coopra
ADVANCED HEATING TECHNOLOGIES

EN

Installation Manual

TWIN80C

Wall hung, fan flue, room sealed, high efficiency gas boiler

2007

E000129016

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CHAPTER 1. GENERAL

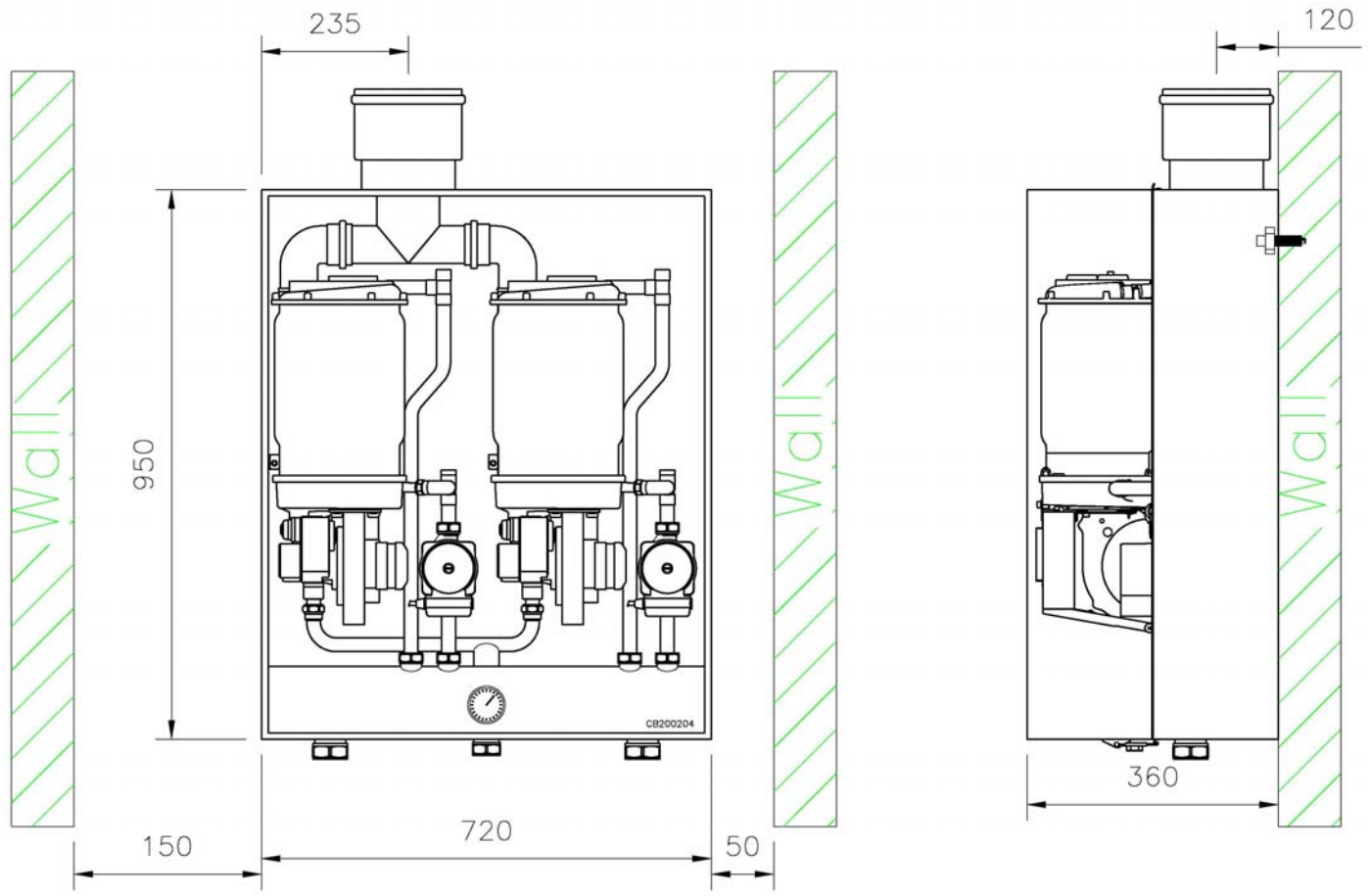
1.1. Technical data

Boiler type		**80C**		
Gas type		**natural gas G20**		**LPG gas G30/G31**
Electrical data	Supply / Frequency	230 V / 50 Hz (195 ÷ 270V @ 47,5 ÷ 52,5Hz)		
	Power consumption (max.)	280 W		
	Thermostat voltage	24 Volt / OpenTherm / 0-10V		
Dimensions and weight	Height	950 mm		
	Width	710 mm		
	Depth	360 mm		
	Weight	65 kg		
Emission value	CO_2	8.2% - 8.8%		9.2% - 9.8%
	CO (0% 0_2)	12 –100 ppm		
	NO_X (0% O_2)	10 – 30 ppm		
Flue gas-temperature	at 80/60ºC	< 70ºC		
	at 50/30ºC	< 35ºC		
Max. chimney resistance	Air feed and flue tube together	125 Pa		
Connections	Gas	G 3/4 ” outside		
	Heating (flow and return)	G 1 1/4” outside		
	Overflow	siphon		
Air feed and flue tube system				
	Concentric system	Ø 100 / 150 mm or Ø 110 / 150 mm		
Boiler heat exchanger	Water contents	4 L		
	Max. temperature	90°C		
	Max. operating pressure	3.2 bar		
	Max. system pressure	4 bar		
Sound level	Pump high	45 dB(A)		
	Pump low	35 dB(A)		
Certification	CE Identification number	CE0063-AT3070		

Cascade selection : menu parameter “.o” = 1		**TWIN in power mode**		
Gas type		**natural gas G20**		**LPG gas G30/G31**
Gas technical data	Nominal gas pressure	20 mbar		37/50 mbar
	Heat input (gross)	16.2 – 82.2 kW		
	Heat input (net)	14.6 – 74.0 kW		
	Nominal output at 80/60ºC	14.1 – 72.0 kW		
	Nominal output at 50/30ºC	15.6 – 75.3 kW		
	Efficiency at 80/60ºC (net)	Low load = 96.6 %; High load = 97.2 %		
	Efficiency at 50/30ºC (net)	Low load = 106.9 %; High load = 101.8 %		

