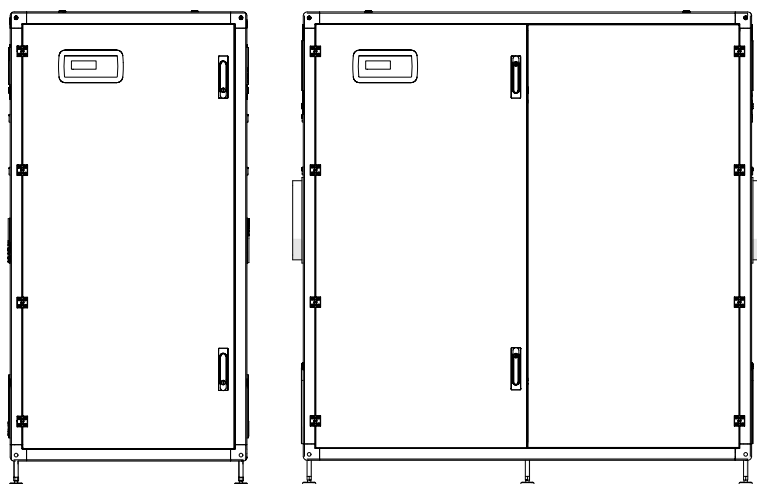


Power Max Box

Modular system

EN Installation Manual



RANGE

MODEL	CODE
POWER MAX BOX 130-2 P	20141085
POWER MAX BOX 160-2 P	20141086
POWER MAX BOX 200-2 P	20141087
POWER MAX BOX 260-2 P	20141088
POWER MAX BOX 300-2 P	20141089
POWER MAX BOX 330-3 P	20141090
POWER MAX BOX 390-3 P	20141091
POWER MAX BOX 450-3 P	20141092
POWER MAX BOX 520-4 P	20141093
POWER MAX BOX 600-4 P	20141095

ACCESSORIES

For a complete list of accessories and details of their compatibility, refer to the Catalogue.

Dear heating engineer,
we congratulate you for proposing a modular system **Beretta** which is able to ensure maximum and long lasting well-being with high reliability, efficiency, quality and safety. This manual provides information that is essential to the installation of the appliance. Used in conjunction with your own knowledge and expertise it will enable you to install the appliance quickly, easily, and correctly.

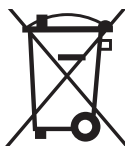
Please accept our thanks and our congratulations on your choice of product.
Beretta

CONFORMITY

thermal modules **Power Max BOX** comply with:

- Regulation (EU) 2016/426
- Directive 92/42/EEC on efficiency requirements and Annex E and Pres. Republic Decree n. 412, 26 August 1993 (****)
- Electromagnetic Compatibility Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- Ecodesign Directive 2009/125/CE for energy-related products
- Regulation (EU) 2017/1369 Energy labelling
- Delegated Regulation (EU) N. 813/2013
- Standard for gas-fired heating boilers - General requirements and tests - EN 15502-1
- Specific standard for type C appliances and type B2, B3 and B5 appliances of nominal heat input not exceeding 1000 kW - EN 15502-2/1

CE



At the end of its life, the product should be not be disposed of as solid urban waste, but rather it should be handed over to a differentiated waste collection centre.

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The following symbols are used in this manual:














CAUTION! = Identifies actions that require caution and adequate preparation.




STOP! = Identifies actions that you MUST NOT do.

1 GENERAL INFORMATION















1.1 General Safety Information

-  After removing the packaging, check the condition and completeness of the supply. If there are any problems, contact the company **Beretta** that sold the equipment.
-  This product must be installed by a legally qualified heating engineer. On completion of the installation, the installer must issue the owner with a declaration of conformity confirming that the installation has been completed to the highest standards in compliance with the instructions provided by **Beretta** in this instruction manual, and that it conforms to all applicable laws and standards.
-  This product must only be used for the purpose for which it is designed and made, as specified by **Beretta**. **Beretta** declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.
-  In the event of a water leak, disconnect the thermal module from the main power supply, shut off the water supply and promptly notify the Technical Assistance Centre **Beretta** or professionally qualified personnel.
-  Regularly check that the condensate drain is free from obstruction.
-  Periodically check that operating pressure in the water circuit is over 1 bar but below the maximum limit specified for the boiler. If this is not the case, contact Technical Assistance Centre **Beretta** or a professionally qualified heating engineer.
-  The following operations shall be necessary if the Modular system is not used for a long period of time:
 - Switch the boiler OFF at the control panel
 - Turn the main system switch "off"
 - Close the fuel cock and heating circuit water cock
 - Drain the central heating circuit if there is any risk of freezing.
-  Maintenance must be performed on the Modular system at least once a year.
-  This manual is an integral part of the appliance and must therefore be kept with care and must ALWAYS accompany the Modular system, even when it is passed on to another owner or user or transferred to another installation. If it is lost or damaged, please contact your local Technical Assistance Centre **Beretta** for a new copy.
-  This manual must be read carefully so as to ensure the correct and safe installation, operation and maintenance of the appliance. The Owner must be adequately informed and trained on how to operate the appliance. Make sure that he/she is familiar with all the information required for safe system operation.
-  The thermal module, before being connected to the hydraulic system, the gas network, and the electrical system, may be exposed to temperatures ranging from 4°C to 40°C. After it can activate the Frost Protection function, it can be exposed to temperatures ranging from -20°C to 40° C.

 We recommend cleaning inside the exchanger once a year, extracting jet and burner and removing any installation debris by suction. This operation should be done by personnel from the Technical Assistance Centre only.

1.2 Precautions

The operation of any appliance that uses fuel, electrical power and water demands that a number of fundamental safety precautions be respected:

-  Do not allow children or infirm persons to operate the system unsupervised.
-  It is forbidden to use electrical devices or equipment, such as switches, appliances, etc. if there is a smell of gas or un-burnt products. If so:
 - Ventilate the room, opening doors and windows
 - Close the fuel shut-off cock
 - Report the fault immediately to the **Beretta's** Technical Assistance Centre or a professionally qualified heating engineer.
-  Do not touch the boiler while barefoot or wet.
-  Any technical or cleaning activity is forbidden before disconnecting the appliance from the main power supply by switching the system's master switch and the appliance's main switch to the "OFF" position.
-  Do not tamper with or adjust the safety or control devices without prior authorisation and instructions from the manufacturer.
-  Do not plug or block the condensate drain outlet.
-  Never pull, disconnect, or twist the electrical cables coming from the appliance even if it is disconnected from the mains electricity supply.
-  Do not obstruct or restrict the vents in the room where the boiler is installed. Adequate ventilation is essential for correct combustion.
-  Do not expose the appliance to weather elements (without using the dedicated accessory). It has been designed for indoor use.
-  Do not switch off the appliance if the outdoor temperature may drop to below ZERO (frost hazard).
-  Do not leave flammable containers and substances in the room where the device is installed.
-  Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.
-  Do not activate the thermal module without water.
-  Individuals without specific qualifications and skills are not allowed not remove the thermal module's casing.

1.3 Description of the appliance

Power Max BOX is a modular, premixed condensing system, consisting of a cascade of modulating thermal elements installed inside a frame assembled in anodised aluminum and painted panels.

The standard product is suitable for indoor installation, with open chamber combustion; it can be transformed either into sealed combustion or into indoor version by means of some specific accessory kits that increase its electrical protection up to IPX5D.

The cabinets are equipped with 2, 3 or 4 heating elements from 57 kW to 131 kW, with overall power of 114 kW to 524 kW.

The models with heat-exchanger from 131 kW (300-2 P - 450-3 P - 600-4 P) are suitable for cascade installation, with side by side coupling, up to a maximum of 10 total thermal elements and a power of 1310 kW.

The optimal management of combustion allows both high efficiency levels (exceeding also the 109%, value calculated on the PCI, under condensation) and low pollutant emissions (Class 5 according to UNI EN 297).

The main technical features of the appliance are:

- pre-mix burner with constant air-gas ratio;
- helicoidal heat exchanger with double coil with smooth stainless steel pipe, to guarantee good corrosion resistance and the option of operating with high Δt s (up to 40°C), reducing system set-up times;
- power from 114 to 524 kW;
- maximum flue gas output temperature 100°C;
- microprocessor management and control with self-diagnostics, shown by means of a display, and logging of main errors;
- Anti-Frost function;
- external probe that enables the climate control function;
- provision for room thermostat / heat request on high or low temperature zones;
- option to manage a CH circuit and a DHW circuit with storage tank;
- high efficiency pump with high residual head mounted on all "P" versions

1.4 Safety devices

All the functions of each thermal element are electronically controlled by a board approved to perform safety functions with dual processor technology.

Any malfunction results in the appliance being shut down and the automatic closure of the gas valve.

On the water circuit of each thermal element are installed:

- **Safety thermostat.**
- **Flow sensor** capable of monitoring the main circuit's flow on an ongoing basis and of stopping the appliance in the event of insufficient flow.
- **Temperature probes** on the flow and return that continuously measure the difference in temperature (Δt) between inlet and outlet fluid and allow the control to intervene.

On the combustion circuit of each thermal element are installed:

- **Gas solenoid** in class B+C, with pneumatic gas flow compensation depending on the suction line's air flow rate.
- **Ionisation electrode for detection.**
- **Flue gases temperature probe.**
- The **Minimum pressure switch** is installed on the manifold of the thermal module



The triggering of safety devices indicates the malfunction of a potentially hazardous thermal module. Therefore, contact Technical Assistance Centre immediately. After a brief pause, it is possible to try and restart the appliance (see Paragraph "Initial startup").



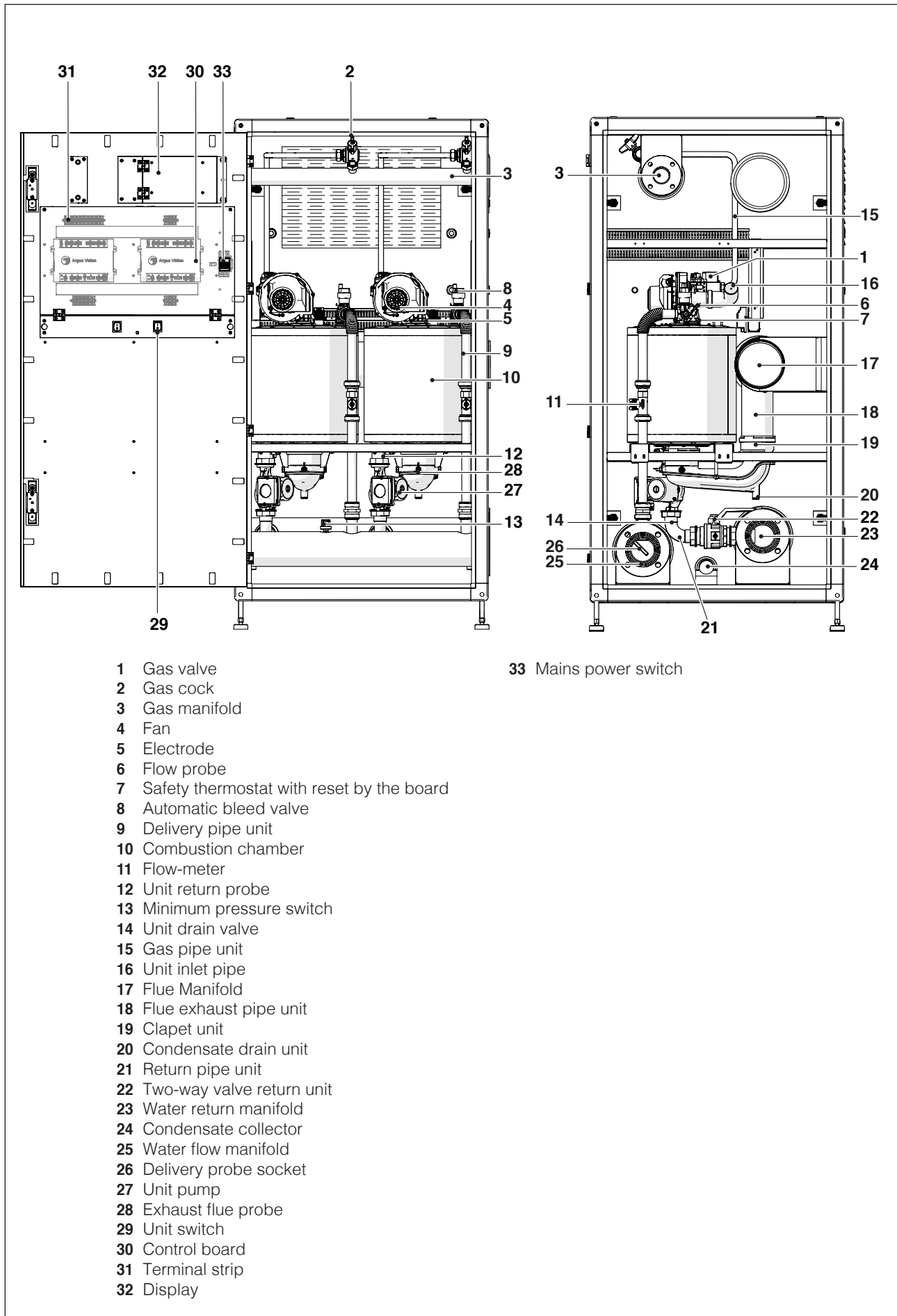
Safety devices must be replaced by Technical Assistance Centre, using only original parts. Refer to the spare parts catalogue supplied with the appliance. After making the repair, check that the appliance is working properly.



The appliance must not be put in service, even temporarily, when tampered safety devices are not in operation or have been tampered with.

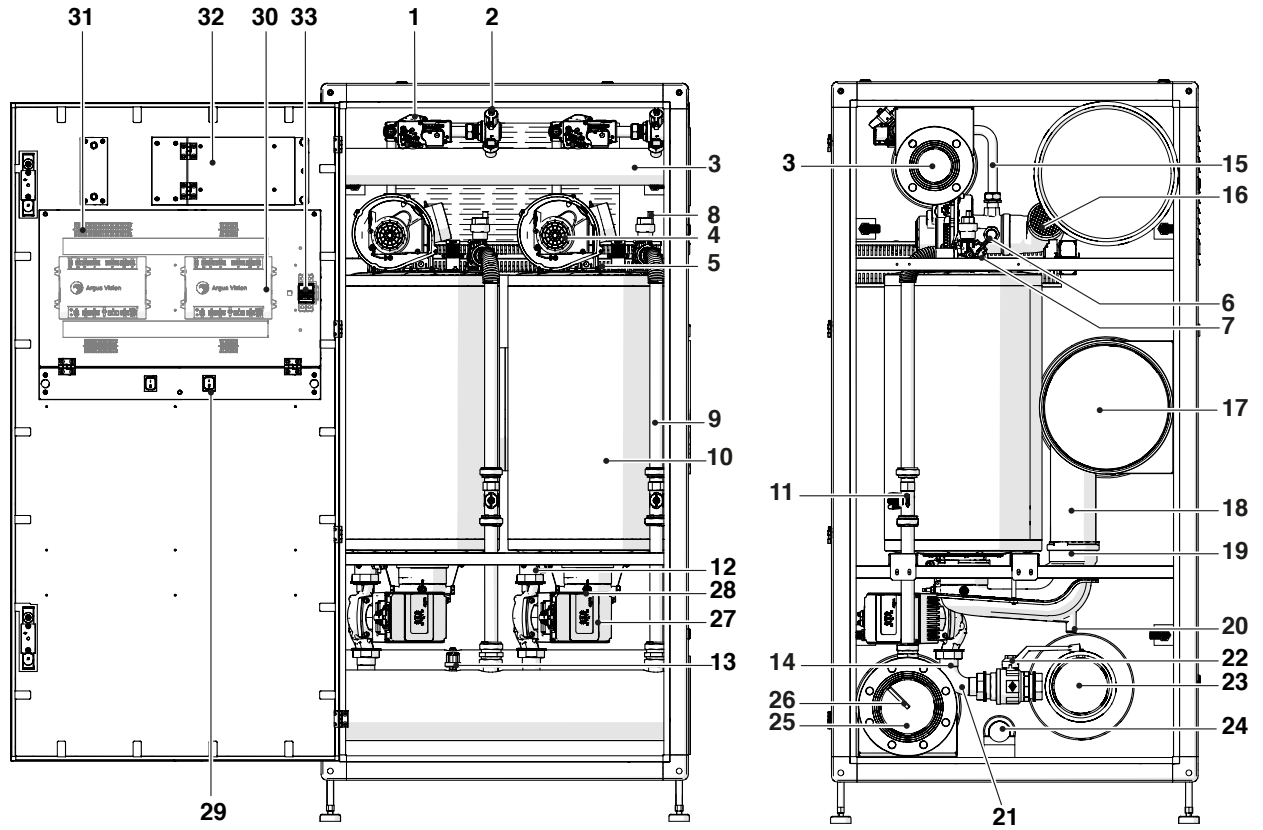
1.6 System layout

Power Max BOX 130-2 P ÷ 160-2 P

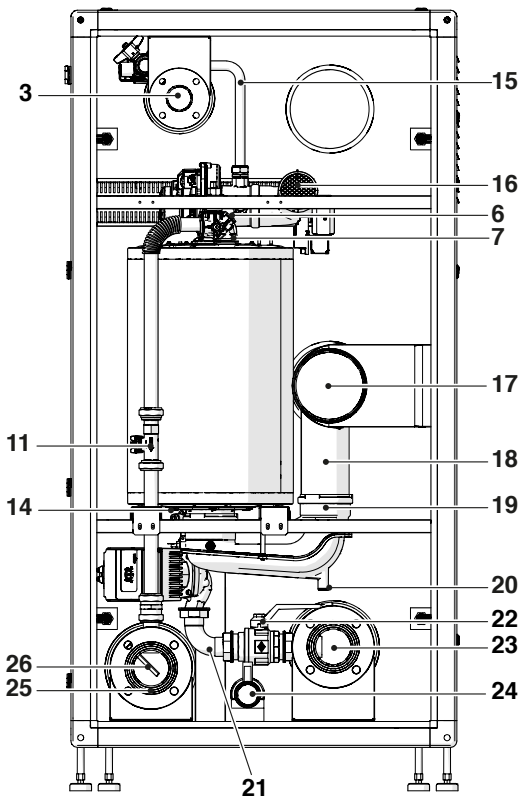
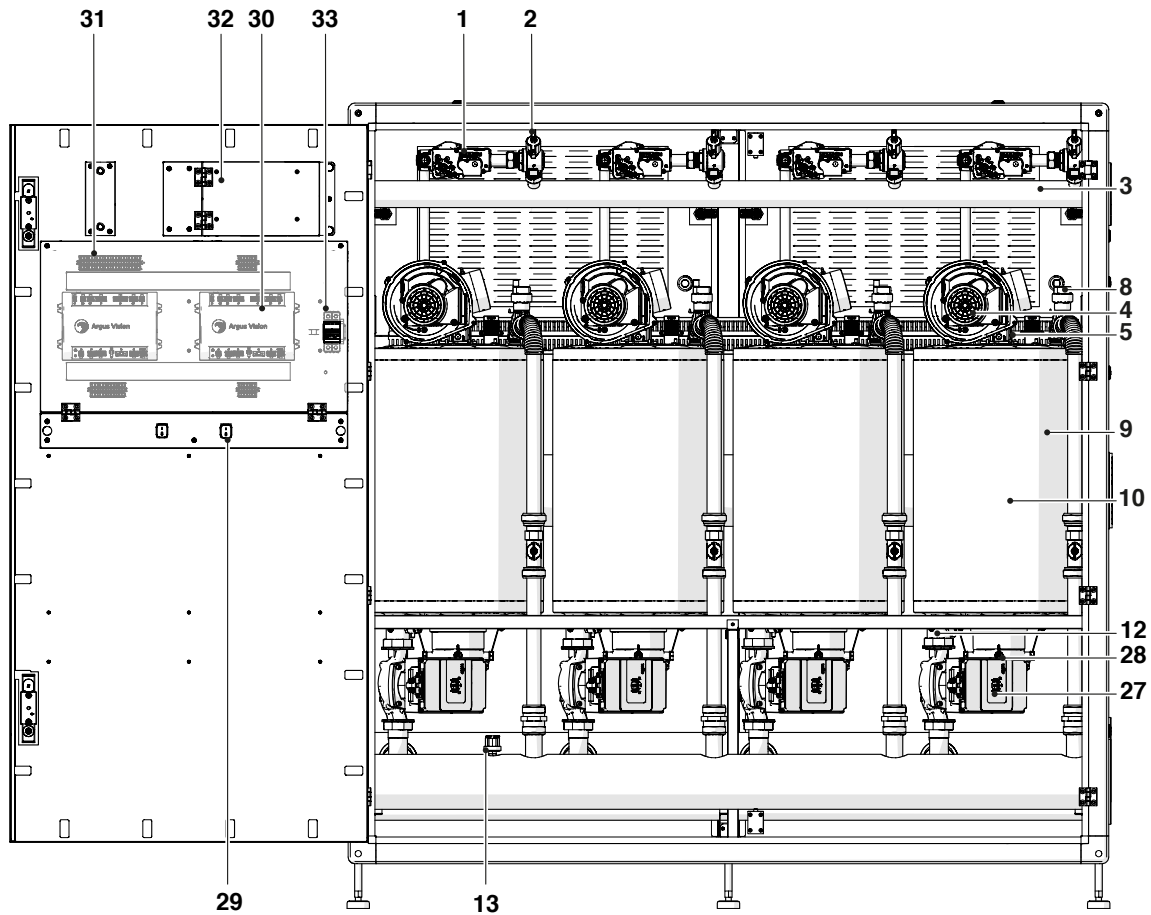


- 1 Gas valve
- 2 Gas cock
- 3 Gas manifold
- 4 Fan
- 5 Electrode
- 6 Flow probe
- 7 Safety thermostat with reset by the board
- 8 Automatic bleed valve
- 9 Delivery pipe unit
- 10 Combustion chamber
- 11 Flow-meter
- 12 Unit return probe
- 13 Minimum pressure switch
- 14 Unit drain valve
- 15 Gas pipe unit
- 16 Unit inlet pipe
- 17 Flue Manifold
- 18 Flue exhaust pipe unit
- 19 Clapet unit
- 20 Condensate drain unit
- 21 Return pipe unit
- 22 Two-way valve return unit
- 23 Water return manifold
- 24 Condensate collector
- 25 Water flow manifold
- 26 Delivery probe socket
- 27 Unit pump
- 28 Exhaust flue probe
- 29 Unit switch
- 30 Control board
- 31 Terminal strip
- 32 Display

33 Mains power switch



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- 2 Gas cock
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- 27 Unit pump
- 28 Exhaust flue probe
- 29 unit switch
- 30 Control board
- 31 Terminal strip
- 32 Display
- 33 Mains power switch

1.7 Technical specifications

Description	Power Max BOX									
	130-2 P	160-2 P	200-2 P	260-2 P	300-2 P	330-3 P	390-3 P	450-3 P	520-4 P	600-4 P
TYPE OF APPLIANCE										
Appliance type	Condensing boiler heating system B23, B53; B53P									
Fuel - Device category	G20=20mbar G20.2=20mbar G30/G31=28-30/37mbar; I12HY203+									
Combustion chamber	vertical									
Flue exhaust homologations	B23, B53, B53P, C13(*), C33(*), C53(*), C63(*)									
Device category according to UNI 10642	I12H3P									

(*) Configurations possible only with the installation of the dedicated accessories (available separately).

Description	Power Max BOX					U.M.	
	130-2 P	160-2 P	200-2 P	260-2 P	300-2 P		
POWERS AND EFFICIENCY							
Nominal rated heat input (PCI)		114	136	180	223,2	262	kW
Nominal rated heat input (PCS)		126	152	200	248	292	kW
Maximum rated heat output (80°-60°C)	G20	111,4	134	176,6	219,6	258	kW
Maximum rated heat output (60-40°C)	G20	119,2	142,8	187,6	232,4	274,6	kW
Maximum rated heat output (50-30°C)	G20	123,8	147,8	194,8	242,2	284,2	kW
Minimum rated heat input (PCI)	G20	13,7	13,7	19,4	22,4	26,3	kW
Minimum rated heat input (PCS)	G20	15	15	21,6	24,9	29	kW
Minimum thermal output 80/60°C	G20	13,5	13,5	19,2	22,1	26	kW
Minimum thermal output 50/30°C	G20	14,9	14,9	21,1	24,5	28,9	kW
Useful efficiency at nominal heat output 80-60°C (PCI)		97,72	98,53	98,11	98,40	98,47	%
Useful efficiency at minimum heat output 80-60°C (PCI)		98,9	98,9	98,8	99,2	99,1	%
Useful efficiency at nominal heat output 50/30°C (PCI)		108,6	108,1	108,3	108,6	108,3	%
Useful efficiency at minimum heat output 50/30°C (PCI)		109,3	109,3	109,2	110	110	%
Useful efficiency 30% - 50/30°C PCS (PCI)		98,94 (109,36)	97,81 (109,31)	98,00 (108,89)	98,39 (108,93)	98,17 (109,41)	%
Combustion efficiency		99,0	99,0	99,0	99,3	99,3	%
Chimney losses with burner off		0,1	0,1	0,1	0,1	0,1	%
Chimney losses with burner on P. max. 80-60°C		2,3	2,3	2,5	2,5	2,6	%
Chimney losses with burner on at 30% Pn 50-30°C		0,5	0,5	0,6	0,5	0,6	%
Chimney losses with burner on P. min. 80-60°C		0,12	0,11	0,22	0,1	0,1	%
Losses through the casing with average T 70°C and burner on		0,5	0,5	0,5	0,5	0,5	%
Losses through the casing with average T 70°C and burner off		0,5	0,5	0,5	0,5	0,5	%
Flue gas temperature at max power and min power 80-60°C		71 - 61	72 - 61	76 - 62	75 - 61	77 - 61	°C
Flue gas temperature at max power and min power 50-30°C		45 - 33	46 - 33	47 - 35	45 - 33	48 - 35	°C
Air index λ at max power	G20	1,27	1,27	1,27	1,27	1,27	no.
	G31	1,29	1,29	1,29	1,29	1,29	no.
Air index λ at min power	G20	1,27	1,27	1,27	1,27	1,27	no.
	G31	1,29	1,29	1,29	1,29	1,29	no.
Max Flue flow at max-min power	G20	53 - 6	64 - 6	84 - 9	104 - 10	122 - 12	g/s
	G31	51 - 6	62 - 6	82 - 9	101 - 10	119 - 12	g/s
Flue Residual prevalence at min power		35	35	32	30	28	Pa
Flue gas residual head with max power		510	630	560	500	353	Pa
Maximum rated heat input (LCV)	G25	106	130	170	214	254	kW
Minimum rated heat input (LCV)	G25	13	13	18,1	21,4	24,5	kW

Description	Power Max BOX					U.M.	
	130-2 P	160-2 P	200-2 P	260-2 P	300-2 P		
ELECTRICAL DATA							
Power supply voltage	230-50					V-Hz	
Electric degree of protection	IPX4D					IP	
Electric power consumption of the boiler at max power	198	264	460	706	964	W	
Electric power consumption of the boiler at min power	92	96	126	198	220	W	
Electric power consumption of the pumps at max power	100	110	160	296	360	W	
Electric power consumption of the pumps with min power	40	44	64	118	144	W	
HEATING EXERCISE							
Water temperature selection range (with plate heat exchanger)	20-80/(85)*					°C	
Lockout thermostat activation temperature	95					°C	
Maximum operating temperature	100					°C	
Maximum working pressure	6					bar	
Minimum operating pressure	0,7					bar	
Water content	45	45	50	60	75	l	
Water side pressure drops with ΔT 20°C "versions V"	102	135	168	356	526	mbar	
Residual head on water side with ΔT 20°C "versions P"	400	280	450	300	500	mbar	
Maximum condensation production at maximum power 50-30°C	17,8	20,2	27,2	35	39,6	l/h	
Noise (sound power)	56	58	58	60	61	dB(A)	
GAS SUPPLY DATA							
Maximum supply gas pressure	G20	60	60	60	60	60	mbar
	G31	60	60	60	60	60	mbar
Nominal supply gas pressure	G20	20	20	20	20	20	mbar
	G31	37	37	37	37	37	mbar
Minimum gas supply pressure	G20	17	17	17	17	17	mbar
	G31	25	25	25	25	25	mbar
DIMENSIONAL DATA							
Heating delivery diameter		3" DN80 PN6	3" DN80 PN6	3" DN80 PN6	3" DN80 PN6	5" DN125 PN6	ø DN
Heating return diameter		3" DN80 PN6	3" DN80 PN6	3" DN80 PN6	3" DN80 PN6	5" DN125 PN6	ø DN
Gas inlet diameter		2 "DN50 PN6	2 "DN50 PN6	2 "DN50 PN6	2 "DN50 PN6	3" DN80 PN6	ø DN
Condensate discharge diameter		50	50	50	50	50	ø mm
Coat height		1800	1800	1800	1800	1800	mm
Width of the mantle		900	900	900	900	900	mm
Depth of the coat		890	890	890	890	890	mm
Flue exhaust diameter		DN160	DN160	DN160	DN160	DN300	ø mm
Air intake diameter (optional)		DN160	DN160	DN160	DN160	DN300	ø mm

Description	Power Max BOX					U.M.	
	330-3 P	390-3 P	450-3 P	520-4 P	600-4 P		
POWERS AND EFFICIENCY							
Nominal rated heat input (PCI)		291	334,8	393	446,4	524	kW
Nominal rated heat input (PCS)		324	372	438	496	584	kW
Maximum rated heat output (80°-60°C)	G20	285,9	329,4	387	439,2	516	kW
Maximum rated heat output (60-40°C)	G20	303,3	348,6	411,9	464,8	549,2	kW
Maximum rated heat output (50-30°C)	G20	315,3	363,6	426,3	484,4	568,4	kW
Minimum rated heat input (PCI)	G20	19,4	22,4	26,3	22,4	26,3	kW
Minimum rated heat input (PCS)	G20	21,6	24,9	29	24,9	29	kW
Minimum thermal output 80/60°C	G20	19,2	22,1	26	22,1	26	kW
Minimum thermal output 50/30°C	G20	21,1	24,5	28,9	24,5	28,9	kW
Useful efficiency at nominal heat output 80-60°C (PCI)		98,25	98,40	98,47	98,40	98,47	%
Useful efficiency at minimum heat output 80-60°C (PCI)		98,8	99,2	99,1	99,2	99,1	%
Useful efficiency at nominal heat output 50/30°C (PCI)		108,2	108,6	108,3	108,6	108,3	%
Useful efficiency at minimum heat output 50/30°C (PCI)		109,2	110	110	110	110	%
Useful efficiency 30% - 50/30°C PCS (PCI)		97,84 (108,93)	98,39 (108,93)	98,17 (109,41)	98,39 (108,93)	98,17 (109,41)	%
Combustion efficiency		99,0	99,3	99,3	99,3	99,3	%
Chimney losses with burner off		0,1	0,1	0,1	0,1	0,1	%
Chimney losses with burner on P. max. 80-60°C		2,6	2,5	2,6	2,5	2,6	%
Chimney losses with burner on at 30% Pn 50-30°C		0,6	0,5	0,6	0,5	0,6	%
Chimney losses with burner on P. min. 80-60°C		0,2	0,1	0,1	0,1	0,1	%
Losses through the casing with average T 70°C and burner on		0,33	0,33	0,33	0,25	0,25	%
Losses through the casing with average T 70°C and burner off		0,33	0,33	0,33	0,25	0,25	%
Flue gas temperature at max power and min power 80-60°C		78 - 62	75 - 61	77 - 61	75 - 61	77 - 61	°C
Flue gas temperature at max power and min power 50-30°C		49 - 35	45 - 33	48 - 35	45 - 33	48 - 35	°C
Air index λ at max power	G20	1,27	1,27	1,27	1,27	1,27	no.
	G31	1,29	1,29	1,29	1,29	1,29	no.
Air index λ at min power	G20	1,27	1,27	1,27	1,27	1,27	no.
	G31	1,29	1,29	1,29	1,29	1,29	no.
Max Flue flow at max-min power	G20	136 - 9	156 - 10	183-12	208-10	245-12	g/s
	G31	132 - 9	152-10	179-12	203-10	238-12	g/s
Flue Residual prevalence at min power		32	30	28	30	28	Pa
Flue gas residual head with max power		610	500	353	500	353	Pa
Maximum rated heat input (LCV)	G25	279	321	381	428	508	kW
Minimum rated heat input (LCV)	G25	18,5	21,4	24,5	21,4	24,5	kW

Description	Power Max BOX					U.M.	
	330-3 P	390-3 P	450-3 P	520-4 P	600-4 P		
ELECTRICAL DATA							
Power supply voltage	230-50					V-Hz	
Electric degree of protection	IPX4D					IP	
Electric power consumption of the boiler at max power	951	1059	1446	1412	1928	W	
Electric power consumption of the boiler at min power	228	297	330	396	440	W	
Electric power consumption of the pumps at max power	342	444	540	592	720	W	
Electric power consumption of the pumps with min power	135	177	216	236	288	W	
HEATING EXERCISE							
Water temperature selection range (with plate heat exchanger)	20-80/(85)*					°C	
Lockout thermostat activation temperature	95					°C	
Maximum operating temperature	100					°C	
Maximum working pressure	6					bar	
Minimum operating pressure	0,7					bar	
Water content	80	100	120	120	150	l	
Residual head on water side with ΔT 20°C	300	300	500	300	500	mbar	
Maximum condensation production at maximum power 50-30°C	45	52,5	59,4	70	79,2	l/h	
Noise (sound power)	60	61	62	63	64	dB(A)	
GAS SUPPLY DATA							
Maximum supply gas pressure	G20	60	60	60	60	60	mbar
	G31	60	60	60	60	60	mbar
Nominal supply gas pressure	G20	20	20	20	20	20	mbar
	G31	37	37	37	37	37	mbar
Minimum gas supply pressure	G20	17	17	17	17	17	mbar
	G31	25	25	25	25	25	mbar
DIMENSIONAL DATA							
Heating delivery diameter		3" DN80 PN6	3" DN80 PN6	5" DN125 PN6	3" DN80 PN6	5" DN125 PN6	ø DN
Heating return diameter		3" DN80 PN6	3" DN80 PN6	5" DN125 PN6	3" DN80 PN6	5" DN125 PN6	ø DN
Gas inlet diameter		2 "DN50 PN6	2 "DN50 PN6	3" DN80 PN6	2 "DN50 PN6	3" DN80 PN6	ø DN
Condensate discharge diameter		50	50	50	50	50	ø mm
Coat height		1800	1800	1800	1800	1800	mm
Width of the mantle		1700	1700	1700	1700	1700	mm
Depth of the coat		890	890	890	890	890	mm
Flue exhaust diameter		DN160	DN160	DN300	DN160	DN300	ø mm
Air intake diameter (optional)		DN160	DN160	DN300	DN160	DN300	ø mm

1.8 ERP data

Description		Power Max BOX					U.M.	
		130-2 P	160-2 P	200-2 P	260-2 P	300-2 P		
Rated input		114	136	180	223,2	262	kW	
Seasonal energy efficiency of space heating η_s		94 / 94	93 / 93	93 / 93	93 / 93	93 / 93	%	
USEFUL HEAT OUTPUT								
At rated heat output and at a high temperature regime P4	G20	114	134	176,6	219,6	258	kW	
At 30% of the nominal heat output and at a low temperature regime P1	G20	37,4	44,6	58,8	73,2	86,6	kW	
EFFICIENCY								
At rated heat output and at a high temperature regime η_4 (PCS)		88,41	88,16	88,3	88,55	88,36	%	
At 30% of nominal heat output and at a low temperature regime η_1 (PCS)		98,94	97,81	98	98,39	98,17	%	
ADDITIONAL ENERGY CONSUMPTION								
At full load Elmax		198 / 98	264 / 154	460 / 300	706 / 410	964 / 604	W	
At Partial load Elmin		92 / 52	96 / 52	126 / 62	198 / 80	220 / 76	W	
In PSB Standby mode		26 / 15	26 / 15	12 / 12	12 / 12	16 / 16	W	
OTHER PARAMETERS								
Thermal losses in Pstby standby mode		159,16	194,47	255,56	316,64	374,47	W	
QHE Annual energy consumption		236	282	364	384	532	GJ	
Sound power level within LWA		56	58	58	60	61	dB(A)	
Nox oxides emissions Nox (*)		34,2	36,4	38,1	39,3	46,1	mg/kWh	
NOx Class		6	6	6	6	6	n°	
Emissions values with maximum flow (*)	CO less than	G20	79	90	81	89	91,5	p.p.m.
		G31	142	147	153	177	185	
	CO2 (**)	G20	9	9	9	9	9	%
		G31	10,4	10,4	10,4	10,4	10,4	
	NOx s.a lower than	G20	30	30	30	30	30	p.p.m.
G31		40	40	40	40	40		
Flue gas T		71	72	76	75	77	°C	
Emissions values with minimum flow (*)	CO less than	G20	6,5	6,5	7,5	4,6	5,6	p.p.m.
		G31	11	11	12	14	16	
	CO2 (**)	G20	9	9	9	9	9 (***)	%
		G31	10,4	10,4	10,4	10,4	10,4	
	NOx s.a lower than	G20	30	30	30	30	30	p.p.m.
G31		40	40	40	40	40		
Flue gas T		61	61	62	61	61	°C	
Gas consumption (min-max)	G20	2,86÷12,00	2,86÷14,48	4,12÷19,06	4,74÷23,64	5,00÷27,82	mc/h	
	G30	2,18÷9,16	2,18÷11,06	3,14÷14,56	3,62÷18,04	3,82÷21,24	kg/h	
	G31	2,14÷9,00	2,14÷10,86	3,08÷14,30	3,56÷17,72	3,74÷20,86	kg/h	

(*) Weights calculated according to EN 15502.

(**) Values referred to atmospheric pressure at sea level.

(***) To adjust the POWER MAX BOX 300-2 P models in **Belgium and Switzerland**, please refer to the chapter "Adjustments".

Description		Power Max BOX					U.M.	
		330-3 P	390-3 P	450-3 P	520-4 P	600-4 P		
Rated input		291	334,8	393	446,4	524	kW	
Seasonal energy efficiency of space heating η_s		93 / 93	93 / 93	93 / 93	93 / 93	93 / 93	%	
USEFUL HEAT OUTPUT								
At rated heat output and at a high temperature regime P4	G20	285,9	329,4	387	439,2	516	kW	
At 30% of the nominal heat output and at a low temperature regime P1	G20	95,1	109,8	129	146,4	172	kW	
EFFICIENCY								
At rated heat output and at a high temperature regime η_4 (PCS)		88,24	88,55	88,36	88,55	88,36	%	
At 30% of nominal heat output and at a low temperature regime η_1 (PCS)		97,84	98,39	98,17	98,39	98,17	%	
ADDITIONAL ENERGY CONSUMPTION								
At full load Elmax		951 / 609	1059 / 615	1446 / 906	1412 / 820	1928 / 1208	W	
At Partial load Elmin		228 / 93	297 / 120	330 / 114	396 / 160	440 / 152	W	
In PSB Standby mode		18 / 18	18 / 18	24 / 24	24 / 24	32 / 32	W	
OTHER PARAMETERS								
Thermal losses in Pstby standby mode		414,19	474,96	561,71	636,09	748,95	W	
QHE Annual energy consumption		588	678	798	904	1064	GJ	
Sound power level within LWA		60	61	62	63	64	dB(A)	
Nox oxides emissions Nox (*)		38,7	39,3	46,1	39,3	46,1	mg/kWh	
NOx Class		6	6	6	6	6	n°	
Emissions values with minimum flow (*)	CO less than	G20	91,5	89	91,5	89	91,5	p.p.m.
		G31	163	177	185	177	185	
	CO2 (**)	G20	9	9	9	9	9	%
		G31	10,4	10,4	10,4	10,4	10,4	
	NOx s.a lower than	G20	30	30	30	30	30	p.p.m.
		G31	40	40	40	40	40	
Flue gas T		78	75	77	75	77	°C	
Emissions values with minimum flow (*)	CO less than	G20	7,5	4,6	5,6	4,6	5,6	p.p.m.
		G31	12	14	16	14	16	
	CO2 (**)	G20	9 (***)	9	9 (***)	9	9 (***)	%
		G31	10,4	10,4	10,4	10,4	10,4	
	NOx s.a lower than	G20	30	30	30	30	30	p.p.m.
		G31	40	40	40	40	40	
Flue gas T		62	61	61	61	61	°C	
Gas consumption (min-max)	G20	6,18÷30,87	7,11÷35,46	7,50÷41,73	9,48÷47,28	10,00÷55,64	mc/h	
	G30	4,71÷23,58	5,43÷27,06	5,73÷31,86	7,24÷36,08	7,64÷42,48	kg/h	
	G31	4,62÷23,16	5,34÷26,58	5,61÷31,29	7,12÷35,44	7,48÷41,72	kg/h	

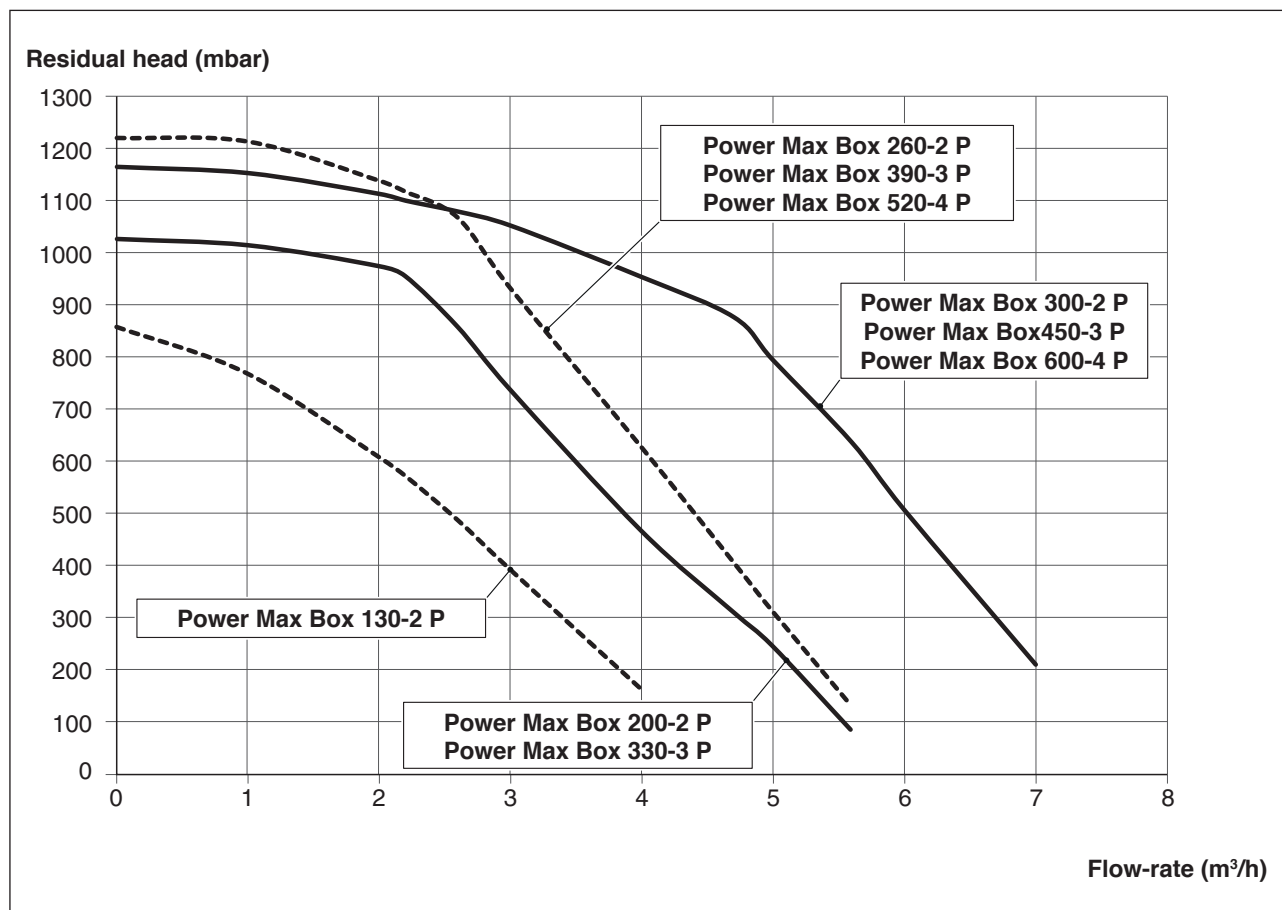
(*) Weights calculated according to EN 15502.

(**) Values referred to atmospheric pressure at sea level.

(***) To adjust the POWER MAX BOX 330-3 P, POWER MAX BOX 450-3 P and POWER MAX BOX 600-4 P models in **Belgium and Switzerland**, please refer to the chapter "Adjustments".

1.9 Pumps

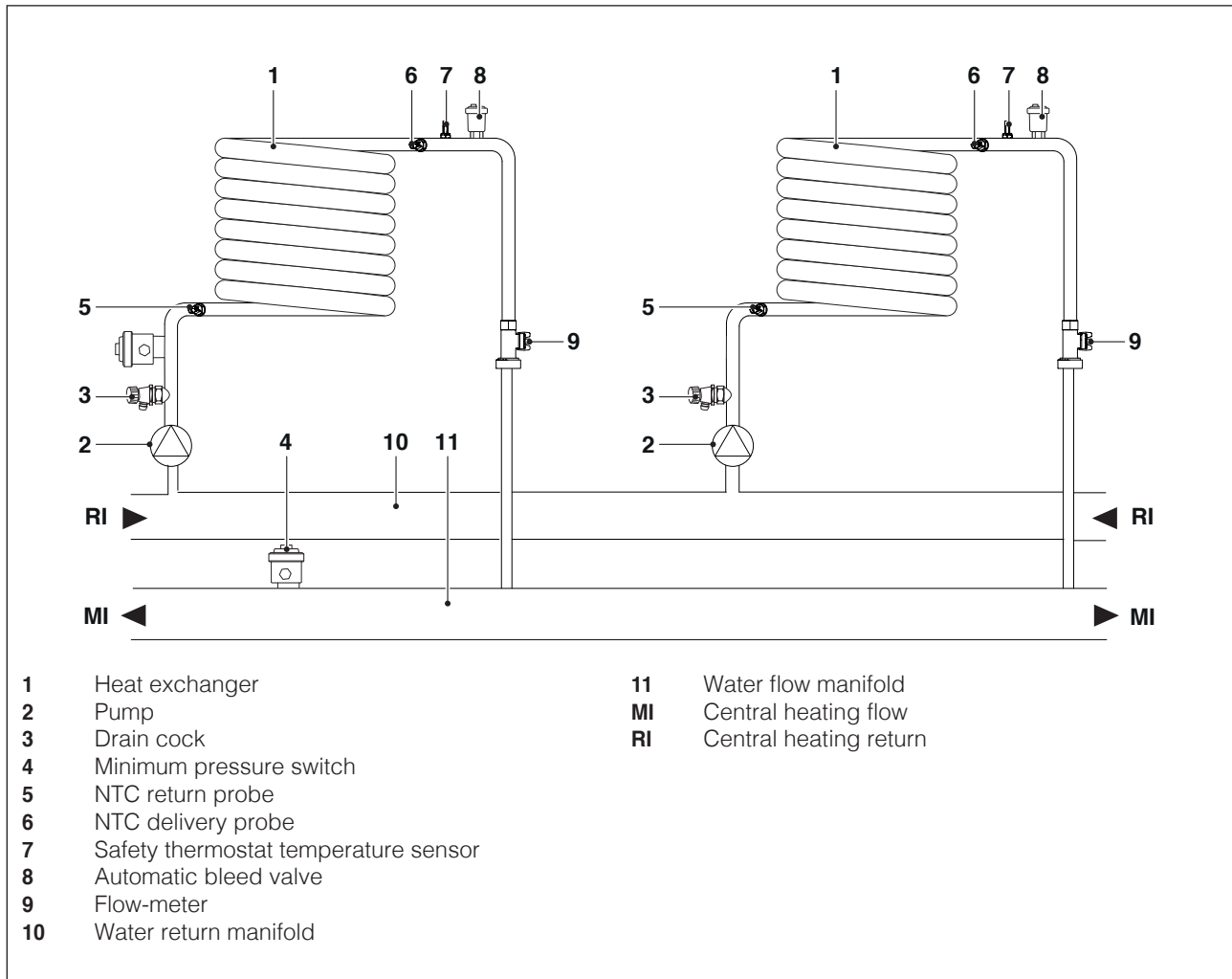
Power Max BOX appliances have the following headform curves for each single module:



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- ⚠ At the first start-up, and at least once a year, the rotation of the circulator shaft should be checked as, especially after long periods of not being operated, deposits and/or residuals could impede its free rotation.
- ⚠ Before loosening or removing the circulator cap, protect the electric devices located underneath from any water that exits.
- ⊘ It is prohibited to operate the circulators without water.

