired and therefore top-ups are essential, it is advisable to address the problem very carefully, in particular in the choice of the water treatment system which must be similar to that used in steam systems for completely descale the water
(hardness < 0.5°fr) maintaining a non-aggressive pH.
It will also be necessary to dose deoxidizing film-forming products and physical filtration to eliminate incoming impurities.
Commissioning must be carried out as specified above.
Below we propose to take into consideration some important aspects that can help redevelopment operations and guarantee the correct functioning of the boiler over time.
- In the presence of a system with an open vessel, the possibility of transforming it into a closed vessel system must always be evaluated. Today it is technically possible to make this modification to the system while maintaining the hydraulic pressure almost unchanged. This solution allows you to solve the many problems resulting from the contact of the system water with the air (corrosion, etc.) and to avoid conditioning the water with deoxidizing products which should, in the open vessel system, be dosed periodically.
- In the case of very large systems and radiant panel systems with plastic pipes without an anti-oxygen barrier, it is necessary to separate the boiler circuit by inserting a heat exchanger made of corrosion-resistant material. In this way it is possible to protect the boiler circuit even in old systems that cannot be renovated.

5. ELIMINATION OF AIR AND GASES IN HEATING SYSTEMS.
Another aspect that is often overlooked even in the design phase of heating systems is the formation of air and gas and their elimination.
It is believed that, after the first filling of the system, no further venting is necessary.
As a result, the system is often made without appropriate vent points, or they are made incorrectly.
Often too small automatic vents are used, which get blocked after the first filling simply because the connection fitting of the same to the pipeline is too small in cross-section, only enough to let air bubbles or small gases pass through. It should be remembered that the presence of air and gas in the circuit, in addition to the corrosion problems mentioned above, contributes to a decrease in the
heat output, causes pumps to malfunction, and causes noise and vibration in the circuit. During operation, air and gas bubbles develop in the heating system within the circuit, especially if the above directions are not observed, in particular:
- as the temperature increases due to the decrease in the solubility of oxygen in water, it is released forming air bubbles;
- the precipitation of calcium and magnesium carbonates (limestone) develops CO_2 (carbon dioxide);
- the process of oxidation of the metal causes a chemical reaction whereby hydrogen is released.

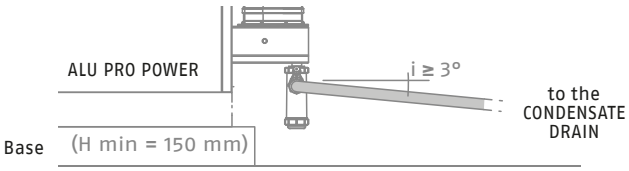
It is important and essential to eliminate these nascent gases by making the system so that venting operations are facilitated and thus done correctly, quickly, and radically.
One solution is to install a gas collection lung in the upper part, with a manual vent of appropriate size.
In this case, an automatic venting system (jolly) is useless because the lung would fill with water, defeating its function.

CONCLUSIONS
Experience confirms that underestimating the issues outlined here can have even serious consequences, with damage to heat generators and other components of the heating system.
In these cases, the causes are often blamed on the boiler, accused of "producing air," "scaling due to poor circulation," "puncturing because the sheets are shoddy," etc., while for boilers built according to the rule of art, the real causes are other.
Let us not forget that proper water treatment and thermal system design are not only a guarantee of safety, but also bring significant economic benefits, in terms of maintenance and overall thermal performance.
We also remind you that the faults of the boiler caused by deposits and corrosion, are not covered by warranty.