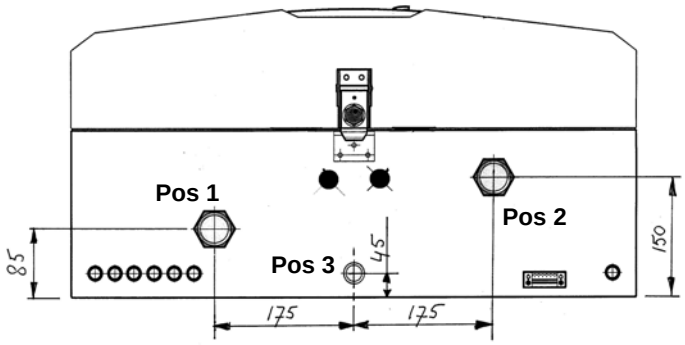
1.2. Dimensional sketch

Dimensions in mm



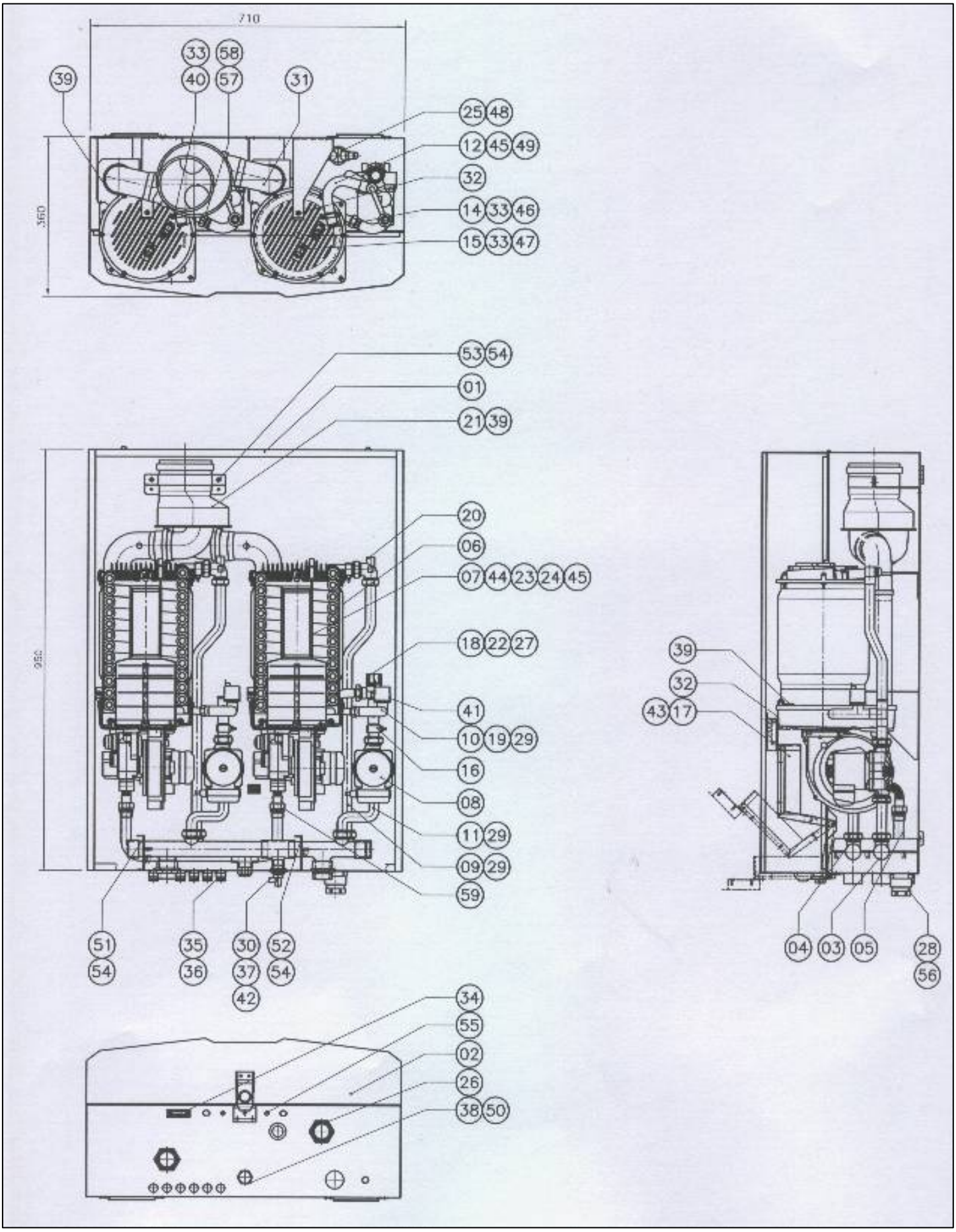
Free space: There must be sufficient space at the top and bottom to be able to suspend the unit and to be able to connect all feed and drain pipes. Normally, roughly 300 mm is required.
It is recommended to leave a free space of 150 mm on the left (for servicing reasons) and 50 mm on the right of the unit.
The front of the unit must be easily accessible for servicing at all times.

Connections



Pos 1 = Flow connection G1¼" male tread
Pos 2 = Return connection G1¼" male tread
Pos 3 = Gas connection G¾" male thread