1.10 Water circuit



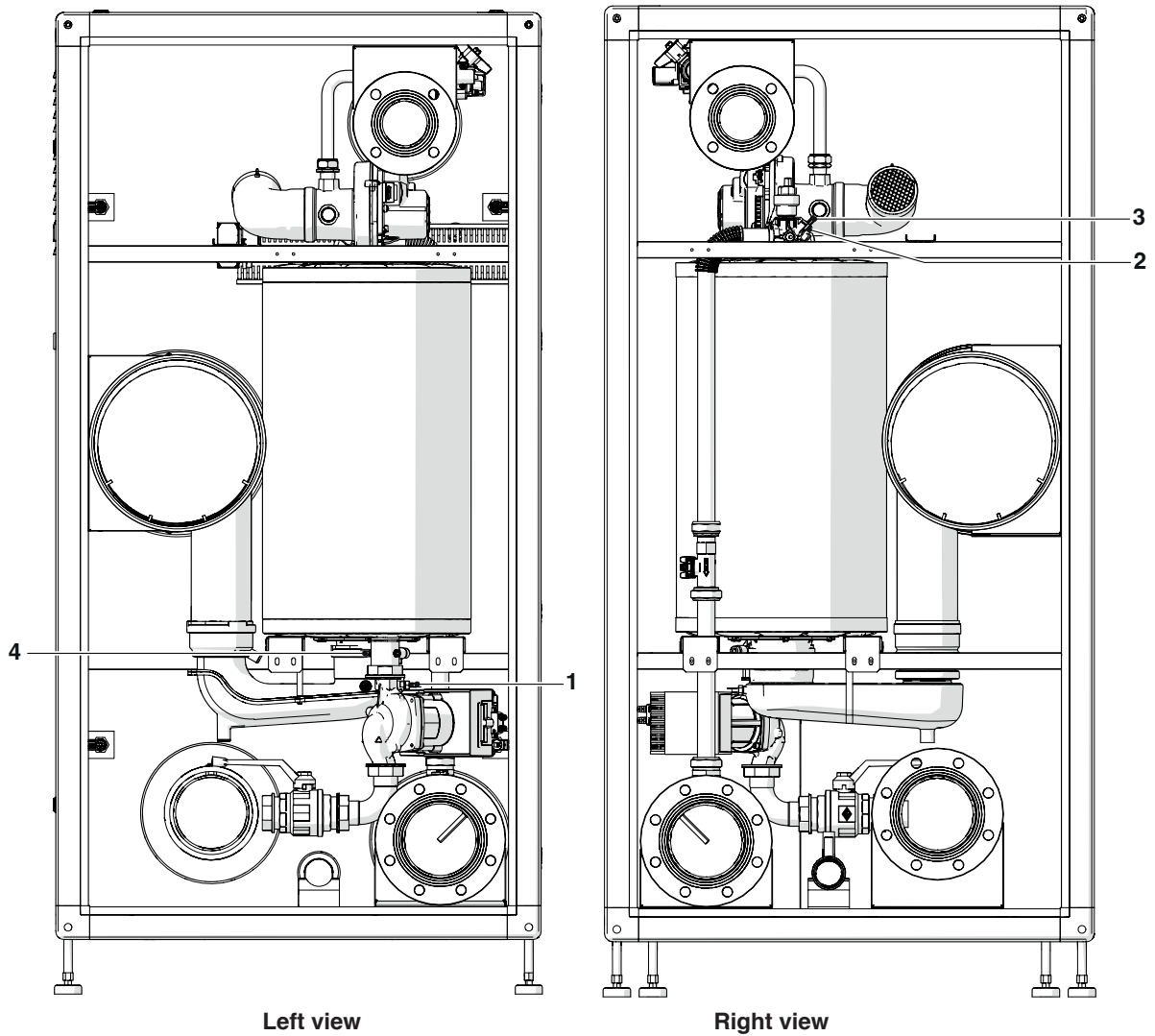
Values of NTC probes' resistors with changing temperatures.

Temperature °C Tolerance test ±10%	Resistor Ω	Temperature °C Tolerance test ±10%	Resistor Ω
-40	191908	45	4904
-35	146593	50	4151
-30	112877	55	3529
-25	87588	60	3012
-20	68471	65	2582
-15	53910	70	2221
-10	42739	75	1918
-5	34109	80	1663
0	27396	85	1446
5	22140	90	1262
10	17999	95	1105
15	14716	100	970
20	12099	105	855
25	10000	110	755
30	8308	115	669
35	6936	120	594
40	5819	125	529

1.11 Positioning the temperature sensors

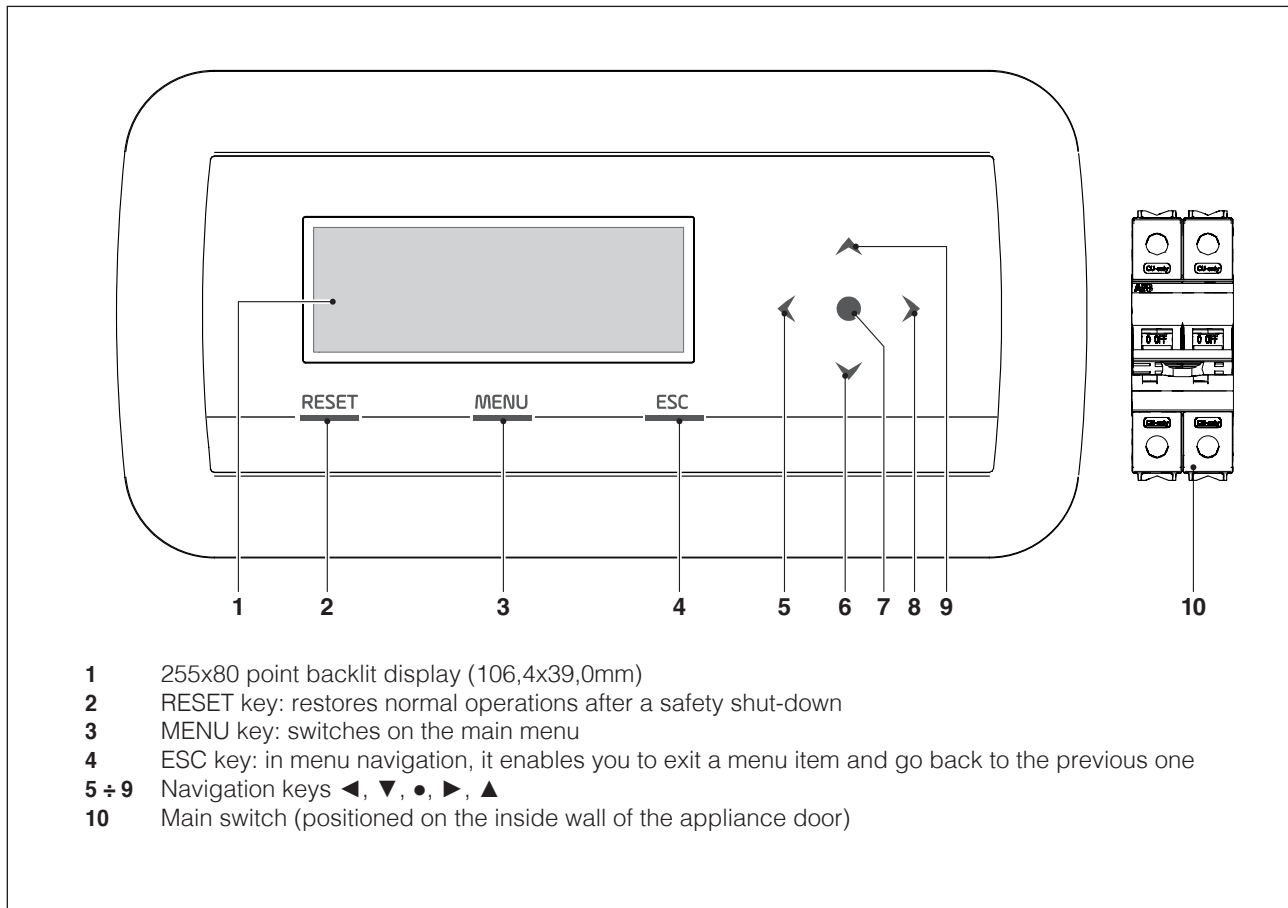
Probes placed on the related sockets of the thermal module:

- 1 Exhaust flue probe
- 2 Safety thermostat
- 3 CH flow temperature sensor
- 4 Return probe

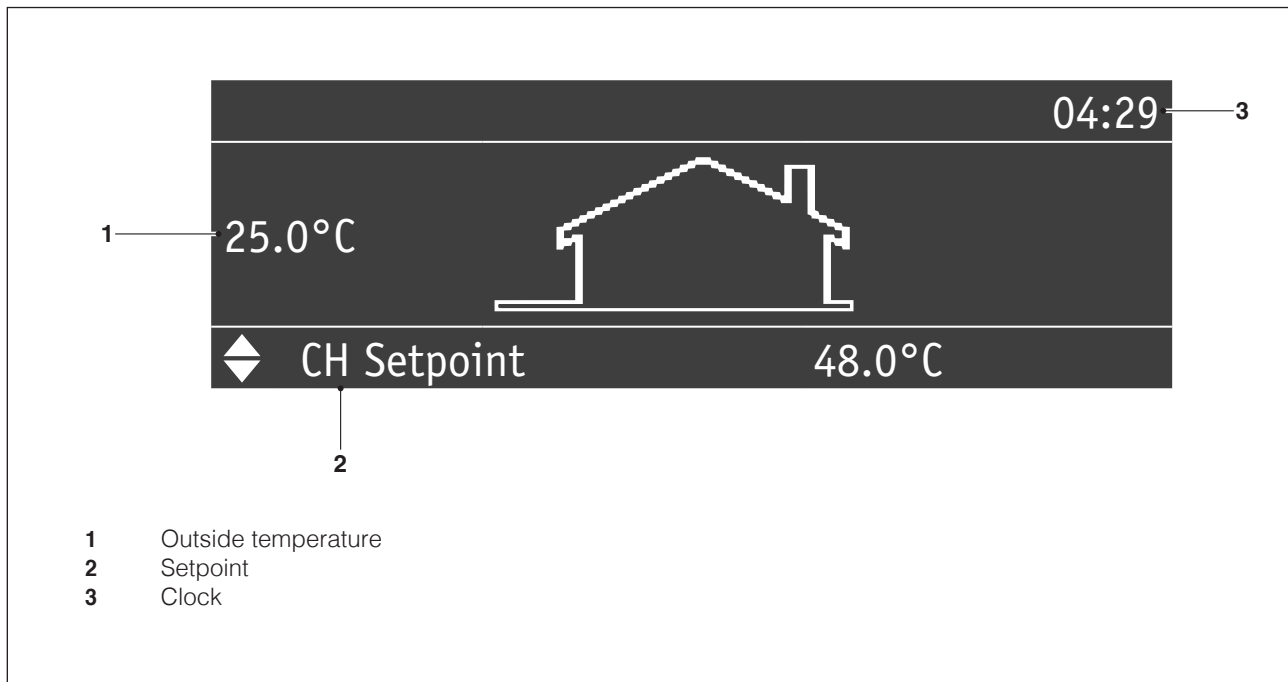


1.12 Control panel

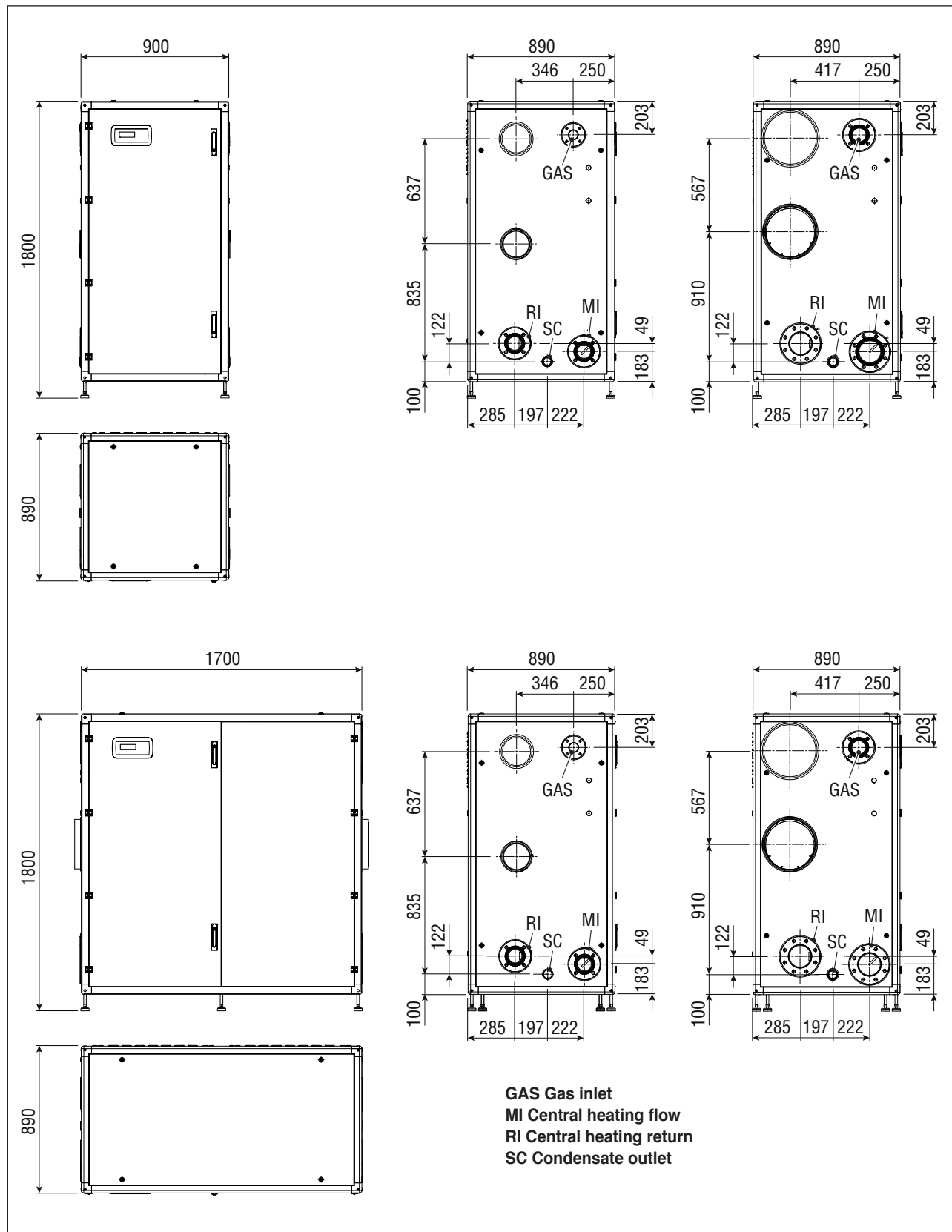
CONTROL PANEL AND SYMBOLS



SECONDARY INFORMATION/DISPLAY VISUALISATION



2.2 Overall dimensions and weights









Description	Power Max BOX					U.M.
	130-2 P	160-2 P	200-2 P	260-2 P	300-2 P	
Empty weight	270	270	280	300	350	kg

Description	Power Max BOX					U.M.
	330-3 P	390-3 P	450-3 P	520-4 P	600-4 P	
Empty weight	450	490	540	560	600	kg

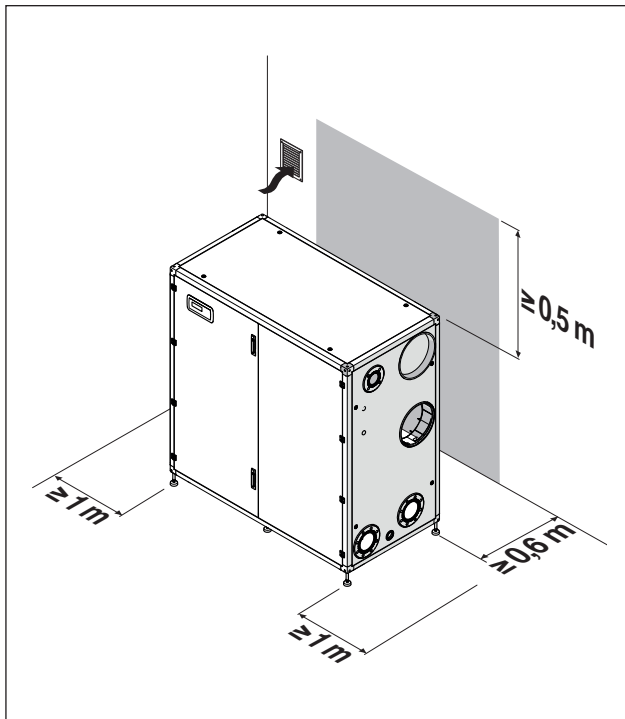
2.3 Installation premises

The thermal module **Power Max BOX** can be installed in rooms that are permanently ventilated and equipped with suitably sized ventilation openings in line with Technical Standards and Regulations applicable to the installation site.

-  When installing the boiler, allow sufficient space around it to access all safety and control devices and to permit easy maintenance.
-  Check that the electric protection level of the appliance is suitable for features of the room where it is installed.
-  Make sure that comburent air is not contaminated by substances containing chlorine or fluorine (elements found in sprays, paints, detergents etc.).
-  Thermal modules may be installed outdoors only if the special accessory is fitted.
-  Do not obstruct or restrict the air vents in the room where the boiler is installed. A free air supply is essential for correct combustion.
-  It is forbidden to leave flammable containers and substances in the room where the thermal module is installed.


2.3.1 Recommended minimum distances

Clearances for the assembly and the maintenance of the appliance are shown in the figure.





2.4 Installation in older systems and systems requiring modernisation

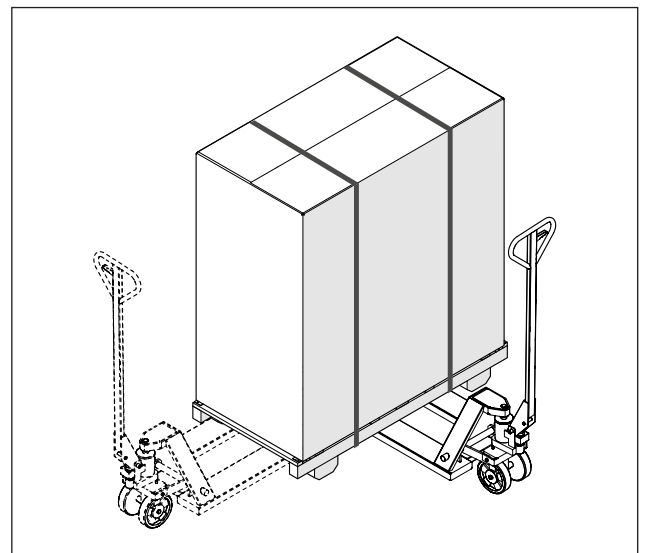
When installing these boilers in older systems or systems requiring modernisation, always perform the following checks:

- Make sure 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. See Paragraph "Discharge of combustion products" for any additional information.
 - Make sure that the electrical supply system has been installed by a qualified electrician in compliance with applicable standards
 - Make sure that the fuel feed line and any storage tank are made and installed in compliance with applicable standards
 - Make sure that expansion vessels are big enough to contain the additional volume generated by thermal expansion
 - Make sure that the flow rate, head and direction of flow of the pumps are suitable and correct
 - The system has been washed, cleaned of mud and grime and water seals have been checked
 - A treatment system is fitted when the supply/refill water has values other than those indicated in Paragraph "Water quality requirements"
-  The manufacturer declines all responsibility for damage caused by incorrectly constructed flue systems.

2.5 Moving and removing the packing

To move the module before removing the packaging, place yourself on the front of the packaging, making sure that the forks stretch out from the opposite side before lifting the load from the ground.

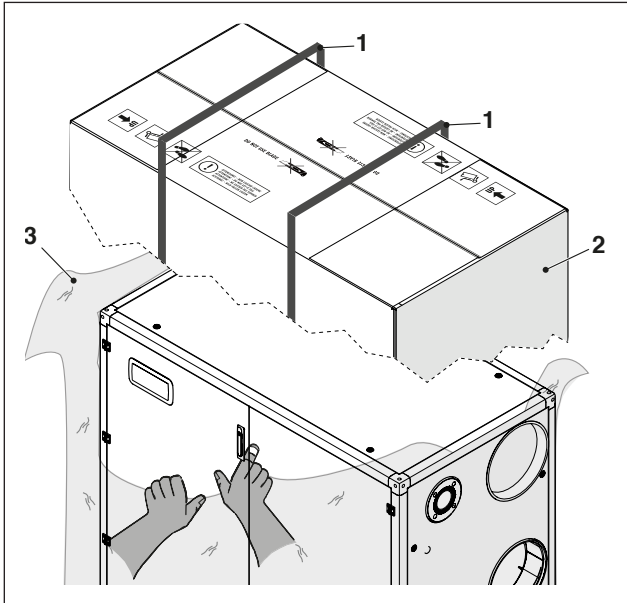
- If it is necessary to fork the appliance from the side, make sure that for the 2 unit modules the fork is stretched beyond the opposite side while for the 3/4 unit modules the forks need to exceed the center line.
-  To move the appliance, use suitable equipment according to the weight of the appliance itself.
-  Avoid slamming against rigid surfaces (such as floors and walls) during operations of movement.



- ⚠ Do not remove the cardboard packaging until you reach the installation location.
- ⚠ Before handling the appliance and removing the packaging, wear PPE and use tools suitable for the appliance's size and weight.
- ⚠ This step must be carried out by several individuals equipped with suitable means with respect to the appliance's size. Make sure that the load is not unbalanced during handling.

Proceed as follows to remove the packing:

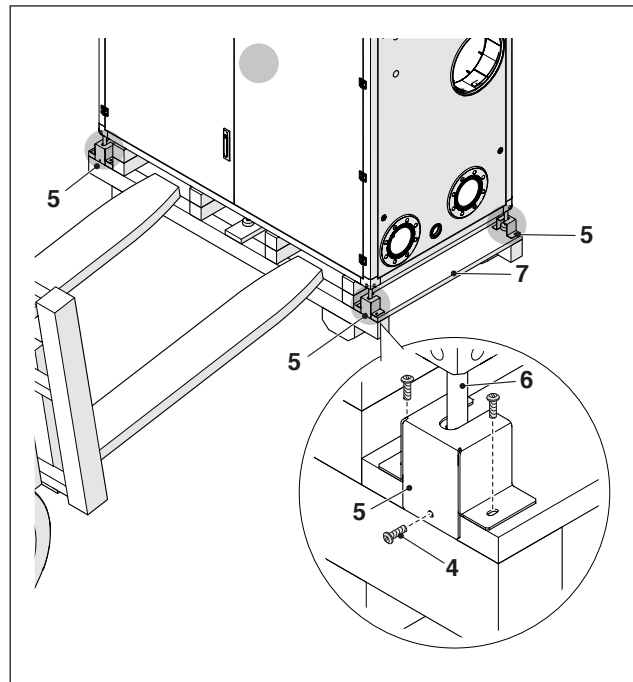
- Remove the straps (1) that fix the packaging to the pallet
- Remove the box (2)
- Remove the protective bag (3)



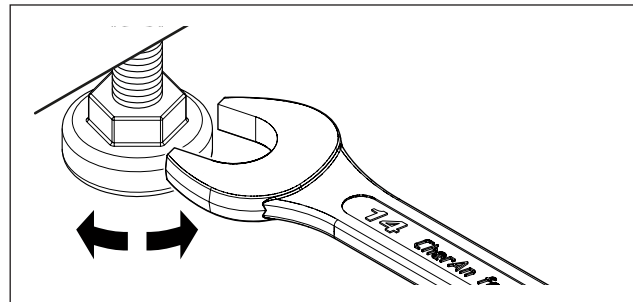
- ⊘ Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.

To remove the module from the pallet proceed as follows:

- Unscrew the screws (4) of the four stops (5) that fix the feet (6)
- To separate the pallet (7) from the module insert it as shown in the figure (always pushing from the front).

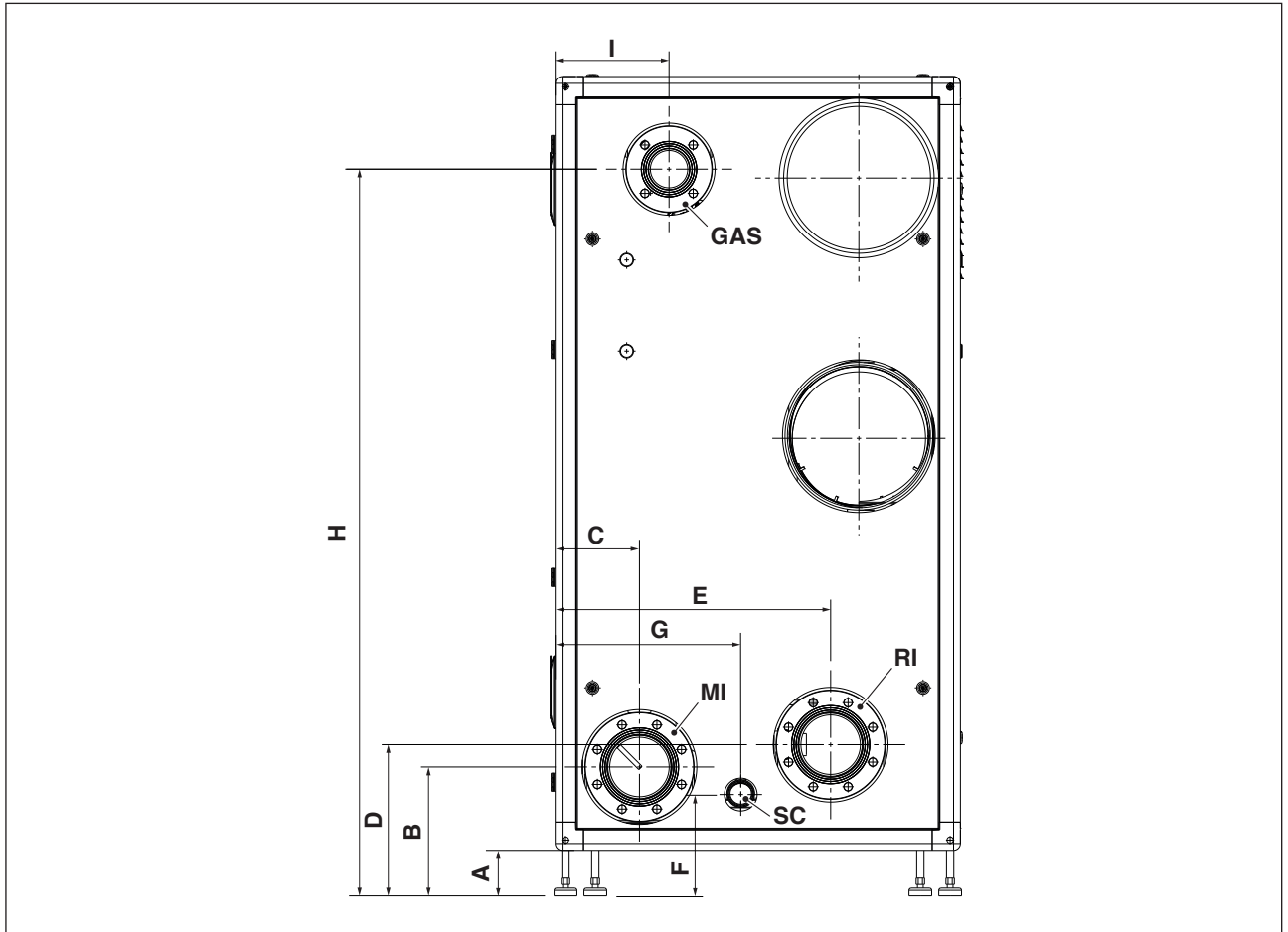


Once the module is positioned, level it by using the appropriate adjustments of the feet with a 14-key, as shown in the figure.



2.6 Water connections

The dimensions and position of thermal module's hydraulic connections are shown in the table below.



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DESCRIPTION	Power Max BOX										
	130-2 P	160-2 P	200-2 P	260-2 P	300-2 P	330-3 P	390-3 P	450-3 P	520-4 P	600-4 P	
A	100	100	100	100	100	100	100	100	100	100	mm
B	283	283	283	283	283	283	283	283	283	283	mm
C	185	185	185	185	185	185	185	185	185	185	mm
D	332	332	332	332	332	332	332	332	332	332	mm
E	605	605	605	605	605	605	605	605	605	605	mm
F	222	222	222	222	222	222	222	222	222	222	mm
G	408	408	408	408	408	408	408	408	408	408	mm
H	1596	1596	1596	1596	1596	1596	1596	1596	1596	1596	mm
I	250	250	250	250	250	250	250	250	250	250	mm
GAS (gas inlet)	DN 50	DN 50	DN 50	DN 50	DN 80	DN 50	DN 50	DN 80	DN 50	DN 80	Ø
MI (system flow)	DN 80	DN 80	DN 80	DN 80	DN 125	DN 80	DN 80	DN 125	DN 80	DN 125	Ø
RI (system return)	DN 80	DN 80	DN 80	DN 80	DN 125	DN 80	DN 80	DN 125	DN 80	DN 125	Ø
SC (condensate drain)	50	50	50	50	50	50	50	50	50	50	Ø

- ⚠ Before connecting the thermal module the protection plugs must be removed from the delivery, return and condensate drain pipes.
- ⚠ Before connecting the thermal module, it is necessary to clean the system. This step is absolutely required when the appliance replaces another one on pre-existing systems.
- ⚠ Before connecting up the external pipework to the boiler, first connect the pipes to a suitable equipotential and earthing system via a specific conductor, different from the earthing terminal board on the boiler. The technician responsible for installing the hydraulic system is responsible for earthing the external pipework.

In order to carry out this cleaning activity, if the old generator is still installed on the system, it is advisable to:

- add a de-scaling additive.
- Operate the system with the generator on for around 7 days.
- Discharge dirty system water and flush the system one or more times with clean water.

If the system is very dirty, repeat the last procedure one more time.

If the old generator is not present or available, use a pump to circulate the water + additive through the system for about 10 days and perform a final washing as described in the previous paragraph.

Once the cleaning has been completed, it is recommended to add a suitable protective fluid to the system's water before installing the thermal module.

In order to clean the heat exchanger's built-in water system, please contact Technical Assistance Centre **Beretta**.



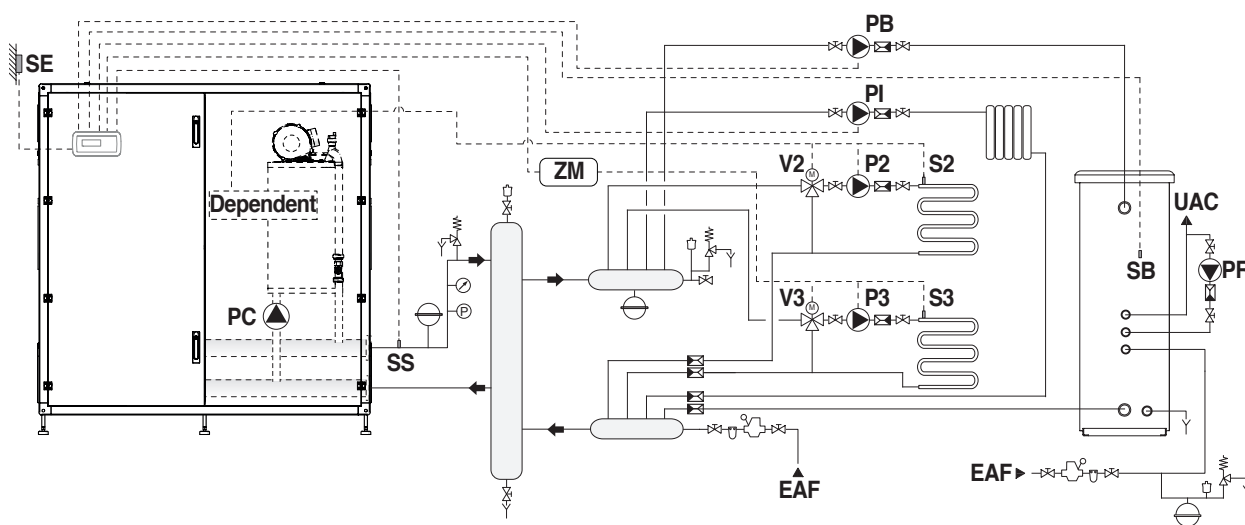
Do not use incompatible liquid detergents, including acids (for instance, chloridric acid and similar) in any concentration.



Do not subject the heat exchanger to cyclical pressure changes because fatigue stress is very dangerous for the integrity of system components.

2.7 Typical water system schematics

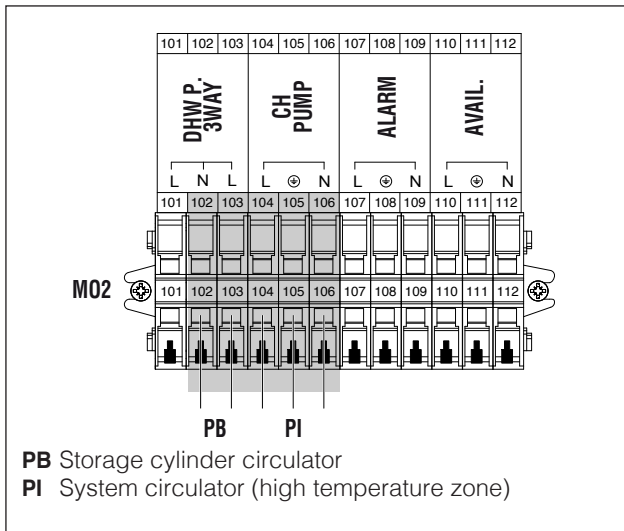
Block diagram 1: Circuit with thermal modules with their own circulator, connected in cascade.



PC	Thermal module circulator	SS	Primary sensor
PB	Storage cylinder circulator	V2	Mixer valve zone 2
PR	DHW circulation pump	V3	Mixer valve zone 3
PI	System circulator (high temperature zone)	ZM	Electronic device for zone management (accessory)
P2	Zone 2 circulator (low temperature)	EAF	Domestic cold water inlet
P3	Zone 3 circulator (low temperature)	UAC	Domestic hot water outlet
S2	Zone 2 sensor		
S3	Zone 3 sensor		
SB	Boiler sensor		
SE	Outdoor sensor		

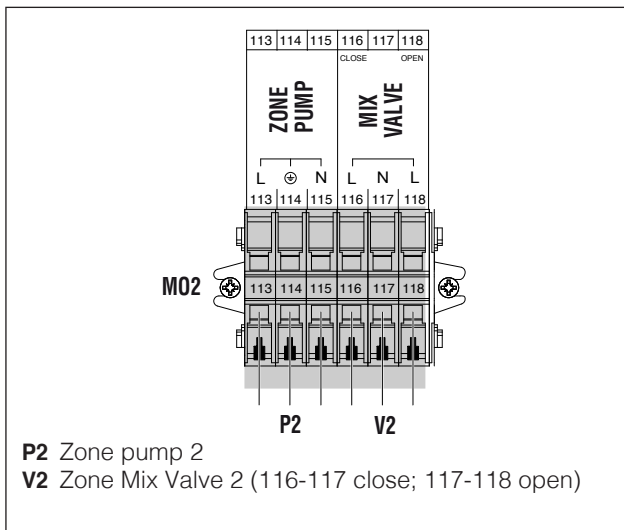
2.7.1 Electrical power connections Block diagram 1

MANAGING CONNECTIONS

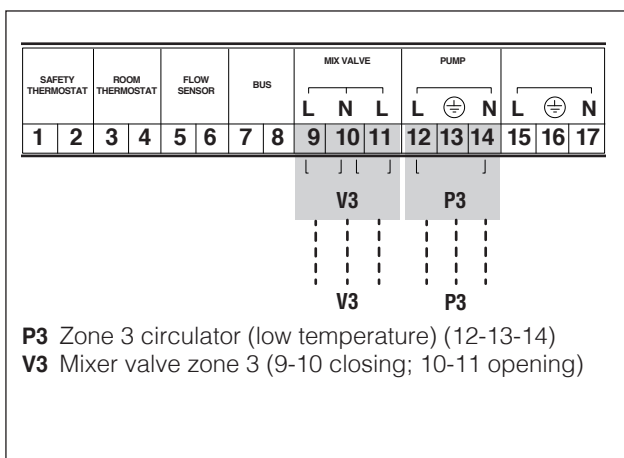


DEPENDENT CONNECTIONS

(only if the dependent zone is connected)

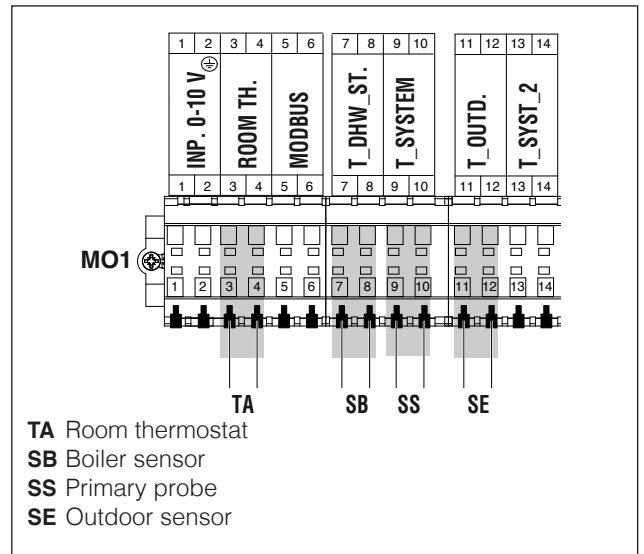


ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE



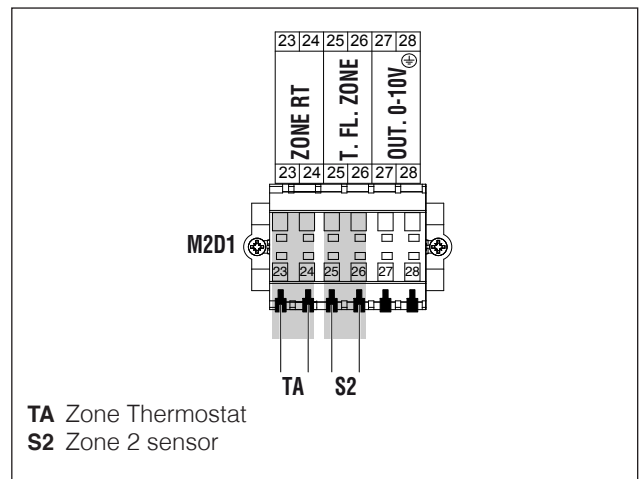
2.7.2 Connecting sensors/room thermostats Diagram 1

MANAGING CONNECTIONS

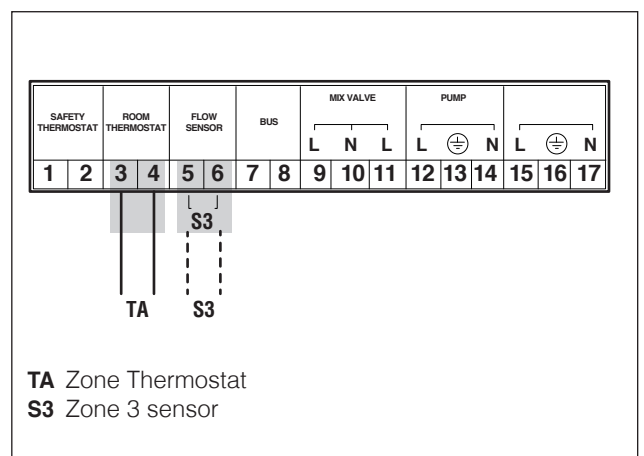


DEPENDENT CONNECTIONS

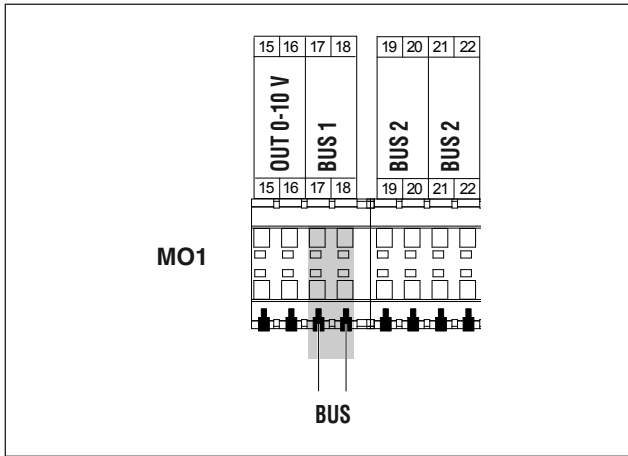
(only if the dependent zone is connected)



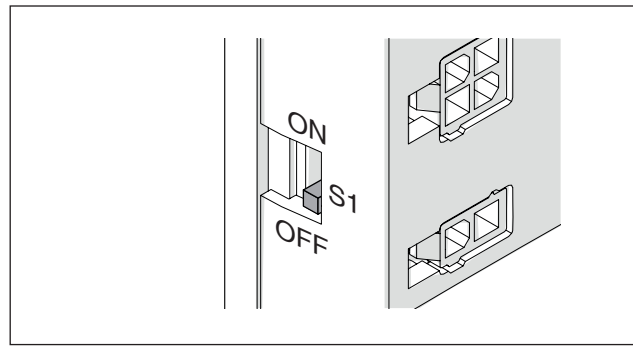
ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE



2.7.3 Bus connections Block diagram 1
MANAGING CONNECTIONS

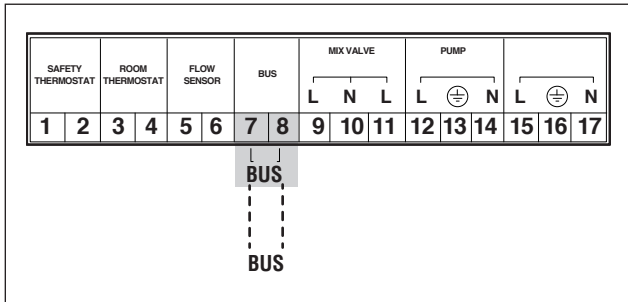


2.7.4 Setting switch S1 Block diagram 1

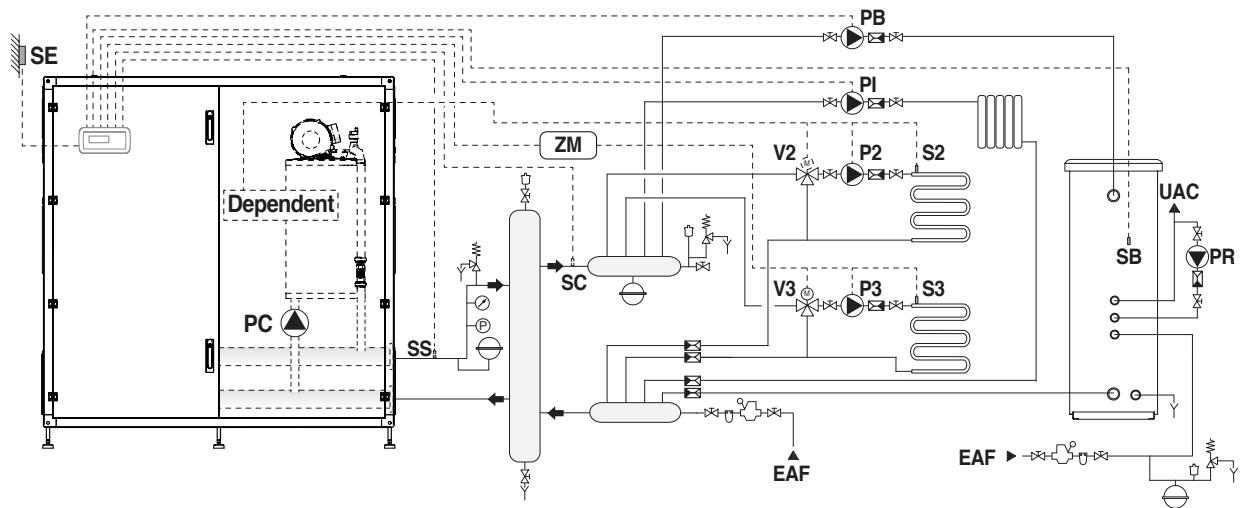


Setting switch S1=OFF

ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE



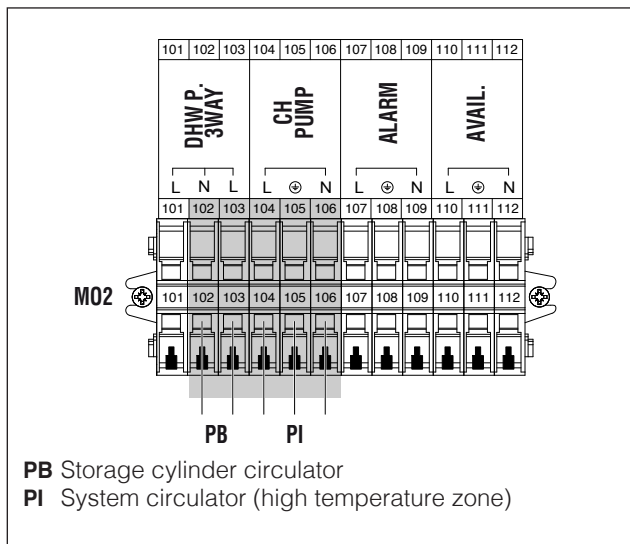
Block diagram 2: Circuit with thermal modules with their own circulator, connected in cascade. Using the secondary sensor.