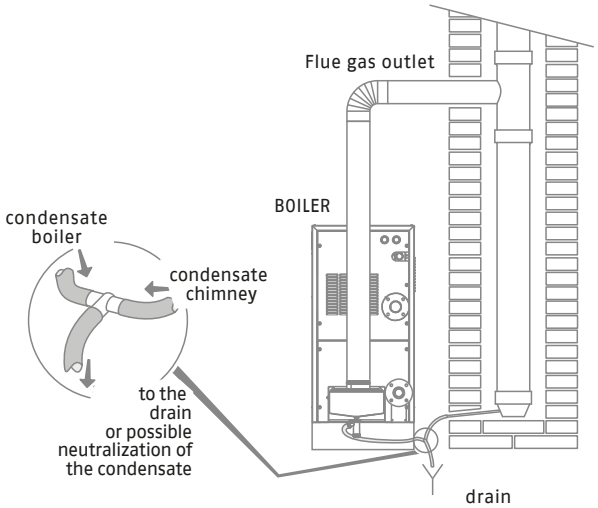
CONDENSATE EVACUATION

The condensate drain must be:
- made in such a way as to prevent the escape of gaseous products of combustion into the environment or sewer (siphoning)
- sized and constructed in such a way as to allow the correct flow of liquid waste, preventing any leaks
- installed in such a way as to prevent freezing of the liquid it contains under the intended operating conditions
- mixed, for example, with domestic effluent (washing machine effluent, dishwasher effluent, etc.) mostly at basic pH in order to form a buffer solution so that it can be fed into the sewage system.

The siphon is supplied with the appliance and must be mounted during installation.
Provide a plinth at least 150 mm high to be positioned under the boiler. Make sure that this plinth is sized in proportion to the support surface of the appliance (that it protrudes by at least 50 mm on each side).



Keep the angle of inclination "i" always greater than 3° and the diameter of the condensate drain pipe always greater than that of the fitting on the heating unit.
Connections to the sewer system must be made in accordance with current legislation and any local regulations.



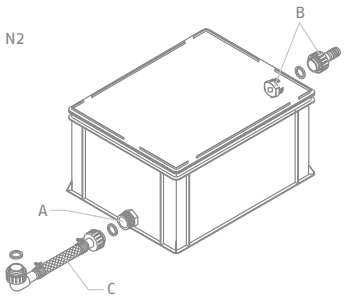
ACCESSORIES

TYPE N2 NEUTRALIZATION UNIT

The neutralization unit TYPE N2 is designed for systems equipped with a central heating unit condensate drain well located lower than the boiler condensate drain. This neutralization unit requires no electrical connections.
The inlet connection (A) of the neutralization unit N2 (lowest) must be connected to the boiler condensate drain with the hose (C) supplied with the unit. This ensures that there is no leakage of combustion products through the boiler condensate drain line.
The outlet connection (B) of the neutralization unit (higher) must be connected, with a flexible pipe (not supplied), to the condensate drain well of the thermal plant.

The condensate drain well of the central heating unit should be lower than the connection (B) of the neutralization unit.

If it is necessary to neutralize the condensation produced in the

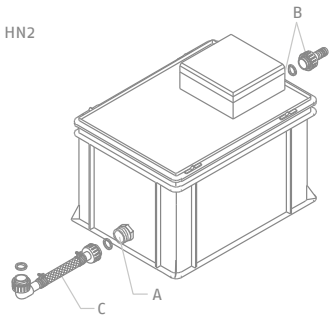


Type	Granulated Qty kg	Dimensions mm	Ø fittings
N2	25	400x300x220	1"

chimney, it is recommended to connect the condensate drains of the boiler and the chimney with a "T" fitting and then bring them to the inlet of the N2 neutralizer.
Tighten the hose clamps properly.

TYPE HN2 NEUTRALIZATION UNIT (WITH PUMP)

The neutralization unit TYPE HN2 is designed for systems equipped with a central heating unit condensate drain well located higher than the boiler condensate drain.
The maximum head that the pump can overcome is 3 meters. The pump is controlled by an electric level contact with which the HN2 neutralization unit is equipped.
This neutralization unit requires electrical connections for which refer to the specific instructions supplied with the unit. The electrical safety rating is IP44.

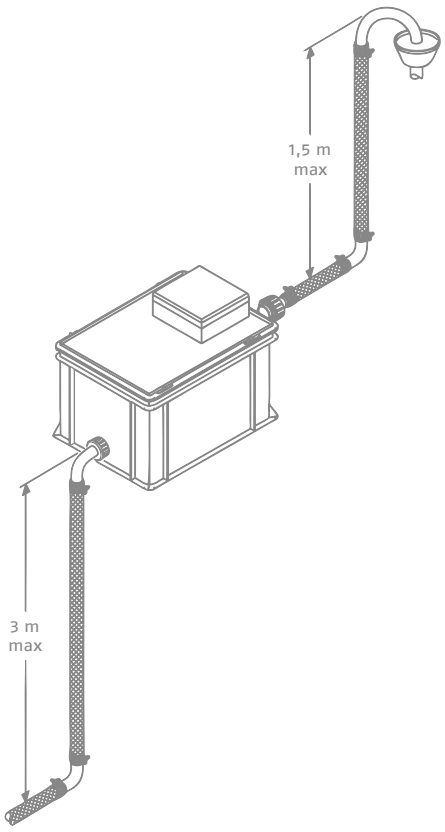


The connection pipes used must be as short and straight as possible and resistant to corrosion. The bends and folds favor the obstruction of the pipes which prevents the correct evacuation of the condensate.

