

E.C.A.

GP24

**GP 11/13/16/20/24 kW HM
HERMETIC MONOTERMIC COMBI
BOILER**



SERVICE MANUAL

1. PRODUCT NOTATION

GP 11/13/16/20/24 HM	Definition
	E.C.A. GP 11/13/16/20/24 kW Hermetic Combi (monothermic model)

2. SAFETY SYSTEMS

With the safety systems in your device, both you and your device are fully secured. These safety systems;

- ❖ Flame Loss Protection
- ❖ Boiler Over-heat Safety System (105°C)
- ❖ DHW (Domestic Hot Water) Over-heat Safety System (71°C)
- ❖ CH (Central Heating Water) Over-heat Safety System (95°C)
- ❖ High Water Pressure Protection System (3 bar)
- ❖ Low Water Pressure Protection System (0,8 bar)
- ❖ Low Voltage Protection System (165 V AC)
- ❖ Thermal Accumulation Protection System (with by-pass circuit and pump over-run)
- ❖ Frost Protection System (The appliance must be on stand-by to activate the frost protection)
- ❖ Water Flow Inspection.
- ❖ Pump Dry Run Protection System
- ❖ 3 Way Valve Anti-sticking Function
- ❖ Automatic Air Vent
- ❖ Expansion Vessel (6L)

3. GENERAL FEATURES

Product Type	Unit	GP				
		11 kW	13 kW	16 kW	20 kW	24 kW
Category		I _{2H}				
Type		C _{12(X)} , C _{32(X)} , *C _{42(X)} , *C _{52(X)}				
Gas Inlet Pressure (Natural Gas G20)	mbar	20				
Power	Unit					
Pmin, heating power (thermal power)	kW	8,2				
Pmax, heating power (thermal power)	kW	11,3	13	16	20	23,3
Qmin. Thermal Load	kW	9,2				
Qmax. Thermal Load	kW	12,8	14,8	17,9	22,3	25,6
Gas Consumption	Unit					
Natural Gas (at full power)	m ³ /h	1,38	1,58	1,93	2,41	2,76
Natural Gas (at min. power)	m ³ /h	0,96				
NOx Class		3				
Central Heating	Unit					
Min. Water Pressure	bar	0,8				
Max. Water Pressure	bar	3				
Operation Range (@Radiator heating)	°C	30 - 80				
Operation Range (@Underfloor heating)	°C	30 - 50				

Domestic Hot Water	Unit	
Min. Flow Rate	l/min	3
Max. Flow Rate	l/min	10 ($\Delta T=33,4^{\circ}\text{C}$)
Min. Water Pressure	bar	0,3
Max. Water Pressure	bar	10
Operation Range	$^{\circ}\text{C}$	35 - 64
General	Unit	
Electric supply	V AC-Hz	230 VAC-50 Hz
Electric Consumption	Watt	119
Protection Class		IPx4D
Expansion Vessel	l	6
Weight (without packaging)	kg	30
Dimensions	mm	720*400*330

*If the twin chimney outlet is not available, a twin chimney adapter should be used to install these chimney types.

4. IMPORTANT INFOS AND WARNINGS



WARNING-1: The device is consist of sheet metals which have sharp edges that may cause injuries. Service operation must be done by only authorized people. Proper personel protective equipments must be used during service operations.

Info-1: Service reminder function will be activated if the input power is supplied to the control board for 7500 hours. SE will be displayed together with the service icon on the user interface. Control board continues normal operation during service reminder function. Service reminder must be cancelled by RESET knob. After resetting the service reminder by RESET knob, service reminder will be activated again for 2 more times in 72 hours. After 3rd resetting of service reminder function, it will be activated again after 7500 hours.

Service reminder time is cleared and 7500 hours counting is restarted if 20 is written to PP31.

Parameter No	Parameter Name Parameter Value Definition	Factory Setting	Range
PP31	Parameters Factory Setting	0	0 - 99
	20: service reminder time cleared 45: all parameters are set to factory defaults 70: fault history logs are all cleared		

Info-2: To connect the room thermostat, firstly **PP30 ON-OFF Room Thermostat Selection** parameter's value must be changed to **ON_OFF room thermostat available (1)**, otherwise boiler doesn't run according to room thermostat.

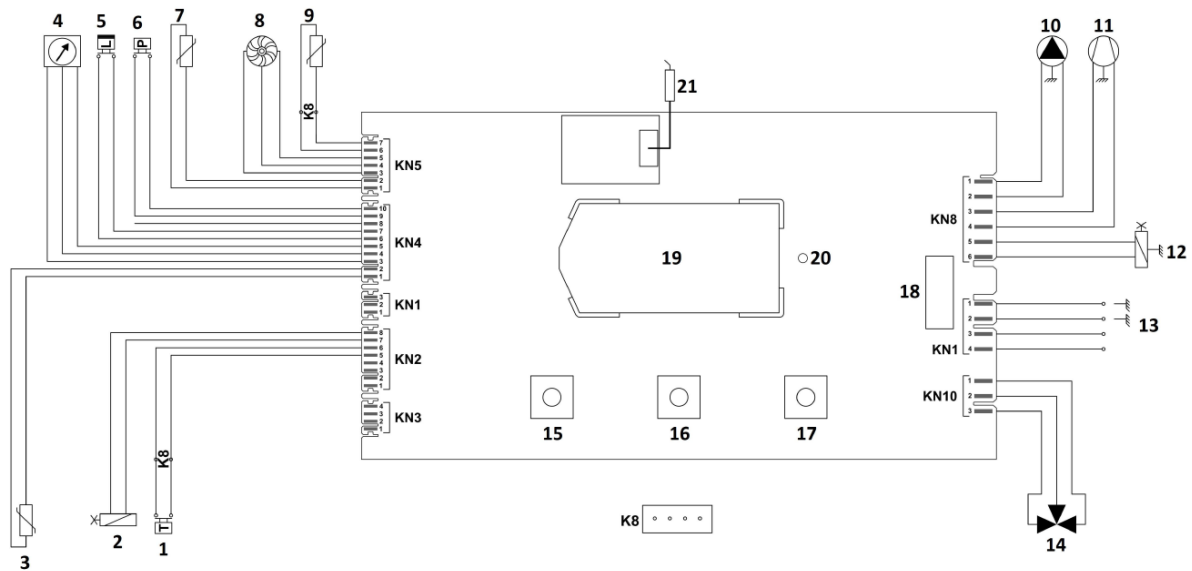
Parameter No	Parameter Name Parameter Value Definition	Factory Setting	Range
PP30	ON-OFF Room Thermostat Selection	0	0 - 1
	0: ON_OFF room thermostat not available 1: ON_OFF room thermostat available		

Info-3: To connect the outdoor NTC probe, firstly **PP15 Outdoor sensor type** parameter's value must be changed to **Outdoor sensor available (1)**. Outdoor temperature measurement starts only if PP15 is selected as 1. If PP15 is selected as 1 and outdoor NTC probe is not connected F6 error code is shown on the display but boiler keeps working.