- | | | | |
|-----------|-------------------------------------------|------------|---------------------------------------------------|
| PC | Thermal module circulator | SS | Primary sensor |
| PB | Storage cylinder circulator | SC | Secondary sensor |
| PR | DHW circulation pump | V2 | Mixer valve zone 2 |
| PI | System circulator (high temperature zone) | V3 | Mixer valve zone 3 |
| P2 | Zone 2 circulator (low temperature) | ZM | Electronic device for zone management (accessory) |
| P3 | Zone 3 circulator (low temperature) | EAF | Domestic cold water inlet |
| S2 | Zone 2 sensor | UAC | Domestic hot water outlet |
| S3 | Zone 3 sensor | | |
| SB | Boiler sensor | | |
| SE | Outdoor sensor | | |

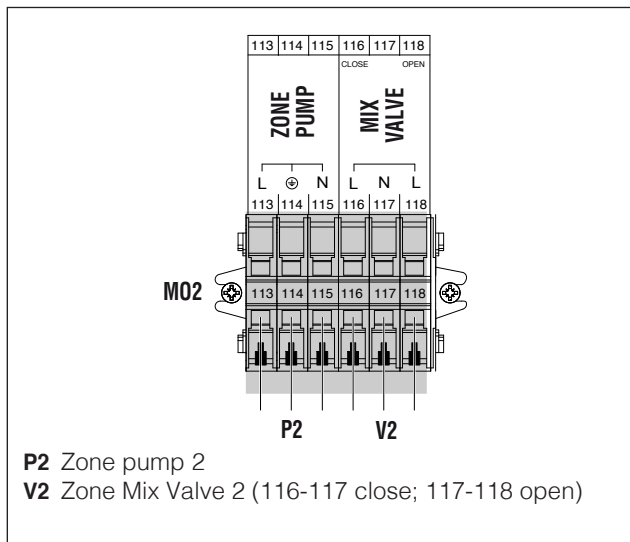
2.7.5 Electrical power connections Block diagram 2

MANAGING CONNECTIONS

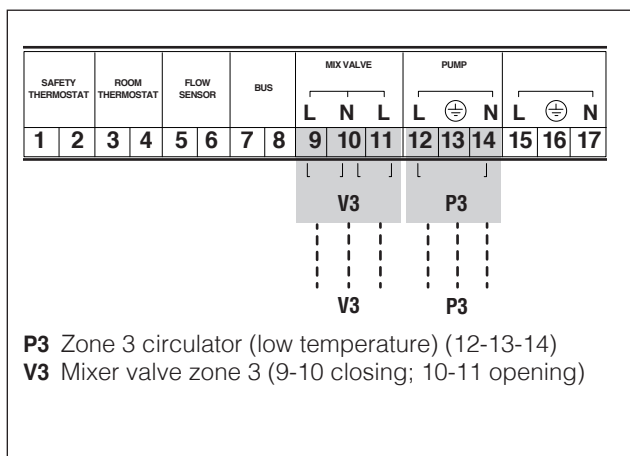


DEPENDENT CONNECTIONS

(only if the dependent zone is connected)

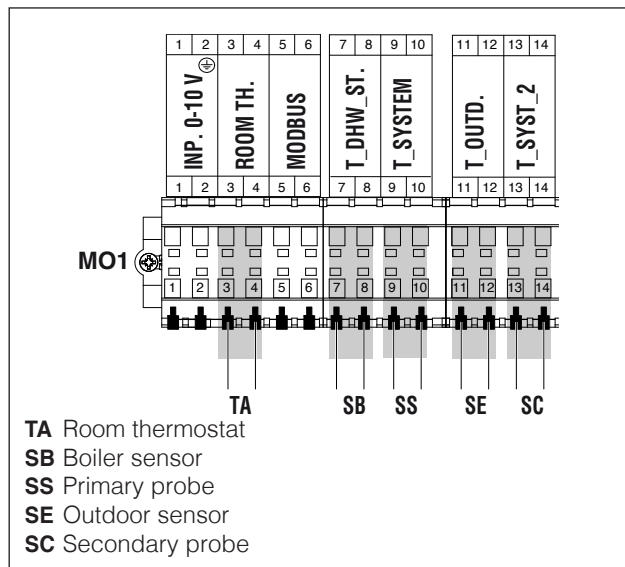


ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE



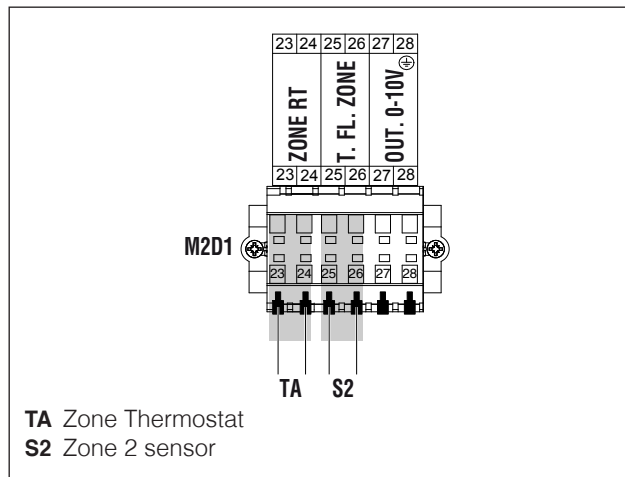
2.7.6 Connecting sensors/room thermostats Diagram 2

MANAGING CONNECTIONS

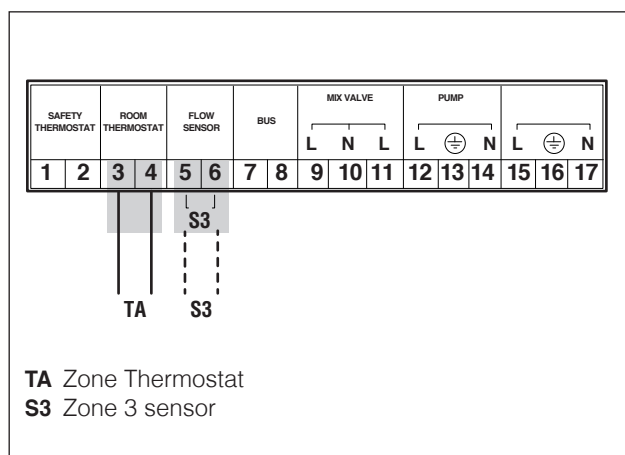


DEPENDENT CONNECTIONS

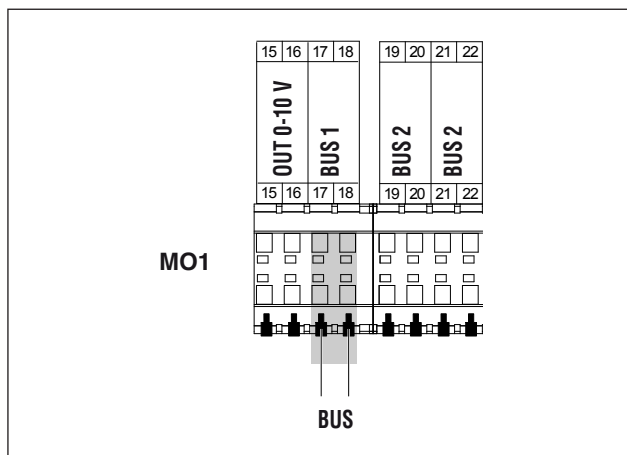
(only if the dependent zone is connected)



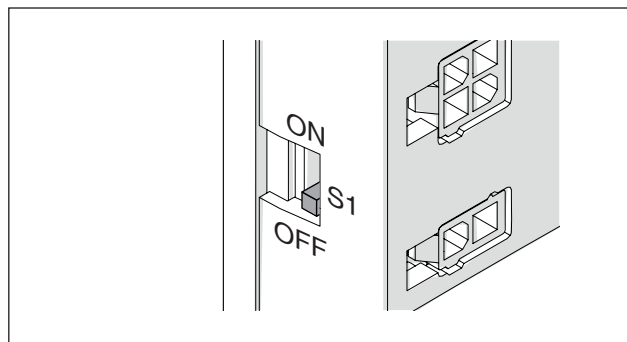
ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE



2.7.7 Bus connections Block diagram 2 MANAGING CONNECTIONS

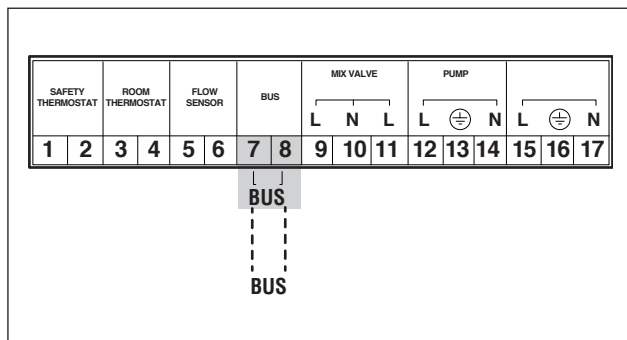


2.7.8 Setting switch S1 Block diagram 2



Setting switch S1=OFF






ACCESSORY CONNECTIONS FOR ADDITIONAL ZONE




2.8 Gas connections


The gas connection must be made respecting the installation regulations in force, and sized to ensure the correct gas delivery to the burner.

Before making the connection, check that:


-  The gas type is suitable for the appliance
-  If the appliance needs to be adapted for use with another gas fuel, contact your local Technical Assistance Centre to have the necessary modifications made. These operations may not be performed by the installer under any circumstances.
-  The piping is thoroughly clean
-  The gas meter's flow rate is capable of ensuring the simultaneous use of all the appliances connected to it. The appliance's connection to the gas supply line must be carried out in accordance with the current regulations.
-  Intake pressure with the appliance in the off position has the following reference values:
 - powered by methane gas: optimal pressure 20 mbar
 - powered by L.P.G.: optimal pressure 37 mbar

 Do not use any fuels other than those provided under any circumstances.

While it is normal for the intake pressure to decrease while the appliance is in operation, it is advisable to verify that no excessive pressure fluctuations take place. In order to limit the extent of these types of variations, the diameter of the gas supply line to be used must be assessed based on the length and the pressure drops of the line itself, from the meter to the thermal module.


 If fluctuations in the gas distribution pressure are encountered, it is recommended to install an appropriate pressure stabiliser upstream of the appliance's gas intake. For G30 and G31 gas supply, all the necessary precautions must be taken in order to prevent the gas from freezing in the case of extremely low outdoor temperatures.


If the gas distribution network contains solid particles, install a filter on the fuel supply line. When selecting it, consider that pressure drops due to the filter should be as low as possible.


 On completion of the installation, check that all joints are sealed.

2.9 Discharge of combustion products


The appliance is supplied as standard in B-type configuration (B23-B23P-B53P), i.e. pre-fitted to suction air directly into the installation room and may be converted into a C-type appliance with the use of specific accessories. In this configuration, the appliance will suction the air directly from outdoors, with the possibility of coaxial or dual piping. For flue gas extraction and the intake of combustion air, it is essential to use only specific pipes for condensing boilers and ensure that they are correctly connected, as shown in the instructions supplied with the flue gas accessories.

 Do not connect this appliance's flue gas extraction pipes with those of other appliances, unless this is specifically authorised by the manufacturer. Non-compliance with this precaution may cause a build-up of carbon monoxide in the room where the appliance is installed. This could jeopardise people's health and safety.

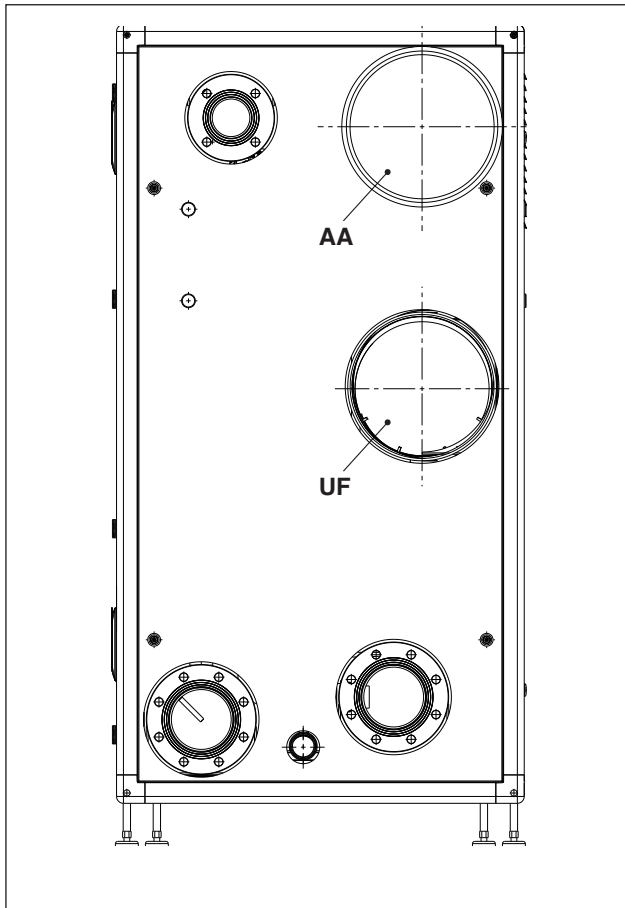
 For further information on flue gas extraction pipes for thermal modules connected in a cascaded system, see Catalogue and the instructions provided for the relevant accessories.

 Ensure that combustion air (suction line air) is not contaminated by:

- waxes/chlorinated detergents
- chemical products based on swimming pool chlorine
- calcium chloride
- sodium chloride use to soften tap water
- refrigerant leaks
- paint or varnish removers
- chloridric acid/muriatic acid
- cements and glues
- anti-static softeners used in dryers
- chloride used for domestic or industrial applications as detergent, whitener or solvent
- adhesives used to glue construction and other similar products.

 To prevent contamination of the thermal module, do not install suction line air intakes and gas flue extraction pipes near:

- dry-cleaners/laundry rooms and factories
- swimming pools
- metal processing plants
- beauty parlours
- fridge repair shops
- photo-processing facilities
- body-shops
- plastics manufacturing plants
- furniture workshops and manufacturing plants.



The AA outlet is supplied capped in B23 configuration.

Power Max BOX	DESCRIPTION		
	UF (flue gas outlet)	AA (air suction)	
130-2 P	DN160	DN160	∅
160-2 P	DN160	DN160	∅
200-2 P	DN160	DN160	∅
260-2 P	DN160	DN160	∅
330-3 P	DN160	DN160	∅
390-3 P	DN160	DN160	∅
520-4 P	DN160	DN160	∅

Power Max BOX	DESCRIPTION		
	UF (flue gas outlet)	AA (air suction)	
300-2 P	DN300	DN300	∅
450-3 P	DN300	DN300	∅
600-4 P	DN300	DN300	∅

- ⚠ For stand-alone installations, a $\varnothing 300/160$ adapter is required for models **Power Max BOX** 300-2 P and 450-3 P to connect both models to a $\varnothing 160$ mm duct.
- ⚠ For B-type installation, combustion air is taken from the environment and goes through the openings (shutters) on the rear panel of the device that must be located in a suitable and ventilated technical room.
- ⚠ Read the requirements, instructions and prohibitions detailed below carefully, since non-compliance with them may result in a safety hazard or the appliance's malfunction.

- ⚠ Condensation appliances described in this handbook must be installed with flue gas pipes compliant with applicable legislation and expressly manufactured for this specific use.
- ⚠ Check that pipes and joints are not damaged.
- ⚠ Joint seals must be executed with materials that withstand the condensate's acidity and the temperatures of the appliance's flue gases.
- ⚠ When installing flue pipes, always bear in mind the direction of the flue gases and of possible condensate flows.
- ⚠ Inadequate or incorrectly sized flue gas pipes may increase combustion noise, create condensate extraction issues and negatively impact on combustion parameters.
- ⚠ Check that pipes are suitably far (min. 500 mm) from flammable or heat-sensitive construction elements.
- ⚠ Make sure that condensation is not built up along the duct. For this purpose, provide a sloping duct of at least 3 degrees towards the appliance in case there is an a horizontal section. If the horizontal or vertical section is longer than 4 meters, a condensate siphon drainage must be provided at the base of the pipe. The useful height of the siphon must be at least equal to the value "H" (see figure below). The siphon discharge must then be connected to the sewerage system (see paragraph "Preparation for the condensate drain" on page 33).

- ⊘ It is prohibited to block or section the flue gas extraction pipe or the combustion air suction pipe, if any.
- ⊘ It is prohibited to use pipes that not designed for this application, because the condensate's action would damage them quickly.

Maximum equivalent lengths are provided below.

B TYPE INSTALLATION

Exhaust $\varnothing 160$ mm

Model	Maximum length $\varnothing 160$ mm	Pressure drop	
		45° bend	90° bend
130-2 P	30 m	1,5 m	2 m
160-2 P	30 m	1,5 m	2 m
200-2 P	30 m	1,5 m	2 m
260-2 P	30 m	1,5 m	2 m
330-3 P	30 m	1,5 m	2 m
390-3 P	30 m	1,5 m	2 m
520-4 P	30 m	1,5 m	2 m

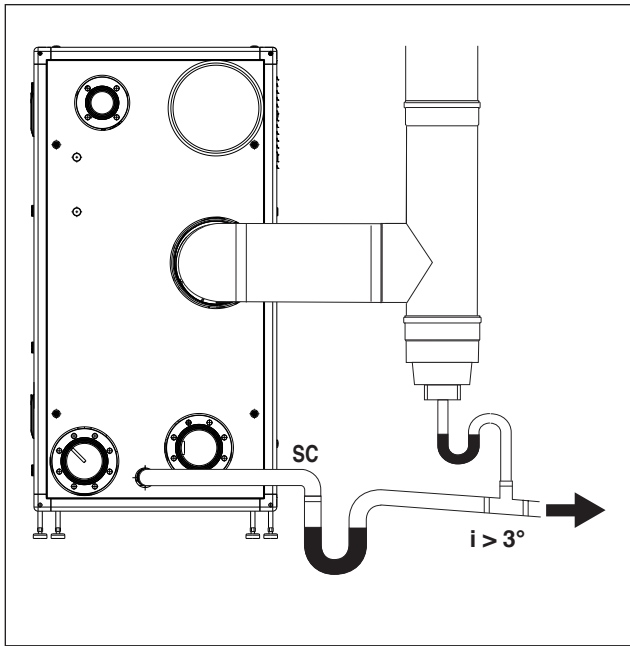
Exhaust Ø 300 mm

Model	Maximum length Ø 300 mm	Pressure drop	
		45° bend	90° bend
300-2 P	30 m	2 m	4 m
450-3 P	30 m	2 m	4 m
600-4 P	30 m	2 m	4 m

The table with available residual discharge heads is shown below.

Description	Discharge head	
	Max	Min
130-2 P	510	35
160-2 P	630	35
200-2 P	560	32
260-2 P	500	30
300-2 P	353	28
330-3 P	610	32
390-3 P	500	30
450-3 P	353	28
520-4 P	500	30
600-4 P	353	28

The residual discharge head values are shown in Pascal.



To change direction, use a T section with an inspection cap to permit easy access for cleaning inside the pipe. After cleaning, always make sure that inspection caps are replaced tightly and that their seals are undamaged and efficient.

2.9.1 Preparation for the condensate drain

The condensate coming out of the drainer must be collected for dripping into a taped vessel connected to the sewer system, if necessary by interposing a neutralizer (for more information see paragraph "Neutralization of the condensate"), according to the following procedure:

- Fit a drip tray near the condensate discharge outlet, adding a condensate neutraliser if necessary
- Connect the drip collection receptacle to the local drain or sewer system using a siphon.

The drip tray can be created by fitting a cup or simply a polypropylene bend, suitable for collecting the condensate that comes out of the appliance and any liquid leaking from the safety valve.

The maximum distance between the condensate drainage of the appliance and the socket (or socket pipe) must not be less than 10 mm.

The connection to the local drain or sewer system must be executed using a siphon in order to prevent unpleasant odours from being released back into the room from the sewer.

We advise using plastic (PP) piping for building the condensate drainage.

⊘ Never use copper pipes under any circumstances, as the condensate itself will cause them to rapidly deteriorate.

⚠ Execute the condensate drain outlet so as to prevent combustion gases leaking into the environment or the drain or sewage system by sizing the siphon (height H) as described in Paragraph "Discharge of combustion products".

⚠ Always maintain a slope angle "s" of over 3° and ensure that the diameter of any condensate drain pipe is greater than that of the connection fitted at the drain outlet.

⚠ Connect the condensate drain hose to a domestic water drain in accordance with national and local legislation and standards.

⚠ Fill the siphons with water before switching on the module, avoiding the release of combustion products into the environment during the first few minutes of switching on the module.

⚠ Both the products from the condensate outlet of the module and the condensate from the flue-gas stack should flow into the same outlet duct.

⚠ The connection pipes used must be as short and as straight as possible. Any curves or sharp bends can lead to hoses becoming clogged and, therefore, can prevent proper condensate discharge.

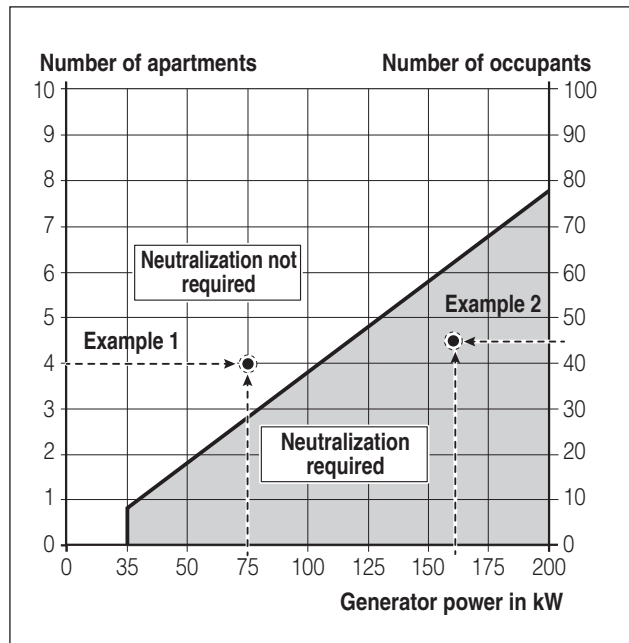
⚠ Size the condensate drain outlet so as to ensure the proper drainage of waste liquids without leaks.

⚠ The condensate drain must be connected to the drain and sewage network in such a way so that the condensate may not freeze under any circumstances.

2.10 Neutralization of the condensate

To correctly eliminate the combustion condensate, check if the condensate needs to be neutralized using a designated accessory.

- For systems with a nominal heat input greater than 200 kW, the condensate always needs to be neutralized
- For systems with a nominal heat input greater than 35 kW but less than 200 kW, the selection and evaluation criteria is provided in the figure below



Example 1

For a residential building with 4 apartments, a 75 kW condensing boiler needs to be installed. The 4 apartments / 75 kW intersection point is within the range "neutralization not required", therefore the condensate does not need to be neutralized.

Example 2

For an office block with 45 users, a 160 kW condensing boiler needs to be installed. The 45 users / 160 kW intersection point is within the range "neutralization required", therefore the condensate needs to be neutralized.

In the case of residential applications, reference must be made to the number of apartments served by the system, while in the case of non-residential applications, reference must be made to the number of users.

In the case of mixed applications, the number of apartments must be converted into equivalent users, or conversely, according to the alignment of the two vertical axes, therefore refer only to one axis (for example, 2 apartments equate to 20 users).

⚠ The condensate drainage system must be sized and installed to ensure correct elimination of the effluents produced by the appliance and/or by the evacuation system of the combustion products in any and all operating conditions.

2.10.1 Water quality requirements

It is ABSOLUTELY NECESSARY to treat the water system in order for the heat generator to work properly and to guarantee its service life, as well as that of all its components. This not only applies to jobs carried out on existing installations but also on new installations.

Sludge, lime-scale and pollutants contained in the water can cause permanent damage to the heat generator, also within a short time and notwithstanding the quality standards of the materials used.

Contact the Technical Assistance Centre for any further information on type and use of additives.

The heat transfer fluid (water) for the central heating circuit must conform to the quality parameters given in the following table:

Parameters	Value	Unit
General characteristic	Colourless, without sediment	
PH value	Min. 6.5; Max. 8	PH
Dissolved oxygen	< 0,05	mg/l
Total iron (Fe)	< 0,3	mg/l
Total copper (Cu)	< 0,1	mg/l
Na ₂ SO ₃	< 10	mg/l
N ₂ H ₄	< 3	mg/l
PO ₄	< 15	mg/l
CaCO ₃	Min. 50 ; Max. 150	ppm
Trisodium phosphate	None	ppm
Chlorine	< 100	ppm
Electrical conductivity	< 200	μS/cm
Pressure	Min. 0.6; Max. 6	bar
Glycol	Max. 40% (only propylene glycol)	%

⚠ All data in the table refer to water contained in the system after 8 weeks' operation.

⚠ Do not use excessively softened water. Excessive water softening (total hardness < 5° f) results in corrosion due to contact with metal elements (pipes or thermal module components)

⚠ Immediately repair any leaks or drips that could result in air entering the system

⚠ Excessive pressure fluctuations can cause stress and fatigue to the heat exchanger. Keep the operating pressure constant.

⚠ Water used to fill a system for the first time and water used to top it up must always be filtered (using synthetic or metal mesh filters with a filtration rating of no less than 50 microns) to prevent sludge from forming and triggering deposit corrosion.

⚠ If oxygen enters a circuit continuously or even intermittently (e.g. in under-floor heating systems whose pipes are not protected by impermeable synthetic sheaths, in circuits with open expansion vessels, or in circuits that require frequent top-ups) always separate the boiler's water circuit from the central heating circuit.

To sum up, in order to eliminate contact between air and water (and to prevent the latter from becoming oxidized), it is necessary:

- that the expansion system be a closed vessel, correctly sized and with the correct pre-loading pressure (to be regularly checked);

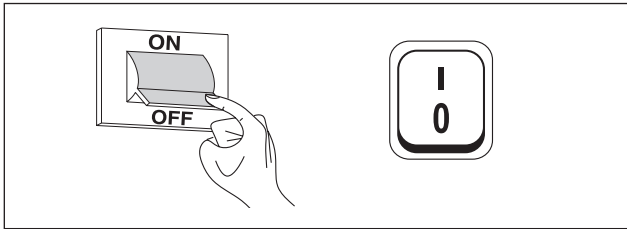
- that the system be always at a pressure higher than the atmospheric one at any point (including the pump suction side) and under any operating conditions (all seals and hydraulic couplings in a system are designed to withstand pressure towards the outside, but not underpressure);
- the installation be not made with gas-permeable materials (e.g. plastic pipes without oxygen barrier for underfloor heating systems)

⚠ Damages suffered by the thermal module, caused by encrustations and corrosion, are not covered by warranty. In addition, the non compliance of the water requirements listed in this chapter will void the appliance warranty itself.

2.11 System filling and emptying

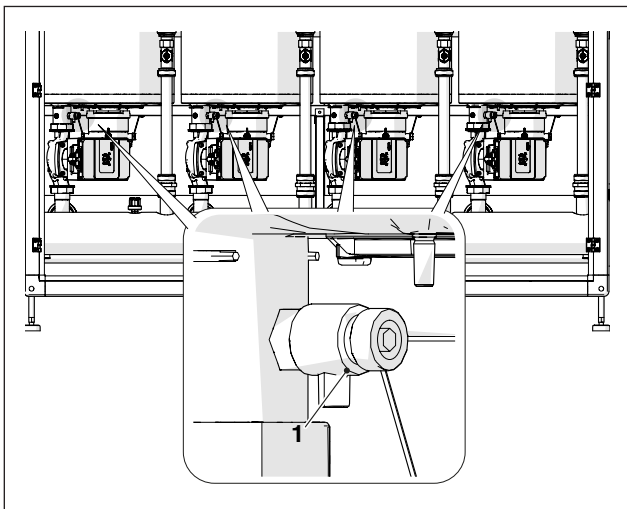
The thermal module **Power Max BOX** must be provided with a charging system to be connected to the appliance's return line.

Before filling or emptying the system, switch the system's master switch to the OFF position and the thermal module's master switch to **(0)**.



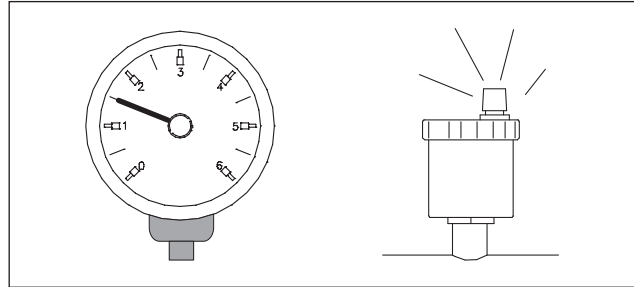
2.11.1 Filling

- Make sure that drain cocks (1) are closed before you start loading the system



- Unscrew the vent valve's release cap
- Open the shut-off cocks in order to slowly fill the system
- Use the pressure gauge to check that the pressure is rising and the water is exiting through the vent valves
- Close the shut-off cocks after the pressure reaches 1.5 bar

- Start the system pumps and the thermal module's pump as shown in Paragraph "Commissioning and maintenance"
- During this stage, check that the air is correctly eliminated
- Restore the pressure if necessary
- Switch the pumps off and on again
- Repeat the last three steps until the pressure is stabilised



⚠ The system must be filled up slowly the first time; once it is filled and the air expelled it should never need to be topped up again.

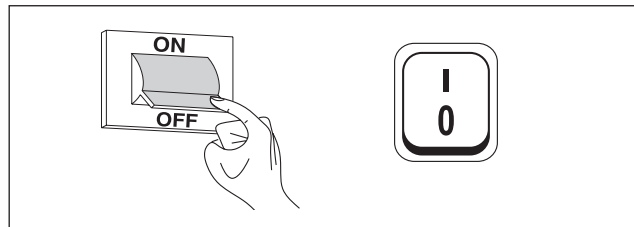
⚠ Systems should also be operated at maximum working temperature the first time they are started up, in order to facilitate de-aeration. (Gas is not released from the water at low temperatures).

⚠ An automatic spurge can be performed during the first ignition. The parameter that set the cycle is Par. 139. See parameter table for more information.

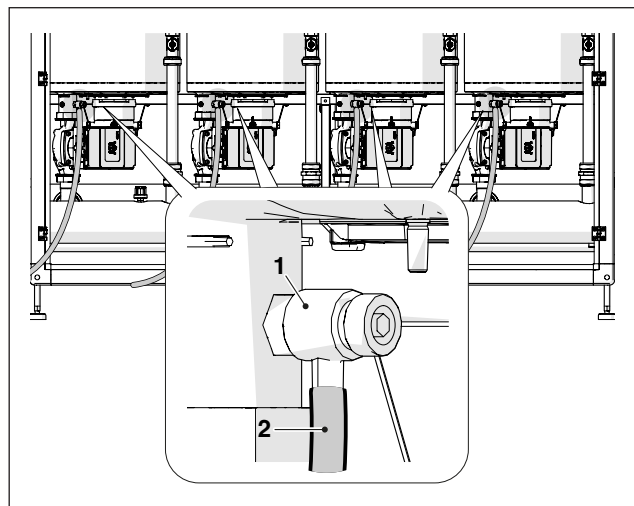
2.11.2 Emptying

Before starting to empty the appliance and the storage cylinder:

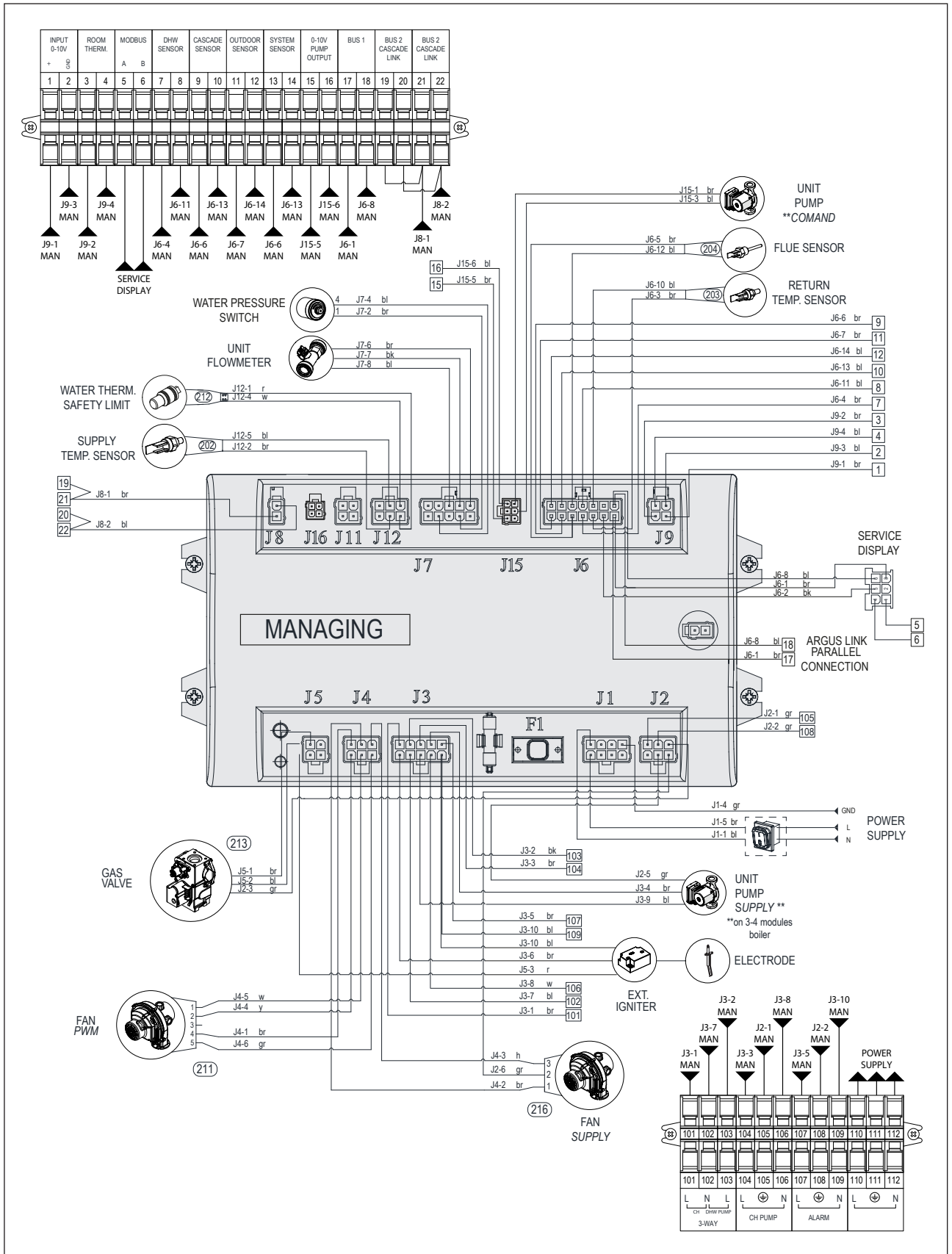
- Switch the system's master switch to the OFF position and the thermal module's master switch to **(0)**.

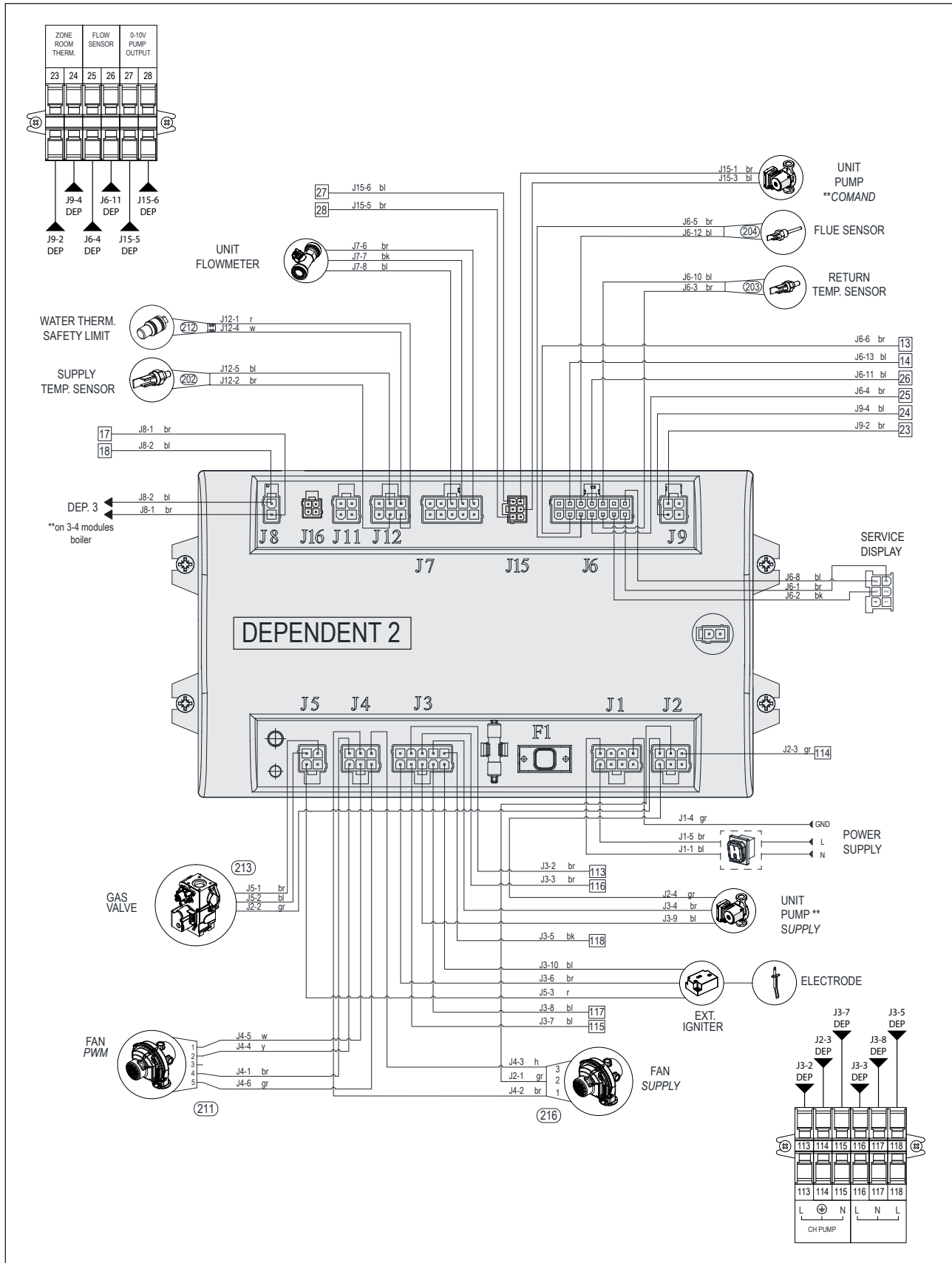


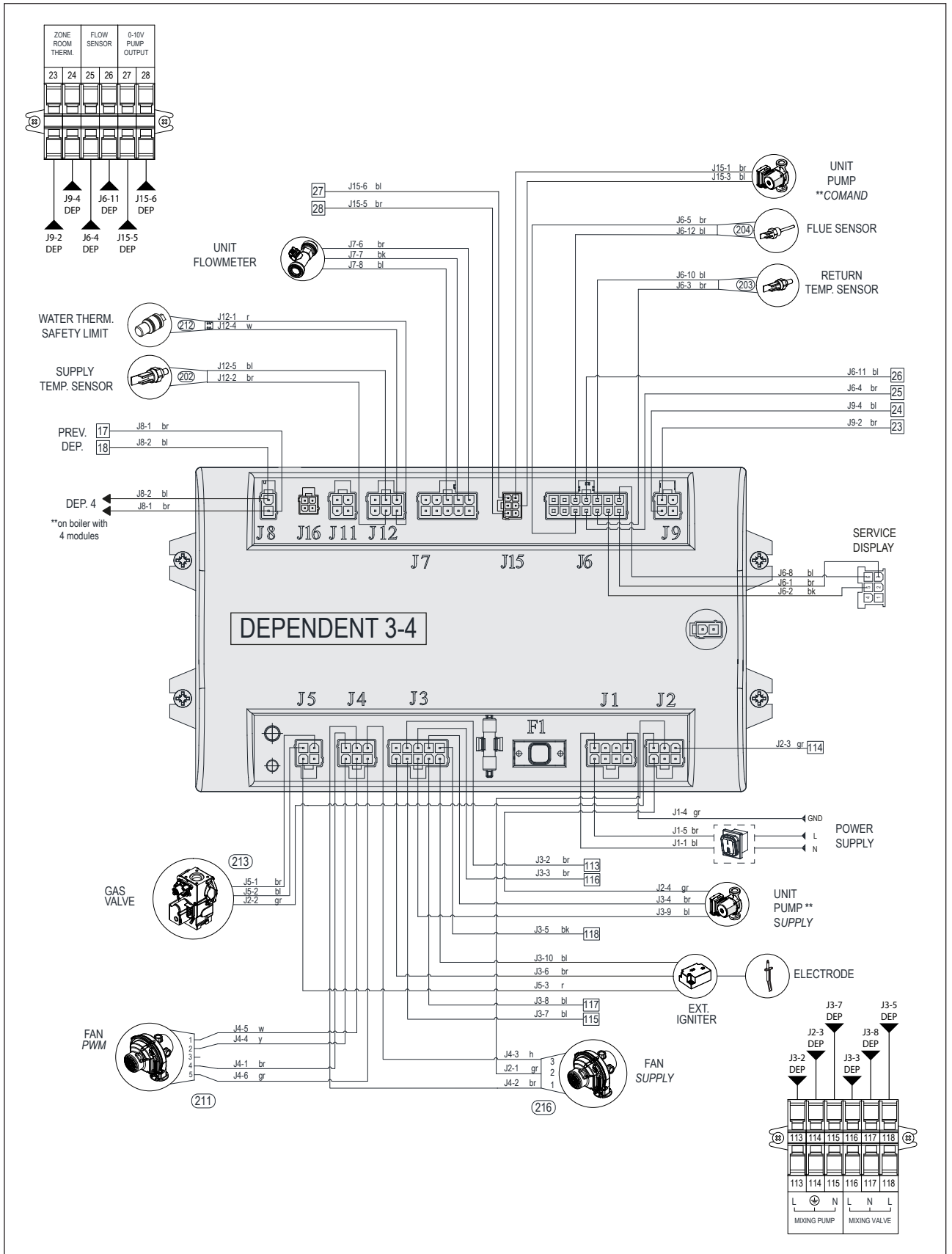
- Close the water supply shut-off cocks;
- To empty the appliance, connect a rubber hose (2) (Øint internal diameter = 12mm) to the drainage hose connector of each unit (1).



2.12 Wiring diagram







2.13 Electrical connections

The thermal module **Power Max BOX** is manufactured fully wired and only needs to be connected to the mains, the room/heat demand thermostat and any other system components.



The following is mandatory:

- The use of an all-pole magnetothermal switch and residual current circuit breaker, line disconnecting switch in compliance with CEI-EN standards (contact opening of at least 3 mm)
- Respect the connection L (line) - N (neutral). Keep the earth conductor 2 cm longer than the power supply conductors
- Use cables with a section greater than or equal to 1.5 mm², complete with cable terminal caps
- Refer to the wiring diagrams in this manual for all electric operations.



The use of adaptors, multiple sockets and extensions to power the appliance is not allowed.



to connect external electric components, it is necessary to use auxiliary relays and/or contactors to be fitted in a dedicated external electrical panel.



Any work on the electrical system must be carried out only by qualified personnel in compliance with all legal provision and safety regulations in particular.



Secure the cables into the dedicated cable ties in order to always guarantee their correct positioning within the appliance.



Electrical supply cables and control cables (room/heat demand thermostat, external temperature probes, etc.) must be strictly separate the one from the other and fitting inside independent ribbed PVC sheaths up to the electrical panel.



The connection to the electrical power supply must be performed using type 1 sheathed cables (3 x 1,5) N1VVK or equivalent, while simple N07VK type or equivalent conductors can be used for the thermoregulation and low voltage circuits.



If the electrical power provided by the electrical company is of "**PHASE-PHASE**" connection type, preventively contact the nearest Technical Assistance Centre.



Never shut the appliance off during normal operation (with the burner on) by shutting off the electrical power supply using the On-Off key or an external switch. This could cause the primary heat exchanger to over-heat.



To switch it off (during the heating stage) use a room/heat demand thermostat. The On-Off key can only be actioned whilst the appliance is in stand-by or emergency mode.



Before connecting any external electrical components to the appliance (regulators, electric valves, climate control probes, etc.), check to make sure that their electrical characteristics are compatible with the available inputs and outputs (voltage, absorption, acceleration current).



Temperature probes must be NTC like. For resistance value, refer to table pag 17.



Always check the proper operation of the "grounding conductor" for the electrical system to which the appliance will be connected.



Beretta shall bear no responsibility for any personal injuries or property damage caused by non-compliance with wiring diagrams or the electrical system's incorrect/lacking connection to the grounding system, or by non-compliance with applicable CEI Standards.



Please note that the unit's electrical system is not protected against lightning. Therefore, transient over-voltage protection devices must be installed in the system and within the power supply unit.



The technician responsible for installing the hydraulic system is responsible for earthing the external pipe-work. Before connecting up the pipes to the boiler, first connect them to a suitable equipotential and earthing system via a specific conductor, different from the earthing terminal board on the boiler. Improper use of the earthing terminal on the appliance may compromise the protective devices and generate dangerous potential differences.



It is strictly forbidden to use pipes of any kind to ground the appliance.



It is prohibited to lay power supply and room/heat demand thermostat cables near hot surfaces (delivery pipes). If they may come into contact with parts that have a temperature of over 50°C, use a suitable type of cable.



It is prohibited to touch electric appliances with damp/wet body parts or when your feet are wet.



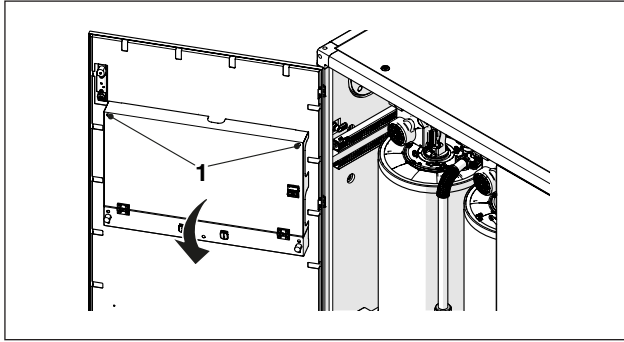
It is prohibited to leave the appliance exposed to weather elements (rain, sun, wind, etc.) unless it is equipped with the relevant weatherproof kit.



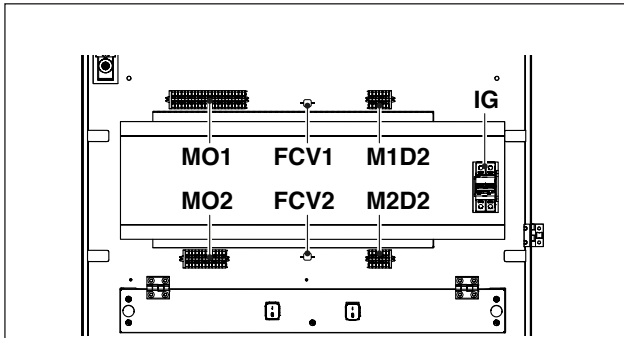
It is prohibited to pull, detach, or twist any electric cables coming from the thermal module even when the latter is disconnected from the mains power supply.