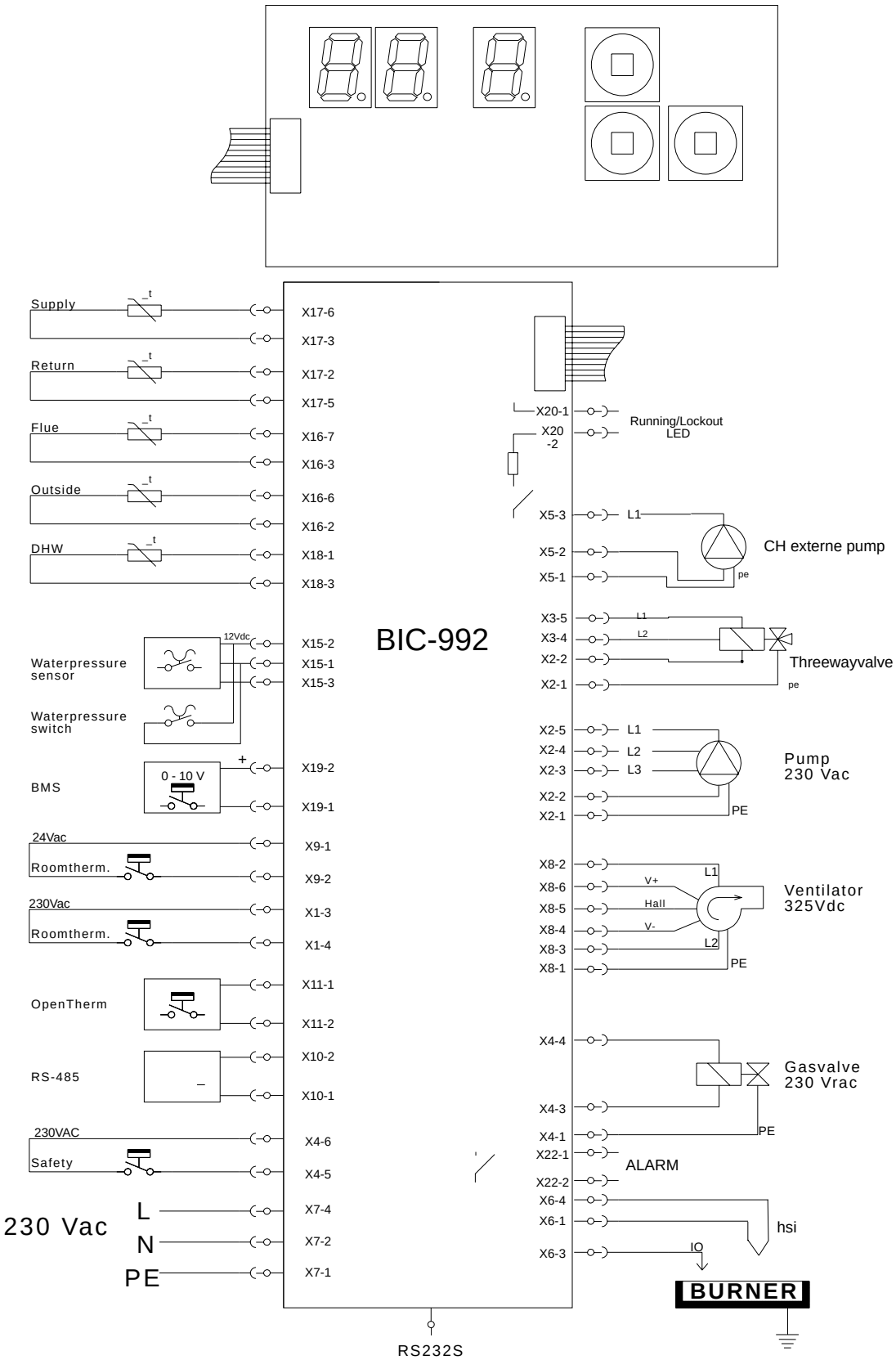
1.3. Boiler layout



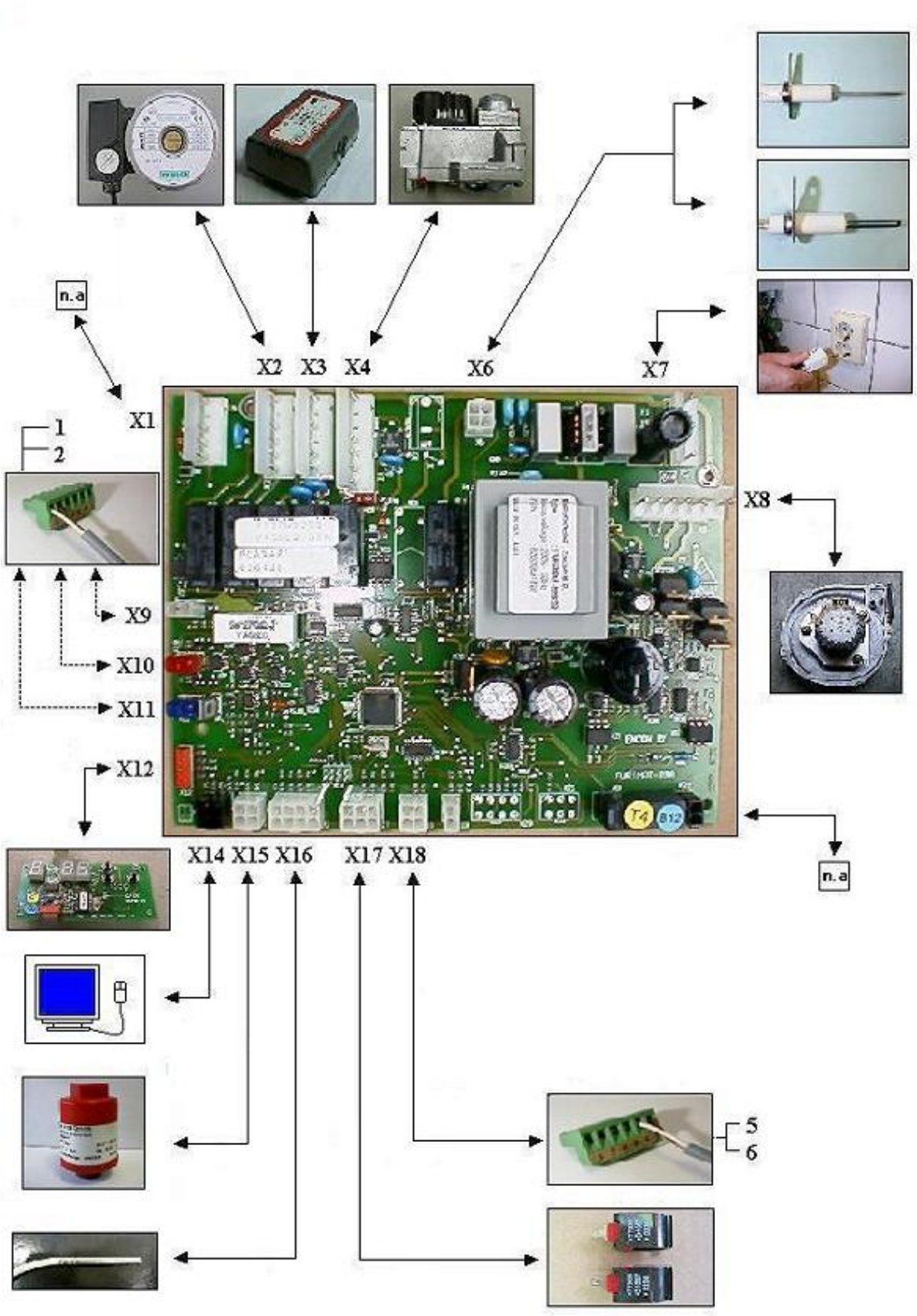
pos	description	Beschreibung	omschrijving		No.
01	Assembly frame	Montagekasten	Achterwand		1x
02	Cover	Mantel	Voorkap		1x
03	Flow collector	Vorlauf-Versammelrohr	manifold aanvoer		1x
04	Return collector	Rücklauf-Versammelrohr	manifold retour		1x
05	Gas collector	Gas-Versammelrohr	Gas-manifold		1x
06	Unit type 40	Wärmetauscher Typ 40	Ketellichaam type 40		2x
07	Burner type 40	Brenner Typ 40	Brander type 40		2x
08	Pump	Pumpe	pomp	Wilo RS15/7-2ku	2x
09	Internal flow pipe	Vorlaufrohr	Leiding aanvoer		2x
10	Kst. pump type 40	Kst.Pumpe Typ 40	Kst. pomp type 40		2x
11	Internal return pipe	Rücklaufrohr	Leiding retour		2x
12	Kst. flow type 40	Kst.Vorlauf Typ 40	Kst. aanvoer type 40		2x
13	Sealing plug	Dichtung	plug	Ø33,5	1x
14	Ionisation probe	Ionisationssonde	ionisatiepen	Beru	2x
15	Glow plug	Glühzünder	gloeiontsteker	230 VAC	2x
16	Temperature sensor pipe	Temperatursensor	Aanlegvoeler buis	Ø 22	4x
17	manager	Brennerautomat	besturing	SIT master / slave	1x
18	Safety valve	Sicherheitsventil	overstortventiel	Emmeti 3,2 bar	1x
19	plug	Dichtung	plug	G½”	1x
20	manual vent	Handentlüfter	handontluchter		2x