When the power supply is switched ON, OC, showed on LCD display, means that the probe is correctly connected and the function enabled

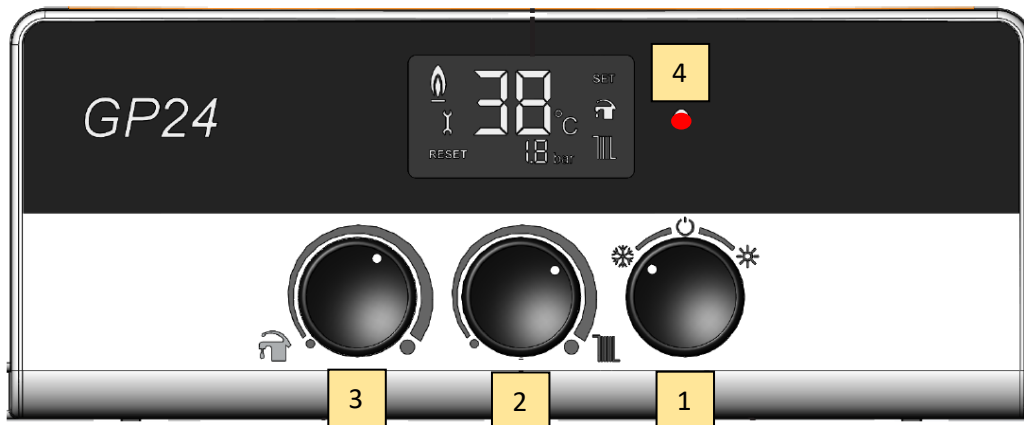
Parameter No	Parameter Name Parameter Value Definition	Factory Setting	Range
PP15	Outdoor Sensor Type	0	0 - 1
	0: Outdoor sensor not available 1: Outdoor sensor available		

5. CONNECTION DIAGRAM



- | | |
|-------------------------------|--|
| 1. Room Thermostat ON-OFF | 12. Gas Valve |
| 2. Gas Valve Modulator | 13. Power Supply |
| 3. CH Flow NTC Probe | 14. 3 Way Valve |
| 4. Water Pressure Sensor | 15. DHW Potentiometer |
| 5. Over Temperature Protector | 16. CH Potentiometer |
| 6. APS | 17. On/Off/Reset/Summer/Winter Potentiometer |
| 7. DHW NTC Probe | 18. Fuse |
| 8. Flowmeter | 19. LCD |
| 9. Outdoor NTC probe (Ops.) | 20. Error LED |
| 10. Pump | 21. Ignition and Ionization Electrode |
| 11. Fan | |

6. CONTROL PANEL



1. Position Selection Knob (Winter, OFF/Reset, Summer Mode)
2. CH Water Temperature Set Knob
3. DHW Water Temperature Set Knob
4. Malfunction Warning LED

6.1 POSITION SELECTION KNOB (WINTER, OFF/RESET, SUMMER MODE)

When this knob turns to left, device runs according to “❄️” mode and ready to CH and DHW heating requests.

When this knob at middle position, device will be on OFF/standby mode. At that mode, frost protection is ready to activate.

When device gave a fault; turn knob to OFF position and wait 3 second for fixing the fault and then turn previous mode.

When this knob turns to right, device runs according to “🔥” mode and ready to only DHW heating requests.

6.2 CH WATER TEMPERATURE SET KNOB

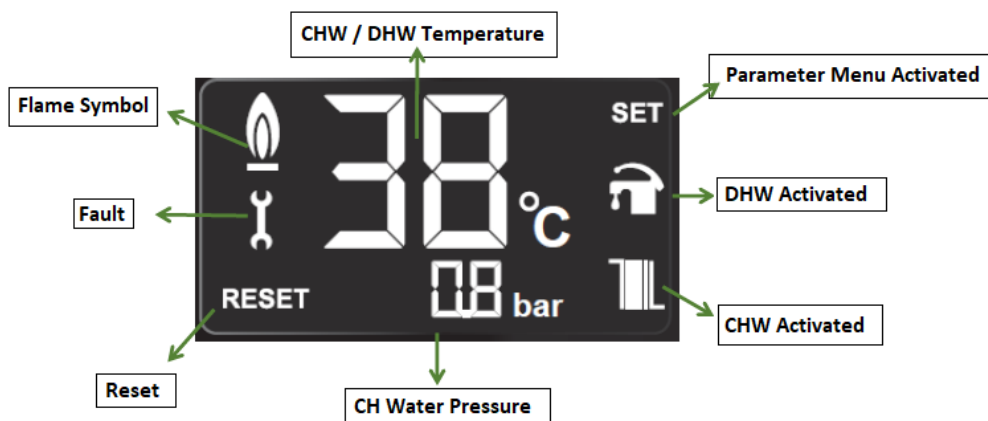
CH water temperature can be set with using “🌡️” knob between 30 - 80°C.

6.3 DHW WATER TEMPERATURE SET KNOB

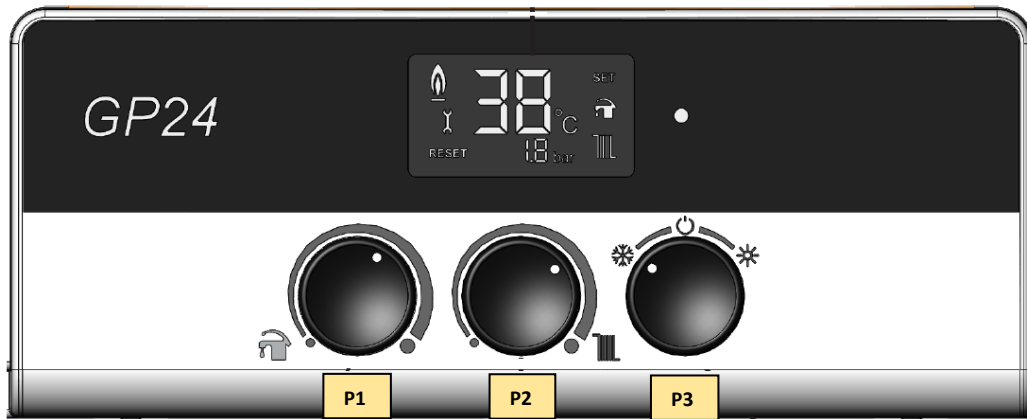
DHW water temperature can be set with using “🚿” knob between 35 - 64°C.

6.4 MALFUNCTION WARNING LED

This LED will be activated, when device gave a fault. At that way, user can notice fault easily.



7. PARAMETER MENU



Parameter Setting:

It's necessary to perform the following sequence to enter parameter menu and make modifications in the menu:

- Move P2 (CH knob) to maximum position.
- Move P3 to "OFF" position and subsequently to "WINTER" position quickly.
- Repeat step 2 four times and then leave knob in "WINTER" position. Parameter menu is entered with displaying "P" and "Parameter No" consequently. Parameter no is 1 after entrance.



- To increase the parameter no, move P3 to "OFF" position and subsequently to "WINTER" position.
- After reaching the desired parameter no, move P3 to "OFF" position and wait for 5 seconds. Display will show the parameter value.



- To change the parameter value, move P3 to "WINTER" position. Move P1 (DHW knob) to modify the value of selected parameter.



- Move P3 to "OFF" position. Wait for 5 seconds to store new value.
- It is now possible to select another parameter.
- Move P2(CH knob) when P3 is in WINTER position to exit from parameter menu.

Note 1: If no movement is done with P3 in 2 minutes during parameter menu, menu is automatically exited after 2 minutes.

Note 2: If the boiler is operating in CH mode while "PP07 CH Max Capacity" modification, the selected value is not immediately applied to gas valve modulator, it is applied to the modulator after storing the new parameter.