To access the terminal jigs operate in this way:

- open the module door (or the left door if two doors are present).
- Unscrew the two screws (1) placed on the panel.

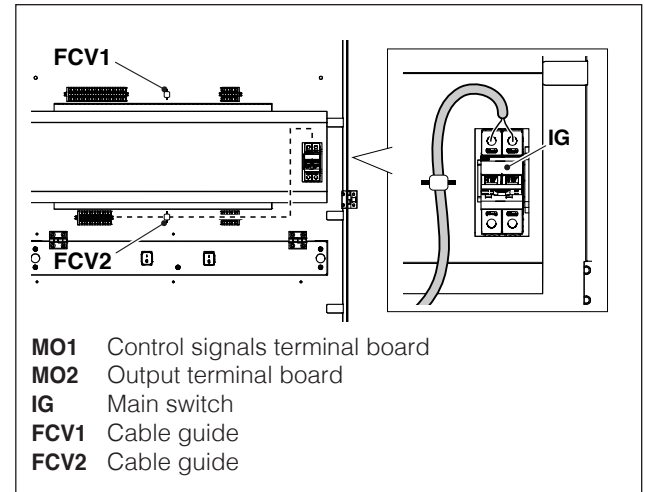


- Fold the panel forward by placing it on the two rubber pads. At this stage, you have full access to the terminal jigs.



- MO1** Low voltage managing terminal jig MO1
- MO2** High-voltage managing terminal jig MO2
- M1D2** Low voltage terminal jig of the first dependent M1D2
- M2D2** High voltage terminal block of the first dependent M2D2
- IG** Main switch
- FCV1** Cable guide
- FCV2** Cable guide

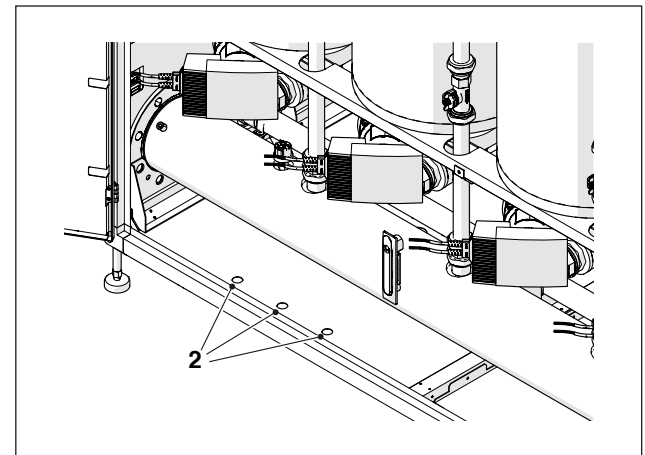
Connect the power cables to the main switch (IG).



- MO1** Control signals terminal board
- MO2** Output terminal board
- IG** Main switch
- FCV1** Cable guide
- FCV2** Cable guide

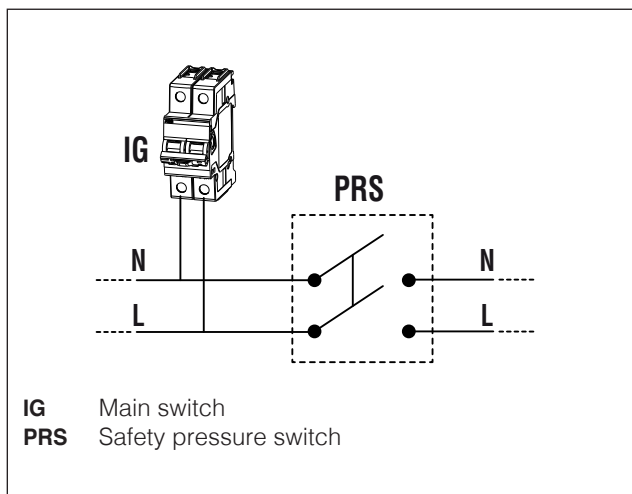
! Always keep the power cables and signal cables separate. Route the signal cables to the top of the control panel and secure them to the cable clamp FCV1. Pass the power cables through the lower part of the panel and secure them with the cable clamp FCV2.

The cables must exit the machine through the appropriate cable glands 2 placed on the side panels and at the bottom.



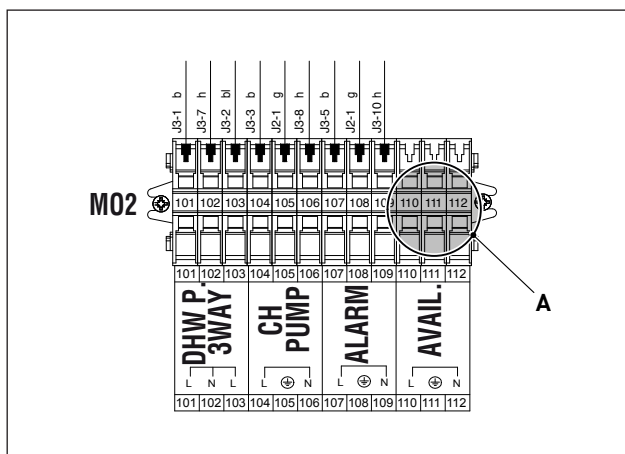
2.13.1 INAIL security connection

Before being connected to the general circuit-breaker IG (see wiring diagram), the power supply cables must be connected to the contacts of the safety pressure switch as provided by the INAIL collection R.

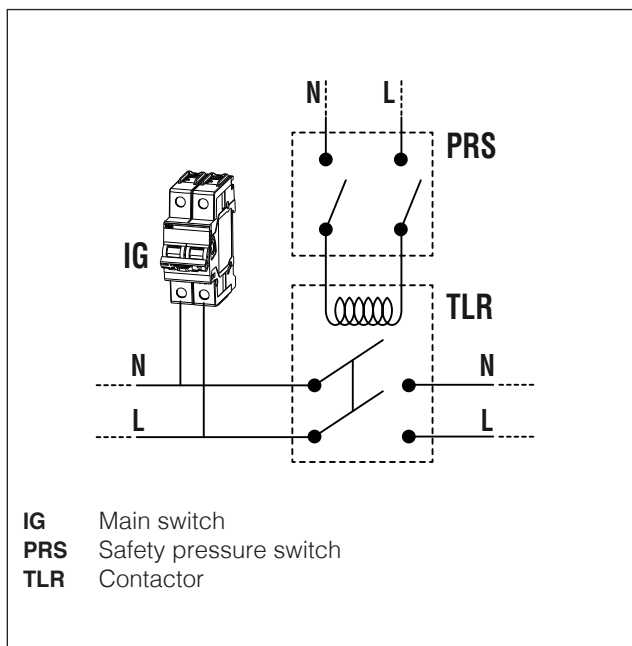


2.13.2 Connection available on terminal board

On the high voltage terminal board managing MO2 there are 3 terminals (A) that can be used to connect specific accessories.



⚠ If several appliances are installed in a battery, if the total absorption of the connected equipments exceeds 4000 VA, a certified contactor with adequate capacity must be interposed as shown in the diagram below.



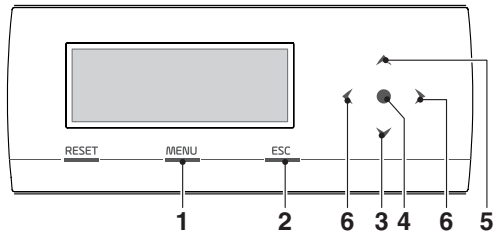
2.14 Electronic control

The electronic control operator interface menu is a multi-level one.

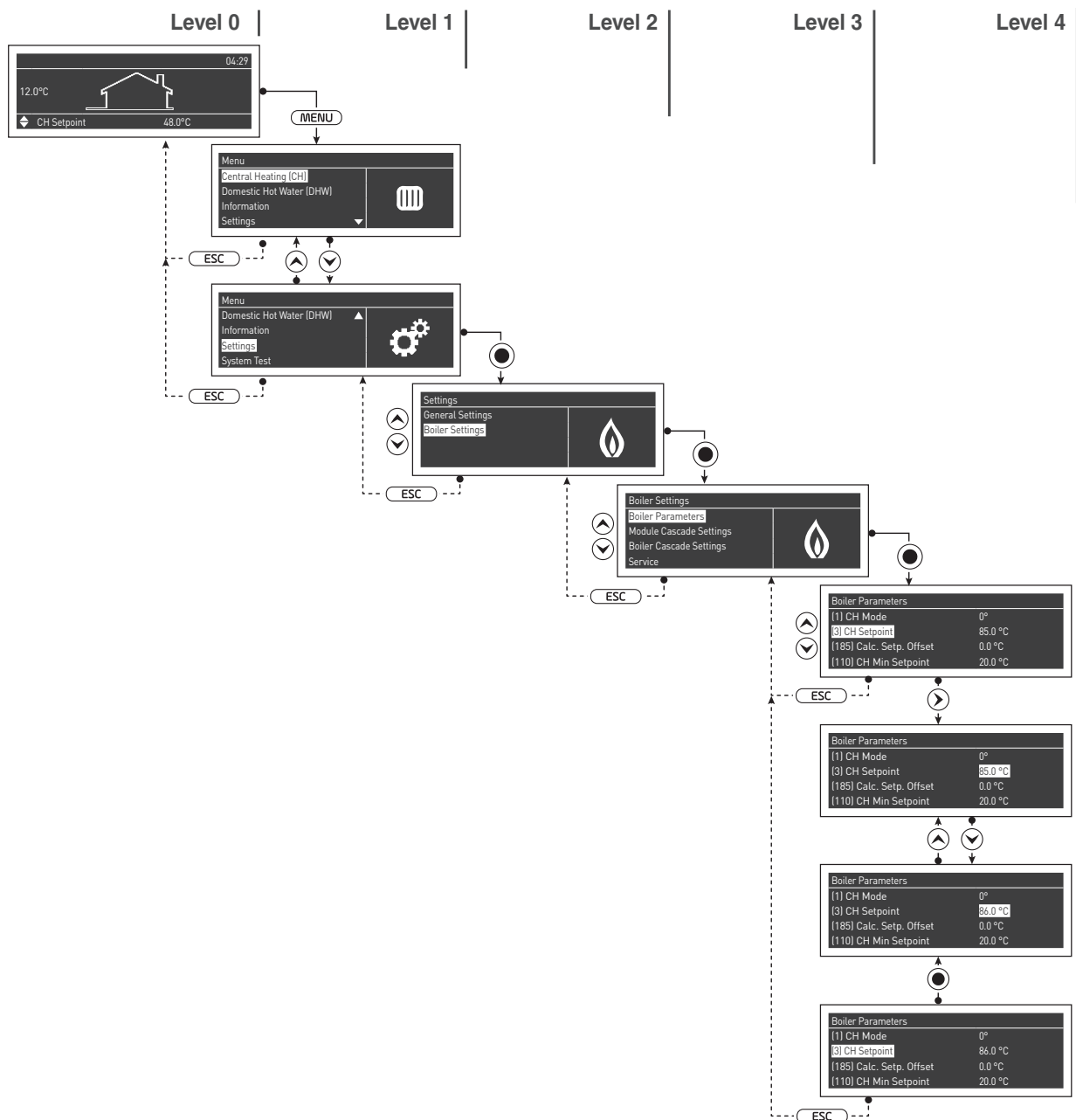
Navigation between the various levels is shown in the figures below.

Level 0 displays the Home Screen (Home). Level 1 displays the Main Menu screen. The subsequent levels are activated depending on available sub-menus. For the full layout, see Paragraph "Control panel". For how to access and change the parameters, see the picture on the next page. The parameters for the installer are accessible only after entering the security password (see paragraph "Control panel").

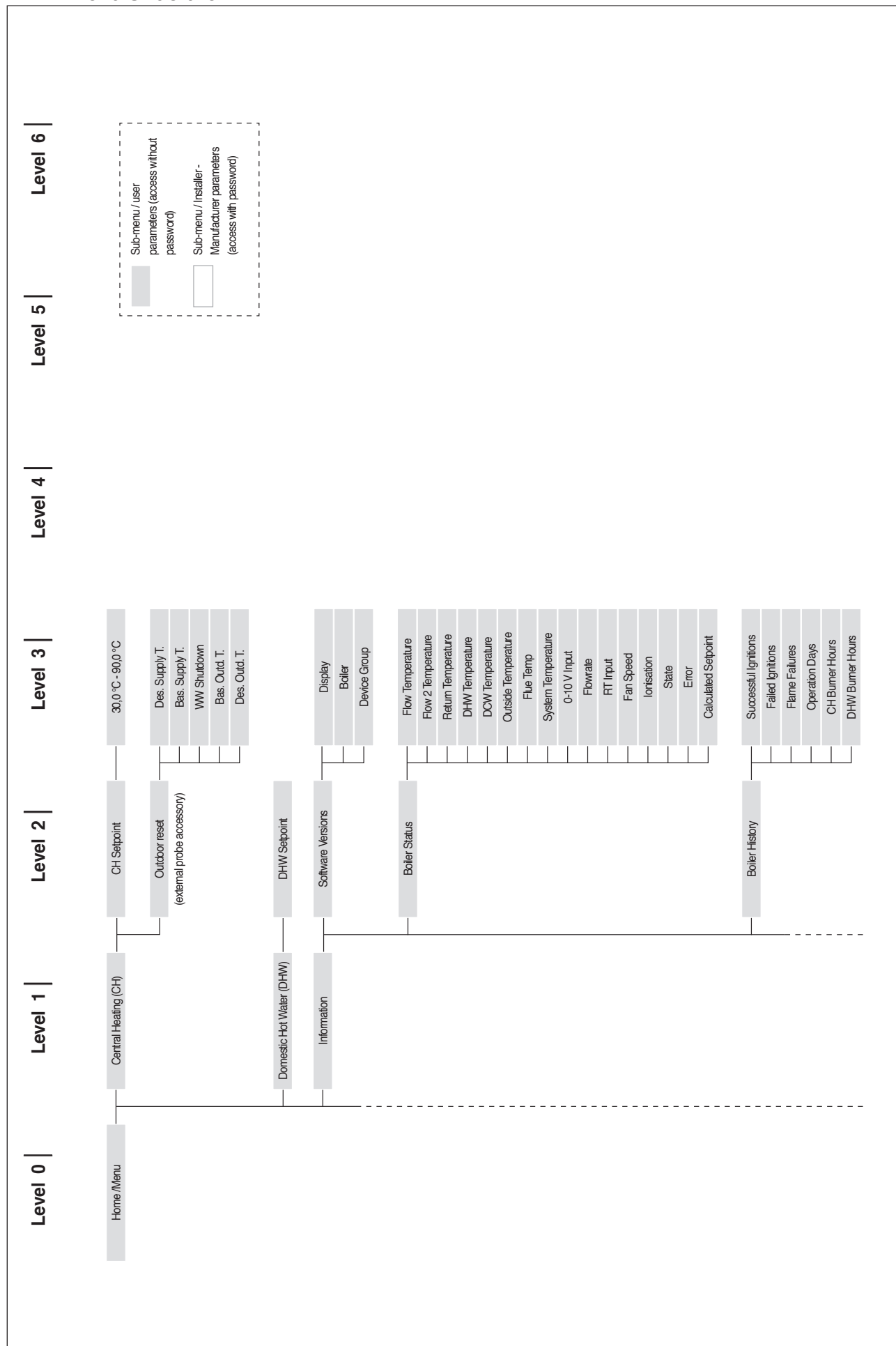
Please note that the thermal module's operating parameters are identified with a number, whilst other additional functions are simply descriptive.

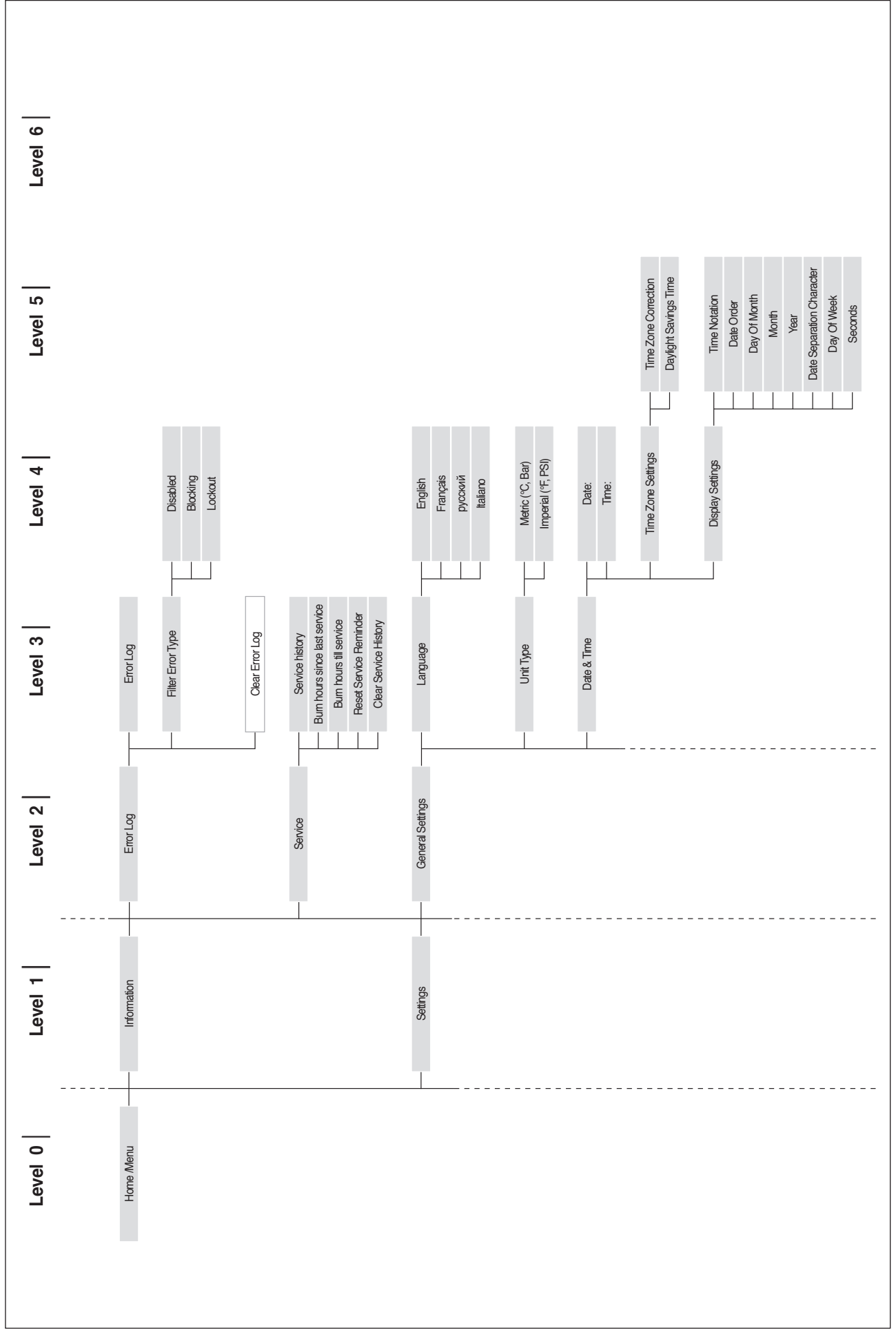


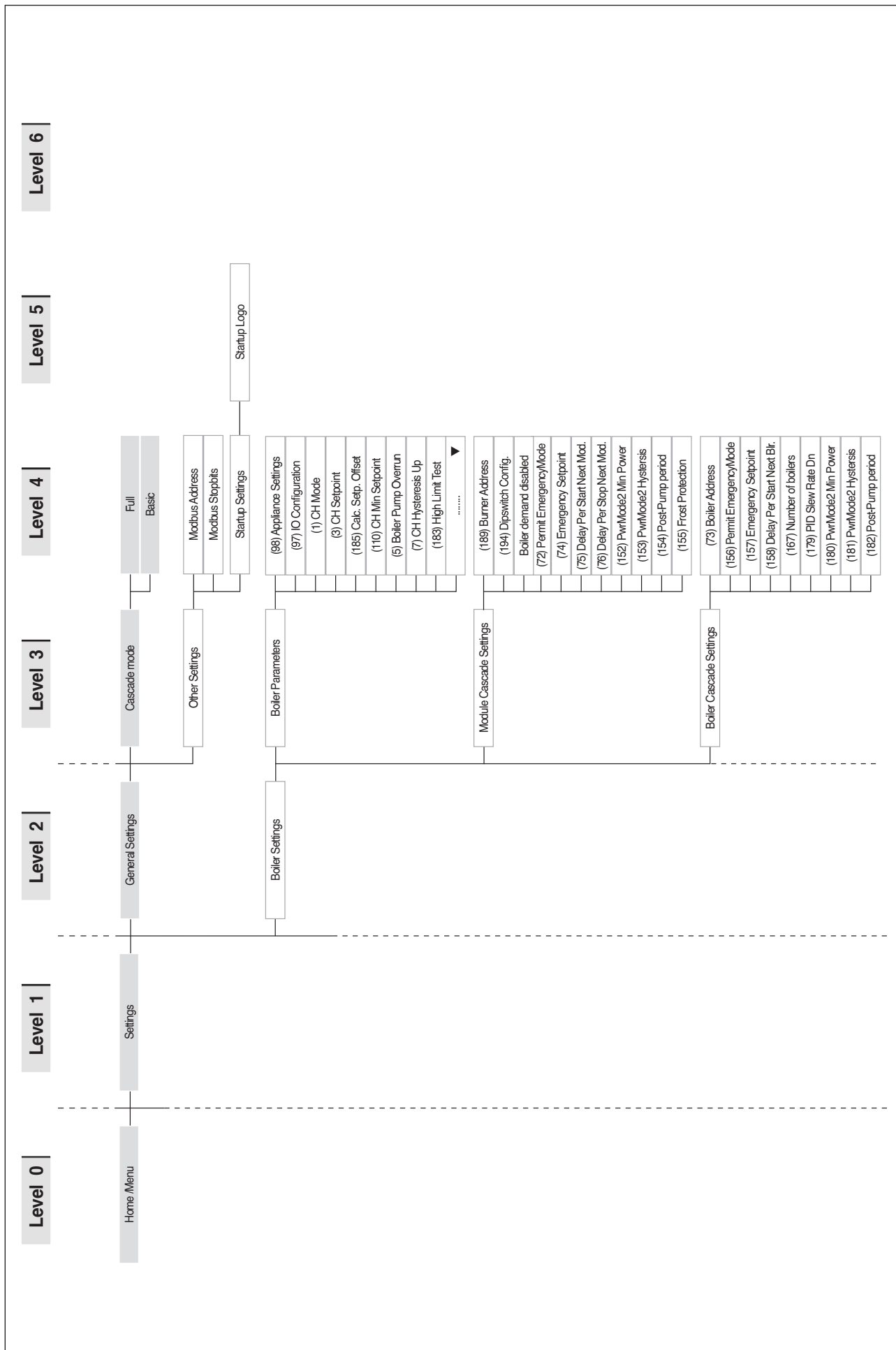
- 1 switches on the main menu
- 2 in menu navigation, it enables you to exit a menu item and go back to the previous one
- 3 supports selecting menus or parameters or decreasing numeric values
- 4 enter
- 5 supports selecting menus or parameters or increasing numeric values
- 6 supports moving to the RH/LH area of the display

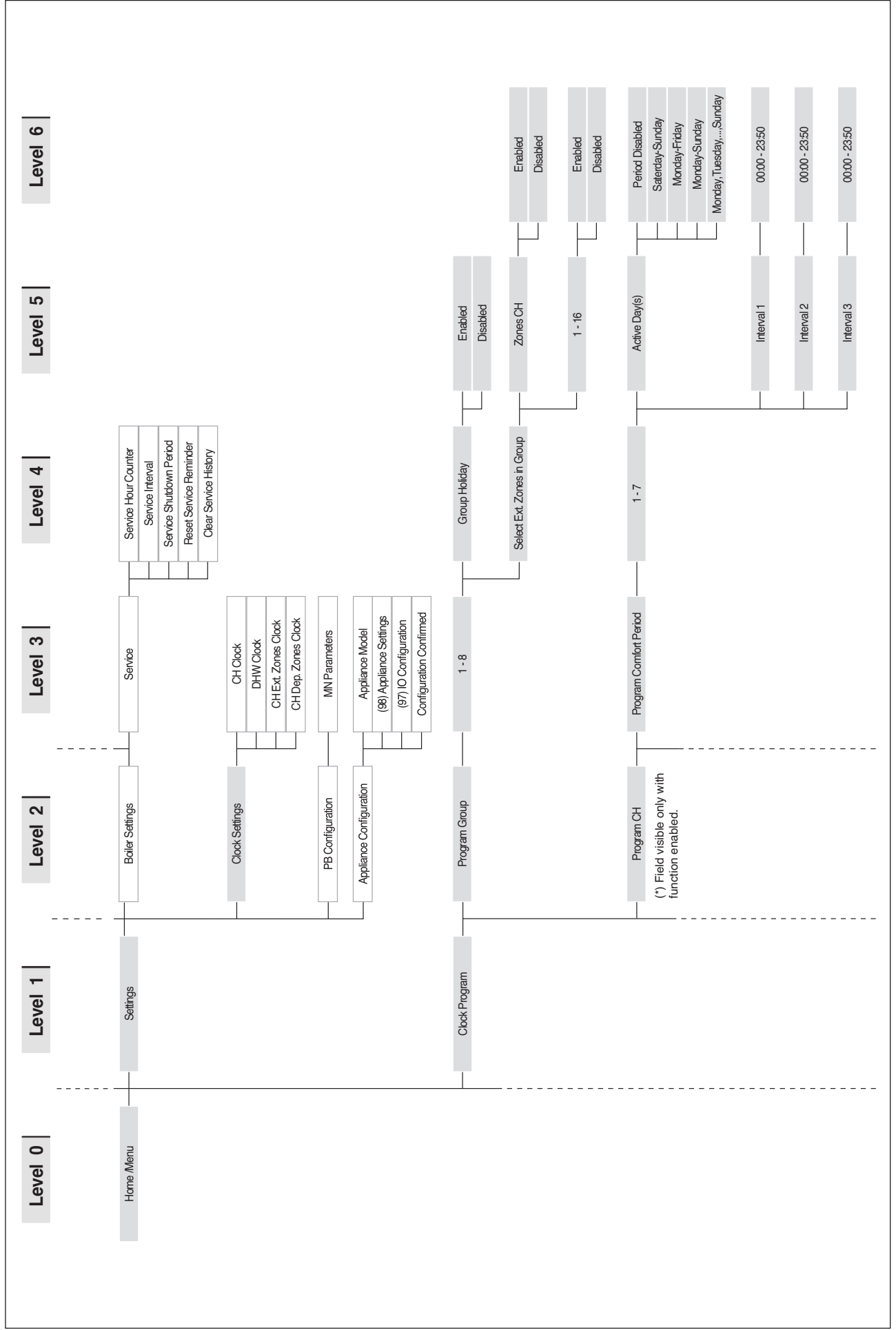


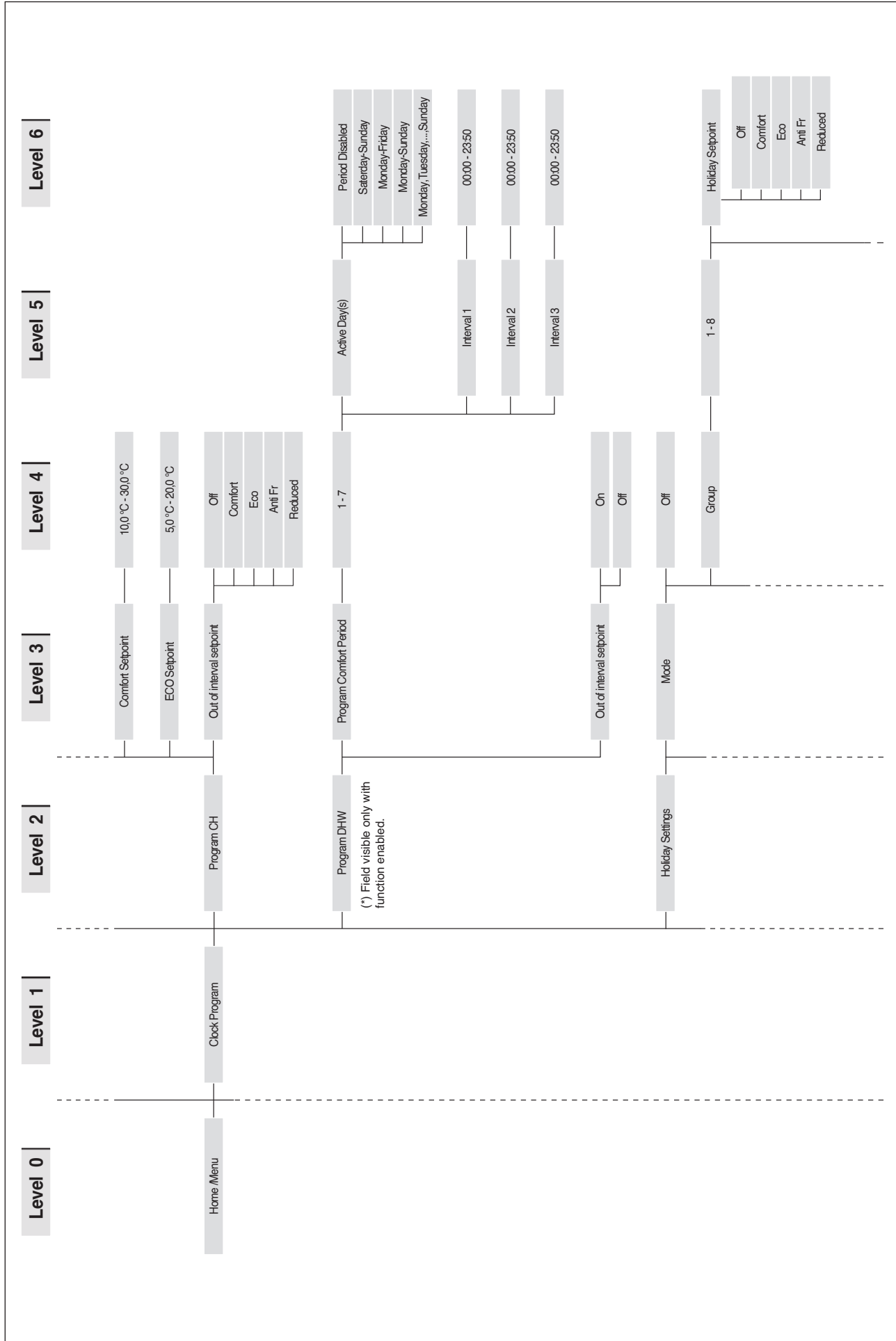
2.14.1 Menu structure











2.14.2 Parameters' list

Parameters are listed base on the reference menu.

Reference Menu

M1	Parameters Menu
M2	Cascaded module configuration menu
M3	Cascaded boiler configuration menu
M4	Appliance configuration menu

Access type

U	End user
I	Installer
O	Manufacturer

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	201	CH Control	Enable or disable the heating circuit.	Enabled/Disabled	Enabled		I	Heating
M1	1	CH mode	Defines the thermal module's various heating operation modes.	0...5	0		I	Heating
M1	3	CH set-point	Defines the desired delivery temperature in heating mode (Par. 1) = 0.	30...90	70	°C	U	Heating
M1	185	Calc. set-point off-set	It is possible to shift the climatic curve up and down. The calculated setpoint can be increased or decreased with a maximum of 10°C.	-10...10	0	°C	I	Heating
M1	109	Comp. T. @Bas. Outd	Establishes the set-point offset value calculated in climatic mode (Par. 1= 1). Offsets the climatic curve in presence of mild outdoor temperatures.	Off, -10...10	0		I	Heating
M1	110	CH Min. Set-point	Defines the minimum delivery temperature at which the system operates in both heating and DHW mode.	20...50	30	°C	I	Heating
M1	111	CH Max. Set-point	Defines the maximum delivery temperature at which the system operates in both heating and DHW mode.	50...90	80	°C	I	Heating
M1	190	Outd. Comp. Fact.		0...100	0	%	I	Heating
M1	5	Boiler Pump Overrun	Sets the overrun time in seconds of the boiler's circulator during stand-alone operation; cascaded operation determines the module's overrun after switch-off due to temperature control.	0...900	60	Sec.	I	Heating
M1	6	Flue Temp. Limit	Sets the activation temperature when the maximum flue gas temperature is exceeded. When the flue gas temperature is higher than a set value, the module switches off and an error message is generated. When the flue gas temperature is in the interval between (Par. 6) -5°C and Par. 6, the module reduces its power in a linear way until it reaches minimum power when the temperature measured is equal to Par. 6.	10...120	100	°C	O	General
M1	7	CH Hysteresis Up	Sets the value in degrees beyond the set-point at which the burner switches off for thermoregulation.	0...20	5	°C	I	Heating
M1	112	CH Hysteresis Down	Sets the value in degrees below the set-point at which the burner switches on again for thermoregulation.	0...20	5	°C	I	Heating
M1	9	An-ti-cycle Period	Sets the stand-by time before the appliance is switched on again after it switches off due to thermoregulation, independently from the delivery temperature dropping below the value indicated in Par. 10. Parameter valid only in stand-alone mode.	10...900	120	Sec.	I	Heating
M1	10	An-ti-cycle Temp. Diff.	Sets the value in degrees below which the burner switches on again notwithstanding from the time spent at Par. 9.	0...20	16	°C	I	Heating

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	12	Hx diff. Minimum	Sets the value of the temperature difference (Delta T) between the module's delivery and return temperature. For a Delta T value ranging between Par. 12 and (Par. 12) +8°C, the module reduces its power in a linear fashion until it reaches the minimum power. The minimum power is maintained until reaching (Par. 12) +8°C+5°C, after which the module switches off for a period of time equal to the value attributed to Par. 13; at the end of this time interval, the module switches on again.	10...60	40	°C	O	General
M1	13	Hx Diff. Max. Wait Time	Defines the restart time after reaching the Delta T limit between delivery and return.	10...250	30	Sec.	O	General
M1	14	Max. Power CH	Sets the heating's % max. power.	50...100	100	%	I	Heating
M1	15	Min. Power CH	Sets the heating's % min. power.	1...30	1	%	I	Heating
M1	16	CH PID P	Defines the proportional parameter for modulation during heating operation.	0...1275	100		O	Heating
M1	17	CH PID I	Defines the modulation integral term during heating operation.	0...1275	250		O	Heating
M1	18	CH PID D	Defines the modulation derivative term during heating operation.	0...1275	0		O	Heating
M1	19	Design Supply Temp.	Defines the max. set-point at the minimum outdoor temperature for climatic regulation.	30...90	80	°C	U	Heating
M1	20	Design Outdoor Temp.	Defines the minimum outdoor temperature to which the maximum set-point can be associated for climatic regulation.	-25...25	0	°C	U	Heating
M1	21	Baseline Supply Temp.	Defines the minimum set-point at the maximum outdoor temperature for climatic regulation.	30...90	40	°C	I	Heating
M1	22	Baseline Outdoor Temp.	Defines the maximum minimum outdoor temperature to which the minimum set-point can be associated for climatic regulation.	0...30	20	°C	I	Heating
M1	23	Design Supply Min. Limit	Limits the minimum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).	4...82	30	°C	I	Heating
M1	24	Design Supply Max. Limit	Limits the maximum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).	27...90	80	°C	I	Heating
M1	25	Warm Weather Shutdn	Defines the temperature at which climatic regulation is switched off.	0...35	22	°C	I	Heating
M1	26	Boost Temp Increment	Establishes the set-point temperature increase delta T, if the heat demand in heating mode is not satisfied after the time interval specified in Par. 27 (applies only to stand-alone mode).	0...30	0	°C	I	Heating
M1	27	Boost Time Delay	Defines the time interval after which the set-point is increased as defined in Par. 26 (applies only to stand-alone mode).	1...120	20	Min.	I	Heating
M1	28	Night Setback Temp.	Used in heating mode Par. 1= 2 or 3. Establishes by how many degrees the delivery set-point is reduced when the RT (room thermostat/heat demand) contact is closed.	0...30	10	°C	I	Heating
M1	195	WWSO Enable	It is possible to enable/disable the shutdown of the entire system due to high external temperatures, both CH and ZH.	Enabled/Disabled	Enabled		I	Heating
	202	DHW check	Enable or disable the DHW circuit.	Enabled/Disabled	Enabled		I	Heating

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	35	DHW mode	Establishes the domestic hot water circuit's operation mode. 0 = Disabled 1 = Tank + sensor 2 = Tank + thermostat	0,1,2	0		I	DHW
M1	113	Max. Power DHW	Defines the domestic hot water circuit's % max. power.	50...100	100	%	I	DHW
M1	114	Min. Power DHW	Defines the domestic hot water circuit's % minimum power.	1...30	1	%	I	DHW
M1	36	DHW Tank Hyst. Down	Defines the hysteresis to initiate the domestic hot water demand.	0...20	5	°C	I	DHW
M1	37	DHW Tank Hyst. Up	Defines the hysteresis to stop the domestic hot water demand.	0...20	5	°C	I	DHW
M1	38	DHW Tank Supply Extra	Defines the primary circuit's set-point increase in degrees compared to the temperature set for the domestic hot water tank.	0...30	15	°C	I	DHW
M1	39	DHW Tank Supp Hyst Dn	Defines the primary circuit's restart hysteresis in modes 1 and 2 of domestic hot water (valid both for cascade and stand-alone applications).	0...20	5	°C	O	DHW
M1	40	DHW Tank Supp Hyst Up	Defines the primary circuit's shut-off hysteresis in modes 1 and 2 of domestic hot water (valid both for cascade and stand-alone applications).	0...20	5	°C	O	DHW
M1	41	DHW Tank Hold Warm	Defines the value referred to the Delta T of the tank for maintenance purposes. E.g.: if it is set on 3, when the tank has a set point lowered of 3 degrees, the module turns on at the minimum to allow maintenance till the set point plus hysteresis. If this parameter is equal to 36, this function is inactivated and the module starts at the maximum sanitary power.	0...10	5	°C	O	DHW
M1	42	DHW Priority	Defines the priority type: 0 = Time: time priority between the two circuits defined by Par. 43; 1 = Off: priority for CH; 2 = On: priority for DHW; 3 = Parallel: parallel priority managed on the basis of the primary circuit's temperature compared to the heating circuit's set-point.	0...3	2 = On		I	DHW
M1	43	DHW Max. Priority Time	Establishes the time in minutes during which priority is alternatively allocated to the DHW and CH circuits when Par. 43 is set to "time" mode.	1...255	30	Min.	I	DHW
M1	44	DHW Pump Overrun	Establishes the overrun time in seconds for the domestic hot water mode with the boiler in stand-alone operation; cascaded operation defines the module's overrun after switch-off due to thermoregulation.	0...900	60	Sec.	I	DHW
M1	45	DHW Tank PID P	Defines the proportional term for modulation during operation of the DHW storage tank.	0...1255	100		O	DHW
M1	46	DHW Tank PID I	Defines the integral term for modulation during operation of the DHW storage tank.	0...1255	500		O	DHW
M1	47	DHW Tank PID D	Defines the derivative term for modulation during operation of the DHW storage tank.	0...1255	0		O	DHW
M1	48	DHW tank set-point	Establishes the DHW storage tank set-point.	40...71	50	°C	U	DHW
M1	115	DHW setpoint setting	"reserved"	40...71	57	°C	U	DHW
M1	49	DHW Hysteresis Down	"reserved"	0...20	4	°C	O	DHW

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	50	DHW Hysteresis Up	"reserved"	0...20	4	°C	O	DHW
M1	51	DHW Instant PID P	"reserved"	0...1255	100	°C	O	DHW
M1	52	DHW Instant PID I	"reserved"	0...1255	160	°C	O	DHW
M1	53	DHW Instant PID D	"reserved"	0...1255	0	°C	O	DHW
M1	60	Flow Rate Start	"reserved"	0.1...20	1.4	l/min	O	DHW
M1	61	Flow Rate Lo Temp Pwr	"reserved"	0.1...20	1.4	l/min	O	DHW
M1	62	Flow Rate Hi Temp Pwr	"reserved"	0.1...20	1.4	l/min	O	DHW
M1	63	DHW On Off Period	"reserved"	10...60	30	Sec.	O	DHW
M1	64	PreHeat Mode	"reserved"	Off, Comfort, Eco, Anti-Fr	Off		U	DHW
M1	65	PreHeat Eco Set-point	"reserved"	20...60	30	°C	O	DHW
M1	67	PreHeat After Tap Hld T.	"reserved"	0...255	30	Sec.	O	DHW
M1	68	After Tap Hold Time	"reserved"	0...255	120	Sec.	O	DHW
M1	69	PreHeat Hyst. Down	"reserved"	0...30	5	°C	O	DHW
M1	70	PreHeat Hyst. Up	"reserved"	0...30	0	°C	O	DHW
M1	71	PreHeat Delay Time	"reserved"	0...15	10	Sec.	O	DHW
M1	92	Fan Speed Maximum	Defines the number of fan rpm at max. power (it depends on the model).	0...12750	Defined by Par. 98	RPM	I	General
M1	93	Fan Speed Minimum	Defines the number of fan rpm at minimum power (it depends on the model).	0...12750	Defined by Par. 98	RPM	I	General
M1	94	Fan Speed Ignition	Defines the number of fan rpm when the boiler is switched on (it depends on the model).	0...12750	Defined by Par. 98	RPM	I	General
M1	116	Prog. Input 1.	0 = Disabled 1 = Water pressure sensor 2 = CH flow switch 3 = Flue pressure switch	0,1,2,3	Defined by Par. 97		I	General
M1	117	Prog. Input 2.	0 = Disabled 1 = DHW flow sensor 2 = DHW flow switch 3 = CH flow sensor	0,1,2,3	Defined by Par. 97		I	General
M1	118	Prog. Input 3.	0 = Disabled 1 = Drain switch 2 = Gas pressure switch	0,1,2	Defined by Par. 97		I	General
M1	119	Prog. Input 4.	0 = Supply 2 sensor 1 = Disabled 2 = Air Damper Switch	0,1,2	Defined by Par. 97		I	General
M1	120	Prog. Input 5.	0 = Disabled 1 = T_Return sensor 2 = Extern switch	0,1,2	Defined by Par. 97		I	General
M1	121	Prog. Input 6.	0 = Disabled 1 = T_Flue sensor 2 = Flue switch 3 = APS switch	0,1,2,3	Defined by Par. 97		I	General

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	122	Prog Input 7.	0 = Disabled 1 = T_Flue_2 sensor 2 = T_Flue_2 + Bl. Flue 3 T_System sensor 4 = Blocked Flue switch 5 Cascade Sensor	0,1,2,3,4,5	Defined by Par. 97		I	General
M1	123	Prog Input 8.	0 = Disabled 1 = T_DCW sensor 2 = Water pressure switch	0,1,2	Defined by Par. 97		I	General
M1	188	Prog. Input 9.	0 = Disabled 1 = DHW sensor 2 = Zone sensor	0,1,2	Defined by Par. 97		I	General
M1	124	Prog. Input RT.	0 = Disabled 1 = Enabled	0,1	1		I	General
M1	125	Prog. Output 1.	0 = Disabled 1 = General Pump 2 = CH Pump 3 = DHW Pump 4 = System Pump 5 = Cascade Pump 6 = Alarm Relay 7 = Filling Valve 8 = LPG Tank 9 = External Igniter 10 = Air Damper 14 = Alarm Burner CC 15 = Status Burner CC 16 = Zone pump 17 = Mixing valve open 18 = Mixing valve closed 19 = Anti-Legionella 20 = LPG Tank Cascade	0,1,2,3,4,5,6,7,8,9,10,14,15,16,17,18,19,20	Defined by Par. 97		I	General
M1	126	Prog. Output 2.	0 = Disabled 1 = General Pump 2 = CH Pump 3 = DHW Pump 4 = System Pump 5 = Cascade Pump 6 = Alarm Relay 7 = Filling Valve 8 = LPG Tank 9 = External Igniter 10 = Air Damper 14 = Alarm Burner CC 15 = Status Burner CC 16 = Zone pump 17 = Mixing valve open 18 = Mixing valve closed 19 = Anti-Legionella 20 = LPG Tank Cascade	0,1,2,3,4,5,6,7,8,9,10,14,15,16,17,18,19,20	Defined by Par. 97		I	General
M1	127	Prog. Output 3.	0 = Disabled 6 = Alarm relay 10 = Air Damper 11 = External Igniter	0,1,2,3,4,5,6,7,8,9,10,11,12	Defined by Par. 97		I	General
M1	128	Prog. Output 4.	0 = Disabled 1 = General Pump 2 = CH Pump 3 = DHW Pump 4 = System Pump 5 = Cascade Pump 6 = Alarm Relay 7 = Filling Valve 8 = LPG Tank 9 = External Igniter 10 = Air Damper 14 = Alarm Burner CC 15 = Status Burner CC 16 = Zone pump 17 = Mixing valve open 18 = Mixing valve closed 19 = Anti-Legionella 20 = LPG Tank Cascade	0,1,2,3,4,5,6,7,8,9,10,14,15,16,17,18,19,20	Defined by Par. 97		I	General

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	187	Prog. Output 5.	0 = Disabled 1 = General Pump 2 = CH Pump 3 = DHW Pump 4 = System Pump 5 = Cascade Pump 6 = Alarm Relay 7 = Filling Valve 8 = LPG Tank 9 = External Igniter 10 = Air Damper 14 = Alarm Burner CC 15 = Status Burner CC 16 = Zone pump 17 = Mixing valve open 18 = Mixing valve closed 19 = Anti-Legionella 20 = LPG Tank Cascade	0,1,2,3,4,5,6,7,8,9,10,14,15,16,17,18,19,20	Defined by Par. 97		I	General
M1	129	Flow sensor	Defines the type of flow sensor used.	Custom, Huba: DN8, DN10, DN15, DN20, DN25, DN32	Huba DN25		I	General
M1	130	Flow Scaling Factor	"reserved"	0...25.5	3.2	rpm/l	I	DHW
M1	131	Min. Pressure	"reserved"	Off, 0.3...5.0	0.1	bar	I	DHW
M1	132	Pressure Fill Hyst.	"reserved"	Off, 0.2...5.0	0.5	bar	I	DHW
M1	133	Mod. Pump dT	Defines the delta T set for the operation of the modulating circulator.	5...40	15	°C	I	General
M1	134	Mod. Pump Start Time	Defines the time in seconds from the moment the burner is switched on to start the modulation of the circulator and obtain the delta T specified in Par. 133.	0...255	120	Sec.	I	General
M1	135	Mod. Pump Type	Defines the PWM circulator model installed. 0 = Wilo 1 = Salmson 2 = Grundfos	0,1,2	2 = Grundfos		I	General
M1	136	Mod. Pump Mode	Defines whether the boiler's circulator operates in modulating mode or at a set speed (as a percentage of maximum speed).	On/Off Modulating Fixed 20... 100%	Modulating		I	General
M1	137	Mod. Pump Min Pwr	Defines the percentage of speed that sets the minimum speed that the circulator can reach during modulation.	0...100	30	%	I	General
M1	139	Dair active	Activates bleeding the system's air. To activate air bleeding, it is necessary to switch on the boiler and change the parameter from "No" to "Yes". Wait for one minute. Switch off and restart. At this stage, when it is restarted the boiler will initiate the automatic bleeding procedure (lasting around 20 minutes). With the parameter set to "Yes", the procedure is carried out each time the boiler is switched off and restarted using its master switch. The value must be set to "No" if you do not wish to initiate the bleeding procedure when the module is switched on.	Yes, No	No		I	General
M1	140	Minimum Flow	Defines the flow rate below which the boiler is switched off. The value varies depending on the model.	0.0...100	Depends on boiler model	l/min	I	General
M1	196	HX flow timeout	If the minimum flow rate is not reached within the timeout, error 163 (LOWEX-FLOW PROTECTION) will be generated which will also cause the end of prepurge.	4...100	18	Sec.	I	General
M1	107	Anti-Legionella day	Sets the weekday on which the anti-Legionella procedure is carried out.	Sun...Sat.	Sun	Day	I	DHW