Type	Electrical power absorbed (W)	Supply (V-Hz)	Condensate flow rate (l/m) (*)	Dimensions (mm)	Granulated Qty (kg)	fittings ø
HN2	50	230-50	12	400x300x220	25	1"

(*) with wing = 3m

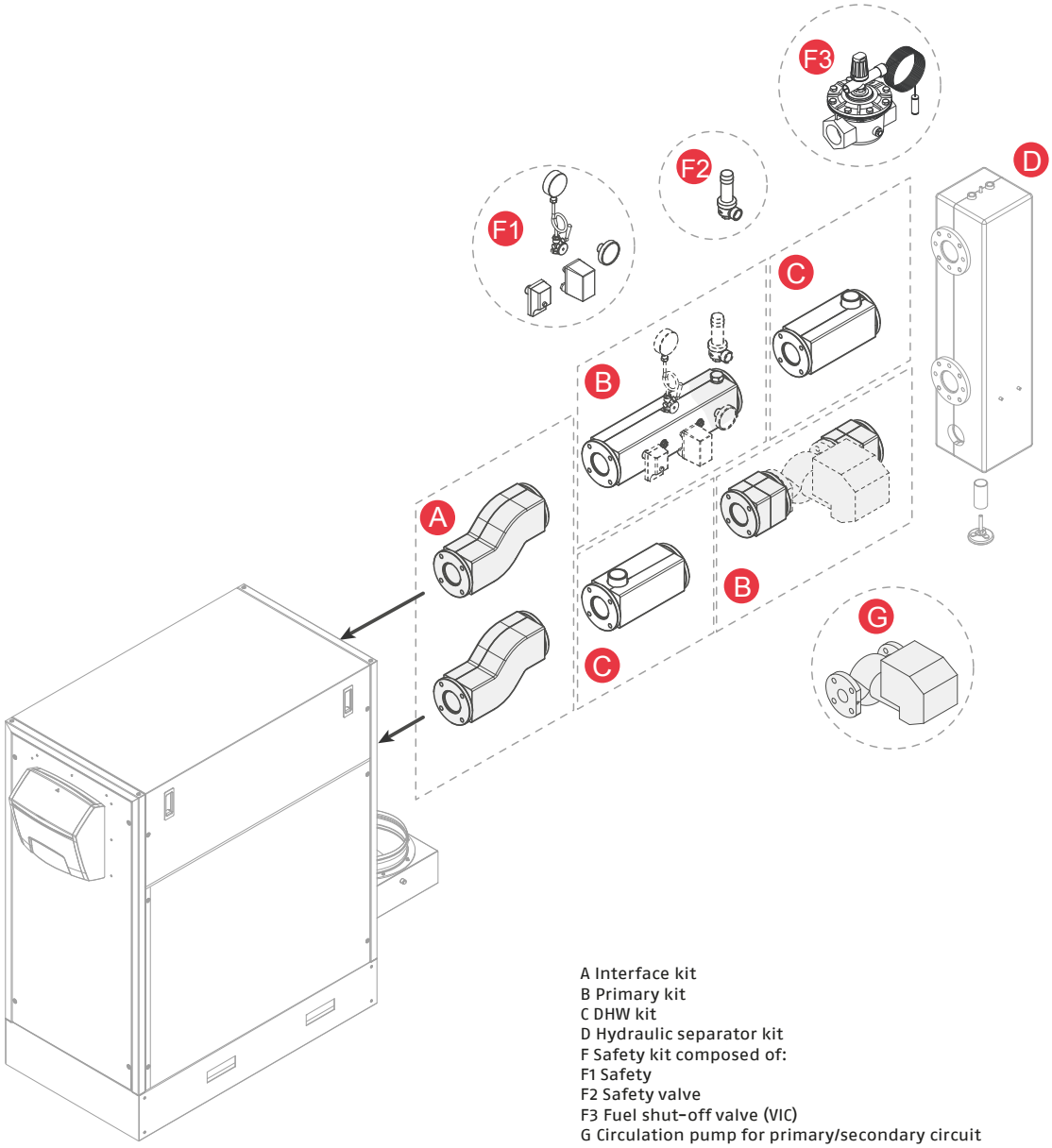
The inlet port (A) of the HN2 neutralization unit (lower) should be connected to the boiler condensate drain with the hose (C) supplied with the unit. This ensures that there is no leakage of combustion products through the boiler condensate drain line.
The outlet connection (B) of the neutralization unit (higher) must be connected, with a flexible pipe (not supplied), to the condensate drain well of the thermal plant.