Note 3: All parameters are set to their factory settings if 45 is written to PP31.

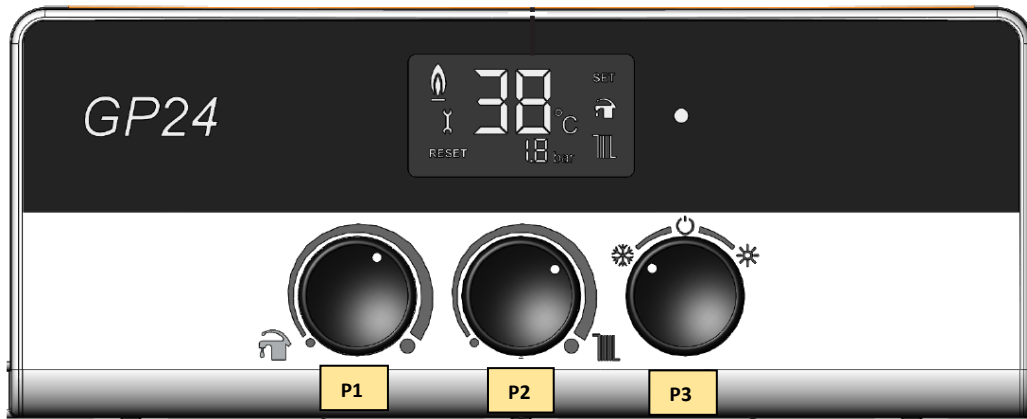
8. SERVICE PARAMETER LIST

Parameter No	Parameter Name Parameter Value Definition	Factory Setting	Range
PP01	Ignition Capacity	25	0 - 50
	0 - 50 (%)		
PP02	Gas Type	0	0 - 3
	0: NG 1: LPG 2: Gas Type 3 3: Gas Type 4		
PP03	AFCT Time	3	1 - 6
	1.....6 minutes		
PP06	Pump Operation in CH AFCT Time	0	0 - 1
	0: Pump always on in CH AFCT 1: Pump on for only 45 seconds in CH AFCT		
PP07	CH Max Capacity (Note 1)	99	5 - 99
	5 - 99 (%)		
PP08	CH Heating Type	0	0 - 1
	0: Radiator 1: Floor		
PP11	DHW Operating Type	0	0 - 1
	0: Turn-off at 71°C 1: Turn-off at "DHW Set temperature + 5°C"		
PP12	DHW Flow CH Pressure Type	4	0 - 4
	0: DHW flow switch, CH pressure switch 1: DHW FUGAS flow sensor, CH pressure switch 2: DHW FUGAS flow sensor, CH GEME pressure sensor 3: DHW BITRON flow sensor, CH BITRON pressure sensor 4: EMAS HYDROBLOCK		
PP13	Heat Dispersion Coefficient	3	0 - 7
	0: k=0 1: k=0.5 2: k=1 3: k=1.5 4: k=2 5: k=3 6: k=4 7: k=6		
PP15	Outdoor Sensor Type	0	0 - 1
	0: Outdoor sensor not available 1: Outdoor sensor available		
PP26	CH Min Capacity (Note1)	0	0 - 60
	0 - 60 (%)		
PP28	CH flow OFF temperature positive hysteresis for AFCT entrance	5	1 - 10
	1.....10 °C		
PP29	CH flow ON temperature negative hysteresis for AFCT exit	3	1 - 10
	1.....10 °C		
PP30	ON-OFF Room Thermostat Selection	0	0 - 1
	0: ON OFF room thermostat not available 1: ON OFF room thermostat available		
PP31	Parameters Factory Setting	0	0 - 99
	20: service reminder time cleared 45: all parameters are set to factory defaults 70: fault history logs are all cleared		

9. OPERATION PARAMETERS

No	Description	Value	Unit
1.	CH flow primary OFF temperature – during DHW operation	90	°C
2.	CH flow primary ON temperature – during DHW operation	80	°C
3.	Maximum modulator current for LPG	170	mA
4.	Maximum modulator current for NG	125	mA
5.	Maximum modulator current for 3 rd Gas	100	mA
6.	Maximum modulator current for 4 th Gas	136	mA
7.	Minimum modulator current for LPG	27	mA
8.	Minimum modulator current for NG	20	mA
9.	Minimum modulator current for 3 rd Gas	20	mA
10.	Minimum modulator current for 4 th Gas	20	mA
11.	CH modulator current range	Min ÷ Max	mA
12.	CH set range (radiator)	30 ÷ 80	°C
13.	CH set range (floor)	30 ÷ 50	°C
14.	DHW set range	35 ÷ 64	°C
15.	CH flow OFF temperature for AFCT entrance (for both PP08: radiator or PP08: floor)	CH SET + PP28	°C
16.	CH flow ON temperature for AFCT exit (for both PP08: radiator or PP08: floor)	CH SET – PP29	°C
17.	DHW temperature OFF (if PP11: 1)	DHW SET + 5	°C
18.	DHW temperature ON (if PP11: 1)	DHW SET	°C
19.	DHW temperature OFF (if PP11: 0)	71	°C
20.	DHW temperature ON (if PP11: 0)	DHW SET - 5	°C
21.	FUGAS Flow sensor DHW ON	30Hz (3lt/min)	
22.	FUGAS Flow sensor DHW OFF	25Hz (2.5lt/min)	
23.	BITRON Flow sensor DHW ON	9,5Hz (3lt/min)	
24.	BITRON Flow sensor DHW OFF	8Hz (2.5lt/min)	
25.	EMAS Flow sensor DHW ON	12Hz (3lt/min)	
26.	EMAS Flow sensor DHW OFF	10Hz (2.5lt/min)	
27.	No-frost ON temperature	6	°C
28.	No-frost OFF temperature	15	°C
29.	No-frost timeout period	15	min
30.	Fan overrun time	10	s
31.	DHW flow ON time	1.5	s
32.	CH flow temperature probe	NTC 10KΩ @ 25°C (β = 3435)	
33.	DHW temperature probe	NTC 10KΩ @ 25°C (β = 3435)	
34.	Outdoor temperature probe	NTC 10KΩ @ 25°C (β = 3970)	

10. FAULT HISTORY MENU



Last occurred 10 errors are logged in fault history menu. L0 shows the latest error, L9 shows the oldest error. If a new error occurs it is logged in L0 and all the logs are switched to a bigger log.

It's necessary to perform the following sequence to enter fault history menu:

- Move P2 (CH knob) to minimum position.
- Move P3 to "OFF" position and subsequently to "WINTER" position quickly.
- Repeat step 2 four times and then leave knob in "WINTER" position. Fault history menu is entered with displaying "L0".

For example if the latest occurred error is F01, it is logged in L0 and seen as below:



- To increase the log no, move P3 to "OFF" position and subsequently to "WINTER" position.

For example if only 2 errors occurred they are logged into L0 and L1; L2 should be empty:



- Move P2(CH knob) when P3 is in WINTER position to exit from fault history menu.

If no movement is done with P3 in 2 minutes during Fault History menu, menu is automatically exited after 2 minutes.