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	108	Anti-Legionella Hour	Sets the time of the day during which the anti-Legionella procedure is carried out.	0...23	0	Hour	I	DHW
M1	183	High Limit Test	Enable limit thermostat physical test.	Simulated/Physical	Simulated		0	General
M1	205	Enabling of dependent zones	Enabling of dependent zones.	Enabled/Disabled	Disabled		U	General
M1	155	Frost Protection	This defines the temperature (detected by the primary sensor) below which the module pump and the system pump (with cascade configuration) activate. If the temperature of the primary sensor falls another 5 degrees below the value set by Par. 155, then a request to activate the cascade is generated. When the temperature of the primary sensor reaches the value defined by Par. 155 increased by 5 degrees, then the request ceases and the cascade returns to stand-by mode.	10...30	15	°C	I	General
M1	186	Frost protection Out	It defines the intervention temperature of the antifreeze function related to the external probe.	-30...15	3	°C	I	General
M1	191	Fan Type	Defines the type of fan installed in the boiler.	0...17	Defined by Par. 97		I	General
M1	193	DHW for all	Enabling DHW for all.	No...Yes	No		I	DHW
M2	189	Burner Address	It is used to address the module.	Stand-alone (0) Managing (1) Dependent (2...16)	Managing (1)		I	DHW
M2	194	Dipswitch Config.	Enable or disable the dipswitch function.	Enabled/Disabled	Disabled		I	Cascade
M2		Boiler demand disabled	All requests for this boiler are disabled.	Yes/No	No		I	Cascade
M2	72	Permit Emergency Mode	Activates the emergency mode. This mode comes on when communication between Managing and the primary circuit's probe is lost. In this event, if Par. 72 is set to "Yes", the cascade is initiated, working to the fixed set-point determined by Par. 74.	Yes/No	Yes		U	Cascade
M2	74	Emergency Set-point	Set-point active in emergency mode.	20...90	70	°C	I	Cascade
M2	75	Delay Per Start Next Mod.	Defines the stand-by time in seconds to restart the subsequent cascade module in normal start mode.	5...255	120	Sec.	I	Cascade
M2	76	Delay Per Stop Next Mod.	Defines the stand-by time in seconds to switch off the last cascade module on in normal Off mode.	5...255	30	Sec.	I	Cascade
M2	142	Delay Quick Start Next	Defines the stand-by time in seconds to restart the next cascade module in quick start mode.	5...255	60	Sec.	I	Cascade
M2	143	Delay Quick Stop Next	Defines the stand-by time in seconds to switch off the last cascade module on in Quick Stop mode.	5...255	15	Sec.	I	Cascade
M2	77	Hyst. Down Start Module	Defines by how many degrees the temperature measured by the primary circuit's probe must fall below the set-point in order for the subsequent module to be started after the time interval set by Par. 75.	0...40	5	°C	I	Cascade
M2	78	Hyst. Up Stop Module	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for the subsequent module to be switched off after the time interval set by Par. 76.	0...40	4	°C	I	Cascade
M2	147	Number of Units	Defines the number of modules of which the cascade consists.	1...16	8		I	Cascade

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M2	144	Hyst. Down Quick Start	Defines by how many degrees the temperature measured by the primary circuit's probe must go below the set-point in order for the subsequent module to be started after the time interval set by Par. 142 (quick-start mode).	0...40	20	°C	I	Cascade
M2	145	Hyst. Up Quick Stop	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for the subsequent module to be switched off after the time interval set by Par. 143 (quick stop mode).	0...40	6	°C	I	Cascade
M2	146	Hyst. Up Stop All	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for all "On" modules to be switched off at the same time.	0...40	8	°C	I	Cascade
M2	148	Power Mode	Defines the cascade operation mode. 0 = Disabled 1 = Min burners 2 = Max burners 3 = Balanced burners	0,1,2,3	2		I	Cascade
M2	79	Max. Setp. Offset Down	Defines the maximum decrease in the primary circuit's cascade set-point. Is based on the primary circuit's probe reading.	0...40	2	°C	I	Cascade
M2	80	Max. Setp. Offset Up	Defines the maximum increase in the primary circuit's cascade set-point. Is based on the primary circuit's probe reading.	0...40	5	°C	I	Cascade
M2	81	Start Mod. Delay Fact.	Defines the time in minutes from the moment the demand is triggered until the activation of the set-point increases or decreases provided for by Par. 79 e 80.	0...60	60	Min.	I	Cascade
M2	82	Next Module Start Rate	It defines the minimum power for at least one of the modules in the cascade in order for the next module to be switched on (if the other conditions linked to Par. 75 and 77 are met).	10...100	80	%	I	Cascade
M2	83	Next Module Stop Rate	It defines the maximum power for all the modules in the cascade in order for the last module on to be switched off (if the other conditions linked to Par. 76 and 78 are met).	10...100	25	%	I	Cascade
M2	84	Module Rotation Interval	It defines the time interval (in days) after which modules are rotated.	0...30	1	Days	I	Cascade
M2	149	First Module to Start	Establishes the number of the next module to be rotated (this value is automatically updated at each rotation).	1..16	1		I	Cascade
M2	86	PID P	Defines the proportional term to change the setpoint of the cascade module.	0...1275	50		O	Cascade
M2	87	PID I	Defines the integral term to change the setpoint of the cascade module.	0...1275	500		O	Cascade
M2	150	PID Slew Rate Up	Defines the speed (in °C/100 ms) with which the set-point of individual modules is increased in the event the primary circuit's set-point is not achieved (if the value is set to zero, the change is controlled by the PI of Par. 86 and 87 without restrictions).	0...25.5	1		O	Cascade
M2	151	PID Slew Rate Dn	Defines the speed (in °C/100 ms) with which the set-point of individual modules is decreased in the event the primary circuit's set-point is exceeded (if the value is set to zero, the change is controlled by the PI of Par. 86 and 87 without restrictions).	0...25.5	1		O	Cascade
M2	152	Pwr-Mode2 Min Power	Defines the power value (in percentage terms) against which the average power of all on modules in cascade operation mode must be compared (Par. 148 = 2).	0...100	20	%	I	Cascade

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M2	153	Pwr-Mode2 Hysteresis	Defines the extra power value (in percentage terms) compared to the average power of all on modules in cascade operation mode (Par. 148 = 2).	0...100	40	%	I	Cascade
M2	154	Post-Pump Period	Defines overrun time in seconds at the end of the cascade heat demand.	0...255	60	Sec.	I	Cascade
M2	184	N. active burner in DHW	With this setting it is possible to set the number of burners that are used for cascade DHW.	0...16	16		I	Cascade
M3	73	Boiler Address	Defines the way in which the boiler is managed.	Managing, Stand-alone, Dependent	Stand-alone		I	Cascade
M3	156	Permit Emergency Mode	Enable/disable emergency mode.	Yes/No	Yes		U	Cascade
M3	157	Emergency Set-point	Defines the emergency mode setpoint.	20...90	70	°C	I	Cascade
M3	158	Delay Per Start Next Blr.	This defines the waiting time in seconds for the next cascade to start up in normal start mode.	0...1275	1275	Sec.	I	Cascade
M3	159	Delay Per Stop Next Blr.	This defines the waiting time in seconds for the last switched-on cascade to switch off in normal off mode.	0...1275	1275	Sec.	I	Cascade
M3	160	Delay Quick Start Next	This defines the waiting time in seconds for the next cascade to start up in quick start mode.	0...1275	400	Sec.	I	Cascade
M3	161	Delay Quick Stop Next	This defines the waiting time in seconds for the last switched-on cascade to switch off in quick off mode.	0...1275	240	Sec.	I	Cascade
M3	162	Hyst. Down Start Boiler	"reserved"	0...40	5	°C	I	Cascade
M3	163	Hyst. Up Stop Boiler	"reserved"	0...40	2	°C	I	Cascade
M3	164	Hyst. Down Quick Start	"reserved"	0...40	10	°C	I	Cascade
M3	165	Hyst. Up Quick Stop	"reserved"	0...40	4	°C	I	Cascade
M3	166	Hyst. Up Stop All	"reserved"	0...60	8	°C	I	Cascade
M3	167	Number of boilers	This defines the number of boilers connected (cascade of cascades).	1...16 (basic cascade) 1...8 (full cascade)	1		I	Cascade
M3	168	Power Mode	"reserved"	0 = Disabled 2 = Max burners 3 = Balanced burners	2		I	Cascade
M3	169	Max. Setp. Offset Down	Defines the maximum decrease in the primary circuit's cascade set-point. Is based on the secondary circuit's probe reading.	0...40	2	°C	I	Cascade
M3	170	Max. Setp. Offset Up	Defines the maximum increase in the primary circuit's cascade set-point. Is based on the secondary circuit's probe reading.	0...40	5	°C	I	Cascade
M3	171	Start Mod. Delay Fact.	Defines the time in minutes from the moment the request is triggered until the activation of the set-point increases or decreases provided for by Par.169 e 170.	0...60	40	Min.	I	Cascade
M3	172	Next Boiler Start Rate	"reserved"	10...100	80	%	I	Cascade
M3	173	Next Boiler Stop Rate	"reserved"	10...100	25	%	I	Cascade

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M3	174	Module Rotation Interval	"reserved"	0...30	5	Days	I	Cascade
M3	175	First Boiler to Start	"reserved"	1...8	-		I	Cascade
M3	176	PID P	Defines the proportional term to change the set-point of the cascade module based on the secondary circuit's temperature.	0...1275	25		O	Cascade
M3	177	PID I	Defines the integral term to change the set-point of the cascade module based on the secondary circuit's temperature.	0...1275	1000		O	Cascade
M3	178	PID Slew Rate Up	Defines the speed (in °C/100 ms) with which the set-point of individual modules is increased in the event the secondary circuit's set-point not reached (if the value is set to zero, the change is controlled by the PI of Par. 176 and 177 without restrictions).	0...25.5	1		O	Cascade
M3	179	PID Slew Rate Dn	Defines the speed (in °C/100 ms) with which the set-point of individual modules is decreased in the event the primary circuit's set-point is exceeded (if the value is set to zero, the change is controlled by the PI of Par. 176 and 177 without restrictions).	0...25.5	1		O	Cascade
M3	180	Pwr-Mode2 Min Power	"reserved"	0...100	20	%	I	Cascade
M3	181	Pwr-Mode2 Hysteresis	"reserved"	0...100	40	%	I	Cascade
M3	182	Post-Pump period	"reserved"	0...255	30	Sec.	I	Cascade
M4		Appliance Model	Defines the boiler model.	1...4			O	General
M4	98	Appliance Settings	Supports uploading the values of Par. 92, 93 and 94 from a set of pre-defined rpm values that identifies the boiler type.	1...85			O	General
M4	97	IO Configuration	Supports uploading the values of Par. from 116 to 128 from a set of pre-defined rpm values that defines the configuration of the boiler's inputs and outputs.	1..53			O	General

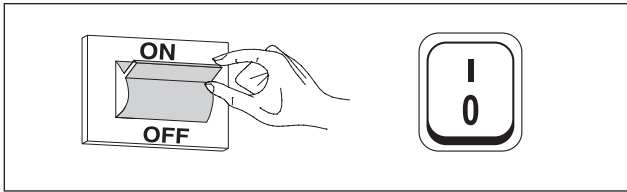
NOTE:

Please see sections "Replacing the display and control boards" and "Replacing the Dependent board" for detailed information on how to use and configure parameters 97 and 98.

3 COMMISSIONING AND MAINTENANCE

3.1 Initial startup

- Switch the system's master switch to the ON position and the thermal module's master switch to (I).



3.1.1 Switching the appliance on and off

After switching the appliance on, the display shall look as shown in the figure below:



External temperature is shown on the display on the left. This value is displayed only if the outdoor temperature sensor (accessory) is installed.

Main setpoint values are shown in the lower side of the display while the time is shown on the top right side.

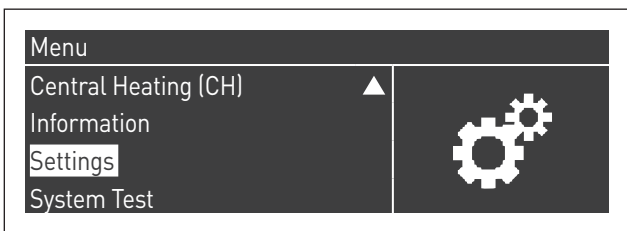
To turn the equipment off set the main switch "0/I" that is placed on the back side to "0".

⚠ Never power off the appliance before switching the master switch to the "0" position.

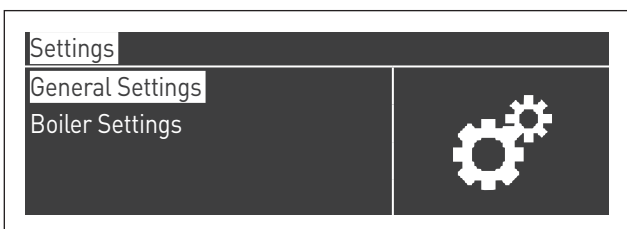
⚠ Never switch off the appliance with the master switch if a request is active. Always make sure that the appliance is in stand-by before switching the main switch.

3.1.2 Date and time setting

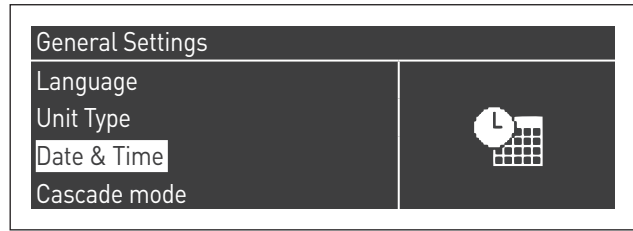
Press the MENU key and select "Settings" with the ▲ / ▼ keys



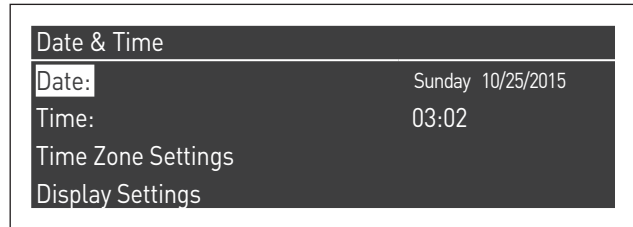
Confirm with the ● key and select "General settings" with the ▲ / ▼ keys



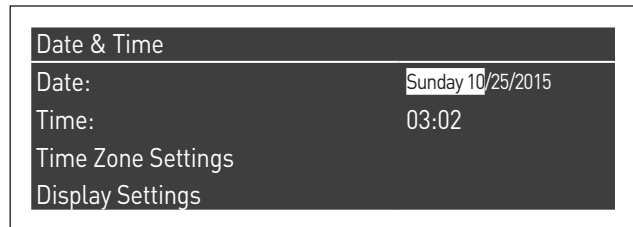
Confirm with the ● key and select "Date and Time " with the ▲ / ▼ keys



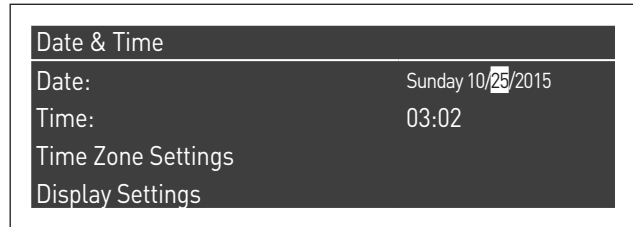
Press the ● key, the display will be shown as follows:



Press the ● key to highlight the values.

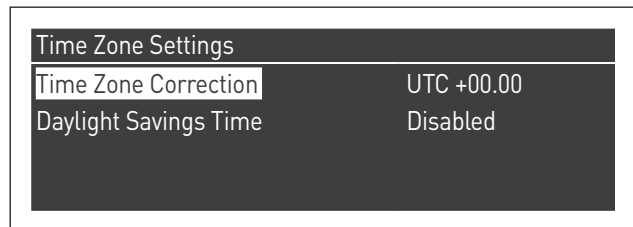


Values can be changed with the ▲ / ▼ keys. Confirm the value entered pressing the ● key and move to the next value.

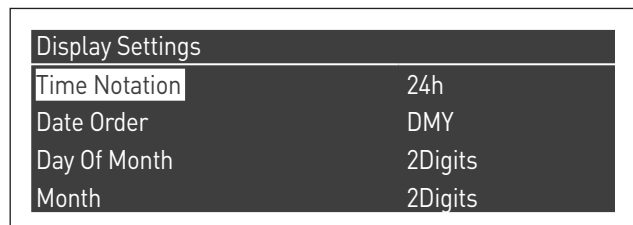


To set the time, follow the same procedure.

By accessing the "Time Zone Settings" menu, it is possible to set the time zone parameter as shown in the figure below:




To change the way in which date and time are displayed, it is possible to change the following characteristics by accessing the "Display Settings" menu:




Display Settings	
Year	4Digits
Date Separation Character	-
Day Of Week	Short Text
Seconds	No

3.1.3 Password access

To access the parameters, press the MENU key and select "Settings" with the ▲ / ▼ keys.

Menu	
Domestic Hot Water (DHW) ▲	
Information	
Settings	
System Test	

Confirm with the ● key and select "Boiler settings" with the ▲ / ▼ keys

Settings	
General Settings	
Boiler Settings	


Press the ● key to confirm.

- The system will now ask you to enter a password (the password is required for thermal module settings only):

Password	
0 * * *	

Enter one digit at a time using the ▲ / ▼ keys to increase/decrease the numeric value. When you have set the right value, confirm by pressing the ● key.

The system provides for three types of access:
 USER (password not required, e.g. password No. 0000)
 INSTALLER (password No. 0300)
 MANUFACTURER

 After it is entered, the password is active during display and/or parametrisation. If the display is inactive for a few minutes, it needs to be re-entered.

3.1.4 Setting the heating parameters


The parameter 1establishes the thermal module's various heating operation modes.

Mode 0

(Operation with room thermostat/heat demand and fixed heating setpoint)

In this mode, the thermal module operates with a fixed set-point (controlled by the parameter3) based on whether the room/heat demand thermostat's contact is closed or not. The set-point value can be entered directly, without entering in the parameter list, by accessing the "CH" menu in the following way:

Press MENU and select "Central heating" using the ▲ / ▼ keys. Press the ● key to confirm.

Menu	
Central Heating (CH)	
Domestic Hot Water (DHW)	
Information	
Settings ▼	

After the selection, use the ► key to highlight the value and use the ▲ / ▼ keys to change the selected value. Press the ● key to confirm/save the new settings.

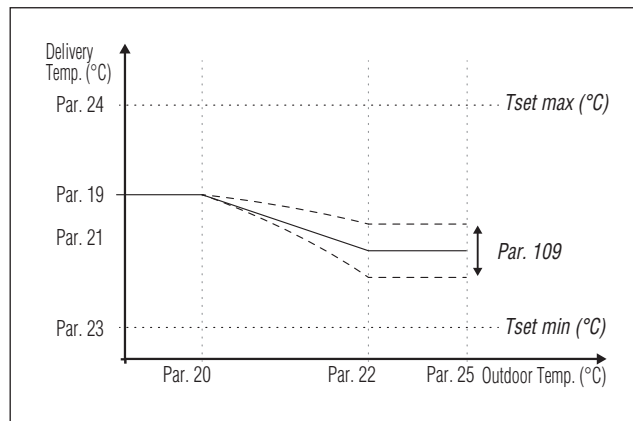
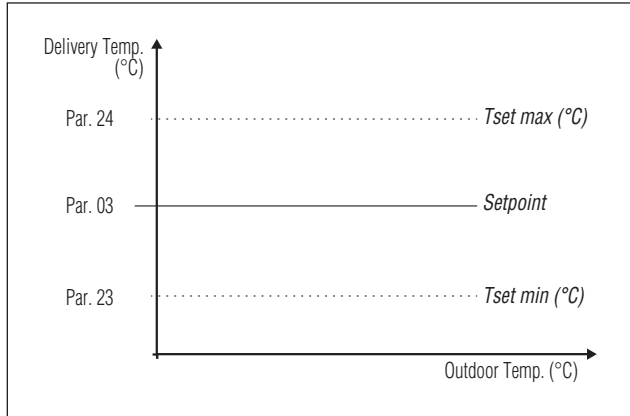
Central Heating (CH)	
CH Setpoint	61.5 °C

the set point can be set within a minimum and maximum value as indicated respectively on Par. 23 and 24 as shown in the figure.

The outdoor temperature sensor (accessory) is not required and if connected the outdoor temperature that is measured does not influence the setpoint that has been set.

The parameters regulating such temperature are:

Par. No.	Description
3	Sets the desired flow temperature with heating mode. Active for the heating mode Par. 1 = 0 o 3
23	Limits the minimum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
24	Limits the maximum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).

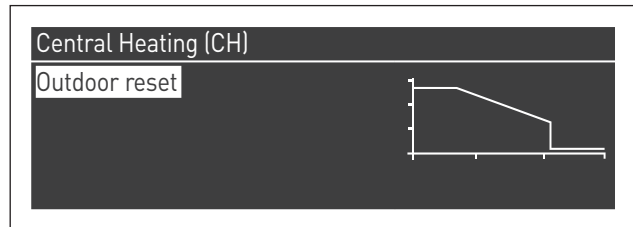


The demand is activated when the room/heat demand thermostat's contact is closed provided that outdoor temperature does not exceed the value set by the parameter 25.

if the outdoor temperature is higher than the one set on parameter 25, the burner is stopped even if there is a heat demand.

The climatic curve can also be adjusted in a simpler, more user-friendly way.

Enter the "CH" menu. The following display will appear:



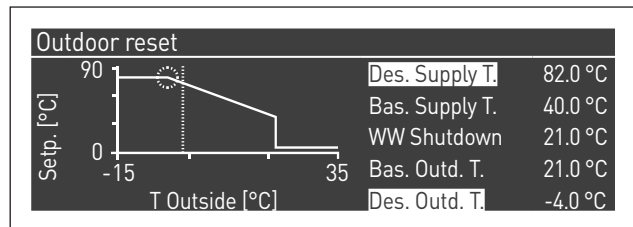
Mode 1

(Climatic functioning with room/heat demand thermostat, variable set point according to the outdoor temperature)

In this case the thermal module operates with a variable set-point depending on outdoor temperature based on a climatic curve defined by the following parameters:

Par. No.	Description
109	Defines the value of the set point calculated on climatic mode (Par. 1 = 1).
19	Establishes the max. set-point at the minimum outdoor temperature for climatic regulation
20	Establishes the minimum outdoor temperature to which the maximum set-point can be associated for climatic regulation
21	Establishes the minimum set-point at the maximum outdoor temperature for climatic regulation
22	Establishes the maximum minimum outdoor temperature to which the minimum set-point can be associated for climatic regulation
23	Limits the minimum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
24	Limits the maximum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
25	Defines the temperature at which climatic regulation is switched off

Press the ● key to confirm and enter the climatic curve screen.



"Design Supply Temp." and "Design Outdoor Temp." will be displayed. To change their value, press the ● key.

1 Use the ▲ / ▼ keys to modify Design Supply Temp and the ◀ / ▶ keys to change Design Outdoor Temp.

2 Press ● to save changes

3 Use the ◀ / ▶ keys to select other values.

Repeat steps 1 from 3 to make other changes.

After setting the parameters, press the ESC key to exit the menu.



If the outdoor temperature sensor (accessory) is not detected (not installed or damaged) the system provides a warning: no. 202

The presence of the warning does not stop the thermal module allowing a heat request to be carried out at the maximum setpoint set on the climatic regulation.

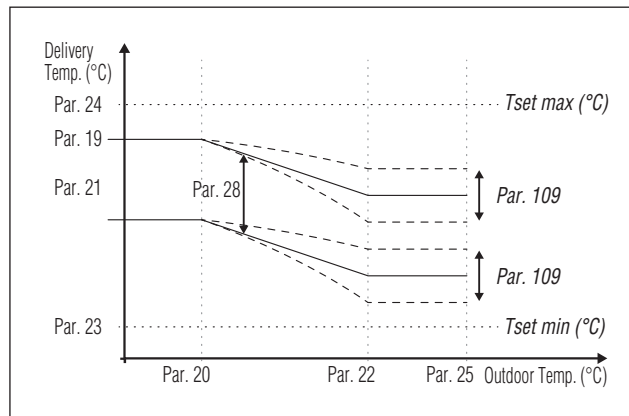
Mode 2

(Working on climatic mode with attenuation controlled by a room/heat demand thermostat, variable set point according to the outdoor temperature)

In this case the thermal module operates with a set-point defined by the climatic curve (which can be set in the same way as described in Mode 1) depending on outdoor temperature. Heat demand is actioned independently from whether the room/heat demand thermostat's contact is closed and stops only when the outdoor temperature is greater than the one defined by the parameter 25.

In this mode the parameter 28 defines by how many degrees the set-point is decreased (attenuation) when the room/heat demand thermostat's contact is opened.

Par. No.	Description
109	Defines the value of the set point calculated on climatic mode (Par. 1 = 1).
19	Establishes the max. set-point at the minimum outdoor temperature for climatic regulation
20	Establishes the minimum outdoor temperature to which the maximum set-point can be associated for climatic regulation
21	Establishes the minimum set-point at the maximum outdoor temperature for climatic regulation
22	Establishes the maximum minimum outdoor temperature to which the minimum set-point can be associated for climatic regulation
23	Limits the minimum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
24	Limits the maximum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
25	Defines the temperature at which climatic regulation is switched off
28	Use the heating mode Par. 1= 2 or 3. Defines how many degrees the flow set point is lowered.

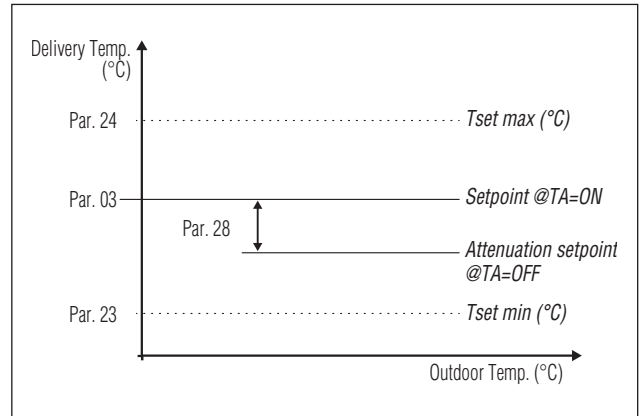


Mode 3

(Continuous fixed set-point operation with attenuation controlled by room/heat demand thermostat)

In this mode the fixed set-point is adjusted in the same way as described for Mode 0. The difference consists in the fact that the demand is always active and the set-point is decreased (attenuation) by the value defined by the parameter 28 when the room/heat demand thermostat's contact is opened.

Par. No.	Description
3	Sets the desired flow temperature with heating mode. Active for the heating mode Par. 1 = 0 o 3
23	Limits the minimum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
24	Limits the maximum value that can be assigned to the set-point in heating mode (does not apply to heating mode 4).
28	Use the heating mode Par. 1= 2 or 3. Defines how many degrees the flow set point is lowered.



⚠ The outdoor temperature sensor (accessory) is not required and if connected the outdoor temperature that is measured does not influence the setpoint that has been set.

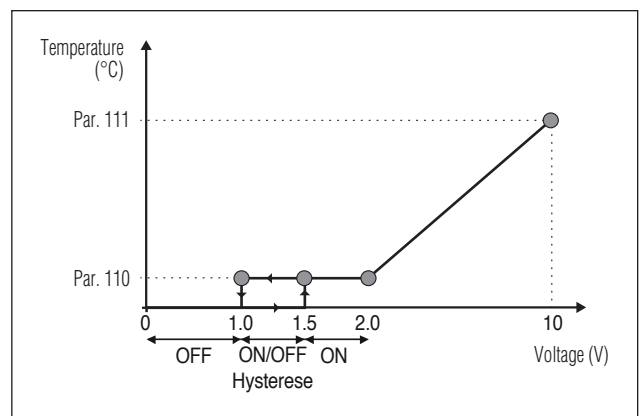
Mode 4

(Set-point adjustment based on a 0-10V analogical input)

The parameters that control this mode are the following:

Par. No.	Description
110	Sets the minimum delivery temperature value in heating mode (Par. 1) = 4.
111	Sets the maximum delivery temperature value in heating mode (Par. 1) = 4.

The operation set-point is adjusted on the basis of the following curve:



3.1.5 Setting the domestic hot water parameters

The parameter 35 defines the various operation modes of the thermal module for DHW production

Mode 0

(No production of domestic hot water)

In this mode the thermal module will work only for the heating circuit (see paragraph "Setting the heating parameters")

Mode 1

(DHW production with storage tank and storage cylinder probe)

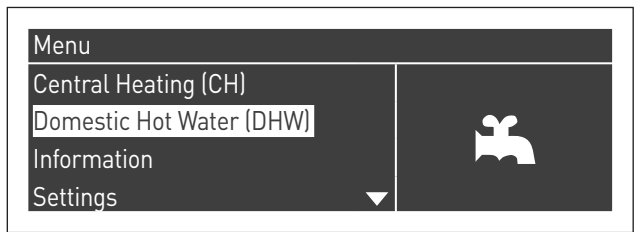
In this mode, the thermal module is activated when the temperature recorded by the storage cylinder probe falls below the DHW setpoint by an amount equal to the hysteresis value and is deactivated when the temperature rises above the DHW setpoint by the value of the hysteresis.

The parameters that control DHW production are the following:

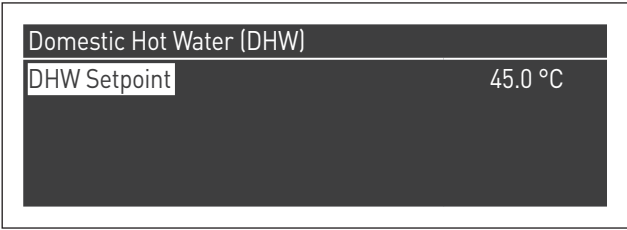
Par. No.	Description
36	Defines the hysteresis to initiate the domestic hot water demand.
37	Defines the hysteresis to stop the domestic hot water demand.
38	Defines the primary circuit's set-point increase in degrees compared to the temperature set for the domestic hot water tank.
39	Defines the primary circuit's restart hysteresis in modes 1 and 2 of DHW (valid both for cascade and stand-alone applications).
40	Defines the primary circuit's shut-off hysteresis in modes 1 and 2 of DHW (valid both for cascade and stand-alone applications).
41	Defines the value referred to the Delta T of the tank for maintenance purposes. E.g.: if it is set on 3, when the tank has a set point lowered of 3 degrees, the module turns on at the minimum to allow maintenance till the set point plus hysteresis. If this parameter is equal to 36, this function is inactivated and the module starts at the maximum sanitary power.
48	Establishes the DHW storage tank set-point.

The setpoint value can be set directly, without entering the list of the parameters:

- Press MENU and select "Domestic Hot Water" using the ▲ / ▼ keys.



- Press the ● key to confirm.



- Use the ► key to highlight the value, and use the ▲ / ▼ keys to change the selected value. Press the ● key to confirm/save the new settings.

the DHW value can be changed only when the "domestic hot water" function is enabled. See paragraph "Password access" for instructions about outdoor recovery.

Mode 2

(DHW production with storage tank controlled by a thermostat)

In this case the thermal module is activated when the contact in boiler's thermostat is closed and is deactivated when the latter is opened.

The parameters that control DHW production are the following:

Par. No.	Description
38*	Defines the primary circuit's set-point increase in degrees compared to the temperature set for the domestic hot water tank.
39	Defines the primary circuit's restart hysteresis in modes 1 and 2 of DHW (valid both for cascade and stand-alone applications).
40	Defines the primary circuit's shut-off hysteresis in modes 1 and 2 of DHW (valid both for cascade and stand-alone applications).
48	Establishes the DHW storage tank set-point.

- (*) Parameter 38 is active on such mode even if the tank probe is not installed and it influences the flow temperature of the module.

It can be used to limit the difference between the flow and set temperature on the tank thermostat so that the system efficiency is maximized.

Also in this case, the setpoint value can be set directly, without entering the parameters list, by accessing the "Domestic Hot Water" menu, as already earlier for mode 1.

Priority setting

The parameter 42 sets the priorities between the DHW and CH circuit.

Four modes are envisaged:

- 0 Time:** timed priority between the two circuits. In the event of a simultaneous demand, initially the domestic hot water circuit is made to operate for a number of minutes equal to the value assigned to the parameter 43. At the end of this time period, the CH circuit is operated (also for the same amount of time) and so on until demand for one or the other circuit stops
- 1 Off:** priority given to the heating circuit
- 2 On:** priority allocated to the DHW circuit
- 3 Parallel:** simultaneous operation of both circuits provided that the delivery temperature requested by the DHW circuit is lower than or equal to the setpoint requested by the heating circuit. When the temperature requested by the DHW circuit exceeds the heating setpoint, the circulation pump of the heating is turned off and priority is switched to the DHW.

Anti-Legionella function

When the production of domestic hot water is activated (Par. 35= 1), using the parameters 107 and 108 it is possible to carry out a weekly scheduling of the "Anti-legionella" function.

Parameter 107 sets the day of the week on which the activity is performed, whilst parameter 108 sets the time.

At the planned time, the thermal module generates a heat demand for DHW storage tank with a pre-set set-point of 60°C (not adjustable). After reaching 60°C, the temperature is maintained for 30 minutes, during which the system checks that the probe's temperature does not fall below 57°C. At the end of this time interval, the Anti-Legionella function stops and standard operation of the thermal module is resumed.

Operation in "Anti-Legionella" mode has priority over other demands independently from the setting of the parameter 42.

Par. No.	Description
107	Sets the weekday on which the anti-Legionella procedure is carried out.
108	Sets the time of the day during which the anti-Legionella procedure is carried out.

3.1.6 Scheduled programme

The Scheduled Programme is designed to program the operation of the various circuits managed by the thermal module, (CH, DHW and additional mixed zones).

Seasonal Programme

The Seasonal Programme is used to exclude additional mixed zones during the summer season. It does not control any DHW parameter.

Holiday Programme

The Holiday Programme is used to exclude part of or all the circuits at a certain time of the year.

A holiday can be set both on the full system and on various groups of circuits.

The group system enables the user to add various circuits to the group to set a holiday period for several circuits at the same time. (For instance, to manage a semi-detached house with a centralised heating system when one of the two families is on holiday and the other is not).

The set-point type can be adjusted so as to correspond to the desired setting.

The system can control up to a total of 16 "Mixed" zones. The programming of mixed areas is only allowed with an accessory.

At the same time as these 16 areas, it is also possible to enable the CH zone (direct zone for central heating only).

Clock Program
Program Group
Burn hours till service
Reset Service Reminder
Holiday Settings

The time programme includes the following parameters:

Group Programming

Group 1	
Group Holiday	Enabled
Select Ext. Zones in Group	
Select Dep. Zones in Group	

It enables the user to select a group to add zones to the selected group. It also enables the user to enable/disable the group in question.

Group settings are used to add zones to the groups.

The "Group programming" menu enables the user to choose among 8 groups. Each of them can be enabled or disabled.

Within it, it is possible to select zones to be added to the group (direct zone (CH) - mixed zones from 1 to 16)

Select Ext. Zones in Group 1		
External Zone	CH	Disabled
External Zone	1	Disabled
External Zone	2	Disabled
External Zone	3	Disabled

N.B. The programming of mixed areas is only allowed with an accessory.

Heating programming

Group 1	
Program Comfort Period	1
Comfort Setpoint	28.0 °C
ECO Setpoint	20.0 °C
Out of interval setpoint	Reduced

It supports adjusting the time programme for the CH zones with the following parameters:

Period setting

Enables the user to select a period from 1 to 7. Period settings enable the user to adjust the active periods for this zone.

- **Active days:** Selection of the day (s) on which the period is active. Enables the user to disable the period set for one or more days. When this parameter is set as inactive, the other items on this menu are no longer used and hidden from the view. The choice of active days is between the following macro-groups: Sat-Sun, Mon-Fri, Mon-Sun, or individual days: Mon, Tue, Wed,...
- **Interval 1 (hidden if Active Days is disabled):** This parameter allows the user to regulate the starting and end time of the period. The starting time must always be before the finishing time.
- **Interval 2 (hidden if Active Days is disabled):** Same as interval 1. Interval added for the activated period.
- **Interval 3 (hidden if Active Days is disabled):** Same as interval 1. Interval added for the activated period.

External Zone CH - Period 1		
Active Day(s)	Sunday	
Interval 1	00:00	00:00
Interval 2	00:00	00:00
Interval 3	00:00	00:00

Comfort Set-point

Comfort temperature to be used when the zone is in a certain period. (10 -30 °C).

ECO set-point

ECO temperature. Adjustable temperature that can be used outside set periods (5 – 20 °C).

Set-points outside the interval

Selection of the type of set-point to be used when a zone is not on a set period by selecting between:

- Off
- Comfort
- Eco
- Anti-Freeze (is activated below 5°C NON-ADJUSTABLE)
- Reduced (Calculated as -10°C Comfort Set-point value)

DHW setting

Group 1	
Program Comfort Period	1
Out of interval setpoint	On

It supports adjusting the time programme for the DHW zone.

Period setting

Enables the user to select a period from 1 to 7. Period settings enable the user to adjust the active periods for this zone.

- **Active days:** Selection of the day (s) on which the period is active. Enables the user to disable the period set for one or more days. When this parameter is set as inactive, the other items on this menu are no longer used and hidden from the view. The choice of active days is between the following macro-groups: Sat-Sun, Mon-Fri, Mon-Sun, or individual days: Mon, Tue, Wed,...
- **Interval 1 (hidden if Active Days is disabled):** This parameter allows the user to regulate the starting and end time of the period. The starting time must always be before the finishing time.
- **Interval 2 (hidden if Active Days is disabled):** Same as interval 1. Interval added for the activated period.
- **Interval 3 (hidden if Active Days is disabled):** Same as interval 1. Interval added for the activated period.

External Zone DHW - Period 1		
Active Day(s)	Sunday	
Interval 1	00:00	00:00
Interval 2	00:00	00:00
Interval 3	00:00	00:00

Set-points outside the interval

Selection of the type of set-point to be used when a zone is not on a set period by selecting between:

- Off
- On

Holiday setting

Holiday Settings	
Mode	Group
Group	1

Enables the user to change parameters for the Holiday Programme.

Mode

Select the Holiday programme mode. It can be set to Off, System or group.

Off

Disabled programme

Group

it enables the selection of the group (1 – 8).

As part of group selection, the Holiday Group is displayed with the following parameters:

- **Holiday set-point:** Set-point type to be used for the selected group. All zones in this group shall use this set-point if the current date is between the start and end date of the holiday period, but only if the group is enabled in the group settings menu, and can be selected from: Off, Comfort, Eco, Anti-freeze and Reduced.
- **Start date / End date (Day DD-MM-YEAR):**

External Zone DHW - Period 1		
Active Day(s)	Sunday	
Interval 1	00:00	00:00
Interval 2	00:00	00:00
Interval 3	00:00	00:00

- **System:** It enables the user to select the holiday programme for the entire system. In this mode, the set-point is common to all system groups.

External Zone DHW - Period 1		
Active Day(s)	Sunday	
Interval 1	00:00	00:00
Interval 2	00:00	00:00
Interval 3	00:00	00:00

- **Holiday set-point (hidden if the Mode is set to "Off"):** Type of reference to be used when system mode is selected. This set-point is used for all areas. Only used for the holiday system.

Seasonal setting

Enables the user to change parameters for the Seasonal Programme.

The seasonal programme is used to define a period of inactivity for the heating system. This menu includes the following elements:

Activates heating basis

Selects how the seasonal programme must verify whether heating can be allowed or not. It can be set on:

- **Always:** it means that the seasonal programme is ignored and (CH) heat demand is always allowed throughout the year.

Season Settings	
Mode	Off

- **At date:** excludes heating (CH+zone) when the current date is included between the start and the end dates.

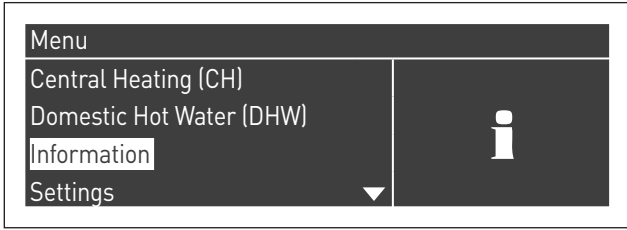
Season Settings	
Mode	On Date
Begin Date	15-04
End Date	15-09

- **At Temp:** excludes heating (CH+zone) when the outdoor temperature is higher than the selected temperature. (Ext. deactivation T: 0.0 °C/50 °C)

Season Settings	
Mode	On Temp
Outdoor Temp. Below	25.0 °C

3.1.7 Thermal module information

In order to display key information on the screen, press the menu key and select "Information" with the ▲ / ▼ keys.



Press the ● key to confirm.

The following screen will be displayed:



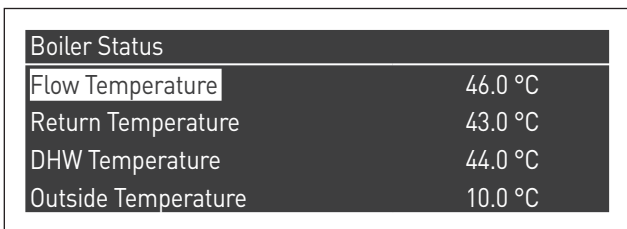
By selecting "Boiler status" and pressing the ● button you have the following screen:



At this point by selecting "Master" or "Dep1 ... N" the following values are displayed:

- Delivery temperature
- Return temperature
- DHW temperature (the sensor must be connected in order to display a value; if it is not present, the default value is displayed)
- Outside temperature
- Flue gas temperature
- System temperature (the sensor must be connected in order to display a value; if it is not present, the default value is displayed)
- Fan speed
- Ionization
- State
- Error

 The display shows four lines at a time. You can scroll the list by using the ▲ / ▼ keys.

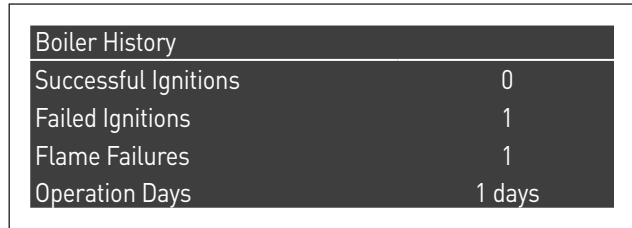


By selecting "Boiler Register" and pressing the ● button you have the following screen:



At this point by selecting "Master" or "Dep1 ... N" the following values are displayed:

- Firing OK
- No firing
- No flame det.
- Oper. days
- Heat. burner hours
- DHW burner hours



You can scroll the list by using the ▲ / ▼ keys.

By selecting "Error log" and pressing the ● key, the following values are displayed:

- Error log (the errors listed in paragraph "Manual error list" are displayed)
- Error filter (in the "Error filter" item, it is possible to select: Disabled - Vol. Err. - Block)
- Boiler ID filter (in the boiler ID filter item you can choose between: Disabled - Master - Dep1 ... N)
- Erase Error Log (allowed only with Installer password)



You can scroll the list by using the ▲ / ▼ keys.

By selecting "Maintenance" and pressing the ● key, the following values are displayed:

- Maintenance log (each time a "Maintenance reminder reset" is performed, the event is logged)
- Oper. hours since last Maint.
- Oper. hours until next Maint
- Maintenance reminder reset (accessible only with installer password)
- Delete Maint. history (accessible only with OEM password)

Service	
Service history	
Burn hours since last service	0 hrs
Burn hours till service	2000 hrs
Reset Service Reminder	No


Service	
Burn hours since last service	0 hrs
Burn hours till service	2000 hrs
Reset Service Reminder	No
Clear Service History	No

You can scroll the list by using the ▲ / ▼ keys.

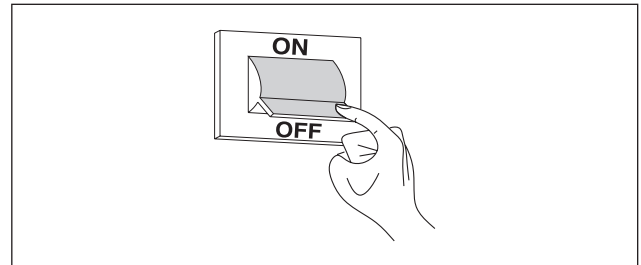
3.2 Checks during and after initial start-up

When the appliance it started, it must be checked by stopping and then restarting the thermal module in the following way:

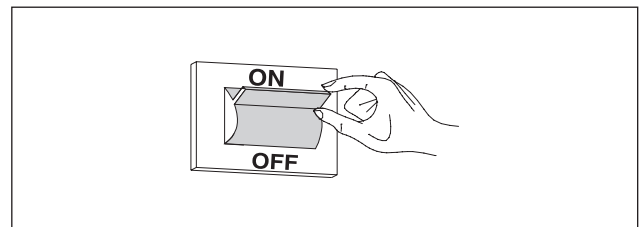
- Set the operating mode of the thermal module in heating to 0 (Par. 1) e and close the RT input to generate a heat request
- If necessary, increase the setpoint value (Centralized Heating → Heating Set) till all units start

Menu	
Central Heating (CH)	
Domestic Hot Water (DHW)	
Information	
Settings	

- Check the full stop of the thermal module and the heat demand by opening the "RT" contact (OFF).
- Check that the thermal module has come to a complete stop by setting the main switch of the equipment and the main switch of the system to "off".

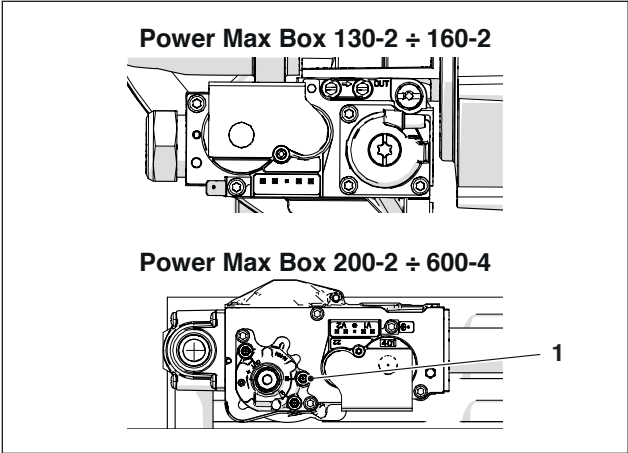


If all conditions are met, power the thermal module by setting the system's and the appliance's master switches to "On" and test combustion products (see Paragraph "Adjustments").