21	Manifold exhaust	Kaminstück	Broekstuk rookgasafvoer		1x
22	Nipple condensate tray	Verbindungsstück	Slangpilaar condensbak		1x
23	Sealing condensate tray	Dichtung Kondensatwanne	Pakking condensbak		2x
24	Sealing ring	Dichtring	Doorvoerrubber condensb.		2x
25	Connection siphon	Siphonanschlussstück	Aansluitbuis sifon		1x
26	Connection nut	Verbindungsmutter	connectiemoer	G1½”	2x
27	Tube of safety valve	sicherheitsventilschlauch	overstortslang	Ø19 x Ø13	1x
28	Strain relief	Ziehentlaster	kabelwartel	22-32 M40	1x
29	Sealing ring	Dichtring	pakkingring	1”	8x
30	Sealing ring	Dichtring	doorvoertule	Ø38 x Ø24,9	1x
31	Flue gas sensor	Abgastemperaturfühler	Voeler rookgas	Tasseron	2x
32	Cil.screw	Zilinderkopfschraube	Cil.schroef met bzk	M6 x 12	6x
33	screw	schraube	Zelfdraadv.schroef	M3 x 8	12x
34	Green connection block	Grüne Anschlussblock	Steker 6-polig		1x
35	Strain relief	Ziehentlaster	PG-wartel	Onkenhout	1x
36	Nut for strain relief	Ziehentlastermutter	Contramoer PG-wartel	Onkenhout	1x
37	Valve extension	Ventilverlängerung	kraanverlengstuk		1x
38	Nipple male/male	Verbindungsnippel	Dubbele nippel	G¾” x G¾”	1x
39	plug	Dichtung	plug	Ø12	6x
40	Fixation bracket	Fixierungsbügel	Fix.beugel aanvoerleiding		2x