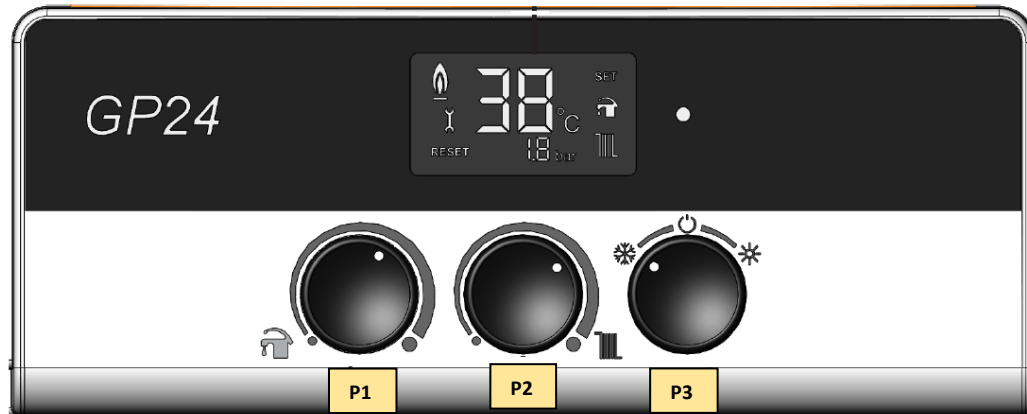
All history logs are cleared if 70 is written to PP31.

11. HATA KODLARI (Error Codes)

FAILURE TYPE	FAILURE CODE	DESCRIPTION
Air Pressure Switch short	F5	When heat demand is available, if APS is closed for 15sec although FAN is stopped, this error is given. When APS is opened, normal operation is started automatically.
Air Pressure Switch open	F5	If APS is opened for 15sec although FAN is run, this error is given. When APS is closed while fan is running, normal operation is started automatically.
Outdoor probe error	F6	If Outdoor NTC probe is available and the temperature measured by this probe is above 70°C or outdoor sensor is short circuit; this error is given. CH operation keeps operating as if system is configured without outdoor sensor. Normal operation starts when the error condition is disappeared.
Low Water Pressure error	F7	If water pressure is $\leq 0.4\text{bar}$ this error is given. Error is cleared automatically if water pressure $\geq 0.8\text{bar}$ Water pressure display also shows the actual pressure value during F7 error.
Safety thermostat open	F1	If safety thermostat is opened for 3 sec this lockout is given. RESET potentiometer action is required in order to reset the failure.
DHW NTC probe error	F2	If DHW NTC probe is open or short circuit, or it is damaged this error is given. Normal operation is started when error is disappeared. This error is not given during CH operation.
CH flow NTC probe error	F3	If CH flow NTC probe is open or short circuit, or it is damaged this error is given. Both DHW and CH demand is stopped during this error. Normal operation is restarted when error is disappeared.
Ionization error	F4	If there are 3 consecutive flame errors when Gas Type is selected as NG or 1 flame error when Gas Type is selected as LPG, this lockout is given. RESET potentiometer action is required in order to reset the failure.
Ionization component error	F0	In case of an out-of-range ionization signal for 15 seconds this error is given. Normal operation is started automatically when the error condition is disappeared for 2 seconds.
False flame error	F4	If there is a false flame condition for 10 seconds, this error is given. Normal operation is started automatically when the error condition is disappeared.
Gas valve feedback error	F9	If there is an error in gas valve feedback check circuitry, this lockout is given. RESET potentiometer action is required in order to reset the failure.
Low voltage error	F8	If supply line voltage is below $155 \pm 15\text{V}$, this error is given. Normal operation restarts when voltage is higher than $160 \pm 15\text{V}$.
High Water Pressure error	F15	If water pressure is $\geq 2.8\text{bar}$ this error is given. Boiler keeps working. If water pressure is $\geq 3.5\text{bar}$ this error is given. Boiler stops working. Error is cleared automatically if water pressure $\leq 2.6\text{bar}$. Water pressure display also shows the actual pressure value during F15 error.

CH NTC High Temperature Error During DHW	F16	If CH Flow NTC is higher than 90°C during DHW operation, burner is stopped and F16 error is given. When CH Flow NTC is below 80°C error is cleared and normal operation is restarted. When DHW flow is closed during this error, error is cleared.
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12. OPERATION MODES



OFF MODE

The boiler enters OFF mode when P3 is adjusted to OFF position. Pump is off, if pump overrun time is elapsed, otherwise it is on. Fan is off, if fan overrun time is elapsed, otherwise it is on. DHW and CH modes are inactive. LCD display is blank. Antifreeze and antiblocking functions are active.

AIR PURGE FUNCTION

Air purge function helps for the pump secure operation by reducing the air bubbles.

This function is activated:

- On power-on: If the device is not in OFF position and if there is not DHW demand this function is activated. If DHW heat demand is available on power-on, firstly DHW demand is supplied, air purge is started after DHW is closed. If the device is in OFF position on power-on, air purge is started after taking P3 to WINTER or SUMMER position.
- After manual resetting of F1(Safety Thermostat Open) lockout
- After CH water pressure is built up to the normal level after F7(Low Water Pressure) and F15(High Water Pressure) errors.

DHW heating has more priority than air purge function. If a DHW demand is received during air purge, air purge is stopped, DHW demand is supplied, after DHW demand air purge is restarted.

Air purge function can be stopped by taking P3 to OFF position.

Air purge function runs for 240 sec (3WV in CH position for the first 90 seconds, then 3WV in DHW position for 60 seconds, then again in CH position for 90 seconds). During air purge, pump is ON for 10 seconds and pump is OFF for 5 seconds continuously.

Display shows AP during this function.

CH HEATING MODE

CH Heating Mode is enabled when P3 Knob is on winter position otherwise CH mode is disabled. If the water temperature, measured by the CH flow NTC probe, is under the low limit (CH flow temperature ON in table 1) for the CH set-point and heat demand is requested on room thermostat input (when PP30 is selected as ON_OFF room thermostat available); the burner is turned on. For CH operation, first fan and pump are energized, then APS check is done and ignition is started.

If the boiler is on for the first time, APS check is done for both of the 2 conditions, APS is checked to be closed after fan is on and then fan is off and APS is checked to be opened.

For the first two minutes after ignition, minimum current is applied to the modulation valve. After two minutes, modulation current is controlled with a PID algorithm to set the CH temperature to CH SET temperature.

Pump is on for “always” or “45 seconds”, during antifast cycling time according to the parameter “PP06 Pump Operation in CH AFCT Time”. If room thermostat input is opened, pump is on for 45 seconds.

After every heat demand request end, a fan overrun (Fan overrun time) is done.

Radiator symbol is flashing during CH heating operation and CH flow NTC probe temperature is displayed on LCD. Flame symbol is ON if the flame is available.

DHW INSTANTENOUS HEATING MODE

The DHW Instantaneous function has higher priority than the central heating function.

DHW Instantaneous Heating Mode is enabled when P3 knob is on winter or summer position. Flow can be detected by a switch or sensor according to parameter “PP12 DHW Flow CH Pressure Type”. If water flow is detected for 1,5 seconds by flow switch or flow sensor, boiler enters into DHW operation. On DHW mode entrance fan is energized. Pump is also energized. After checking the air pressure switch, ignition is enabled. After flame detection, flame modulation is done with a PID type algorithm till the achievement of the DHW set point.

Aim is to set the water temperature to DHW SET temperature, for this purpose the modulator current is controlled with a PID algorithm. But, if the water temperature measured by the DHW NTC probe goes over the high limit (DHW temperature OFF), the burner is turned off. When it's under the low limit (DHW temperature ON in table 1), the boiler is turned on again.