Important
The condensate drain well of the heating room must be no more than 1,5 m high with respect to the neutralization unit.
The connection pipes used must be as short and straight as possible and resistant to corrosion. The bends and folds favor the obstruction of the pipes which prevents the correct evacuation of the condensate.
It is also recommended to fix the pipes to the floor and protect them.

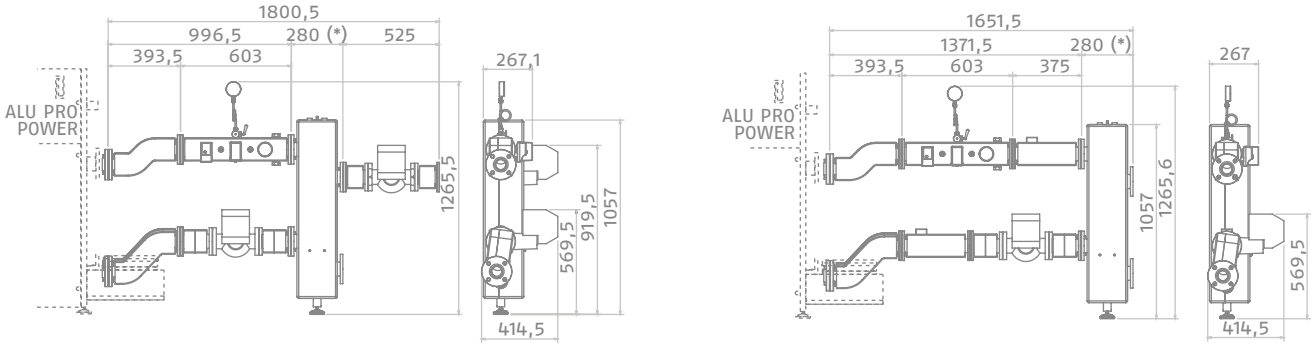
PRIMARY AND SECONDARY CIRCUIT CONFIGURATION KIT

The primary and secondary circuit configuration kit consists of:
- flow and return fittings complete with insulation and flanges
- safety-ready fittings
- electronic circulator MAGNA 3 40-120 F up to 300 kW and MAGNA 3 65-120 F up to 600 kW
- 120 mm insulated hydraulic separator
- 5.4 bar safety valve (1 valve for models up to 580 kW, 2 valves for 600 kW model)
- M1-ABS 80 0-10 G 3/8 safety pressure gauge
- immersion safety thermostat
- safety pressure switch PRM (0402101)
- safety pressure gauge valve (403R38)
- safety shock absorber hedgehog (407D38)
- D=63 0-120° thermometer with 1/2" M x 10 L = 100 well
- TB G-50 safety control well (PGUA0TT002)
- D 14.5X8X2 (3/8") "FASIT 205" gasket