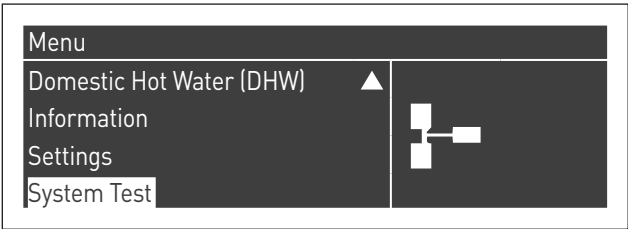


SUPPLY GAS PRESSURE CHECK

- Turn the main system switch "off"
- Access the module and identify the unit you want to check (it is not necessary to do it for all the units)
- Loosen by about two turns the pressure inlet screw (1) upstream of the gas valve and connect the pressure gauge



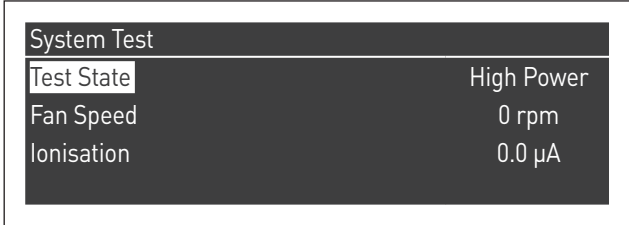
- Power the thermal module by setting the system's and the appliance's master switches to "On".
- Press the MENU key, select "System test" and press ● to confirm.



- select the unit between "Master" and "Dep1 ... N"



- select "Max. power" with the ▲ / ▼ keys and press ● to confirm. The fan starts turning at its maximum speed (which can vary based on the model).



DESCRIPTION	G20	G30	G31	
Wobbe index	45,7	80,6	70,7	MJ/m ³
Nominal supply pressure	20	28-30	37	mbar

After the checks:

- select "OFF" with the ▲ / ▼ keys and press ● to confirm.
- Disconnect the pressure gauge and tighten again the pressure test point screw (1) upstream from the gas valve.



- After completing the operations, close the module doors.

3.3 Error List

When a display has a technical fault, a numeric error code appears that will enable the maintenance operator to identify the possible cause.

There are 3 categories of errors:

- 1 Permanent: errors that require a manual reset
- 2 Temporary: errors that are automatically reset once the cause that generated them is removed or stopped
- 3 Notices: simple warnings that do not block the appliance's operation

3.3.1 Permanent Errors

Nr.	Error	Description	Checks	Solutions
0	E2PROM_READ_ERROR	Internal software error		Control board replacement
1	IGNIT_ERROR	Three unsuccessful ignition attempts in a row	Check gas supply pressure Check ignition spark Correct amount of air Check for voltage at the gas valve	If the gas supply pressure is incorrect, it must be adjusted to the correct pressure If spark is not present check for correct ignition electrode position If the combustion air pressure is incorrect, inspect the vent system and eliminate any obstructions If the voltage at the gas valve is not the same as the boiler power supply, replace the control board
2	GV_RELAY_ERROR	Failure detected in the GV (Gas Valve) relay	Check the integrity of the wire connections between gas valve and control board	If wires are damaged, replace them If the wiring is intact, replace the gas valve or the control board
3	SAFETY_RELAY_ERROR	Internal control board error		a) If the error appears during operation, replace the control board b) If the error appears when the boiler is starting up (using main switch), check that the limit thermostat (and wiring) is integral
4	BLOCKING_TOO_LONG	Control had a blocking error for more than 20 hours	Press RESET button to display the Blocking error description	Remove the cause of the Blocking error
5	FAN_ERROR_NOT_RUNNING	Fan is not running for more than 60 seconds	Check that the fan is connected to the power supply Check PWM connection of the fan	If there is no voltage, replace the control board If no PWM signal is present, replace control board Replace the fan
6	FAN_ERROR_TOO_SLOW	Fan runs too slow for more than 60 seconds		
7	FAN_ERROR_TOO_FAST	Fan runs too fast for more than 60 seconds		
8	RAM_ERROR	Internal software error		Control board replacement

Nr.	Error	Description	Checks	Solutions
9	WRONG_EEPROM_SIGNATURE	Contents of Eeprom is not up to date		Control board replacement
10	E2PROM_ERROR	Wrong safety parameters in Eeprom		Control board replacement
11	STATE_ERROR	Internal software error		Control board replacement
12	ROM_ERROR	Internal software error		Control board replacement
15	MAX_TEMP_ERROR	The external overheat protection is enabled or the T_Supply sensor measures a temperature of over 100°C (212°F)	Check the pump to verify the flow circulation Check if the valves on hydraulic circuit are open Check the safety thermostat	Change the pump or restart it Open the valves on hydraulic circuit Replace the safety thermostat
16	FLUE_GAS_ERROR	Flue temperature exceeded the maximum flue temperature		
17	STACK_ERROR	Internal software error		Control board replacement
18	INSTRUCTION_ERROR	Internal software error		Control board replacement
19	ION_CHECK_FAILED	Internal software error		Control board replacement
20	FLAME_OUT_TOO_LATE	Flame still present 10 seconds after closing the gas valve		Replace the gas valve
21	FLAME_BEFORE_IGNIT	Flame is detected before ignition		Replace the gas valve
22	Loss of flame	Flame lost three times during a request		
23	CORRUPTED_ERROR_NR	Error code RAM byte was corrupted to an unknown error code		
29	PSM_ERROR	Internal software error		
30	REGISTER_ERROR	Internal software error		Control board replacement

3.3.2 Temporary Errors

Nr.	Error	Description	Checks	Solutions
100	WD_ERROR_RAM	Internal software error		Control board replacement
101	WD_ERROR_ROM	Internal software error		Control board replacement
102	WD_ERROR_STACK	Internal software error		Control board replacement
103	WD_ERROR_REGISTER	Internal software error		Control board replacement
106	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
107	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
108	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
109	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
110	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
111	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
112	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
113	REFHI_TOO_HIGH / REFHI_TOO_LOW	Internal software error		Control board replacement
114	FALSE_FLAME	Flame is detected in a state in which no flame is allowed to be seen.		Control board replacement
115	LOW_WATER_PRESSURE_ERROR	Low water pressure error		
118	WD_COMM_ERROR	Watchdog communication error		Control board replacement
119	RETURN_OPEN	Return sensor open	Check the integrity of the wire connections Check the return temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
120	SUPPLY_OPEN	Supply sensor open	Check the integrity of the wire connections Check the return temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
122	DHW_OPEN	DHW sensor open	Check the integrity of the wire connections Check the DHW temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
123	FLUE_OPEN	Flue sensor open		
126	RETURN_SHORTED	Return sensor shorted	Check the integrity of the wire connections Check the return temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.

Nr.	Error	Description	Checks	Solutions
127	SUPPLY_SHORTED	Supply sensor shorted	Check the integrity of the wire connections Check the return temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
129	DHW_SHORTED	DHW sensor shorted	Check the integrity of the wire connections Check the DHW temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
130	FLUE_SHORTED	Flue sensor shorted	Check the integrity of the wire connections Check the Outdoor temperature sensor	If the wiring is damaged, replace it Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
133	Net Freq Error	Net. freq. error detected by the watchdog		
134	RESET_BUTTON_ERROR	Too many resets in a short time period		
163	T_SELECTION1_OPEN	Heat exchanger's flow rate too low		
164	Boiler model not detected	Boiler model not set		

3.3.3 Warnings

Nr.	Error	Description
200	CC_LOSS_COMMUNICATION	Cascade system: the burner of the managing module has lost the signal of one of the dependent thermal module burner
201	CC_LOSS_COMMUNICATION	Cascade system: the managing module has lost the signal of one of the dependent thermal module
202	OUTDOOR_WRONG	Outdoor sensor is open of shorted
203	T_SYSTEM_WRONG	T_System sensor is open of shorted
204	T_CASCADE_WRONG	T_Cascade sensor is open of shorted
207	DHW sensor error	DHW sensor error
208	Zone sensor error	Zone sensor error
209	Boiler request disabled	Boiler request disabled

3.4 Transformation from one gas type to another

3.4.1 Gas conversion for G30/G31

The thermal module **Power Max BOX** is supplied for operation with G20 (natural gas). However, it can be converted to operation with G30-G31 (LPG) using the dedicated accessory supplied as standard.



Forbidden in Belgium and Switzerland.



Conversion can only be executed by Technical Assistance Centre or staff authorised by **Beretta**.



In order to execute the conversion, only follow the instructions in this manual and the provisions of safety standards.



If the information contained in these instructions is not properly performed or performed by personnel not properly trained, there is a potential risk of fuel leakage and/or carbon monoxide production resulting in personal injury and/or injury.



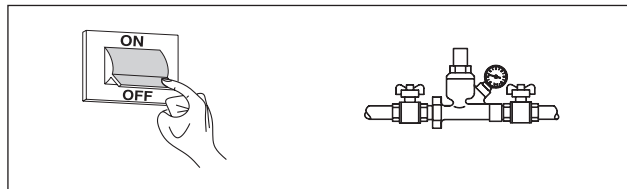
Conversion is not complete until all the control steps described in these instructions have been carried out.



After conversion, calibrate the CO₂ as shown in the "Adjustment" Paragraph.

Before making the transformation:

- make sure that both the main switch, the switch on the module, and the switch on the unit you are working on are in the "off" position.
- check that the main shut-off valve and the gas tap on the single unit on which you are working are closed.



To install the accessory:

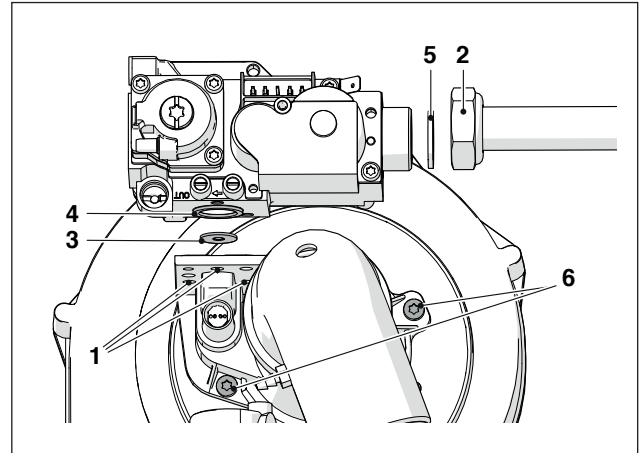
- Access the module and start operating on one of the units.

Versions 130-2 P and 160-2 P

- unscrew the three screws (1) and the swivel nut (2) of the gas pipe in order to remove the valve from the fan
- insert the related diaphragm (3) onto the gasket (4) without removing the gasket itself

Model	int. Ø (mm)
POWER MAX BOX 130-2 P	6.5 (*)
POWER MAX BOX 160-2 P	6.5 (*)

- check the integrity of the gasket (5); replace it if necessary
- retighten the mixer screws (6)
- refit the three screws (1)
- refit the swivel nut (2)
- reconnect the fan and gas valve electrical connections



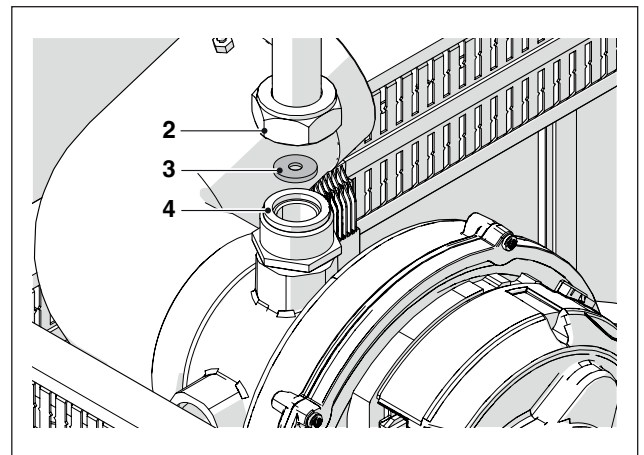
Check the tightening torques described in the "Torque valve" section.

All other versions: 200-2 P ÷ 600-4 P

- disconnect the electrical connections of the fan and the gas valve
- unscrew the swivel nut (2) on the gas pipe
- insert the related diaphragm (3) onto the gasket (4) without removing the gasket itself

Model	int. Ø (mm)
POWER MAX BOX 200-2 P	9
POWER MAX BOX 260-2 P	9.25
POWER MAX BOX 300-2 P	9.25
POWER MAX BOX 330-3 P	9
POWER MAX BOX 390-3 P	9.25
POWER MAX BOX 450-3 P	9.25
POWER MAX BOX 520-4 P	9.25
POWER MAX BOX 600-4 P	9.25

- retighten the valve
- retighten the fan screws
- screw the swivel nut (2) on the gas pipe
- reconnect the electrical connections of the fan and the gas valve



Check the tightening torques described in the "Torque valve" section.

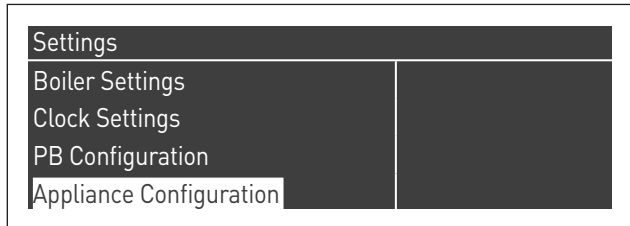
For all models

- Open the general fuel shut-off valve.
- Open the tap of the unit you are working on.
- Place the main system switch, the main switch of the module and the one of the unit on which you are working on "ON".
- Make sure that there is no heat or DHW demand.

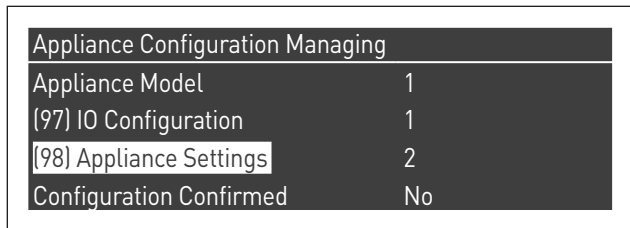
It is now necessary to change the setting of the parameter 98.

Proceed as follows:

- On the home screen of the control panel, press the ● key
- Select "Settings" with the ▲ / ▼ keys and press the ● key
- Select "Device configuration" with the ▲ / ▼ keys and press the ● key



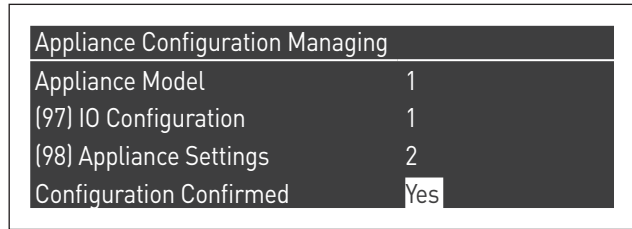
- Enter the password as described in paragraph "Password access"
- Select the unit between "Master" and "Dep1 ... N"
- Press the ▼ key, select "(98) Appliance Settings" and press the ● key



- With the ▲ / ▼ keys change the value following what is in the following table and press the ● key:

Model	Parameter 98
Power Max BOX 130-2 P	12
Power Max BOX 160-2 P	10
Power Max BOX 200-2 P	8
Power Max BOX 260-2 P	4
Power Max BOX 300-2 P	2
Power Max BOX 330-3 P	6
Power Max BOX 390-3 P	4
Power Max BOX 450-3 P	2
Power Max BOX 520-4 P	4
Power Max BOX 600-4 P	2

- Press the ▼ key, select "Config. Confirmed" and press the ● key
- With the ▲ / ▼ keys change the value to "Yes" and press the ● key



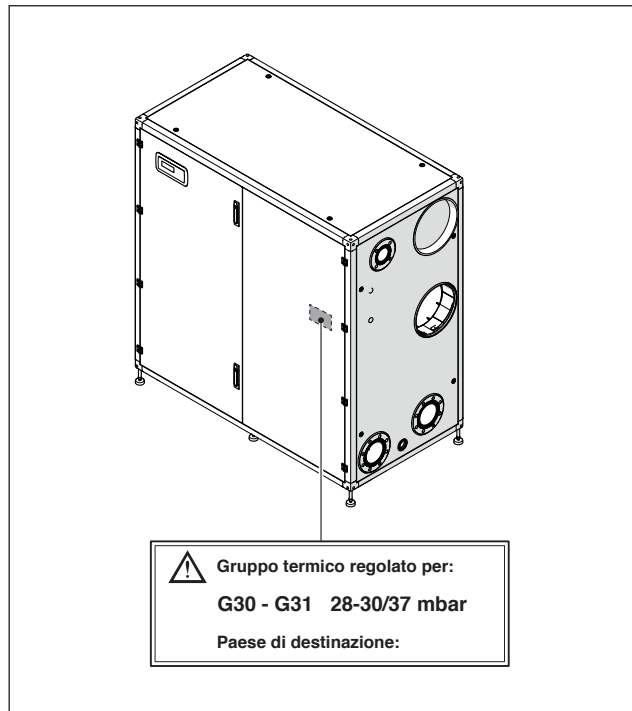
At this point the systems starts an application update process. Once this is finished, the menu "Settings" appears on the menu.

Repeat this operation for all the modules.

- Press ◀ until you return to the home screen

An error message is displayed for a few seconds and then the display returns to its normal state.

Apply the new gas label supplied in the kit on completion of the conversion.




After installing the accessory, check all gaskets tightness. Carry out all calibration activities described in Paragraph "Adjustments".

Restore the desired set points.

3.5 Adjustments

The thermal module **Power Max BOX** is supplied for operation with G20 (methane gas), as indicated by the type plate, and has already been factory-calibrated by the manufacturer.

If further adjustments need to be made, for example after non-scheduled maintenance, replacing a gas valve or switching the gas supply, follow the instructions below.

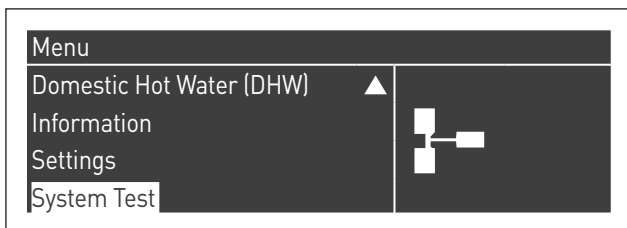
 Adjustments to maximum and minimum power must be performed in the indicated sequence and only by Technical Assistance Centre.

Before making the regulation:

- access inside the module
- identify the unit on which you want to operate.

CO2 ADJUSTMENT AT MAXIMUM POWER

- Press the MENU key, select "System test" and press **•** to confirm.



- Selecting "System Test" you will have the following screen:



- Choose between "Master" or "Dep1 ... N"
- select "Max. power" with the **▲ / ▼** keys and press **•** to confirm. The fan starts turning at its maximum speed (which can vary based on the model).



- the appliance will operate at maximum power.
- unscrew the cap from the smoke duct (1) and insert the combustion analyser probe
- set the CO2 with a screwdriver on the regulation screw (2) placed on the gas valve, thus reaching the value reported on the table.

CO2% maximum power	Gas type			
	G20	G25	G30	G31
Power Max BOX 130-2 P	9 ^(+0.2) / _(-0.2)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 160-2 P	9 ^(+0.2) / _(-0.2)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 200-2 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 260-2 P	9 ^(+0.2) / _(-0.2)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 300-2 P	9 ^(+0.2) / _(-0.4) (*)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 330-3 P	9 ^(+0.2) / _(-0.4) (*)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 390-3 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 450-3 P	9 ^(+0.2) / _(-0.4) (*)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 520-4 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 600-4 P	9 ^(+0.2) / _(-0.4) (*)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)

 (*) In Belgium and Switzerland the value must be adjusted to 8.6 ^(+0.6)/_(-0.6).

CO2 ADJUSTMENT AT MINIMUM POWER

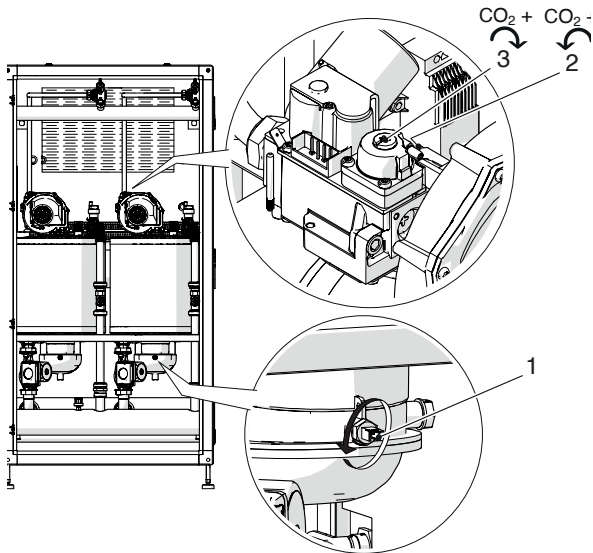
- Select "Min. power" with the **▲ / ▼** keys and press **•** to confirm.



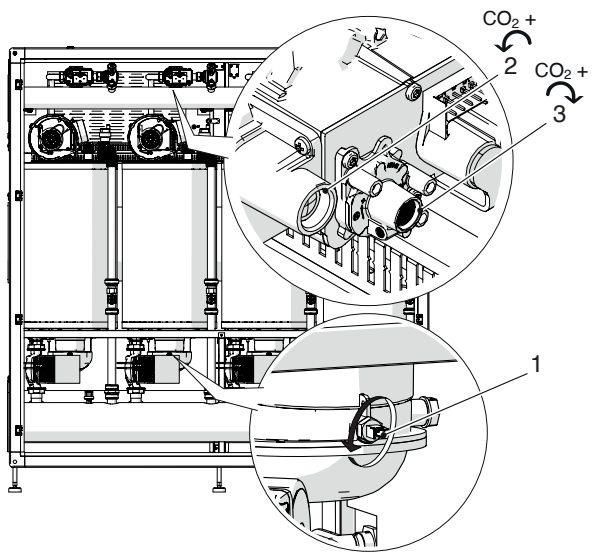
- the appliance will operate at minimum power.
- Adjust the CO2 using a screwdriver on the adjustment screw (3) on the fan unit, so as to obtain a value listed in the table.

CO2% minimum power	Gas type			
	G20	G25	G30	G31
Power Max BOX 130-2 P	9 ^(+0.2) / _(-0.2)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 160-2 P	9 ^(+0.2) / _(-0.2)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 200-2 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 260-2 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 300-2 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 330-3 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 390-3 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 450-3 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 520-4 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)
Power Max BOX 600-4 P	9 ^(+0.2) / _(-0.4)	9 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)	10,4 ^(+0.2) / _(-0.2)

Versions 130-2 P ÷ 160-2 P



Versions 200-2 P ÷ 600-4 P



CHECKING THE CALIBRATION

Select the "Max. power" value, wait until speed stabilises and check that CO₂ correspond to required ones.

After the checks:

- select "OFF" with the ▲ / ▼ keys and press ● to confirm.
- remove the analyzer probe and carefully screw the flue probe back (1)
- place back the front panel and lock the locking screw.

System Test	
Test State	Off
Fan Speed	0 rpm
Ionisation	0.0 µA

3.6 System antifreeze protection

The anti-freeze protection function protects the system against freezing.

The flow and return sensors of each individual thermal element are monitored to generate an antifreeze protection request in the following ways:

- When one of the sensors falls below 10°C, the CH pump and the module pump start up.
- When one of the sensors falls below 5°C, the burner is started.
- When all sensors measure a value above 15°C, the antifreeze protection request is deactivated.
- When the primary probe detects a temperature lower than parameter 155 (by default set to 15°C), the CH pumps and the general cascade pump are activated. When the temperature of the primary probe reaches the value defined by the parameter 155 plus 5 degrees, the request ceases and the cascade returns to stand-by mode.
- When the antifreeze protection is switched off, the pumps continue to operate for the post-circulation period.

If the external probe is present, an additional antifreeze protection is activated. If the external probe detects a temperature lower than that set in parameter 186 (default value=3 °C), then the pump of the first element and the pump of the CH circuit are started.

In case of indoor installation and if no antifreeze protection (linked to the external probe) is requested, it is sufficient to set the parameter 186 at the lowest possible value -30 °C).

3.7 Temporary or short-term shut-down

In the event of temporary or short-term shut-down (e.g. due to holidays), proceed as follows:

- Press the MENU key and select with keys ▲ / ▼ "Time schedule", confirm with key ●.
- Select with keys ▲ / ▼ "Holiday Schedule" and confirm with key ●.
- Select with keys ▲ / ▼ "Mode" and confirm with key ●. Select "System" mode and confirm.

Clock Program
Program Group
Burn hours till service
Reset Service Reminder
Holiday Settings

Holiday Settings	
Mode	System
Holiday Setpoint	Comfort
Begin Date	Saturday 01-08-2015
End Date	Saturday 01-08-2015

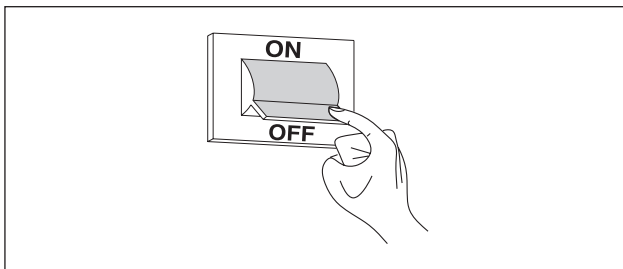
- Select with keys ▲ / ▼ "Holiday Setpoint" and confirm with key ●.
- Select "Antifreeze" holiday setpoint and confirm.

Holiday Settings	
Mode	System
Holiday Setpoint	Anti Fr
Begin Date	Saturday 01-08-2015
End Date	Saturday 01-08-2015

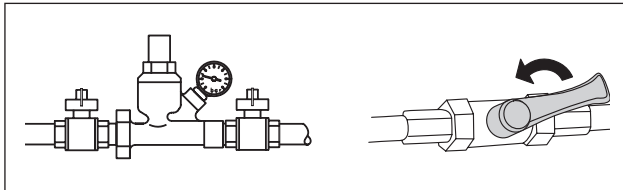
3.8 Preparing for extended periods of disuse

The following operations shall be necessary if the Modular system is not used for a long period of time:

- set the modules' main switch and the system's main switch to "off"



- Close the fuel and water valves for the heating and domestic hot water system.



- ⚠ Empty the thermal and sanitary system if there is a danger of frost.

3.9 Replacing the display and control boards

- ⚠ System configurations must be performed only by the Technical Assistance Centre or by personnel authorized by **Beretta**.

After the control panel has been replaced, the next time the device is restarted, the initial screen is shown.

The system performs a consistency check between the configuration data saved on the motherboard and those saved in the user interface; therefore, when replacing the control interface, the system can detect an inconsistency between the saved data. Set the Par. 97 and the Par. 98.

Proceed as follows:

- On the home screen of the control panel, press the ● key
- Select "Settings" with the ▲ / ▼ keys and press the ● key
- Select "Device configuration" with the ▲ / ▼ keys and press the ● key

Settings	
General Settings	
Boiler Settings	
Appliance Configuration	

- Enter the password as described in paragraph "Password access"
- Select the unit between "Master" and "Dep1 ... N"
- Select "(97) IO Configuration" and press the ● button
- With the ▲ / ▼ keys change the value following what is in the following table and press the ● key:

Version	Par. 97
Master, pump version	14
Master, valve version	15
Dependent, pump version	16
Dependent, valve version	17

- Press the ▼ key, select "(98) Appliance Settings" and press the ● key

Appliance Configuration Managing	
Appliance Model	1
(97) IO Configuration	1
(98) Appliance Settings	2
Configuration Confirmed	Yes

- With the ▲ / ▼ keys change the value following what is in the following table and press the ● key:

Model	Gas	Par. 98
POWER MAX BOX 130-2 P	methane	11
	LPG	12
POWER MAX BOX 160-2 P	methane	9
	LPG	10
POWER MAX BOX 200-2 P	methane	7
	LPG	8
POWER MAX BOX 260-2 P	methane	3
	LPG	4
POWER MAX BOX 300-2 P	methane	1
	LPG	2
POWER MAX BOX 330-3 P	methane	5
	LPG	6
POWER MAX BOX 390-3 P	methane	3
	LPG	4
POWER MAX BOX 450-3 P	methane	1
	LPG	2
POWER MAX BOX 520-4 P	methane	3
	LPG	4
POWER MAX BOX 600-4 P	methane	1
	LPG	2

- Press the ▼ key, select "Config. Confirmed" and press the ● key
- With the ▲ / ▼ keys change the value to "Yes" and press the ● key


Appliance Configuration	
(97) IO Configuration	1
(98) Appliance Settings	4
Configuration Confirmed	Yes

At this point the systems starts an application update process. Once this is finished, the menu "Settings" appears on the menu.

- Press ◀ until you return to the home screen

An error message is displayed for a few seconds and then the display returns to its normal state.

3.10 Replacing the Dependent board

 System configurations must be performed only by the Technical Assistance Centre or by personnel authorized by **Beretta**.

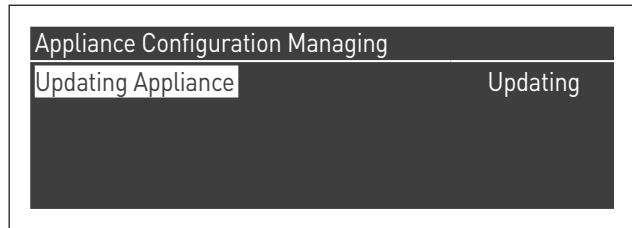
When replacing the front control panel, an initial screen with the logo is displayed on the next reboot **Beretta**.

Before configuring:

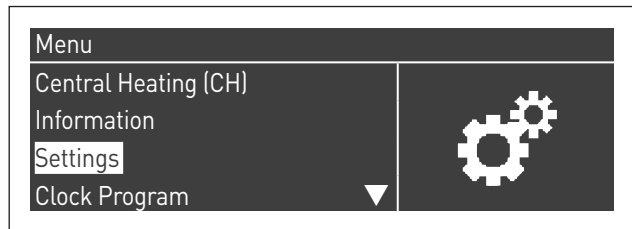
- Disconnect the power supply to all modules
- Remove the failed board and replace it with the new one with the selected dipswitch
- Disconnect the display from the Managing board and connect it to the Dependent board
- Power the replaced board

The display updates the board automatically with the Managing configuration.

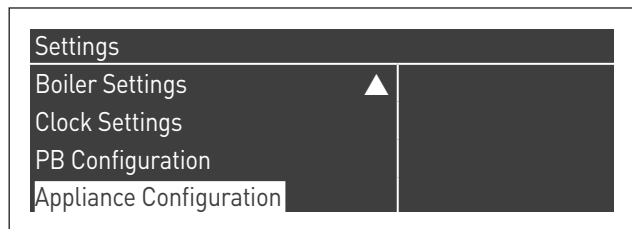
After the configuration is complete, the board must be re-configured into a Dependent board:



- Press the Menu key on the display
- Select "Settings" with the ▲ / ▼ keys and press the ● key



- Select "Appliance Configuration" using keys ▲ / ▼ and press ●



- Enter the password as described in paragraph "Password access". The configuration menu appears on the display

Appliance Configuration Managing	
Appliance Model	3
(97) IO Configuration	12
(98) Appliance Settings	17
Configuration Confirmed	No

- Select "(97) IO Configuration" and press the ● button
- Use keys ▲ / ▼ to change the value from 12 to 13 and press ● to confirm


Appliance Configuration Managing	
Appliance Model	3
(97) IO Configuration	13
(98) Appliance Settings	17
Configuration Confirmed	Yes

Act on the parameters by configuring them in accordance with the Dependent Table shown at the end of this paragraph.


At this point, the system starts updating the application.

Appliance Configuration Managing	
Updating Appliance	Updating

- After the configuration is complete, select "Boiler Settings" using keys ▲ / ▼ and press ●

Settings	
General Settings	
Boiler Settings	
Clock Settings	
PB Configuration	

- Select "Module Cascade Settings" using keys ▲ / ▼ and press ●

Boiler Settings	
Boiler Parameters	
Module Cascade Settings	
Boiler Cascade Settings	
Boiler error settings	

- Select "Dipswitch Config" using keys ▲ / ▼ and press ●
- Use keys ▲ / ▼ to set in "Disabled" and press ● to confirm

Module Cascade Settings	
(189) Burner Address	Managing
(194) Dipswitch Config.	Disabled
Boiler demand disabled	No
(72) Permit EmergencyMode	Yes

- After making the modifications, press ESC to return to the HOME page

12:11	
Dependent	
Calculated Setpoint	20.0°C

- Disconnect the power supply to the Dependent board; disconnect the Display from the Dependent board and connect it to the Managing board. Power the Managing board and, after the initialisation phase when the logo is displayed BERETTA, the Display automatically switches to the "Master Device Configuration" page; use keys ▲ / ▼ to configure the parameters (according to the Dependent Table) and press ● to confirm

Appliance Configuration Managing	
Appliance Model	0
(97) IO Configuration	0
(98) Appliance Settings	0
Configuration Confirmed	No

Appliance Configuration Managing	
Appliance Model	3
(97) IO Configuration	13
(98) Appliance Settings	17
Configuration Confirmed	Yes


After the configuration is complete, the Display shows a configuration error for a short time. Disconnect the power supply to the Managing board and power all modules simultaneously.

Dependent Table

Model	Par. 97	Par. 98
POWER MAX BOX 130-2 P	Managing: 14	11
	Dependent: 16	
POWER MAX BOX 160-2 P	Managing: 14	9
	Dependent: 16	
POWER MAX BOX 200-2 P	Managing: 14	7
	Dependent: 16	
POWER MAX BOX 260-2 P	Managing: 14	3
	Dependent: 16	
POWER MAX BOX 300-2 P	Managing: 14	1
	Dependent: 16	
POWER MAX BOX 330-3 P	Managing: 14	5
	Dependent: 16	
POWER MAX BOX 390-3 P	Managing: 14	3
	Dependent: 16	
POWER MAX BOX 450-3 P	Managing: 14	1
	Dependent: 16	
POWER MAX BOX 520-4 P	Managing: 14	3
	Dependent: 16	
POWER MAX BOX 600-4 P	Managing: 14	1
	Dependent: 16	

3.11 Maintenance


It is mandatory to perform maintenance and cleaning of the device at least once a year.


 The non-performance of the annual maintenance will invalidate the warranty.

This operation, carried out by Technical Assistance Centre or by professionally qualified personnel, is necessary to monitor and ensure that the flue pipes inside and outside of the device, the fan, the safety valves, the condensate removal devices, the water drainage tubes and all the measurement and control devices are in perfect working order.

Table of the compulsory maintenance activities (to be performed every 2000 working hours or at least once a year)

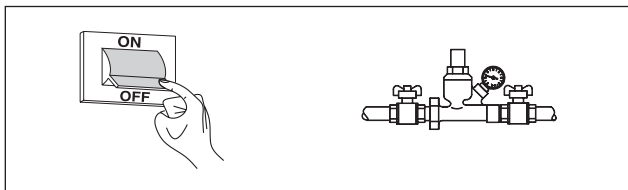
Make the combustion test
Check the conditions of the inlet pipes (if present) and the flue pipes by making sure that no leakage is present
Check the ignition electrode
Clean the combustion chamber and check the conditions of the gaskets you have dismantled during such operation
Clean the condensate discharge pipe
Check the parameters settings
Check if there is any gas leakage
Check if there is any leakage on the hydraulic connections
Check the integrity of the cabling system and its related connections
Make sure the ignition takes place regularly
Make sure that there is the flame after ignition
Check the safety devices down the equipment
Check the system pressure

 Before carrying out any maintenance or cleaning, disconnect the power from the device by turning off the bipolar main switch and closing the main gas valve. In addition, for all maintenance (to be carried out at least once a year, as noted above) always replace all the flue and gas seals, in particular the burner seals.

 After performing maintenance work, check the tightening torques of the nuts/screws/gas connectors on the burner and gas valve; for the torque values, please see the "Torque value" section.

Before performing any operation:

- disconnect the electric power supply by turning the main system switch to "off"
- close the gas shut-off valve.

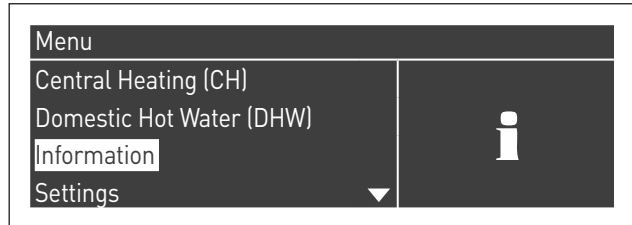


3.11.1 "Service reminder" function

The thermal module is fitted with a function that reminds the user of the need to carry out planned maintenance on the appliance after a number of hours defined in the maintenance plan.

When this maintenance activity is required, the following text appears on the normal display: **"Maintenance required!"** This text will remain active until the technical support service resets the internal meter after maintaining the appliance.

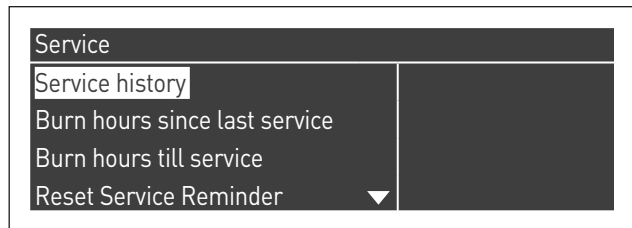
The user can check at any time how many hours miss from the next planned maintenance activity by accessing the "Information" menu



and selecting "Maintenance" using the ▲ / ▼ arrows



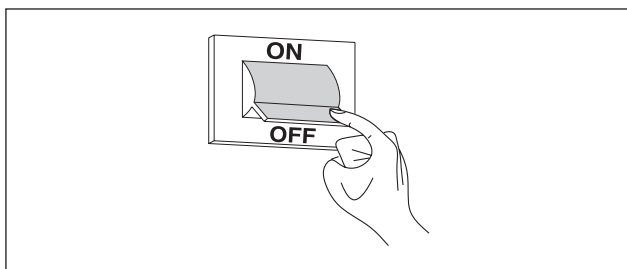
The menu also shows the hours from the last maintenance activity performed and access to a log that lists the dates of the last 15 maintenance activities.



The "Settings" → "Boiler set." → "Maintenance" menu contains the advanced controls for this function, which, in any case, are only available if you access it with the manufacturer password. If it is necessary to use this access level, contact the Technical Assistance Centre.


3.12 Cleaning and removing internal components

Before any cleaning operation, disconnect the electric power supply by switching the main system switch to "off".



OUTSIDE

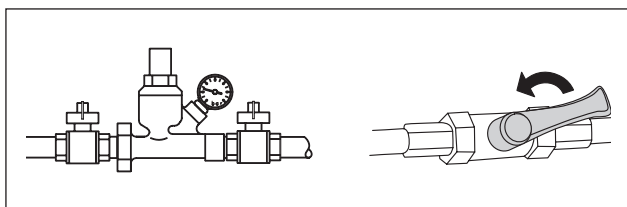
Clean the casing, the control panel, the painted parts and plastic parts with cloths moistened with soap and water. In the case of stubborn stains, moisten the cloth with a 50% water and alcohol mixture or specific products.

 Do not use fuels, sponges impregnated with abrasive solutions or powder detergents.

INSIDE

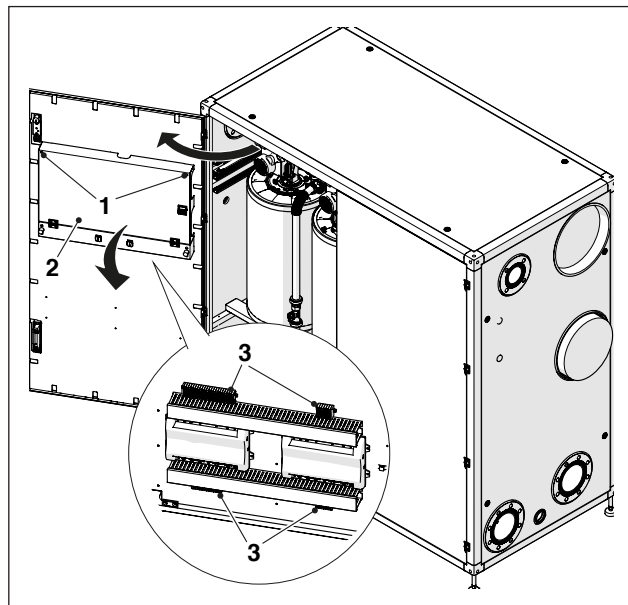
Before starting internal cleaning operations:

- close the gas shut-off valves
- close the system taps.



Access to the control panel and the internal modular system parts

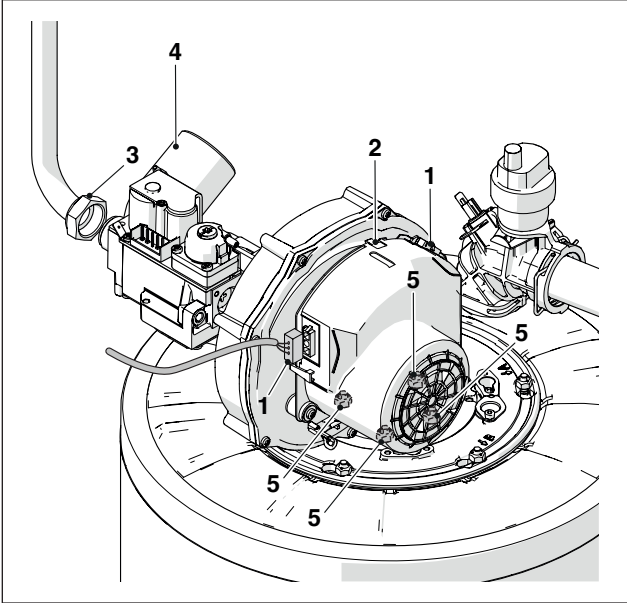
- open the module door (or the left door if two doors are present).
- Unscrew the two screws (1) placed on the panel.
- Fold the panel forward (2) making it rest on the two rubber pads. At this point you have full access to the terminal blocks (3).



Once the maintenance operations are complete, refit the components working in the opposite direction of what was described.

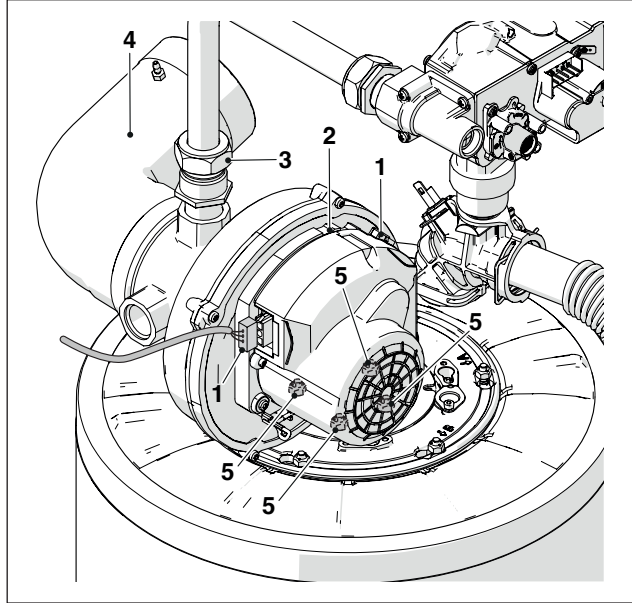
Disassemble of the fan and burner models Power Max BOX 130-2 P ÷ 160-2 P

- Open the module's doors (or the door in case there is only one door).
- Disconnect the wirings (1) of the fan (2).
- Unscrew the turntable (3) and disconnect the gas pipe.
- Remove the air conveyor (4).
- Unscrew the four nuts (5) that fix the fan (2) to the flange.



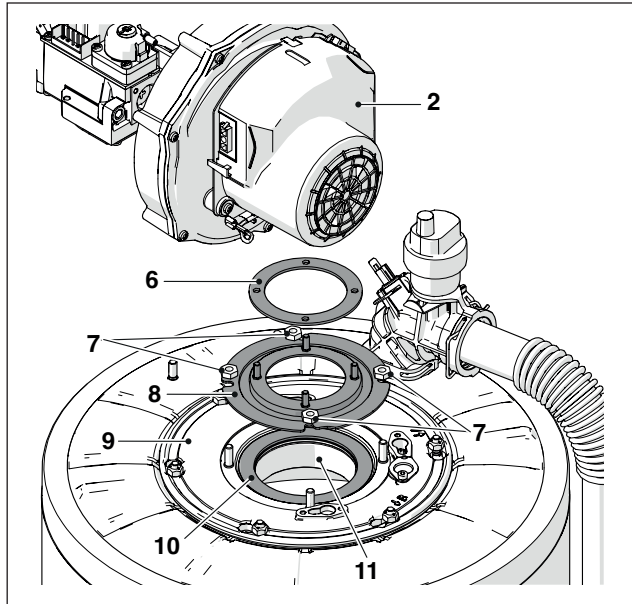
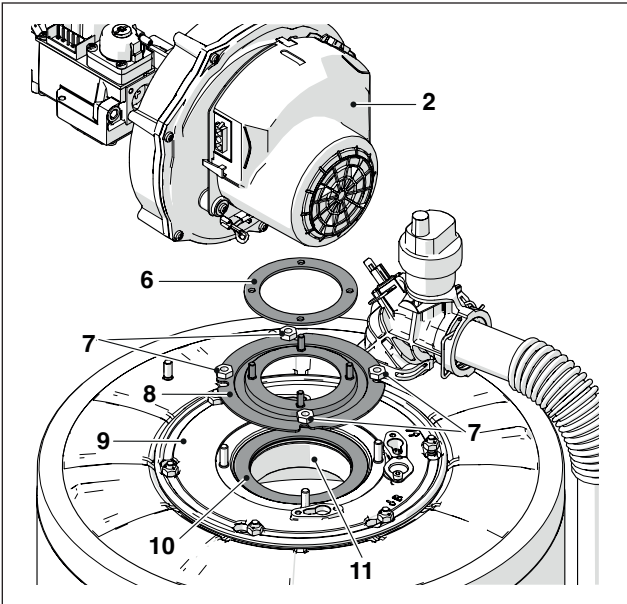
Disassemble of the fan and burner models Power Max BOX 200-2 P ÷ 600-4 P

- Open the module's doors (or the door in case there is only one door).
- Disconnect the wirings (1) of the fan (2).
- Unscrew the turntable (3) and disconnect the gas pipe.
- Remove the air conveyor (4).
- Unscrew the four nuts (5) that fix the fan (2) to the flange.




- Take the fan (2) and the gasket (6) out.
- Unscrew the four screws (7) fixing the flange (8) to the flange below (9).
- Remove the seal (10) and extract the burner (11).


- Take the fan (2) and the gasket (6) out.
- Unscrew the four screws (7) fixing the flange (8) to the flange below (9).
- Remove the seal (10) and extract the burner (11).



Once the maintenance operations are complete, refit the components working in the opposite direction of what was described; for information on the tightening torques, please see the "Torque value" section.