DHW heating demand request is stopped when water flow detection is stopped. Pump and fan are run till their overrun times.

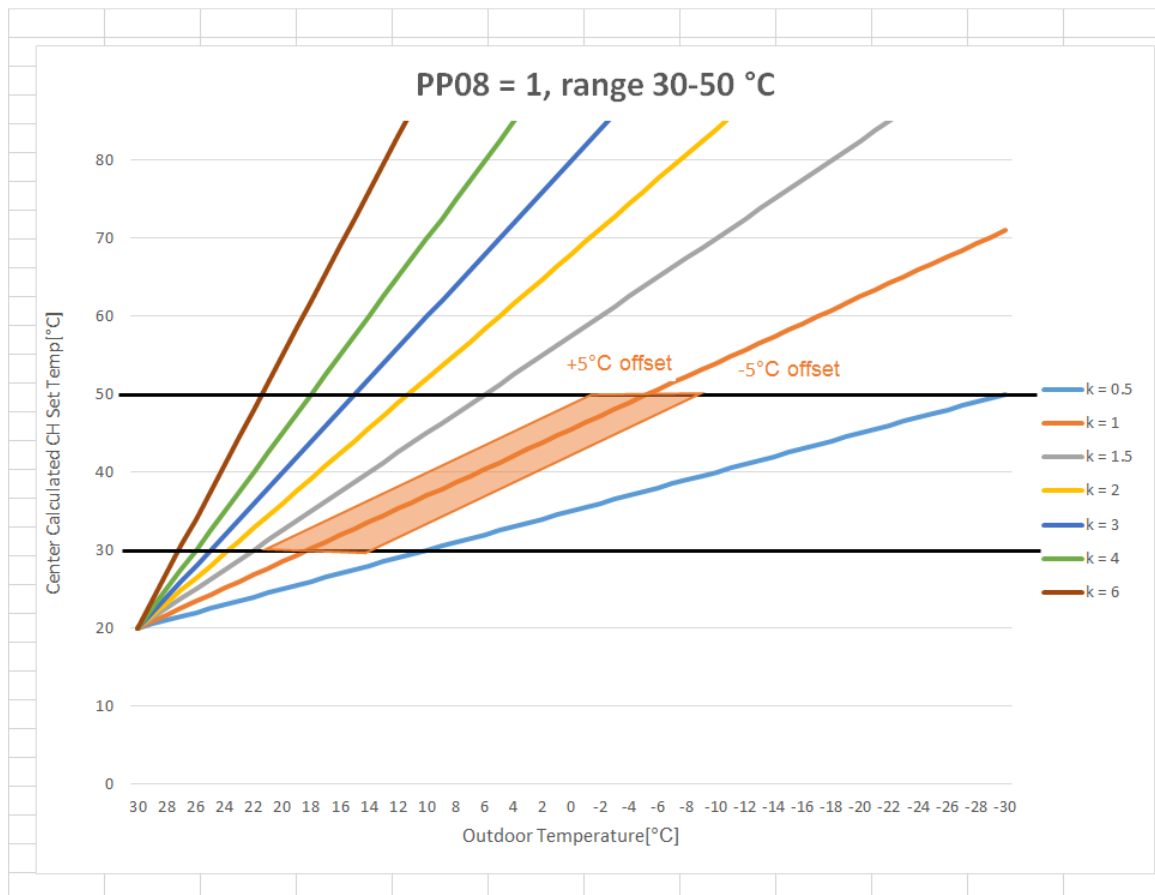
DHW (tap) symbol is flashing during DHW heating operation and DHW NTC probe temperature is displayed on LCD. Flame symbol is ON if the flame is available.

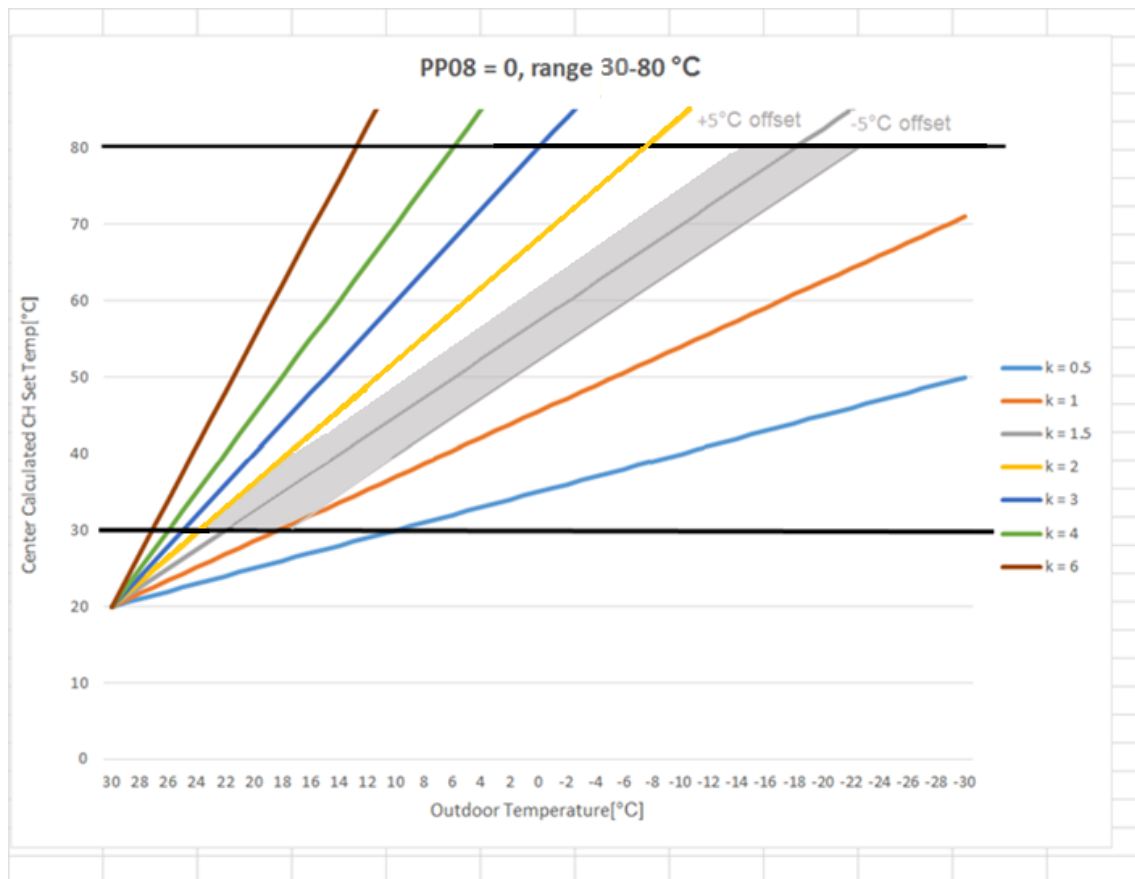
If DHW sensor error occurs “F2” error is given and DHW heating is stopped. But CH heating operation goes on.