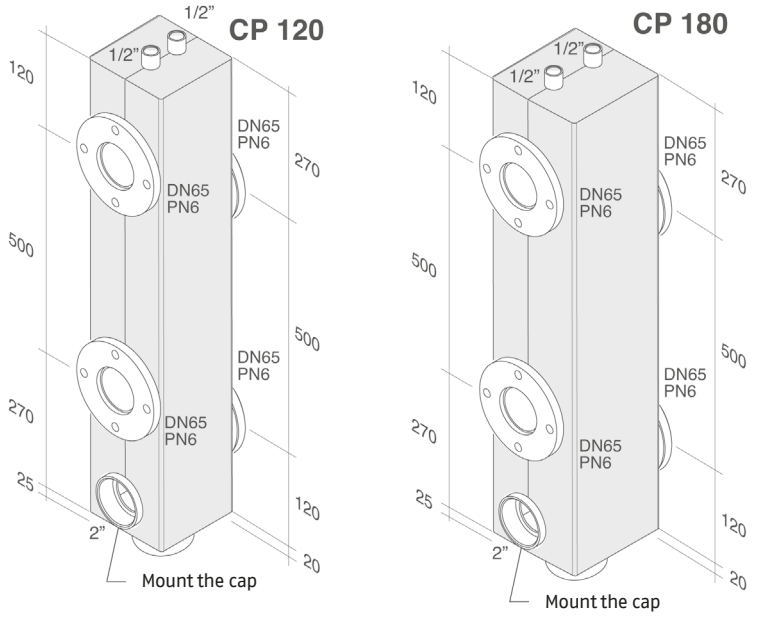
A Interface kit
B Primary kit
C DHW kit
D Hydraulic separator kit
F Safety kit composed of:
F1 Safety
F2 Safety valve
F3 Fuel shut-off valve (VIC)
G Circulation pump for primary/secondary circuit

up to 300 kW
mod. 115÷225 1" 1/2 fittings
mod. 300 2" fittings



(*) The size of the hydraulic separator varies depending on the output of the generator: 280mm up to 300 kW – 335mm up to 600 kW.

up to 600 kW
mod. 375 2" fittings
mod. 450÷600 2" 1/2 fittings

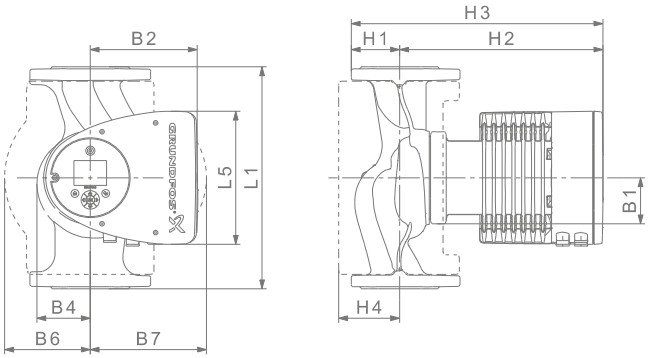


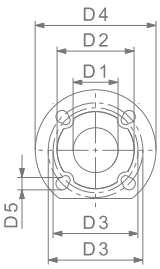
PRIMARY/ SECONDARY CIRCUIT PUMP KIT

MAGNA3 circulation pumps are designed to circulate liquids in variable-flow heating systems, in all cases where the pump operating point is to be optimized, thus reducing energy costs.
The MAGNA3 is of the wet rotor type, that is, the pump and motor form a single unit, without a mechanical seal, with only two seals. The bearings are lubricated by the pumped liquid.
The main features of the pump are as follows:
- integrated regulator
- control panel on the terminal box
- Integrated differential pressure and temperature sensor.
- cast iron pump body
- external motor protection not required

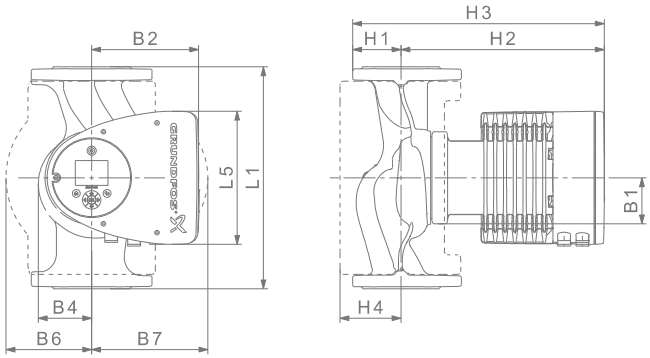
The MAGNA3 is equipped with a 4-pole, synchronous, permanent-magnet motor (PM motor). This motor is characterized by higher electrical efficiency than a conventional squirrel-cage asynchronous motor.
The rotation speed is controlled directly by the boiler through the 0-10 V DC analogue input.