41	Pressure sensor	Drucksensor	Druksensor	Huba / IMIT	2x
42	Filling/straining device	Fühl/Entlehrhahn	Radiator aftapkraan	G½”	1x
43	El. connection material	El. Verbindungsmaterial	kabelbundelband		25x
44	Cil.screw	Zilinderkopfschraube	Cil.schroef met bzk	M6 x 60	10x
45	Sealing flowpipe	Dichtung Vorlauf	Afdichting aanvoerleiding		4x
46	Sealing ionisation probe	Dichtung Ionisationssonde	Pakking ionisatiepen		2x
47	Sealing glow plug	Dichtung Glühzünder	Pakking ontsteekpen		2x
48	Condensate tube	Kondensatabfuhrschlauch	condensafvoerslang		2x
49	0-ring	0-Ringe	0-ring	Ø15,54 x Ø2,62	4x
50	Connection nut	Verbindungsmutter	connectiemoer	G¾”	1x
51	Bracket manifold L.	Bügel Versammelrohr L.	Sluitplaat manifold L.		1x
52	Bracket manifold R.	Bügel Versammelrohr R	Sluitplaat manifold R.		1x
53	Bracket flue pipe	Bügel Abgasrohr	Kapbeugel broekstuk		1x
54	Cil.screw	Zilinderkopfschraube	Cil.schroef met bzk	M6 x 20	8x
55	LED with wire	LED mit Schnur	LED met kabel		2x
56	Nut for strain relief	Ziehentlastermutter	Contramoer kabelwartel	M40	1x
57	Nut	Mutter	knelmoer	G½” x 15	2x
58	sleeve	Klemmring	knelring	Ø15	2x
59	Sealing ring gas	Dichtungsring Gas	Pakkingring gas	G¾”	2x
60	Sealing ring	Dichtungsring	pakkingring	Ø25 x Ø21 x 1,5	1x