OPERATION WITH OUTDOOR NTC PROBE

The system is prearranged for the connection to an NTC sensor, which measures the external temperature outside the building in which the installation is placed. The available adjustments in this heating mode are the calculated center CH Set Temperature and the heat dispersion coefficient of the room walls. To connect the outdoor NTC probe, firstly **PP15 Outdoor sensor type** parameter's value must be changed to **Outdoor sensor available (1)**. Outdoor temperature measurement starts only if PP15 is selected as 1. If PP15 is selected as 1 and outdoor NTC probe is not connected F6 error code is shown on the display but boiler keeps working.

Note: The set-point calculated by the external probe formula is never higher than the maximum temperature range and never lower than the minimum temperature range of the wall / floor central heating. CH Set Temperature is calculated according to the below graphics.





SERVICE REMINDER FUNCTION

Service reminder function will be activated if the input power is supplied to the control board for 7500 hours. SE will be displayed together with the service icon on the user interface. Control board continues normal operation during service reminder function. Service reminder must be cancelled by RESET knob. After resetting the service reminder by RESET knob, service reminder will be activated again for 2 more times in 72 hours. After 3rd resetting of service reminder function, it will be activated again after 7500 hours.

Service reminder time is cleared and 7500 hours counting is restarted if 20 is written to PP31.

ANTIFREEZE FUNCTION

If the water temperature, measured by the CH flow NTC probe is under the low limit for “No-frost ON temperature in table 1”, the burner is turned on. After flame detection the modulation level is set to the minimum. If the CH flow NTC probe temperature goes over the high limit for the “No-frost OFF temperature in table 1”, the burner is turned off. The antifreeze function operates in the mode SUMMER or OFF or WINTER when the heat demand is not available on room thermostat inputs. In lock-out condition only the pump is energized.

If No-frost temperature OFF value is not reached in a period (No-frost timeout period) antifreeze is stopped and pump is energized for 3 min.

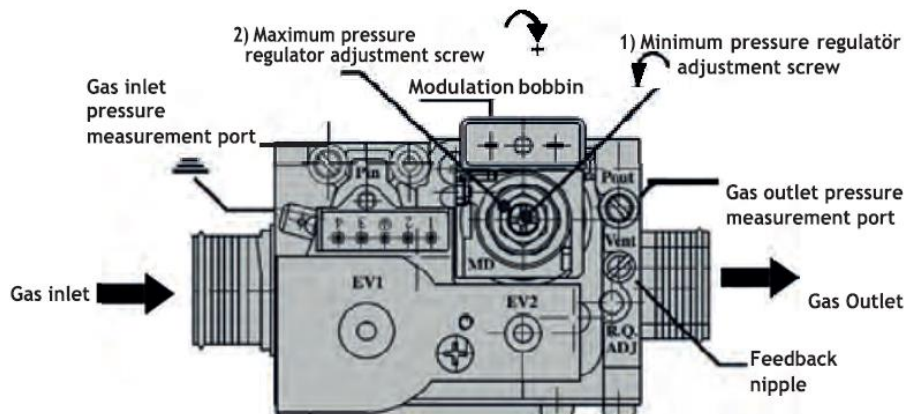
During antifreeze function, display shows “AF” and CH temperature alternately.

13. GAS CONVERSION

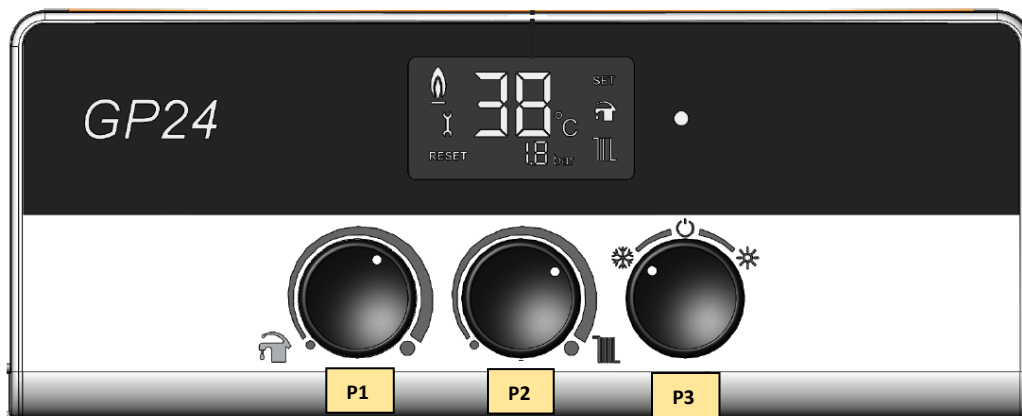
This device is useable with only naturel gas. LPG version is not available, so gas conversion isn't necessary.

14. GAS PRESSURE ADJUSTMENT

As the heating capacity of the device is directly dependent on gas pressure, the device's (mechanically) minimum and maximum heating capacity becomes adjusted by the determination of operation pressure range.



15. SERVICE MODE



- Power off the control board
- Adjust the knob positions to P1 maximum, P2 minimum, P3 OFF
- Power on the boiler and observe the "CC" written on the display, after seeing the "CC" adjust the P2 to maximum.

⚠ Info : The special parameter setting sequence is available to disable the minimum modulator current for the first 2 minutes of each burner operation

Setting the maximum outlet pressure;

- ❖ The device is taken to maximum operation position.
- ❖ Gas outlet pressure measurement port's screw is loosened.
- ❖ U manometer is connected to gas outlet pressure ($\varnothing 9$ mm) measurement port.
- ❖ After removing the protection cap of maximum pressure regulator's adjustment screw –shown by no 2 in Figure- , the gas flow towards the burner increases by slowly turning it clockwise, and otherwise it decreases.
- ❖ By monitoring the pressure values from U manometer, the required pressure value is obtained. Setting of maximum outlet pressure is made only for natural gas, the adjust screw of maximum pressure regulator is completely tightened.

Setting the minimum outlet pressure;

- ❖ The device is taken to minimum operation by removing one of the gas modulation cables.
- ❖ Gas outlet pressure measurement port's screw is loosened.
- ❖ Gas flow decreases by turning the minimum pressure regulator's adjustment screw –shown by no 1 in Figure- clockwise, and otherwise it increases.
- ❖ The required pressure value is obtained by monitoring the pressure values from U manometer.
- ❖ After making the setting, the screw removed from the outlet pressure measurement port is fastened again and tightened for the measurement of gas valve's outlet pressure.
- ❖ The removed front panel and control panel are fastened again.

ECA GP 24 HM		
Natural Gas	Max. Gas Pressure (mbar)	12,3
	Min. Gas Pressure (mbar)	1,4

ECA GP 24 HM	CH Capacity	P07 Parameter Value
	11,3	51
	13	60
	16	70
	20	82
	24	99

16. MAIN COMPONENTS

Mainboard

The mainboard operates at 230V AC, 50Hz and controls the gas valve, fan, circulation pump and 3-way valve. A dynamic air pressure test is performed before each ignition cycle. The limit thermostat provides an extra level of safety. Whether or not the burner is flame is continuously checked by ionisation. The signals from the NTCs assess the need for heat and ensure safe operation. The mainboard provides the operating functions and safety of the device. The mainboard is covered with a plastic housing and has IP4XD safety class. The mainboard functions are made by the 2 microprocessors (low voltage and high voltage microprocessors) included. The mainboard consists of 2 parts: the high voltage side and the low voltage side. There are microprocessors on both sides. There is continuous communication between microprocessors. A lot of data is sent from one section to another for control and comparison.