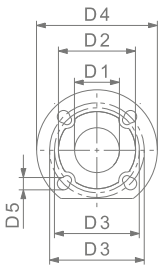
up to 300 kW





up to 600 kW





	Dimensions (mm)															
Ref.	L1	L5	B1	B2	B4	B6	B7	H1	H2	H3	H4	D1	D2	D3	D4	D5
up to 300 kW	250	204	84	164	73	106	128	65	304	369	83	40	84	100/110	150	14/19

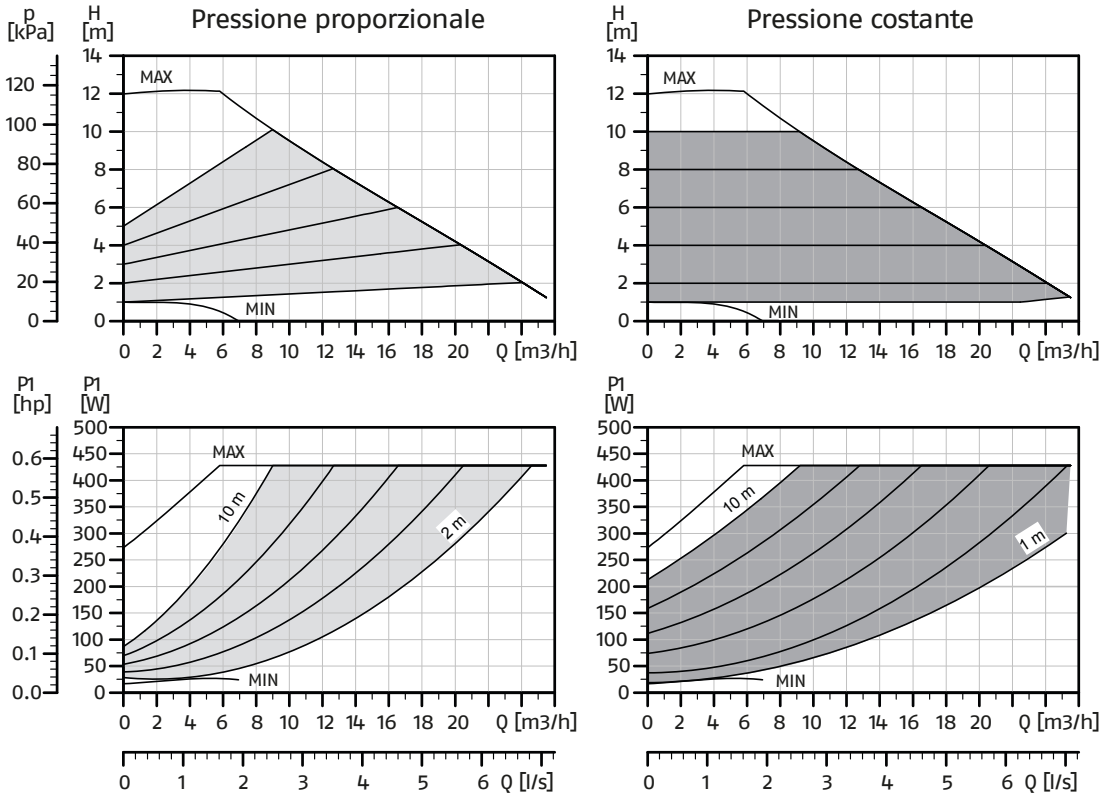
	Dimensions (mm)															
Ref.	L1	L5	B1	B2	B4	B6	B7	H1	H2	H3	H4	D1	D2	D3	D4	D5
up to 600 kW	340	204	84	164	73	133	133	74	312	386	94	65	119	130/145	185	14/19