1.4. Diagrams

1.4.1. Functional flow diagram

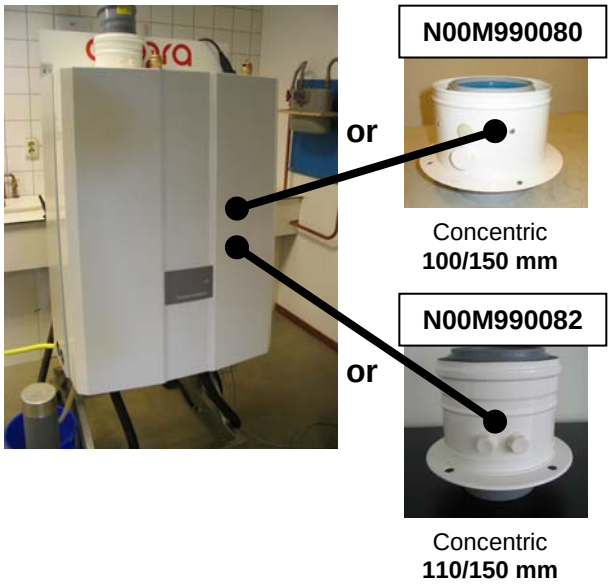


1.4.2. Wiring diagram



1.5. Condensing boiler

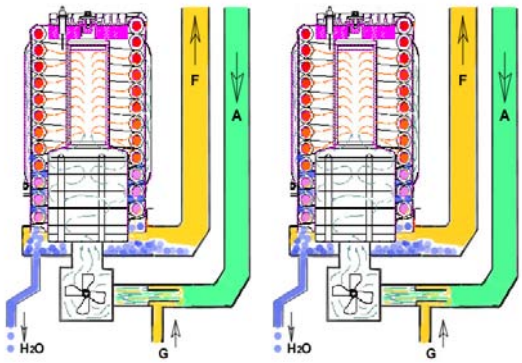
The concentric air inlet and exhaust outlet need to be connected with one of the adapter sets.