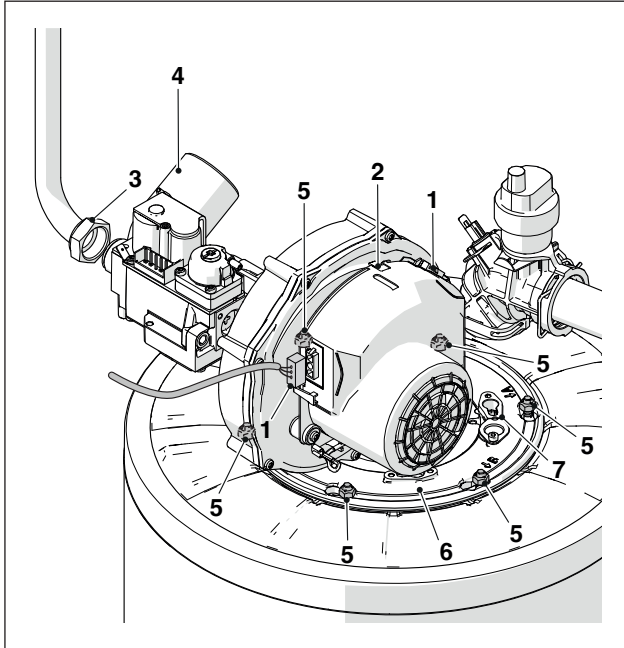
Once the maintenance operations are complete, refit the components working in the opposite direction of what was described; for information on the tightening torques, please see the "Torque value" section.

 Check that the gas connection is leak proof.

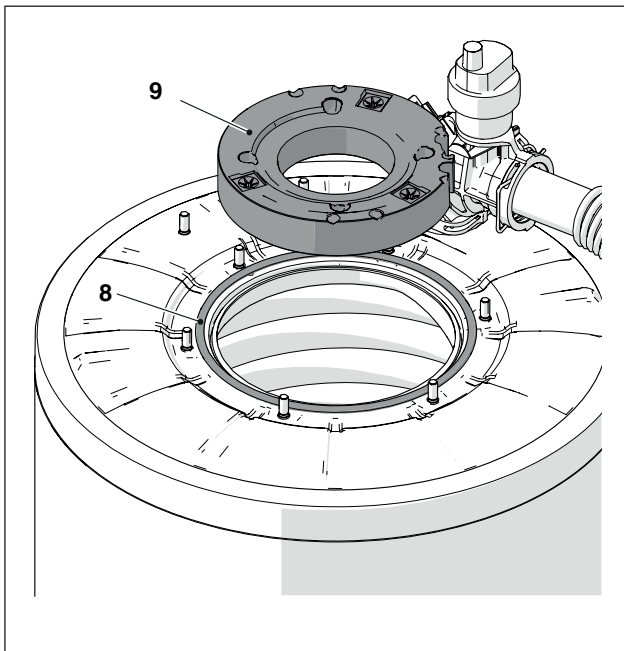
 Check that the gas connection is leak proof.

Disassembly of the flange for cleaning the exchanger models Power Max BOX 130-2 P ÷ 160-2 P

- Open the module's doors (or the door in case there is only one door).
- Disconnect the wirings (1) of the fan (2).
- Unscrew the turntable (3) and disconnect the gas pipe.
- Remove the air conveyor (4).
- Unscrew the six screws (5) that secure the burner unit (6) to the heat exchanger with a socket wrench.
- Remove the fan and the entire burner body (6).
- Remove the electrode plate (7), check the electrode's condition and replace it if necessary.



- Remove the gasket (8) and the protective padding (9).

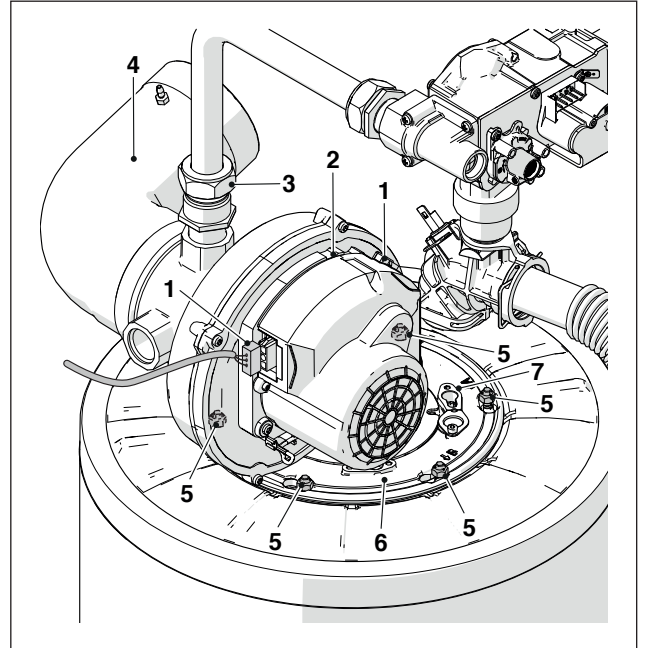


Once the maintenance operations are complete, refit the components working in the opposite direction of what was described; for information on the tightening torques, please see the "Torque value" section.

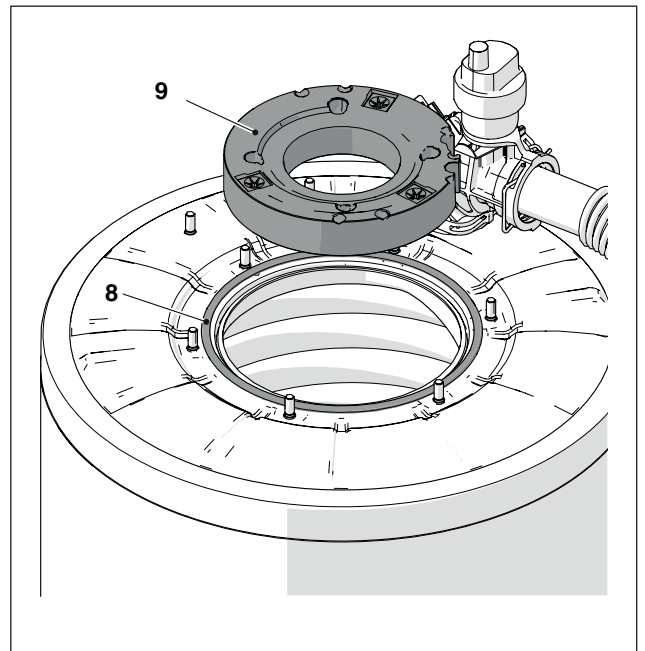
⚠ Check that the gas connection is leak proof.

Disassembly of the flange for cleaning the exchanger models Power Max BOX 200-2 P ÷ 600-4 P

- Open the module's doors (or the door in case there is only one door).
- Disconnect the wirings (1) of the fan (2).
- Unscrew the turntable (3) and disconnect the gas pipe.
- Remove the air conveyor (4).
- Unscrew the six screws (5) that secure the burner unit (6) to the heat exchanger with a socket wrench.
- Remove the fan and the entire burner body (6).
- Remove the electrode plate (7), check the electrode's condition and replace it if necessary.



- Remove the gasket (8) and the protective padding (9).

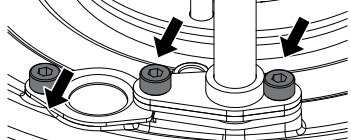
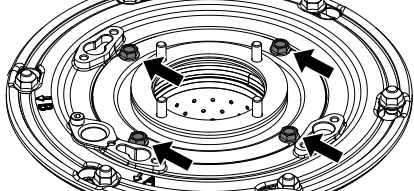
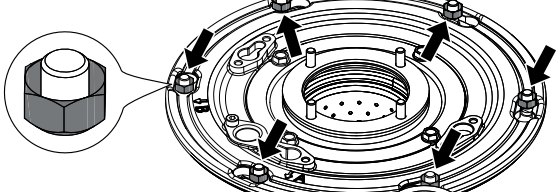
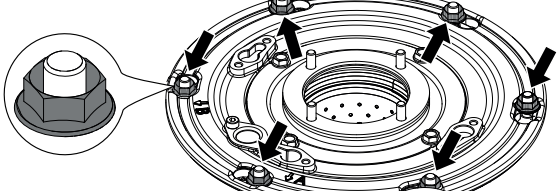
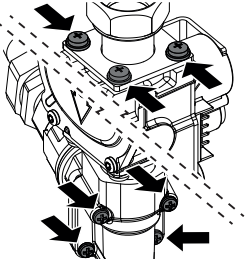
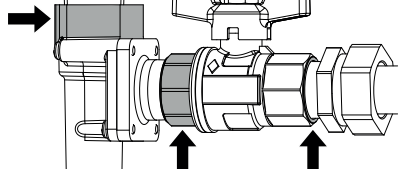
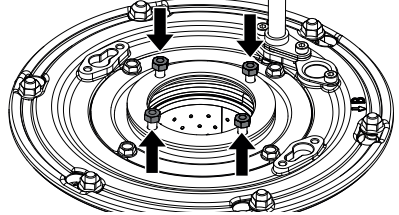
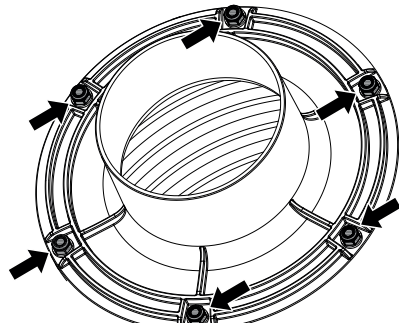


Once the maintenance operations are complete, refit the components working in the opposite direction of what was described; for information on the tightening torques, please see the "Torque value" section.

⚠ Check that the gas connection is leak proof.

3.13 Torque value

The tightening torques and torque values expressed in Nm are shown below.

Torque value	Nm	Figure
Ignition electrode and inspection glass	2,5	
Fan flange	5	
Burner flange (nut)	5	
Burner flange (flanged nut)	6	
Gas valve flange screw and shutter screws	3	
Threaded gas connections	Connections are secured with sealant and tightened to obtain the appropriate geometry using a standard wrench.	
Fan flange - fan installation	5	
Flue flange nut	5	

3.14 Troubleshooting

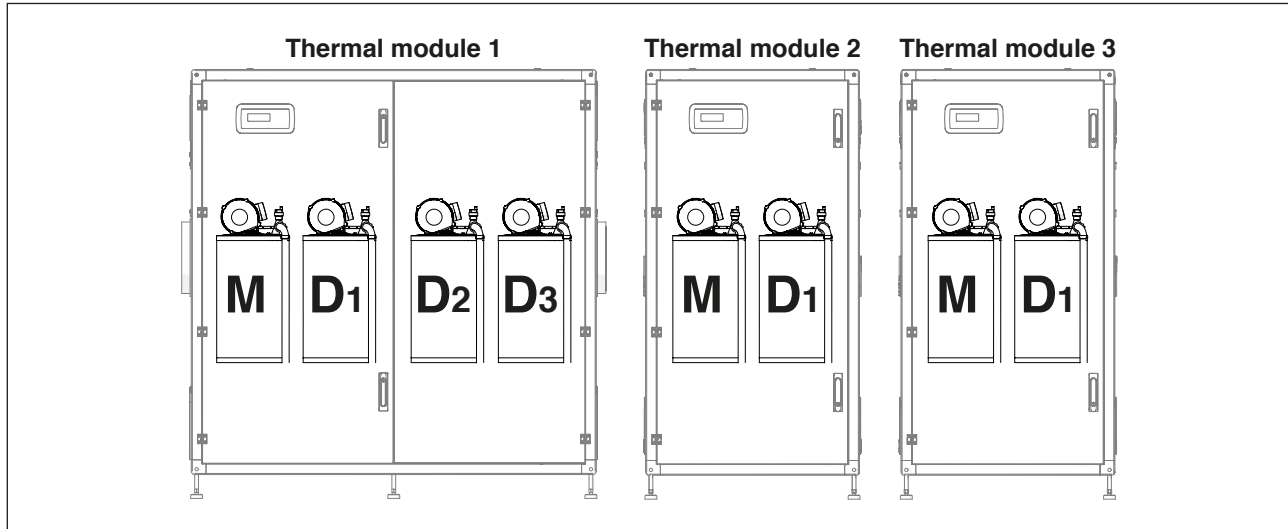
FAULT	CAUSE	SOLUTION
There is a smell of gas	Gas supply circuit	- Check the seal of the gaskets and the closure of the pressure tapping points
Odour of unburnt gas	Flue gas circuit	- Check the gasket seals - Make sure there are no obstructions - Check the combustion quality
Irregular combustion	Burner gas pressure	- Check the setting
	Diaphragm installed	- Check the diameter
	Clean the burner and exchanger	- Check the conditions
	Exchanger passages obstructed	- Check passage cleaning
	Faulty fan	- Check operation
Ignition delays with pulsations to the burner	Burner gas pressure	- Check the setting
	Ignition electrode	- Check the positioning and conditions
The modular system becomes dirty very quickly	Combustion	- Check the combustion controls
The burner does not start upon consent of the modular system control	Gas valve	- Check for the presence of 230Vac voltage on the gas valve terminals, check wiring and connections
The modular system does not start	No electric power supply (no message on the display)	- Check the electric connections - Check the condition of the fuse
The modular system does not arrive at temperature	Boiler dirty	- Clean the combustion chamber
	Burner capacity insufficient	- Check and adjust the burner
	Modular system adjustment	- Check correct functioning - Check the temperature setting
The generator triggers a thermal safety block	No water	- Check correct functioning - Check the temperature setting - Check the electrical wiring - Check the position of the sensor bulbs
	Modular system adjustment	- Check the bleed valve - Check the heating circuit pressure
The generator is at temperature but the heating system is cold	Presence of air in the system	- Bleed the system
	Pump malfunctioning	- Check/unseize the pump - Replace the circulator - Check the electrical connection of the circulator
The circulator does not start	Pump malfunctioning	- Check/unseize the pump - Replace the circulator - Check the electrical connection of the circulator
Frequent tripping of the system safety valve	System safety valve	- Check calibration or efficiency
	Incorrect circuit pressure	- Check the circuit pressure - Check pressure reducer functioning
	CH expansion vessel	- Check the efficiency of the expansion vessel

4 CASCADE CONNECTION

The models **Power Max BOX 300-2 P**, **450-3 P** and **600-4 P** can be connected together to build a modular and modulating cascading system with a maximum of 10 heating elements, with maximum installed power of 1310 kW. There are two ways of connecting up a cascading system, illustrated in the following chapters.

4.1 Connection in a direct cascade

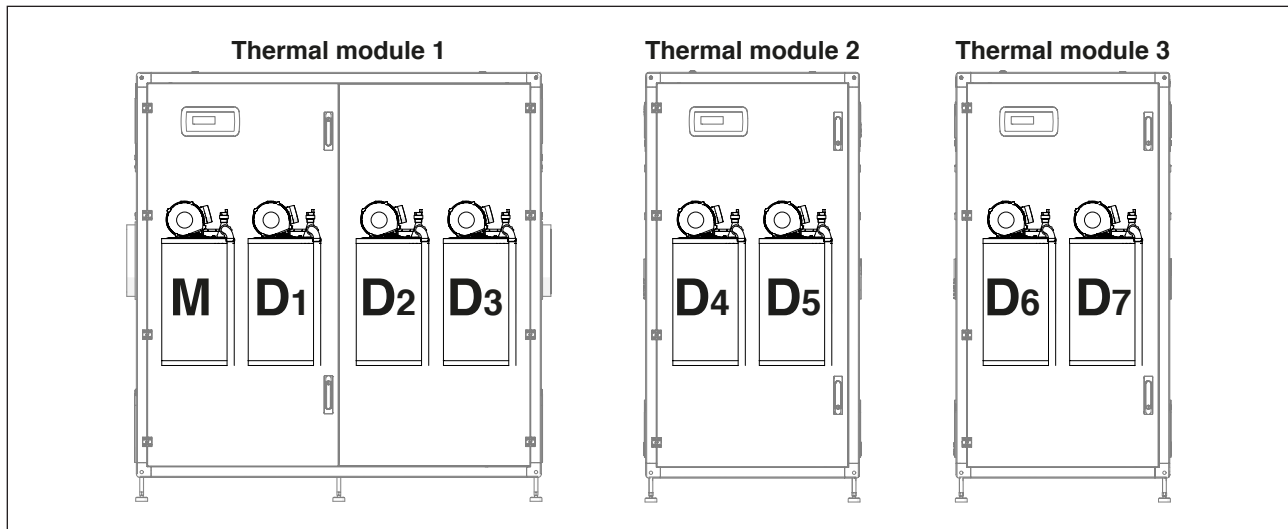
This configuration is feasible for up to 8 modules. This means that the whole cascade can be managed from the interface on one of the two thermal modules (chosen as the managing unit for the system).



The thermal modules are standard set with a MANAGING element (M) and a DEPENDENT (D) element. To be able to connect the modules in cascade it is necessary to carry out the operations described in the following paragraph.

Before proceeding to connect the cascade bus, the following preliminary operations must be carried out:

- 1 Configure the I/Os of the MANAGING element as DEPENDENT (see table below);
- 2 Reconfigure the MANAGING element address of thermal modules 2 and 3 in D4 and D6 respectively;
- 3 Reconfigure the DEPENDENT element address of thermal modules 2 and 3 in D5 and D7 respectively.



4.1.1 IO Configuration

⚠ Perform this operation only on the cascade-connected thermal modules such as "DEPENDENT". This operation is intended to modify the I/O management on the "MANAGING" tab of each of the thermal modules connected as "DEPENDENT".

Modify the par. 97 in this way:

- give power to the only thermal module on which the I/O assignment needs to be carried out;
- go to "Settings", "Device Configuration", "MANAGING" and assign the correct value to parameter 97 as shown in the table below;
- remove the power supply to the module;
- repeat this operation for all the "DEPENDENT" thermal modules of the cascade.

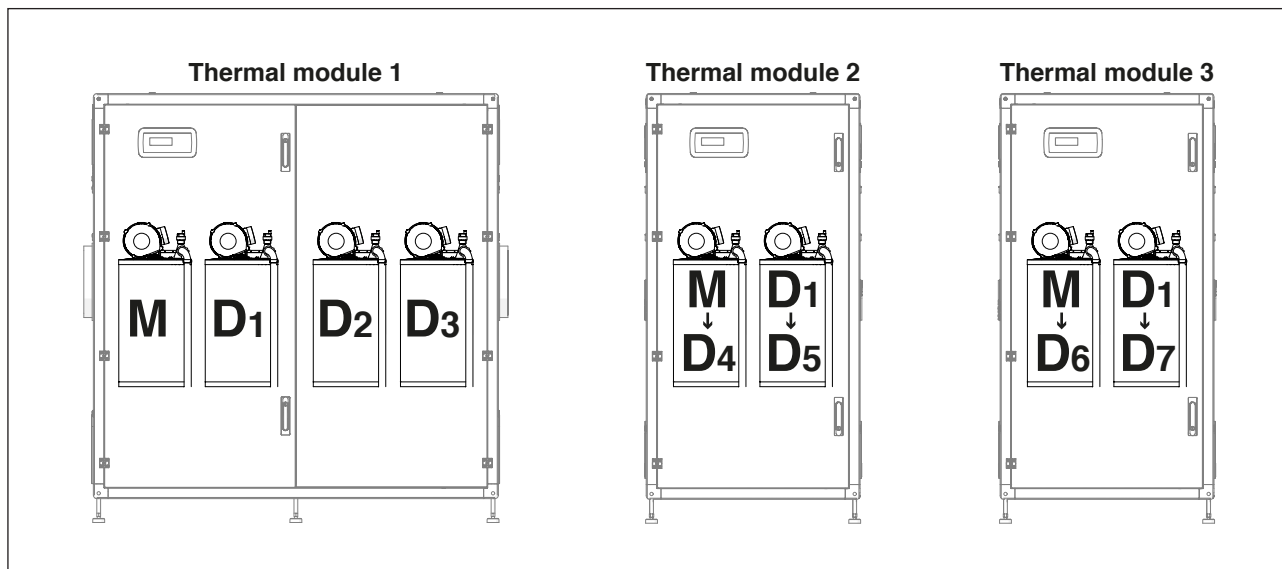
4.1.2 Setting the Address parameter

The addresses of all the thermal modules in the system must be set, and each must be set with an unequivocal sequence. To access the dip-switches, open the hatch using a flat-bladed screwdriver.

! The addresses must be configured in sequence. The thermal module 1 will always be correct because the configuration has not been changed. From the thermal module 2 onwards, we recommend maintaining the elements in sequence after changing the configuration (from MANAGING to DEPENDENT).

- only power the thermal module that needs to be modified;
- go to "Settings", "Boiler sett.", "Cascade Module Conf." and assign the desired value to parameter 189;

Note! Make sure that parameter 194 (Dipswitch Config) is disabled.



4.1.3 Bus connection

The bus connections are made on the MANAGING "MO1" low voltage terminal blocks of the connected thermal modules in cascade.

Locate the thermal module that will be deputed to be MANAGING of the system.

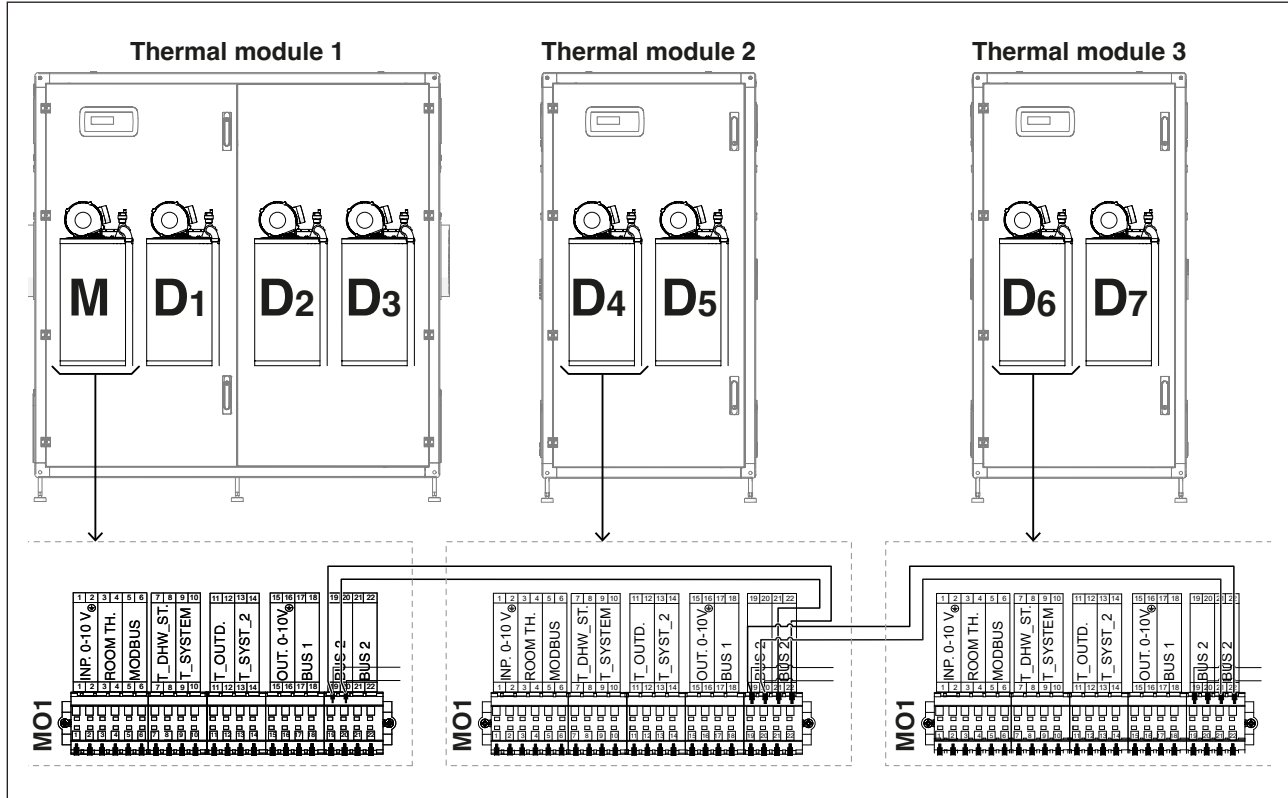
Connect a bipolar cable to the contacts 17 and 18 (BUS 1) of the "MO1" of the thermal element M (the bipolar cable already present in the contacts 17 and 18 must not be removed).

Connect the outgoing bipolar cable from the "MO1" (thermal element M) of the "MANAGING" thermal module into the contacts 21 and 22 (Bus 2) present on the "MO1" of the thermal element D4.

Move the cable in the contacts 17 and 18 (Bus 1) on contacts 19 and 20 (Bus 2).


If you need to connect an additional thermal module, you have to start from contacts 19 and 20 of the "MO1" (element D4) of the first DEPENDENT module, a bipolar cable which will be connected to the terminals 21 and 22 of the "MO1" of the thermal element D8.

Example: cascade connection diagram of three thermal modules:



4.1.4 Setting the main parameters

Some parameters are essential in order for the system to operate in cascade and setting these parameters is a determining factor for correct system operation.

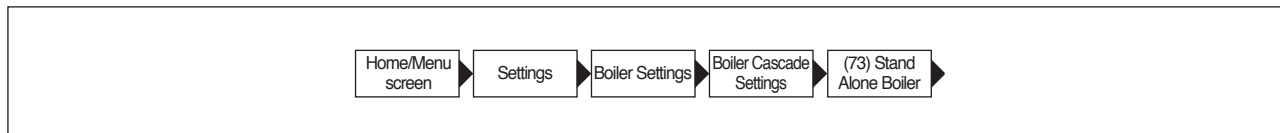
 The parameters below must be set only on the Managing thermal module.

Par. 73 – Managing, Stand-alone mode

Parameter 73 defines how the thermal module is addressed and serves to ensure that the signal from the secondary sensor is recognised.

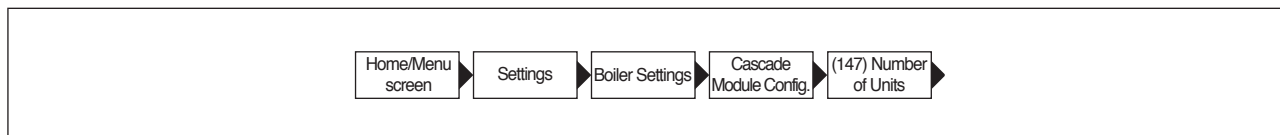
You can set two values:

- **Managing:** to be set on the Managing module so that secondary sensor operation is activated.
NOTE: The secondary SC probe must be connected to the 13 terminals and 14 of the MO1 terminal block of the managing module;
- **Stand Alone:** to be set on the Managing module so that secondary sensor operation is deactivated;



Par.147 – No. thermal modules

Parameter 147 defines the number of thermal modules in the system (it is important to set the number of connected modules for the system to work properly). This parameter must only be set on the "Managing" module.



4.2 Connection in a cascade of cascades

This connection must be done only to connect more than 10 modules in cascade.

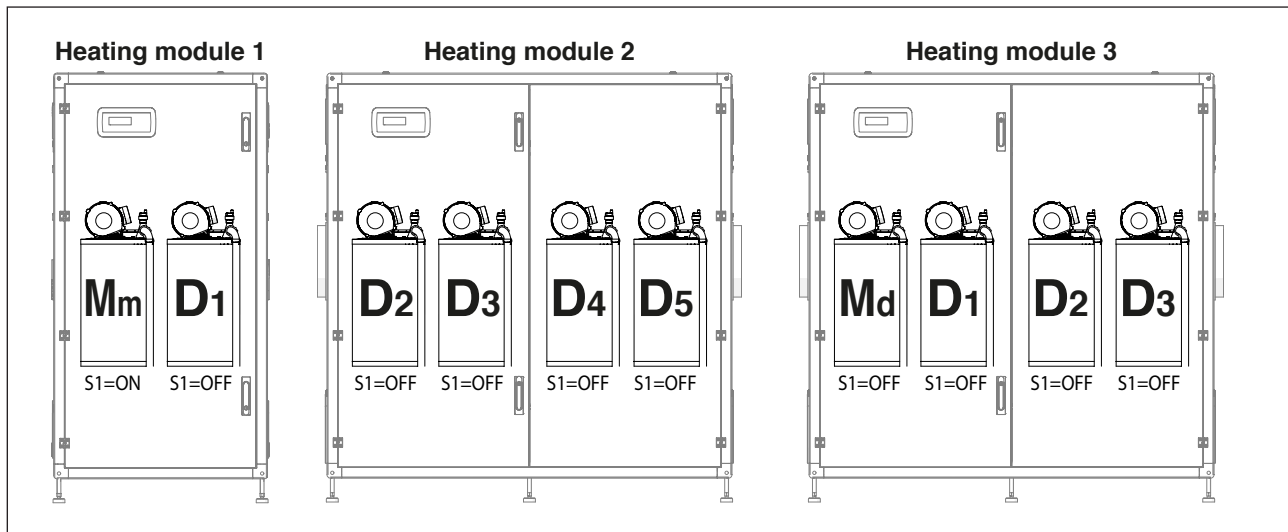
This connection joins two cascades created in "direct cascade" mode (please see the paragraph "Connection in a direct cascade") so that the managing unit in one of the two direct cascades commands the managing unit in the second direct cascade.

The overall operation of the cascade of cascades is identical to the direct cascade. The only different is that each of the two managing units can control the units connected in its own direct cascade.

Once the connections have been made for the two direct cascades (please see the paragraph "Connection in a direct cascade"), decide which of the two managing units will be the managing unit for the cascade of the cascades. In the example below, there is a direct cascade of six units and a direct cascade of four units (the direct cascade of four units is made up of a thermal module which is itself made up of four units, but two thermal modules made up of two units could also be joined). Here, the managing unit for the direct cascade composed of six units has been chosen as the managing unit for the cascade of cascades.

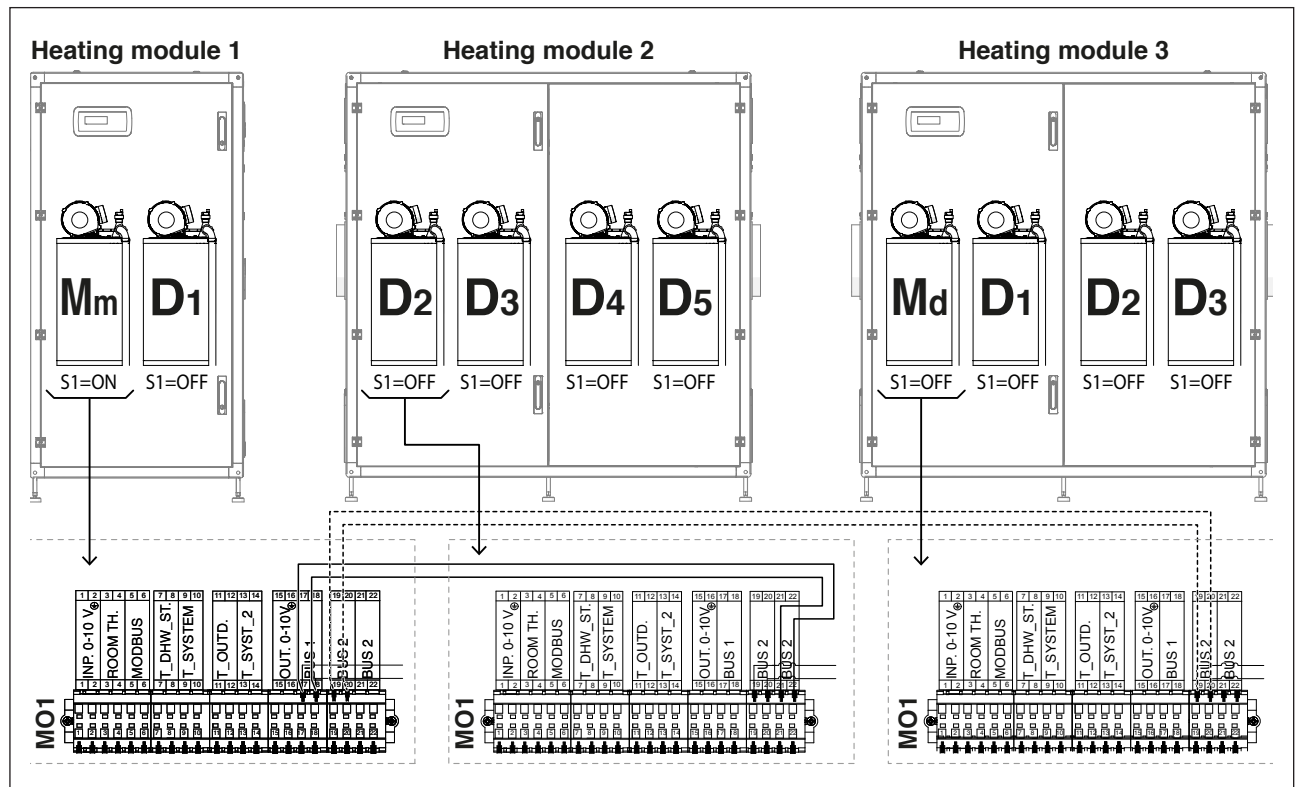
The configuration of addresses is as follows:

⚠ NOTE: Switch S1 must be set to OFF (factory setting) on all of the boards, except the Mm (the managing unit of the cascade of cascades), which must be set to ON.



4.2.1 Bus connection

The bus connections are made on the MANAGING "M01" low voltage terminal blocks of the connected thermal modules in cascade.



N.B. The cable marked with a dotted line is the one joining BUS 2 on the first managing unit (Mm) with BUS 2 on the second managing unit (Md) (connect terminal 19 to 19 and 20 to 20). Connect the system sensor (T_syst_2) to terminals 13 and 14 on the Mm.

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4.2.2 Setting the main parameters

Some parameters are essential in order for the system to operate in cascade and setting these parameters is a determining factor for correct system operation.

Par.73

Parameter 73 must be set as follows:

- On the Mm module, set: **Managing**
- **On the Md module, set: DEP 1**

Connect the Cascade Probe (T_System_2) to terminal 13-14 of the Mm module.

Typical parameters for a cascade of cascades

The parameters below are specific to controlling a cascade of a cascades. All of these parameters must be set on the Mm.

The parameter 167 is used for defining the number of direct cascades connected together to form a cascade of cascades.

This parameter must be set on the Mm. In the example shown, the following must be set:

- Parameter 167 = 2

The parameters 158, 159, 160 and 161 must be set using the formula below:

- Par. 158 = Par. 75*(N+1)
- Par. 159 = Par. 76*(N+1)
- Par. 160 = Par. 142*(N+1)
- Par. 161 = Par. 143*(N+1)

Where N is the number of modules in the cascade connected to the Mm.

4.3 Operation with the primary sensor

The system sensor present on the primary system (see block diagram 1) allows the setpoint sent to the individual modules to be modulated on the basis of the difference between the setpoint and the value read on the delivery manifold of the primary system.

The following parameters regulate this modulation:

- 79** defines the maximum setpoint decrease
- 80** defines the maximum setpoint increase
- 81** defines the time (from the start of the request) from which the setpoint modulation is started
- 86** proportional parameter for setpoint modulation
- 87** integrative parameter for setpoint modulation

4.4 Operation with the secondary sensor

When the secondary system is present (see diagram 2), the setpoint sent to the individual modules to be modulated on the basis of the difference between the setpoint and the value read on the delivery manifold of the secondary system.

In the same way that modulation is based on the system sensor, the following parameters intervene:

- 169** defines the maximum setpoint decrease
- 170** defines the maximum setpoint increase
- 171** defines the time (from the start of the request) from which the setpoint modulation is started
- 176** defines the proportional term for setpoint modulation
- 177** defines the integrative term for setpoint modulation

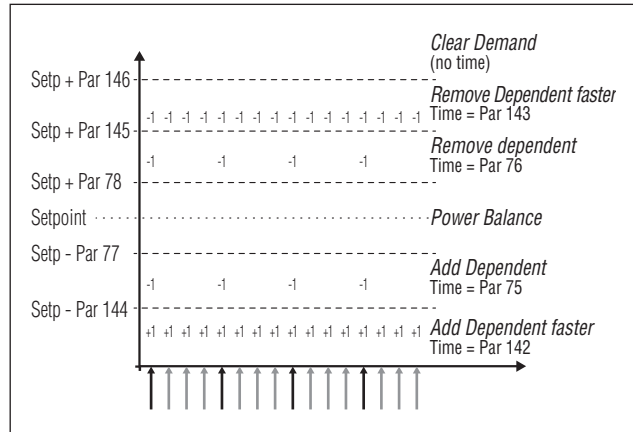
4.5 Parameter 148: operating mode of the cascade

It is possible to adopt cascade management which can be modified according to different strategies. These different strategies can be set using the parameter known as "Cascade mode" Par. 148.

4.5.1 Par 148 = 0

The start-up/shutdown law of each module is based on the following graph.

The shut-off values of the lines with the y axis are the sum or the difference of the values of the corresponding parameter in relation to the value of the setpoint sent by the Manging module to the modules.

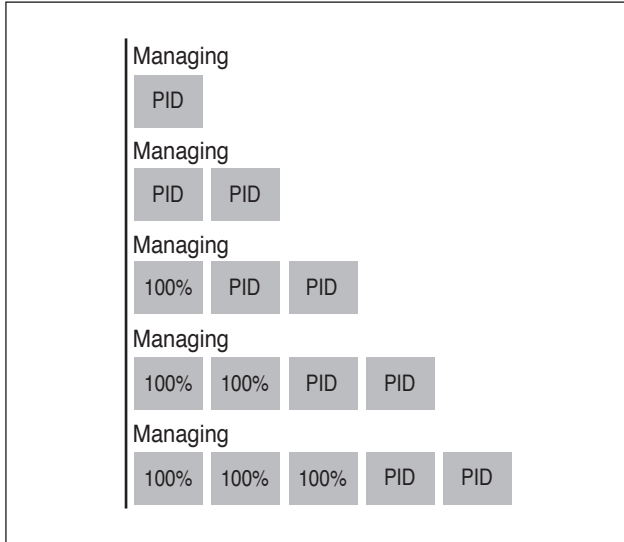


4.5.2 Par 148 = 1

In this mode the system manages the cascade so that the minimum number of modules is on.

The first difference in relation to mode 0 refers to the logic with which the modulation of Dependent modules within the cascade is managed.

While each module modulates with its own PID in mode 0, no more than two dependent modules modulate with the same criteria in mode 1, while the remaining modules operate at maximum power. The diagram is represented in the following figure:



Practically speaking, if more than two modules are on, only two modules are controlled via PID, while the others receive a signal to move to maximum power.

The second difference refers to the start-up/shutdown rules of the individual modules.

In any case, the start-up and shutdown rules are managed according to the indications shown in the previous graph. The difference is that it is also possible to have start-ups/shutdowns of the Dependent modules in the "balancing" zone.

This additional start-up criteria (valid in the balancing band only) ensures that a module is started-up when any one of the two modules controlled by a PID adjustment has reached a threshold power (Par 82) once a specific wait time defined by Par 75 has elapsed.

Similarly (still within the balancing band), a module is shut-down if both modules controlled by a PID adjustment have reached a percentage of power which is below the minimum power threshold (Par 83) once a specific wait time defined by Par 75 has elapsed.

4.5.3 Par 148 = 2


In this mode the system manages the cascade so that the maximum number of modules is on.

This mode is similar to mode 0 apart from the start-up and shutdown rules.

In this case the rules based on the information illustrated by the previous graph are still valid, with the following differences (in any case, always applicable to the "balancing" band only):

To add an additional dependent module, the managing module evaluates whether the sum of the power (calculated on the basis of the fan speed) of all the active modules is greater than the product between the number of the active dependent modules increased by one and the minimum power value (Par 152) increased by a hysteresis value (defined by Par 153). $[\sum P1,P2,\dots Pn] > (n+1) * (Par 152) + (Par 153)$.

To shutdown a dependent access, the managing module evaluates whether the sum of the power (calculated on the basis of the fan speed) of all the active modules is less than the product between the number of the active dependent modules and the minimum power value (Par 152). $[\sum P1,P2,\dots Pn] < (n) * (Par 152)$.

 We must consider that the percentage of power varies from a minimum of 1% and a maximum of 100% and therefore, the parameter values 152 and 153 are not to be taken as the percentage of absolute power.

4.6 Parameters specific to cascade systems

Parameters are listed base on the reference menu.

Reference Menu

M1	Parameters Menu
M2	Cascaded module configuration menu
M3	Cascaded boiler configuration menu
M4	Appliance configuration menu

Access type

U	End user
I	Installer
O	Manufacturer

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M2	189	Burner Address	It is used to address the module.	Stand-alone (0) Managing (1) Dependent (2...16)	Managing (1)		I	DHW
M2	194	Dip-switch Config.	Enable or disable the dipswitch function.	Enabled/Disabled	Disabled		I	Cascade
M2		Boiler demand disabled	All requests for this boiler are disabled.	Yes/No	No		I	Cascade
M2	72	Permit Emergency Mode	Activates the emergency mode. This mode comes on when communication between Managing and the primary circuit's probe is lost. In this event, if Par. 72 is set to "Yes", the cascade is initiated, working to the fixed set-point determined by Par. 74.	Yes/No	Yes		U	Cascade
M2	74	Emergency Set-point	Set-point active in emergency mode.	20...90	70	°C	I	Cascade
M2	75	Delay Per Start Next Mod.	Defines the stand-by time in seconds to restart the subsequent cascade module in normal start mode.	5...255	120	Sec.	I	Cascade
M2	76	Delay Per Stop Next Mod.	Defines the stand-by time in seconds to switch off the last cascade module on in normal Off mode.	5...255	30	Sec.	I	Cascade
M2	142	Delay Quick Start Next	Defines the stand-by time in seconds to restart the next cascade module in quick start mode.	5...255	60	Sec.	I	Cascade
M2	143	Delay Quick Stop Next	Defines the stand-by time in seconds to switch off the last cascade module on in Quick Stop mode.	5...255	15	Sec.	I	Cascade
M2	77	Hyst. Down Start Module	Defines by how many degrees the temperature measured by the primary circuit's probe must fall below the set-point in order for the subsequent module to be started after the time interval set by Par. 75.	0...40	5	°C	I	Cascade
M2	78	Hyst. Up Stop Module	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for the subsequent module to be switched off after the time interval set by Par. 76.	0...40	4	°C	I	Cascade
M2	144	Hyst. Down Quick Start	Defines by how many degrees the temperature measured by the primary circuit's probe must go below the set-point in order for the subsequent module to be started after the time interval set by Par. 142 (quick-start mode).	0...40	20	°C	I	Cascade
M2	145	Hyst. Up Quick Stop	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for the subsequent module to be switched off after the time interval set by Par. 143 (quick stop mode).	0...40	6	°C	I	Cascade

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M2	146	Hyst. Up Stop All	Defines by how many degrees the temperature measured by the primary circuit's probe must go above the set-point in order for all "On" modules to be switched off at the same time.	0...40	8	°C	I	Cascade
M2	147	Number of Units	Defines the number of modules of which the cascade consists.	1...16	8		I	Cascade
M2	148	Power Mode	Defines the cascade operation mode. 0 = Disabled 1 = Min burners 2 = Max burners	0,1,2	2		I	Cascade
M2	79	Max. Setp. Offset Down	Defines the maximum decrease in the primary circuit's cascade set-point. Is based on the primary circuit's probe reading.	0...40	2	°C	I	Cascade
M2	80	Max. Setp. Offset Up	Defines the maximum increase in the primary circuit's cascade set-point. Is based on the primary circuit's probe reading.	0...40	5	°C	I	Cascade
M2	81	Start Mod. Delay Fact.	Defines the time in minutes from the moment the demand is triggered until the activation of the set-point increases or decreases provided for by Par. 79 e 80.	0...60	60	Min.	I	Cascade
M2	82	Next Module Start Rate	It defines the minimum power for at least one of the modules in the cascade in order for the next module to be switched on (if the other conditions linked to Par. 75 and 77 are met).	10...100	80	%	I	Cascade
M2	83	Next Module Stop Rate	It defines the maximum power for all the modules in the cascade in order for the last module on to be switched off (if the other conditions linked to Par. 76 and 78 are met).	10...100	25	%	I	Cascade
M2	84	Module Rotation Interval	It defines the time interval (in days) after which modules are rotated.	0...30	1	Days	I	Cascade
M2	149	First Module to Start	Establishes the number of the next module to be rotated (this value is automatically updated at each rotation).	1..16	1		I	Cascade
M2	86	PID P	Defines the proportional term to change the setpoint of the cascade module.	0...1275	50		O	Cascade
M2	87	PID I	Defines the integral term to change the setpoint of the cascade module.	0...1275	500		O	Cascade
M2	150	PID Slew Rate Up	Defines the speed (in °C/100 ms) with which the set-point of individual modules is increased in the event the primary circuit's set-point is not achieved (if the value is set to zero, the change is controlled by the PI of Par. 86 and 87 without restrictions).	0...25.5	1		O	Cascade
M2	151	PID Slew Rate Dn	Defines the speed (in °C/100 ms) with which the set-point of individual modules is decreased in the event the primary circuit's set-point is exceeded (if the value is set to zero, the change is controlled by the PI of Par. 86 and 87 without restrictions).	0...25.5	1		O	Cascade
M2	152	Pwr-Mode2 Min Power	Defines the power value (in percentage terms) against which the average power of all on modules in cascade operation mode must be compared (Par. 148 = 2).	0...100	20	%	I	Cascade
M2	153	Pwr-Mode2 Hysteresis	Defines the extra power value (in percentage terms) compared to the average power of all on modules in cascade operation mode (Par. 148 = 2).	0...100	40	%	I	Cascade
M2	154	Post-Pump Period	Defines overrun time in seconds at the end of the cascade heat demand.	0...255	60	Sec.	I	Cascade

Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M1	155	Frost Protection	This defines the temperature (detected by the primary sensor) below which the module pump and the system pump (with cascade configuration) are activated. If the temperature of the primary sensor falls below the value set by Par. 155 by another five degrees, then a request is generated that turns on the cascade. When the temperature of the primary sensor reaches the value defined by Par. 155 increased by 5 degrees, then the request ceases and the cascade returns to stand-by mode.	10...30	15	°C	I	General
M2	184	N. active burner in DHW	With this setting it is possible to set the number of burners that are used for cascade DHW.	0...16	16		I	Cascade
M2	205	Dep. Zone Control	Enables the control of the additional heating zone managed by the Dependent module. 0 = Disabled 1 = Enabled	0...1	0		U	General
M3	73	Boiler Address	Defines the way in which the boiler is managed.	Managing, Stand-alone, Dependent	Stand-alone		I	Cascade
M3	156	Permit Emergency Mode	Enable/disable emergency mode.	Yes/No	Yes		U	Cascade
M3	157	Emergency Set-point	Defines the emergency mode setpoint.	20...90	70	°C	I	Cascade
M3	158	Delay Per Start Next Blr.	This defines the waiting time in seconds for the next cascade to start up in normal start mode.	0...1275	1275	Sec.	I	Cascade
M3	159	Delay Per Stop Next Blr.	This defines the waiting time in seconds for the last switched-on cascade to switch off in normal off mode.	0...1275	1275	Sec.	I	Cascade
M3	160	Delay Quick Start Next	This defines the waiting time in seconds for the next cascade to start up in quick start mode.	0...1275	400	Sec.	I	Cascade
M3	161	Delay Quick Stop Next	This defines the waiting time in seconds for the last switched-on cascade to switch off in quick off mode.	0...1275	240	Sec.	I	Cascade
M3	162	Hyst. Down Start Boiler	"reserved"	0...40	5	°C	I	Cascade
M3	163	Hyst. Up Stop Boiler	"reserved"	0...40	2	°C	I	Cascade
M3	164	Hyst. Down Quick Start	"reserved"	0...40	10	°C	I	Cascade
M3	165	Hyst. Up Quick Stop	"reserved"	0...40	4	°C	I	Cascade
M3	166	Hyst. Up Stop All	"reserved"	0...60	8	°C	I	Cascade
M3	167	Number of boilers	This defines the number of boilers connected (cascade of cascades).	1...16 (basic cascade) 1...8 (full cascade)	1		I	Cascade
M3	168	Power Mode	"reserved"	0 = Disabled 2 = Max burners 3 = Balanced burners	2		I	Cascade
M3	169	Max. Setp. Offset Down	Defines the maximum decrease in the primary circuit's cascade set-point. Is based on the secondary circuit's probe reading.	0...40	2	°C	I	Cascade
M3	170	Max. Setp. Offset Up	Defines the maximum increase in the primary circuit's cascade set-point. Is based on the secondary circuit's probe reading.	0...40	5	°C	I	Cascade

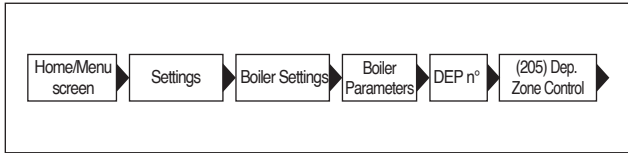
Menu	Par. No.	Display visualisation	Description	Range	Default setting	UM	Access type	Category
M3	171	Start Mod. Delay Fact.	Defines the time in minutes from the moment the request is triggered until the activation of the set-point increases or decreases provided for by Par. 169 e 170.	0...60	40	Min.	I	Cascade
M3	172	Next Boiler Start Rate	"reserved"	10...100	80	%	I	Cascade
M3	173	Next Boiler Stop Rate	"reserved"	10...100	25	%	I	Cascade
M3	174	Module Rotation Interval	"reserved"	0...30	5	Days	I	Cascade
M3	175	First Boiler to Start	"reserved"	1...8	-		I	Cascade
M3	176	PID P	Defines the proportional term to change the set-point of the cascade module based on the secondary circuit's temperature.	0...1275	25		O	Cascade
M3	177	PID I	Defines the integral term to change the set-point of the cascade module based on the secondary circuit's temperature.	0...1275	1000		O	Cascade
M3	178	PID Slew Rate Up	Defines the speed (in °C/100 ms) with which the set-point of individual modules is increased in the event the secondary circuit's set-point not reached (if the value is set to zero, the change is controlled by the PI of Par. 176 and 177 without restrictions).	0...25.5	1		O	Cascade
M3	179	PID Slew Rate Dn	Defines the speed (in °C/100 ms) with which the set-point of individual modules is decreased in the event the primary circuit's set-point is exceeded (if the value is set to zero, the change is controlled by the PI of Par. 176 and 177 without restrictions).	0...25.5	1		O	Cascade
M3	180	Pwr-Mode2 Min Power	"reserved"	0...100	20	%	I	Cascade
M3	181	Pwr-Mode2 Hysteresis	"reserved"	0...100	40	%	I	Cascade
M3	182	Post-Pump period	"reserved"	0...255	30	Sec.	I	Cascade

5 ZONE DEPENDENT

5.1 Zone control with Dependent module

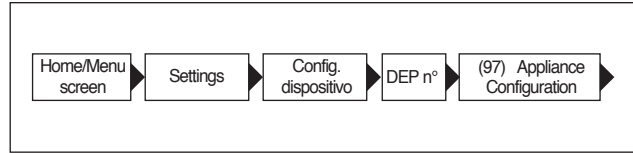
The thermal elements Dependent on the **Power Max BOX** are prepared as standard to be configured as zones. Thus, for example, a thermal module with 4 thermal elements will be set up as standard for the management of 3 zones (one for each Second thermal element) installed inside the thermal module itself.