MAGNA3 circulator

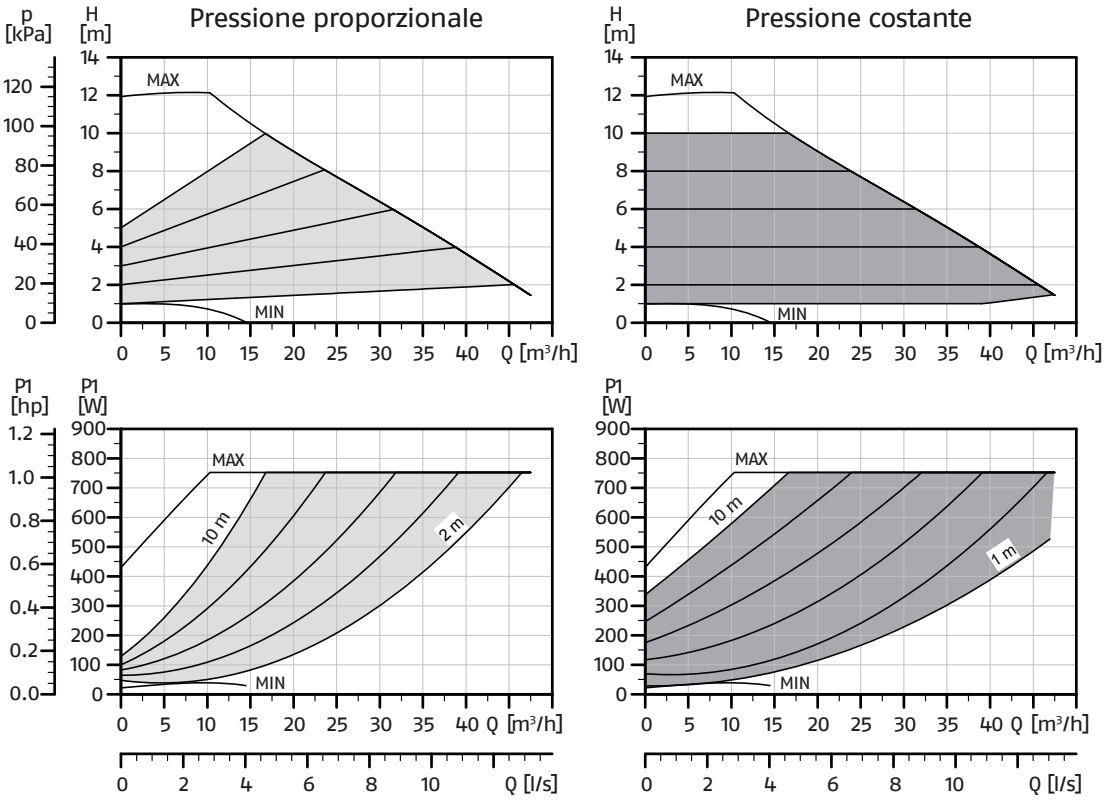
			MAGNA3 40-120 F	MAGNA3 65-120 F
Max working pressure		bar	10	10
Min-max operating temperature (water)		°C	-10 + 110	-10 + 110
Electrical voltage supply		V/Hz	single-phase 230 ± 10% / 50-60	single-phase 230 ± 10% / 50-60
Absorbed electrical power	min - max	W	17-440	16-679
Current absorbed at 230 V	min - max	A	0,19-1,95	0,18-3,38
Insulation class				
Electrical protection level		IPX	4D	4D
Net weight	-	kg	15,5	21
EEI			0,18	0,17

The pump is equipped with overload protection.

DN 40 – 120



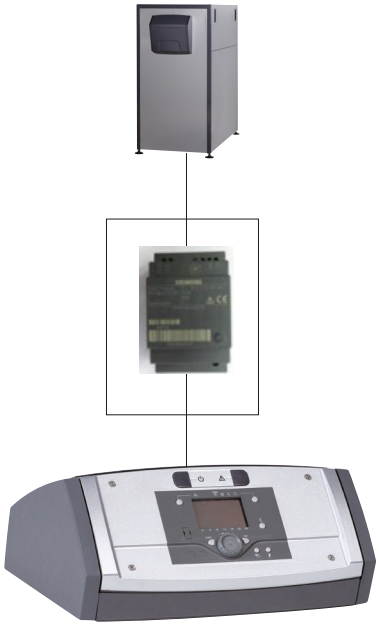
DN 65 – 120



COMMUNICATION KIT (ACCESSORY)

Using the communication kit it is also possible to connect a RIELLOtech panel to the generator for the management of distribution systems.
The communication kit consists of the OCI 364.03/01 interface and the wiring that connects it to the cascade sequencer (generator panel) and a support bracket.

The OCI interface is installed inside the generator on an omega bar positioned on the front panel.