Gas Valve

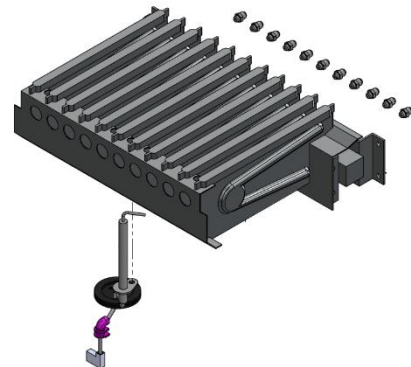
The gas valve modulates the flow of gas to the burner. The gas valve has 2 valves. First valve, on / off safety valve. The second is the main valve (modulating valve) which provides both safety and modulated gas control. The minimum and maximum operating pressures can be adjusted mechanically via the gas valve. The modulation valve is set with the maximum output pressure, the maximum pressure regulator adjustment screw. The minimum outlet pressure is set using the mechanical minimum adjustment screw (see Gas pressure adjustment).

Burner

The burner is the place where the gas coming from the gas valve is burned. An 11-bladed burner is used for 24 kW combi boilers.

Injector diameter in the use of NG: 1,32 mm

Gas inlet connection: G3/4 (External thread)



Ignition – Ionisation Electrode

The device has a single electrode and it is used for ignition and ionisation. The ignition on the burner leads to burning of the burner by generating a spark with high voltage from the mainboard. Ionisation electrode generates a current to inform the electronic card whether a flame has formed in the burner and controls it throughout the burning period.

Attention: To disassemble electrodes, burner should be removed.

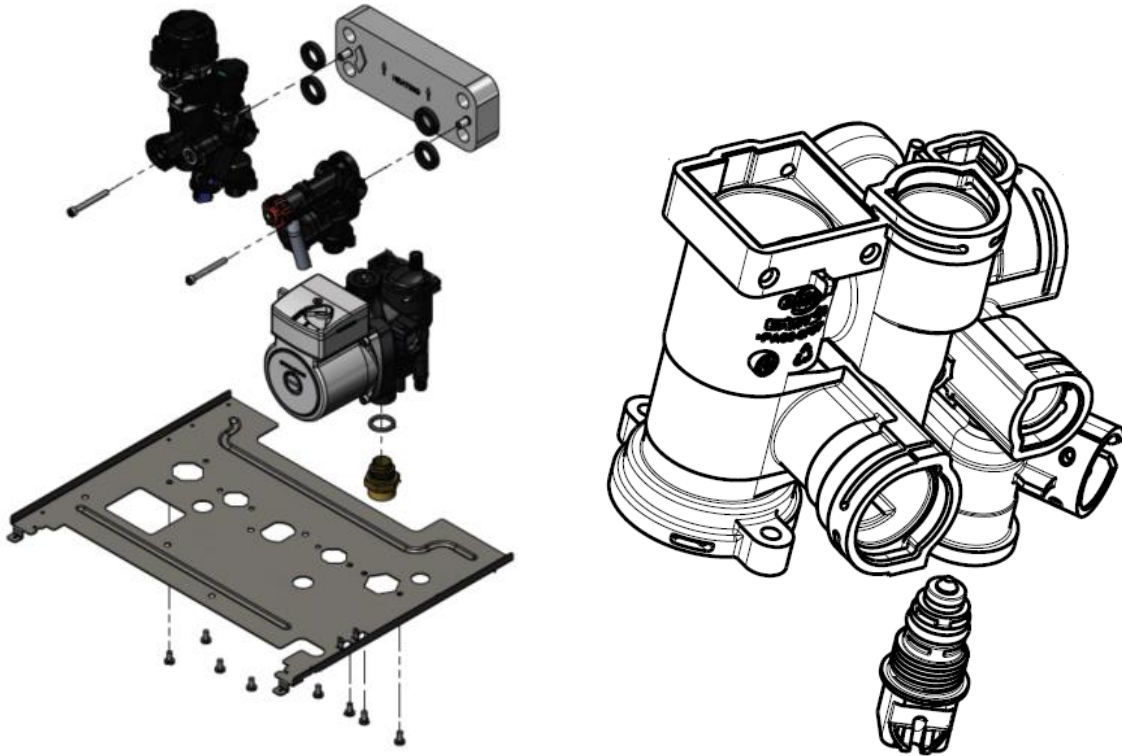
Heat Exchanger

The heat exchanger is a component that transfers the energy generated by the burning of the gas to the installation water. Monothermic heat exchangers only have central heating water heated, so there is only one water inlet and outlet. In monothermic models, Domestic hot water is heated by means of a second heat exchanger (plate exchanger).

Hydroblock

There is a pump, 3 bar safety valve, filling valve, water pressure sensor, plate exchanger, turbine, 3 way motorized valve and immersion/surface NTC on this hydroblocks.

The pump suction is from the left side of the pump and the exit is upside as shown in the figure below.



Filling Tap

Filling tap has a basic structure. To fill the system, open the valve by turning. When the water pressure reaches between 1,0 - 1,5 bars, filling tap can be closed.

Disassemble of filling tap:

Firstly disassemble the flow manifold and turn the tap.

Assemble of filling tap:

Turn the tap until closing the filling tap.

Pump

Pump central heating (central heating system) provides circulation of water. Also, in monothermic models, the pump allows the central heating water to be circulated in the boiler, thus domestic hot water is heated by water passing through plate heat exchanger. The pump is located on the hydroblock. It has 3 speed range that can be adjusted. The pump has expansion tank connection hole and an automatic air purge.

Maximum Power	75W
Speed Stage	3
Pump Water Outlet Connection	G3/4 (External Thread)
Manometer Connection	Closed
Drain Valve	Integrated pump

Water Pressure Sensor

The water pressure sensor prevents the device from operating at low water pressure. When the water pressure at the central heating circuit falls below 0.4 bar, the normally open water pressure sensor closes and blocks the operation of the mainboard combination with the signal from the water pressure sensor. When the water pressure rises above 0.8 bar, the boiler returns to normal operation. The water pressure sensor is located on the flow manifold (in the central heating flow line). Sensors are assembling with clips. Option 1 and 2 are using same water pressure sensor.

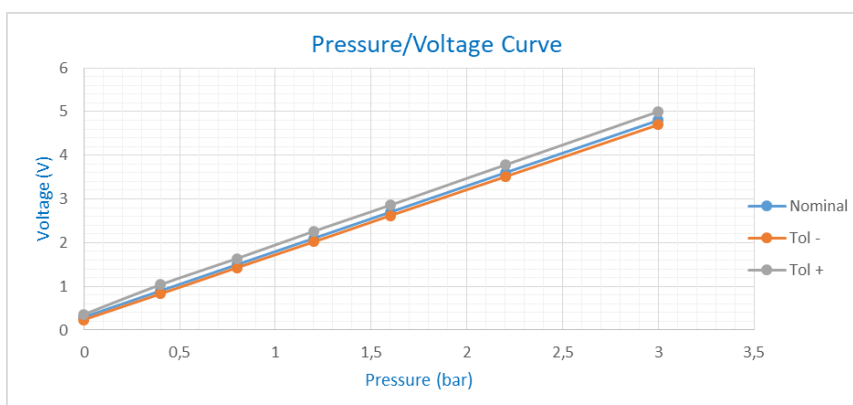
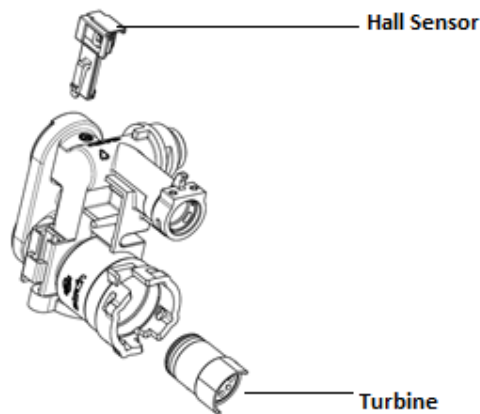


Plate Heat Exchanger

The plate exchanger is a second exchanger that provides heating of the domestic hot water in monothermic models. When hot water is needed, the 3-way motorized valve directs the central heating water from the main exchanger to the plate heat exchanger. The plate heat exchanger allows heat to be transferred to the domestic hot water as it passes through the central heating water. For 24 kW combi boiler, 10 plate plate heat exchanger is used. The plate exchanger is mounted on the hydroblock with 2 imbus bolts. O-ring sealing is provided at the inlet and outlet of domestic hot water and central heating water.