To enable the functioning of the element as a zone, the procedure described below must be carried out.



- Select "Enabled" and confirm

Access the following menu:



- Choose 19
- Select "CONFIRMED CONFIG"
- Select "YES"
- Wait for initialization and finalization.

The (temporary) error appears on the initial screen 164 and then the error 208 that signals that the zone probe is not connected. At this point the zone is ready to be connected as reported in the paragraph "Typical water system schematics".

5.2 Setting zone parameters (accessible only with installer password)

Menu → "Settings" → "Config. area dep "

This menu allows you to separately set the parameters of all the connected zones with the exception of the "Extra setpoint zone" which is the same for all zones.

To select the zone for controlling/changing the parameters, proceed as follows:

- press the ► button so that the number to the right of the word "zona dep." is highlighted;
- once the number is highlighted use the ▲ and ▼ keys to change the number of the zone;
- once the zone is selected, confirm with the ● key.

The zone parameters are the following:

Description	Standard value that is set	Range	Explanation	UM
Mix Valve Max Op/Cl Time	25	0-255	Fixes the time in second of the total opening/closing of the mix valve (valid for three point mix valve)	Secs
PID P Zone	10	0-255	Proportional parameter for the valve control	
PID I Zone	150	0-255	integrative parameter for the valve control	
PID D Zone	0	0-255	Derivative parameter for the valve control	
Extra zone setpoint	10	0-30	Establishes the increase for the primary setpoint with respect to the zone setpoint	°C

The setting of the parameters of the climatic curve and the programming of the dependent zone is identical to that of the additional external zone, as described in the paragraphs "Setting zone's climatic curve parameters (accessible only with installer password)" and "Programming the zone".

5.2.1 Deleting dependent zone

To remove a Dependent zone operate in the reverse way to its installation:

- enter the parameters menu and select the par. 205. Change its value from "Enabled" to "Disabled";
- change the par. 97. If par. 97 = 19 change to = 16; if par. 97 = 18 change to = 17.

On the "Information" menu:

- enter "Status zone dep.";
- select the number of the dependent zone;
- The "Detection" field will indicate "NO";
- select "Remove zone" changing to "YES" and confirm.

Now in the "Settings" and "Information" menus the dependent zone will no longer be displayed.

The electronic control of the thermal module will automatically check which zones are connected to the bus.

The menu items of the zone in the electronic control of the thermal module will be available when one or more zone management devices are detected.

The electronic control of the thermal module remembers the zone number detected when a device is connected.

The zone number detected is not automatically removed when the corresponding accessory is no longer connected.

The zone number needs to be removed manually.

Removing the zone number

- remove the bus connection of the zone to be deleted;
- access the Settings/Zone Config./Zone;
- select the disconnected zone;
- go to Remove Zone;
- press the ► key to highlight the values, change them to "Yes" with the ▲ / ▼ keys, press the ● key to confirm and remove the zone from the display menus.

Example:

Dependent Zone 3	
Detection	No
Remove Zone	No

Dependent Zone 3	
Detection	No
Remove Zone	Yes

6 MANAGING ADDITIONAL ZONE

6.1 Controlling zone with additional zone accessory

When using on a system with just one thermal module or cascade systems, where the number of heating zones to be controlled exceeds the number of DEPENDENT thermal modules, the additional Zone accessory module must be installed.

After connecting the Zone module as indicated below, wait for the module to be detected.

At the end of the detection, the following new functions will be available:

- in the "Information" menu "Ext. Zone Status." will be displayed, from where it is possible to display information regarding the selected zone;
- in the "Settings" menu two new lines will be displayed:
 - "Zone Config."
 - "Zone Clim. Curve"



See the additional Zone accessory booklet for further details.

The electronic control of the thermal module will automatically check which zones are connected to the bus.

The menu items of the zone in the electronic control of the thermal module will be available when one or more zone management devices are detected.

The electronic control of the thermal module remembers the zone number detected when a device is connected.

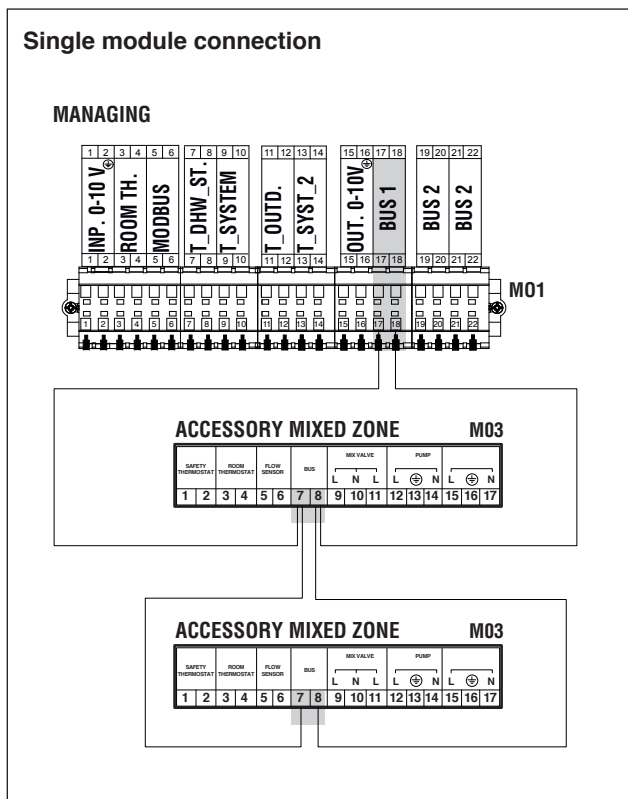
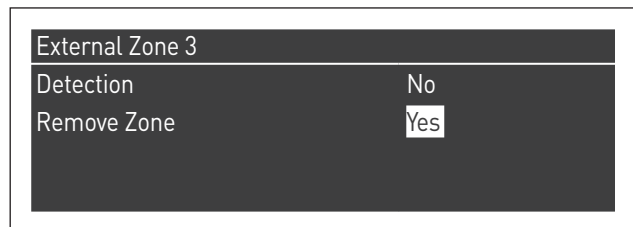
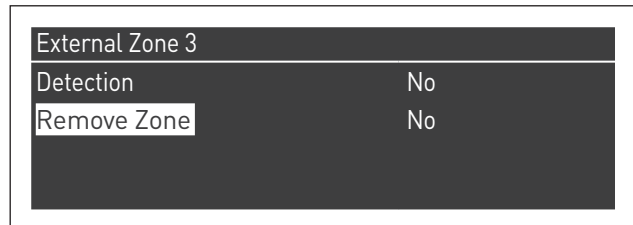
The zone number detected is not automatically removed when the corresponding accessory is no longer connected.

The zone number needs to be removed manually.

Removing the zone number

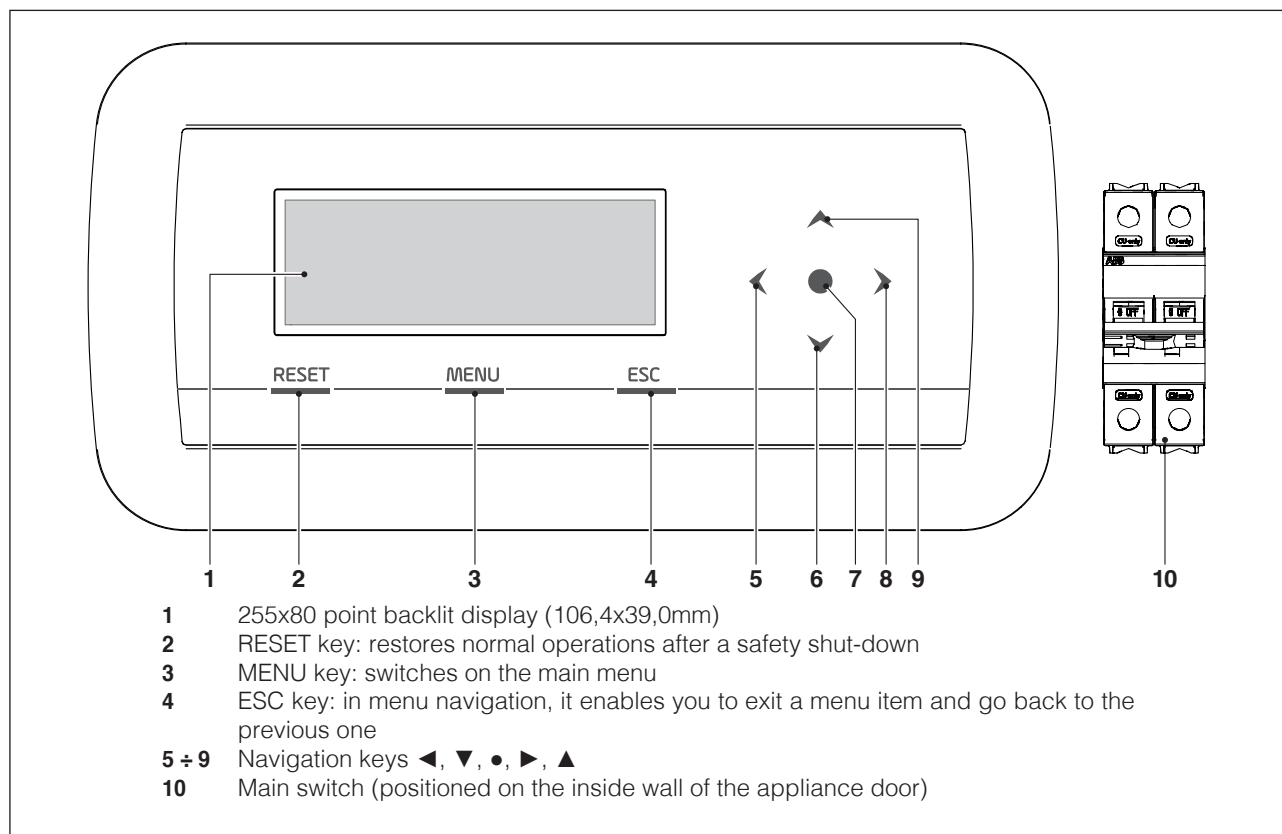
- remove the bus connection of the zone to be deleted;
- access the Settings/Zone Config./Zone;
- select the disconnected zone;
- go to Remove Zone;
- press the ► key to highlight the values, change them to "Yes" with the ▲ / ▼ keys, press the ● key to confirm and remove the zone from the display menus.

Example:



6.2 Setting parameters of the additional zone

Controls interface



6.3 Setting zone parameters (accessible only with installer password)

Menu → “Settings” → “Zone Config.”

This menu allows you to separately set the parameters of all the connected zones with the exception of the “Extra setpoint zone” which is the same for all zones.

To select the zone for controlling/changing the parameters, proceed as follows:

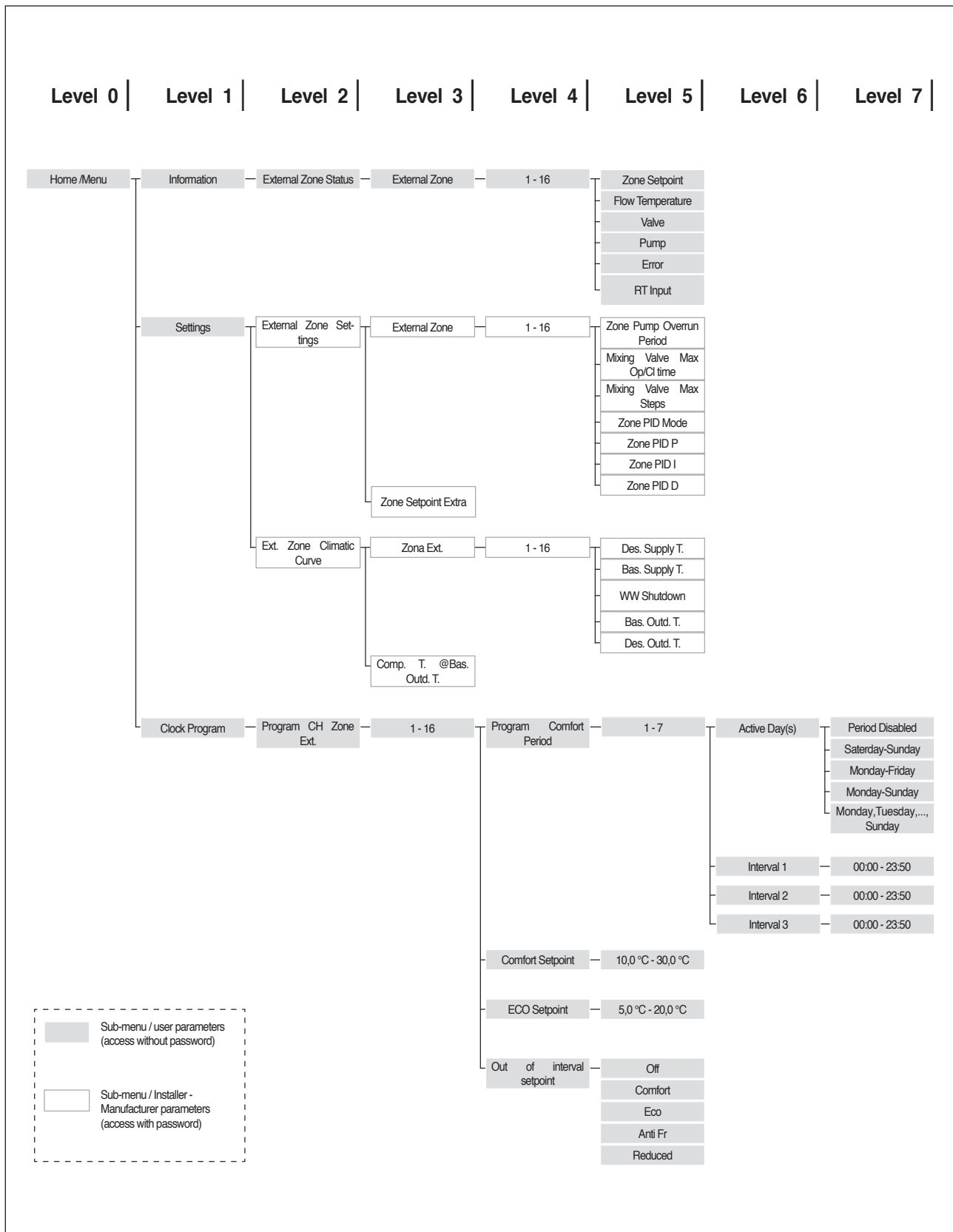
- press the ▶ key so that the number to the right of “zone” is highlighted;
- once the number is highlighted use the ▲ and ▼ keys to change the number of the zone;
- once the zone is selected, confirm with the ● key.

The zone parameters are the following:

Description	Standard value that is set	Range	Explanation	UM
Post-circ. Zone Pump	120	0-255	Establishes the time in seconds of the post-circulation	Secs
Mix Valve Max Op/CI Time	25	0-255	Fixes the time in second of the total opening/closing of the mix valve (valid for three point mix valve)	Secs
Mix Valve Max steps	700	0-65535	Fixes the number of steps for the total opening of the mix valve (valid for step-by-step mix valve)	
PID zone mode	Symmetrical	Symmetrical/Asymmetrical	Fixes the PID control mode	
PID P Zone	10	0-255	Proportional parameter for the valve control	
PID I Zone	150	0-255	integrative parameter for the valve control	
PID D Zone	0	0-255	Derivative parameter for the valve control	
Extra zone setpoint	10	0-30	Establishes the increase for the primary setpoint with respect to the zone setpoint	°C

⚠ For more information regarding navigating the commands interface (thermal module display) see the paragraph “Electronic control”.

6.3.1 Menu structure

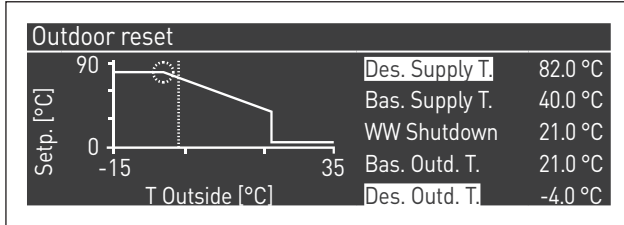


6.4 Setting zone's climatic curve parameters (accessible only with installer password)

Menu → "Settings" → "Zone Clim. Curve"

- press the ► key so that the number is highlighted on the right of the word "Zone";
- use the ▲ and ▼ keys to change the zone number;
- press the ● key.

The following is displayed:

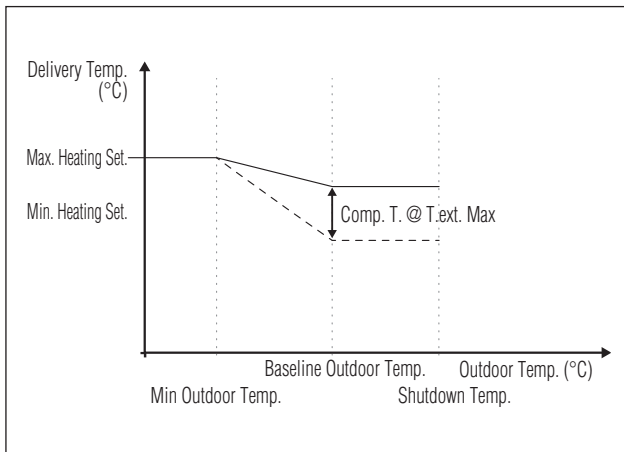


The "Comp. T. @ T.ext. Max" parameter, if other than 0, transforms the climatic curve from linear to quadratic allowing you to best adapt the variation of the setpoint to the variation of the outdoor temperature.

The resulting quadratic climatic curve will have three parameters:

- Heat. Set. Max
- Baseline Outdoor Temp.
- Text. Min

of the basic linear climatic curve and a value of the Heat. Set. Min. diminished by the value of the parameter "Comp. T. @ T.ext. Max", as can be seen in the example in the figure.



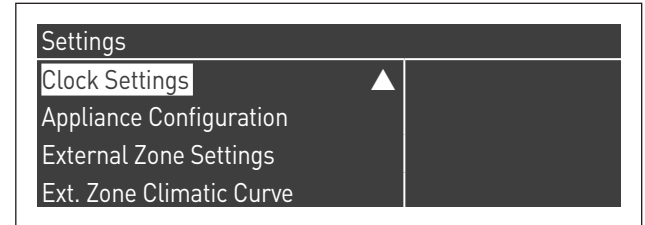
6.5 Programming the zone

By default the schedule timer is disabled.

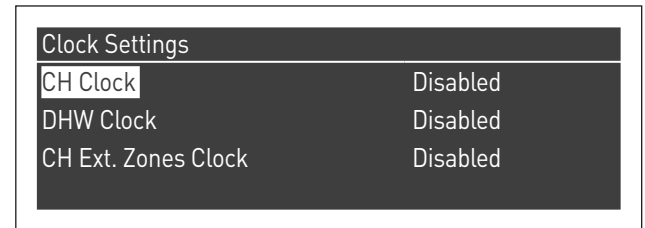
To start a request from the zone, simply close the contact of the zone request. In this case the module (or the cascade of modules) will start with a setpoint equal to the value calculated on the zone climatic curve increased by the "Zone Extra Setpoint" value and the mix valve will modulate to maintain the delivery temperature of the zone at the calculated setpoint.

To activate zone programming:

Menu → "Settings" → "Clock Settings"



Confirming with ● the following screen is displayed:

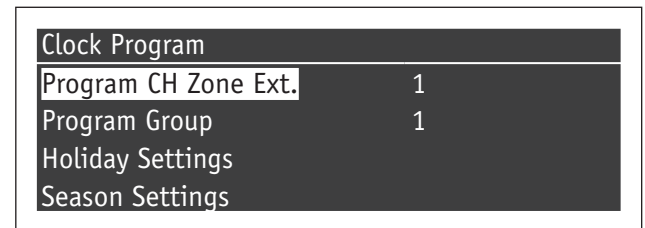


- with the ▲ / ▼ keys select "CH Zones clock"
- with the ► key move to "Disabled", change it to "Enabled" with the ▲ / ▼ keys
- confirm with the ● key

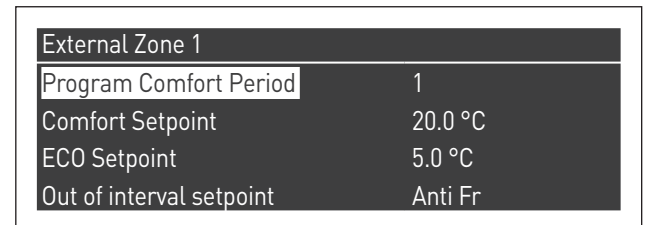
Go to:

Menu → "Clock program"

Confirming with the ● key:



At this point select the number of the zone to be programmed and confirm with the ● key.



The programmable periods for each zone are 7 and they can be selected by changing the number that appears beside "Program Comfort period".

The "Comfort Setpoint" is the setpoint that is set for the area served by the zone in the active time band established within the period and can be set between ten and forty degrees.

Setting the "Comfort Setpoint" at a default of 20°C, the climatic curve that regulates the setpoint of the zone is exactly that which was set in paragraph Setting zone's climatic curve parameters (accessible only with installer password) on page 104.

By changing the "Comfort Setpoint" the climatic curve is moved upwards or downwards depending on whether the setpoint is higher or lower than 20°C. The curve will shift by two degrees for each degree of difference between the value of the setpoint and the value 20.

The "ECO Setpoint" is a setpoint that can be set between 5 and 20 degrees and can be selected as a setpoint for the area served by the zone outside the active time band.

The "Out of the interval Setpoint" defines how the zone outside the active time bands are managed (within which the setpoint of the area is always set on "comfort").

The selections for the "Out of the interval Setpoint" are the following:

- **Eco:** the ambient setpoint is set to ECO. The zone setpoint is changed by two degrees less for each degree of difference between the ECO setpoint and the value 20 (for example, if at 20° I have a setpoint of 50, at 18 degrees I have a setpoint of $50+2*(18-20)=46$).
- **Night-time:** the zone setpoint is lowered by 10 degrees with respect to the value of the zone setpoint set for a $T_{comfort} = 20^\circ$.
- **Antifreeze:** the ambient setpoint is set at 5°C, thereby obtaining a reduction with respect to the comfort setpoint of 30 degrees.
- **Off:** in this case the delivery of heat is interrupted.
- **Comfort:** the setpoint remains the same as that for the active time bands. This choice clearly makes no sense when scheduling is desired, but it can be useful if you want to provide heat continuously without changing the programming itself.



So that the zone programming works the "heat request" contact should be closed. Otherwise the zone will ignore any request from the schedule timer.

6.6 Scheduling the time bands

By going to:

Menu → "Clock program" → "Zones CH Program "

External Zone 1	
Program Comfort Period	1
Comfort Setpoint	20.0 °C
ECO Setpoint	5.0 °C
Out of interval setpoint	Anti Fr

Entering in "Program Comfort Period":

External Zone 1 - Period 1		
Active Day(s)	Monday-Sunday	
Interval 1	07:10	11:00
Interval 2	00:00	00:00
Interval 3	00:00	00:00

Using the option "Active Day(s)" it is possible to select the scheduling period. You can select a day of the week or else one of these three groups of days:

- Mon-Sun
- Mon-Fri
- Sat-Sun

This facilitates weekly scheduling or else scheduling that is different during the work week and the week-end.

There are three active time bands for each period. The time resolution is 10 minutes.

6.7 Information on the operation of the zone

By going to:
Menu → "Information" → "Zone Status"

External Zone Status 1	
External Zone	1

To choose the zone whose information will be displayed, proceed in the same way as in the previous paragraph.

Once the ● key is selected the following display appears:

External Zone 1	
Error	▲ 255
RT Input	No
Zone Setpoint	-10.0 °C
Flow Temperature	25.5 °C

External Zone 1	
Zone Setpoint	▲ -10.0 °C
Flow Temperature	25.5 °C
Valve	0%
Pump	Off

The information displayed is the following:




Error code	Description
Err	Indicates the error code of the board (255 = no error)
Input Heat	Indicates whether there is a request (namely, if the contact for the heat request is open (NO, no request) or closed (Yes, request present))
Zone set-point	Indicates the zone setpoint
Delivery temperature	Indicates the temperature measured by the zone probe
Valve	Indicates the opening percentage of the valve (100% = fully open)
Pump	Indicates if the pump is stopped (off) or active (on)

Zone board errors table:

Error code	Description	Solution
22	Zone probe disconnected	Check probe
23	Zone probe short-circuit	Check probe
24	Overtemperature detected (opening of safety thermostat)	Check parameters Check operation of mixer

7 SYSTEM MANAGER

7.1 Putting into service

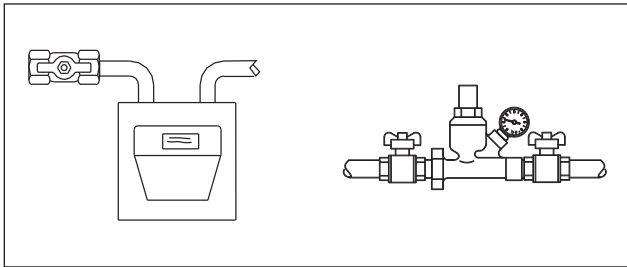
-  The appliance must be maintained and adjusted at least once a year by Technical Assistance Centre or by professionally qualified staff in compliance with all applicable National and Local provisions.
-  Incorrect maintenance or adjustment may damage the appliance and cause damage to people or create a hazard.
-  The system manager is forbidden from opening and removing the appliance's casing. These activities must be carried out only by Technical Assistance Centre or by professionally qualified personnel.

The first commissioning of the **Beretta Power Max BOX** module must be carried out by **Beretta** Technical Assistance Centre after which the appliance can operate automatically.

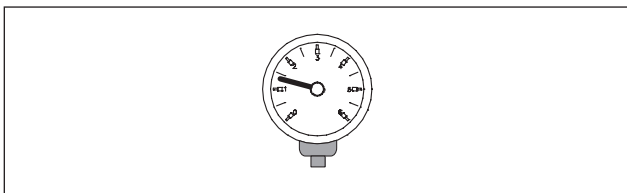
However, the system manager may be required to restart the appliance independently, without involving Technical Assistance Centre; for example after a long period of absence.

To do so, perform the following checks and operations:

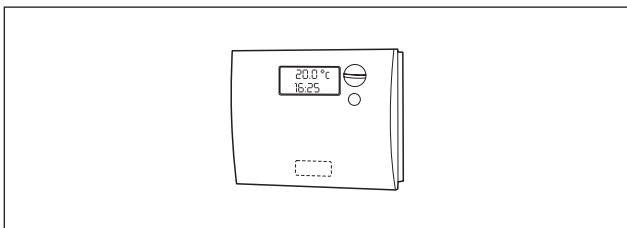
- Check that the gas cock and heating water cock are open



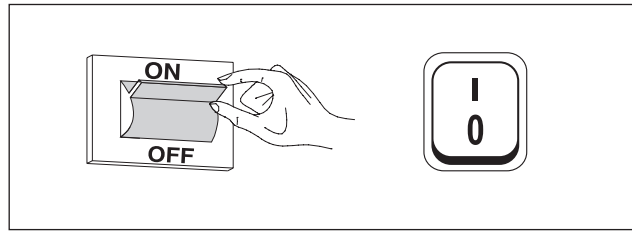
- While the system is still cold, check that working pressure in the central heating circuit is **over 1 bar** but below the maximum limit specified for the boiler



- Adjust the room thermostats for the high and low temperature zones to the required temperature (~20°C) or, if the systems are equipped with timer thermostats or a time programming unit, make sure it is on and adjusted (~20°C)




- Switch the system's master switch to the ON position and the thermal module's master switch to (I).



The appliance will go through the switch-on stage and, after starting, it will continue to operate until set temperatures are achieved.

The burner will then switch off and on automatically to maintain the set temperature without further operator action.

In the event of ignition or operation faults, the display will show a numeric error code that will enable the user to interpret the possible cause as detailed in Paragraph "Error List".

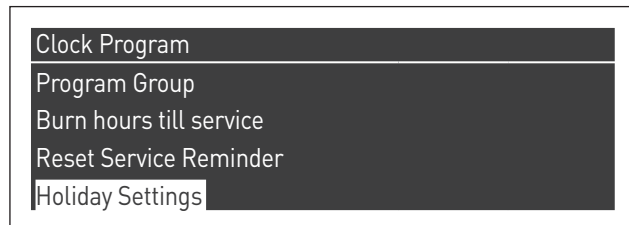
-  In the event of a permanent error, to reset starting conditions press the "RESET" key and wait for the thermal module to restart.

Repeat this operation 2-3 times at the most. If the problem persists after that, call **Beretta's** Technical Assistance Centre.

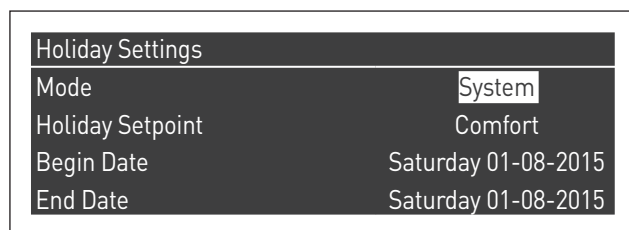
7.2 Temporary or short-term shut-down

In the event of temporary or short-term shut-down (e.g. due to holidays), proceed as follows:

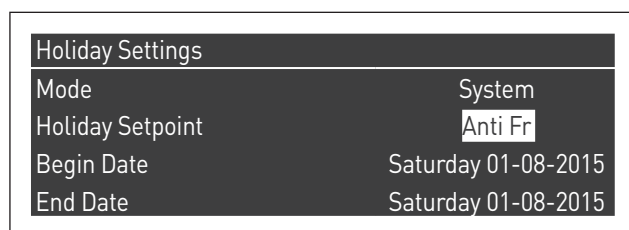
- Press the MENU key and select with keys ▲ / ▼ "Time schedule", confirm with key ●.
- Select with keys ▲ / ▼ "Holiday Schedule" and confirm with key ●.



- Select with keys ▲ / ▼ "Mode" and confirm with key ●. Select "System" mode and confirm.



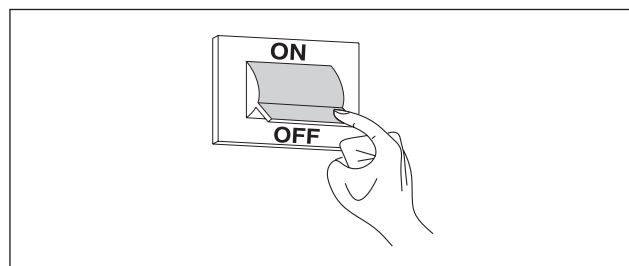
- Select with keys ▲ / ▼ "Holiday Setpoint" and confirm with key ●.
- Select "Antifreeze" holiday setpoint and confirm.



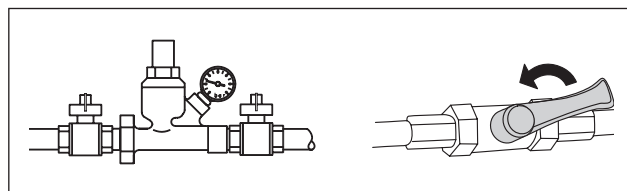
7.3 Preparing for extended periods of disuse

The following operations shall be necessary if the Modular system is not used for a long period of time:

- set the modules' main switch and the system's main switch to "off"



- Close the fuel and water valves for the heating and domestic hot water system.



- ⚠ Empty the thermal and sanitary system if there is a danger of frost.

7.4 Cleaning

Use a cloth damped in soapy water to clean the boiler's external casing.

To remove stubborn marks, use a cloth damped in a 50% mix of water and denatured alcohol or a suitable cleaning product.

Carefully dry after cleaning.

- ⊘ Do not use abrasive cleaning pads or powder detergents.

- ⊘ Never clean the boiler without first disconnecting it from the mains electricity supply by turning the mains power switch and the control panel switch OFF.

- ⚠ The combustion chamber and flue pipes must be cleaned periodically by the manufacturer's Technical Assistance Centre or by a qualified heating engineer.

7.5 Maintenance

Please remember that THE PERSON RESPONSIBLE FOR SYSTEM MANAGEMENT MUST ENSURE THAT PROFESSIONALLY QUALIFIED HEATING ENGINEERS UNDERTAKE PERIODIC MAINTENANCE AND COMBUSTION EFFICIENCY MEASUREMENTS.

Beretta's Technical Assistance Centre is qualified to satisfy these legal requirements and can also provide useful information on MAINTENANCE PROGRAMMES designed to guarantee:

- Greater safety
- Compliance with applicable legislation
- Freedom from the risk of fines in the event of spot checks.

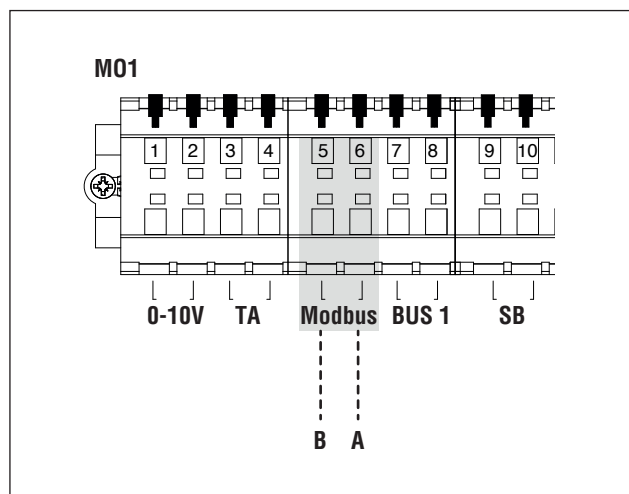
Regular maintenance is essential for the safety, efficiency and durability of the boiler.

Servicing is a legal requirement and must be performed at least once a year by a professionally qualified heating engineer.

8 MODBUS CONNECTION

The thermal mode is equipped with a Modbus connection (based on the RS485 communication standard) that supports the remote management and adjustment of the aforementioned thermal module.

The Modbus connection is available in the low-voltage terminal board.



Configuration

The following table shows the connection details.

Protocol	Modbus RTU
Slave address	Adjustable from the display. Default: 1
Supported Modbus controls	Read Holding registers (03) Write single holding register (06) Write multiple holding registers (10)
Baud rate	9600 bps.
Length	8
Parity	No
Stop Bits	1 or 2 (adjustable from PB or PC software)
Connection	RS485 (2 wires + optional earthing)

As shown in the table above, the thermal module's address (meant as the address of the slave device in the Modbus system) and the number of "Stop Bits" are two adjustable values.

To modify one or the other, from the home screen, access the "Settings" menu, select "General settings" and confirm.



Access the "Other settings" menu and select "Modbus Address"



Registers

Depending on the type of Modbus device used to connect to the thermal module, the registers' addressing may start from 0x0000 or 0x0001.

If addressing starts from 0x0000, the numbers of the registers listed in the table below may be used directly for reading/writing operations; if addressing starts from 0x0001, the numbers of registers shown in the table, plus one, must be used for reading/writing operations.

Control register

The control register is used for special functions.

The first one is that of enabling writing on registers. All accessible registers, including write ones, must be first enabled to receive data. To prevent undesired entries, it is possible to change the value in a register only during the first four seconds after the status change of the 0 bit in the control register.

Therefore, before changing the value of a register, it is necessary to change the status of 0 bit of the control register (register No. 99), sending the string 1 to it.

The control register also supports the remote resetting of the board, by changing the status of the 14 bit. Therefore, by sending the value 16384 to register No. 99, it is possible to reset the board.



By sending a value other than 1 and from 16384 to register No. 99, the latter will return to the write-protected status (bit 0=0).

The table that summarises the control register's operation is provided below:

Register number	Access	Access		Description	Value range
		L	S		
99	0063	X	X	Control register	Bit 0: enables writing Bit 14: controller reset

Measurement unit selection register

Register 98 is used to change the format of the data stored in registers (those containing temperature or pressure values).

Before changing the value of the selection register, it is necessary to enable it for writing by forwarding the enabling command to the 99 control register.

The table for measurement unit selection register is the following:

Register number	Access	Access		Description	Value range
		L	S		
98	0062	X	X	Measurement unit selection register	Bit 0: °C/°F Bit 1: bar/psi

Types of data

Type of data	Unit
Temperature	°C/°F
Voltage	Volt
Pressure	bar/psi
Ionisation current	µA
Percentage	%
Connection	RS485 (2 wires + optional earthing)

Status parameters

Register number	Access		Description	Automatic conversion	Value range
	L	S			
100	X		State		See "State" table
101	X		Status		Same "State" value
102	X		Error code (*)		See "Error" tables
110	X		Heating pump		0=off; 1=on
111	X		DHW pump		0=off; 1=on
112	X		Module pump		0=off; 1=on
(*) 255= no error					

Temperatures/Information

Register number	Access		Description	Automatic conversion	Value range
	L	S			
120	X		Delivery temperature	Yes	Depends on °C/°F units
121	X		Return temperature	Yes	Depends on °C/°F units
122	X		DHW temperature	Yes	Depends on °C/°F units
123	X		Flue gas temperature	Yes	Depends on °C/°F units
124	X		System temperatures (where available)	Yes	Depends on °C/°F units
125	X		Outdoor temperature (where available)	Yes	Depends on °C/°F units
140	X		Power	Yes	0..100%
142	X		Ionisation current	Yes	0..x µA

Dependent information

Register number	Access		Description	Automatic conversion	Value range
	L	S			
Dependent 01					
300	X		State		See "State" table
302	X		Error code		See "Error" tables
303	X		Power	Yes	0..100%
Dependent 02					
306	X		State		See "State" table
308	X		Error code		See "Error" tables
309	X		Power	Yes	0..100%
Dependent 03					
312	X		State		See "State" table
314	X		Error code		See "Error" tables
315	X		Power	Yes	0..100%
Dependent 04					
318	X		State		See "State" table
320	X		Error code		See "Error" tables
321	X		Power	Yes	0..100%
Dependent 05					
324	X		State		See "State" table
326	X		Error code		See "Error" tables
327	X		Power	Yes	0..100%
Dependent 06					
330	X		State		See "State" table
332	X		Error code		See "Error" tables
333	X		Power	Yes	0..100%
Dependent 07					
336	X		State		See "State" table
338	X		Error code		See "Error" tables
339	X		Power	Yes	0..100%
Dependent 08					
342	X		State		See "State" table
344	X		Error code		See "Error" tables
345	X		Power	Yes	0..100%

Register number	Access		Description	Automatic conversion	Value range
	L	S			
Dependent 09					
348	X		State		See "State" table
350	X		Error code		See "Error" tables
351	X		Power	Yes	0..100%
Dependent 10					
354	X		State		See "State" table
356	X		Error code		See "Error" tables
357	X		Power	Yes	0..100%
Dependent 11					
360	X		State		See "State" table
362	X		Error code		See "Error" tables
363	X		Power	Yes	0..100%
Dependent 12					
366	X		State		See "State" table
368	X		Error code		See "Error" tables
369	X		Power	Yes	0..100%
Dependent 13					
372	X		State		See "State" table
374	X		Error code		See "Error" tables
375	X		Power	Yes	0..100%
Dependent 14					
378	X		State		See "State" table
380	X		Error code		See "Error" tables
381	X		Power	Yes	0..100%
Dependent 15					
384	X		State		See "State" table
386	X		Error code		See "Error" tables
387	X		Power	Yes	0..100%

Parameters registers

Register number	Access		Description	Note	Automatic conversion	Value range
	L	S				
500	X	X	Heating mode (Par. 1)	NV		0..x
501	X	X	DHW mode (Par. 35)	NV		0..x
502	X	X	Heating set-point (Par. 3)	V	Yes	Depends on °C/°F units
503	X	X	DHW set-point (Par. 48)	V	Yes	Depends on °C/°F units
504	X	X	Set-point at min. climatic T (Par. 19)	NV	Yes	Depends on °C/°F units
505	X	X	Set-point at max. climatic T (Par. 21)	NV	Yes	Depends on °C/°F units
506	X	X	Out. temperature for climatic minimum (Par. 22)	NV	Yes	Depends on °C/°F units
507	X	X	Out. temperature for climatic maximum (Par. 20)	NV	Yes	Depends on °C/°F units
508	X	X	Climatic shut-off (Par. 25)	NV	Yes	Depends on °C/°F units
509	X	X	Maximum value that can be assigned to the heating set-point (Par. 24)	NV	Yes	Depends on °C/°F units

Register number	Access		Description	Note	Automatic conversion	Value range
	L	S				
510	X	X	Minimum value that can be assigned to the heating set-point (Par. 23)	NV	Yes	Depends on °C/°F units
511	X	X	Night-time attenuation (Par. 28)	NV	Yes	Depends on °C/°F units
512	X	X	Extra primary setpoint for DHW (Par. 38)	NV	Yes	Depends on °C/°F units

In the "Note" column, the registers marked with "V" can be written on an ongoing basis (and be used for dynamic size control). Registers marked with "NV", on the other hand, can be overwritten only for a limited number of times (around 10,000 times with an average of twice a day).

Service reminder

Register number	Access		Description	Automatic conversion	Value range
	L	S			
1500	X		Hours elapsed from the last maintenance activity		0...65534 hours
1501	X		Hours from the next maintenance activity		.. 0... maintenance intervals
1504	X		Counter delay index		0...14
1505	X		Delay counter 0		0...65534 hours
1506	X		Delay counter 1		0...65534 hours
1507	X		Delay counter 2		0...65534 hours

Register number	Access		Description	Automatic conversion	Value range
	L	S			
1508÷1518	X		Delay counter 3÷13		0...65534 hours
1519	X		Delay counter 14		0...65534 hours
1540	X	X	Service reminder reset		0...1 (1=reset)
1541	X	X	Setting the hour counting mode for logs 33000-33001		0= burner ON hours counted 1= boiler ON hours counted
1542	X	X	Maintenance interval hours		0..25500 hours (in steps of 100)

Note: If a counter shows the value 65535, this means that either it is inactive or has exceeded the limit value.

History

Register number	Access		Description	Automatic conversion	Value range
	L	S			
200	X		No. of successful ignitions		0...65534
201	X		No. of failed ignitions		0...65534
202	X		No. of flame losses		0...65534
203	X		Hours CH demand		0...65534 hours
204	X		Hours DHW demand		0...65534 hours
220÷235	X		Non-volatile error sequence		See "Error" tables
236÷251	X		Hours since last non-volatile error		0...65534 hours
260÷275	X		Volatile error sequence		See "Error" tables
276÷291	X	X	Hours since last volatile error		0...65534 hours

STATE

Nr.	Description
0	Initialisation
1	Reset
2	Standby
3	Pre-wash
4	Pre-wash
5	Pre-ignition
6	Pre-ignition
7	Flame detection test
8	Burner ON
9	Burner ON
10	Post-purging
11	Post-purging
12	Volatile lockout error
13	Non-volatile lockout error

9 RECYCLING AND DISPOSAL

The appliance is manufactured using various materials, such as metal, plastics, and electric and electronic components. At the end of the life cycle, safely remove the components and dispose of them in a responsible manner, in compliance with the installation country's applicable environmental legislation.



Adequate sorted waste collection, processing and environmentally-friendly disposal contribute to preventing possible negative impacts on the environment and health and promote the reuse and/or recycling of the materials of which the appliance consists.



Illegal disposal of the product by the owner shall be subject to administrative fines provided for by applicable laws.

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The manufacturer strives to continuously improve all products. Appearance, dimensions, technical specifications, standard equipment and accessories are therefore liable to modification without notice.