ALU PRO POWER

PRODUCT DESCRIPTION FOR SPECIFICATIONS

ALU PRO POWER aluminum boilers are modular condensing heat generators for heating systems and, when combined with a boiler, for domestic hot water production, for indoor or outdoor installation.
The generator is based on a cascade of independent 75 kW firebox thermal modules, operated sequentially by a cascade control.
The modules are connected to each other by means of a delivery manifold, a return manifold and a flue gas manifold with a single condensate drain.
The number of modules varies from 1 to 8 for powers ranging from 75 to 600 kW. This logic allows us to guarantee high service continuity and a high degree of modulation (up to 40:1 for the 600 kW model).
The aluminum elements with low water content have a high exchange surface to maximize heat exchange, energy efficiency, thermal balance, obtaining high condensation efficiency.
The continuous total premix burner, in stainless steel, allows for stable, silent combustion with low polluting emissions (NOx class). Mixing is carried out via a venturi located upstream of the fan.
The sequence regulation is carried out with climatic logic, with an external probe, and allows the flow temperature to be regulated according to the external temperature.
The ALU PRO POWER generator in turn can be managed in cascade logic in a system made up of up to 8 generators, using a second level master, thus being able to create thermal power plants of up to 4.8 MW.
The sequence control on the generator is designed to manage a circulator (primary or system depending on the parameterisation) with modulating logic controlled with a 0-10V DC signal.
The sequence control can however be controlled with a TA, OT+ input or with a 0-10V DC signal.
Error code display and PC diagnostic connections are also available.
Maximum operating pressure is 6 bar.

PRODUCT DESCRIPTION FOR SPECIFICATIONS

ALU PRO POWER condensing hot water heat generator with low pollutant emissions (class 5), type B23 consisting of:
- exchange bodies in aluminum silicon with a high exchange surface and low water content
- flow and return connection with 2" threaded connections
- 1" gas supply connection
- electrical protection rating IP 20 indoor version and IPX5D with outdoor accessory
- hydraulic circuit drainage tap
- syphon for condensate drain
- NTC probe for flow temperature control
- NTC probe for return temperature control
- NTC flue gas safety probes
- NTC probe placed on the exchanger to control the safety temperature.
- control panel with microprocessor card that controls the generator, inputs, outputs, safety devices and alarm management
- user interface with display
- each thermal module is equipped with a combustion chamber with a premixing modulating burner and low polluting emissions. Pre-mixing in combustion chamber with anti-return flap valve
- distribution of thermal output over the greatest possible number of modules and at the minimum load to obtain maximum efficiency.
- balanced distribution of working hours for each module in order to guarantee homogeneous exploitation.

Electronic ignition and ionization flame control
- variable-speed fan to modulate the amount of air needed for combustion according to demand
- proportional gas solenoid valve
- air vent valve
- air safety pressure switch that also prevents generator ignition in case of flue gas exhaust occlusion
- combustion analysis sockets
- general electrical panel, equipped with:
  - main disconnector
  - main fuse
  - terminal block for general power supply, external probe
  - management via hourly programming (see RVS) or via external regulation with both fixed point and sliding temperature, according to the set heating curve
  - 0-10 Vdc linear input for head request during operation or heating phase
  - relay output for remote alarm signals
  - 0÷10V analog output for controlling a modulating circulator
  - DHW function with the insertion of a boiler probe, in parallel or previously, which favors the production of domestic hot water over heating
  - antifreeze function always active in situation of no heat demand
  - automatic summer/winter function
  - NTC probe for remote storage tank, which enables domestic hot water management

ALU PRO POWER comply with:

Regulation (EU) 2016/426
• Efficiencies Directive 92/42/EEC
• Electromagnetic Compatibility Directive 2014/30/EU
• Eco-design of energy-related products directive 2009/125/EC
• Low Voltage Directive 2014/35/EU
Delegated Regulation (EU) No. 814/2013;

EQUIPMENT SUPPLIED AS STANDARD

- instruction manual
- warranty certificate
- product identification plate to be applied on the paneling upon installation
- hydraulic test certificate

RIELLO

ALU PRO POWER

RIELLO S.p.A. –
37045 Legnago (VR) Italy
tel. +39 0442 630111

www.riello.com

As the company is constantly engaged in the continuous improvement of its entire production, the aesthetic and dimensional features, technical data, equipment and accessories can be subject to variation.

Carrier

©2024 Carrier. All rights reserved.
All product and service marks referenced herein are the property of their respective owners.