Turbine (Water Flow Sensor)

Turbine measures domestic hot water flow. In both bitermic and monothermic models, it is integrated in the hydroblock (return manifold). When the water is flowing, the turbine turns and forms a magnetic field. The Hall effect sensor collects the generated magnetic field and informs the electronic card. The electronic card controls the operation of the hot water according to the frequency values from the turbine type. When the water flow frequency reaches 3 lt/min, the hot water enters the operating circuit and when it falls below 2,5 lt / min the hot water operation ends.



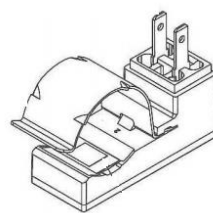
3 Bar Safety Valve

The 3 bar safety valve protects the central heating circuit and the device against a possible increase in pressure. When the water pressure at the central heating circuit exceeds 3 bar, the safety valve is opened to reduce the water pressure (safety valve output drainage should be provided). The 3 bar safety valve is located in the central heating flow line on the hydroblock.

DHW – CH Temperature Sensor (NTC)

The device have 2 NTC (Negative Temperature Coefficient). One of that is immersion type at DHW outlet, other is surface type at CH outlet. The principle of this type of sensors; The temperature is inversely proportional to the sensor resistance, the sensor resistance decreases as the temperature increases, or the sensor resistance increases as the temperature decreases. NTC sensors are usually identified with nominal resistance values of 25 ° C. However, this value does not fully define the nominal R-T curve of the NTC. (25°C 10kΩ β3435)

The temperature sensors measure the water temperatures of the domestic hot water and the central heating (central heating system) and signal the electronic board. The surface type temperature sensor is connected to the heating pipe by a clip. Immersion type temperature sensors are mounted on hydroblock (flow manifold) by a clips.



Surface Type NTC



Immersion Type NTC

3 Way Motorized Valve

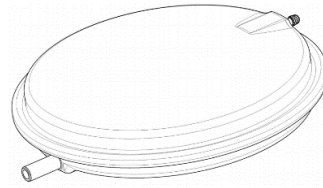
The 3-way motorized valve directs the central heating water from the main exchanger to the plate heat exchanger when it needs domestic hot water in monothermic models. When hot water is needed, the valve returns to its original position, allowing the central heating to continue.



Expansion Vessel

The expansion tank meets the expansion of the hot water circulating in the central heating (heating circuit) circuit, which is a closed circuit system.

Tank volume is 6 litres and inlet connection point is G3/8 (external thread)



Differential Air Pressure Switch (APS)

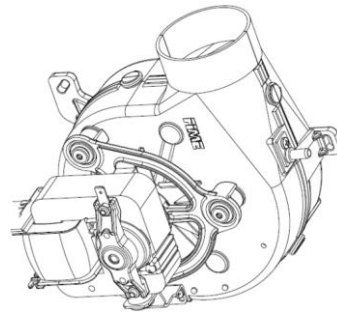
The differential air pressure switch is used in hermetic models. It monitors air flow by measuring the pressure difference between fresh air and waste gas required for combustion. When there is a blockage in the hermetic chimney set or in the case of several external air currents, the differential air pressure is switched off to stop the combination from operating. The low pressure inlet of the differential air pressure switch is connected to the fan via a silicone hose. The high pressure inlet is again connected to the combustion chamber by means of a silicone hose.

At the start of operation, the differential air pressure switch is on. In the first stage, the fan starts to run, when the pressure difference rises above the set value within a certain period of time, the switch closes and the combination starts working. When the pressure difference falls below a certain value, the switch is opened and the combination is inhibited from operating.

Fan

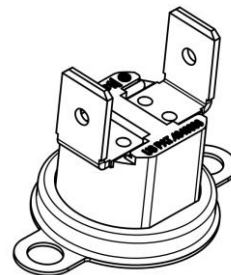
The fan allows both the discharge of exhaust gas and the fresh air required for combustion in the hermetic combination.

Maximum power: 48W
Inner diameter of silicon hose : 5 mm

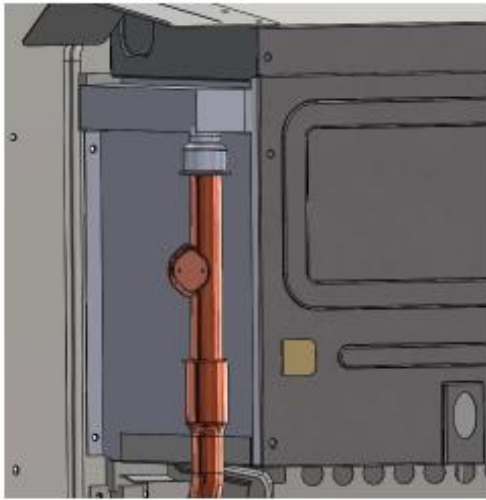


Limit Thermostat

Limit thermostat is bimetal type. The limit thermostat opens when the water temperature from the exchanger exceeds 105°C and stops the operation of the combination by cutting off the signal to the electronic board and provides safety. When the water temperature falls below 75°C, the limit thermostat switches off and allows the combination to restart after a reset. Limit thermostat is mounted in monotermic models with 2 screws (YSB 2.9 * 6.5) to the upper central heating flow pipe.

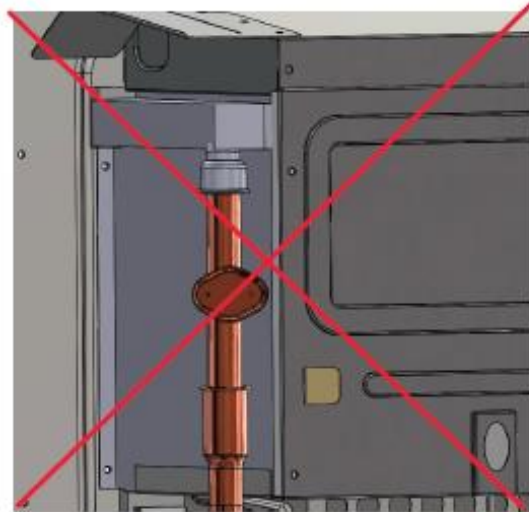


CORRECT POSITION



Upper pipe must be assembled as shown below.

WRONG POSITION



If the pipe is assembled in this position, the side cover will damage NTC Sensor Terminal.