The TWIN 80C is a wall hung, fan flue, room sealed, high efficiency condensing gas boiler for central heating and / or under floor heating systems.
The type plate, which specifies the type of gas etc. to be used, for which the unit is set, is on the left side of the unit.

1.6. Operation

The appliance is equipped with pre-set gas/air ratio regulators. The purpose of this regulator is to keep the gas/air ratio in the burner as optimal as possible at all times e.g. when modulating. This ensures clean and reliable combustion across the entire load range. In addition it achieves high part-load efficiency.



The TWIN 80C incorporates 2x type 40C heat units (existing of 2x heat exchanger, 2x premix burner, 2x fan, 2x gas valve, 2x venturi, 2x circulation pump, 2x printed circuit board). Each heat burner works independently, cascade controlled by two printed circuit boards.

A fan sucks the air required for the combustion through the air feed canal (A). Because the combustion air in the venturi sucks an under pressure, the correct amount of gas (G) is automatically added to the combustion air.
The flammable gas/air mixture thus obtained is fed to the burner(s), via a mixing chamber, to be ignited at the surface of the burner(s) by a ceramic glow plug. The hot combustion gases are efficiently fed through the heat exchanger(s), where they give their heat to the system water. The flue gases are fed outdoor, through the flue tube (F), into a combined flue tube exhaust canal.
The formed condensation water (H_2O) is discharged through the waste trap.

1.6.1. Display

The display operates for both printed circuit boards.

Open the door in front of the jacket for operating and reading the codes on the display,

- The boiler of this picture is in the stand-by mode, because the display shows a continuous 0.
- The actual water temperature of the flow sensor is 19'C.

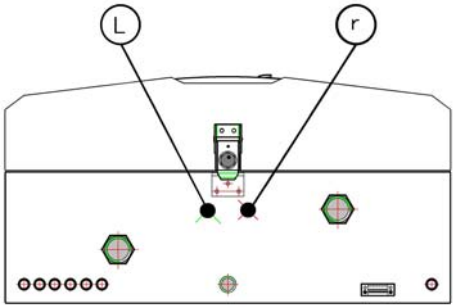
1.6.2. Master – Left hand side printed circuit board.
The Master is the leading board, calculates and divides the necessary power over both units. Therefore the regulation controls will always be connected to the Master.

- Room thermostat 24 Volt default
- Outdoor temperature sensor default
- OpenTherm regulation default
- Room thermostat 230 Volt optional
- Direct control 0-10 Volt optional

Note: Spare part boards are set for SLAVE.
If needed, make SLAVE (A=1) into MASTER (A=0).

1.6.3. Slave –right hand side printed circuit board.
In case of a lock-out of the Master printed circuit board the Slave is still able to operate correctly.

1.7. LED indication



Two LED's have been placed under the appliance informing the user the status of each unit individually.

The **left hand side LED (L)** is indicating the actual status of the Left hand side heating unit.

- LED is ON = burner concerned is ON
- LED is OFF = burner concerned is OFF
- LED is FLASHING = unit concerned is LOCK-OUT

The **right hand side LED (r)** is indicating the actual status of the right hand side heating unit.

- LED is ON = burner concerned is ON
- LED is OFF = burner concerned is OFF
- LED is FLASHING = unit concerned is LOCK-OUT

1.8. Permitted flue discharge and air supply resistance

The total resistance of the flue tube and air supply together may not be greater than 125 Pa.

Indication for the resistance values given in table below apply to
- Flue exhaust flow rate of max 122 m^3/hour (at 70 'C)
- Supply air flow rate of max 96 m^3/hour (at 20 'C)

1.8.1. "Concentric flue and air" system

Concentric system	Ø 110/150 mm	Ø 100/150 mm
Type 80		
Tube per metre	7.5 Pa	9.4 Pa
Bend 90°, R = 1.5 D	7.5 Pa	9.4 Pa
Bend 90°, R = 0.5 D	12.0 Pa	15.0 Pa
Bend 45°, R = 1.5 D	6.0 Pa	7.5 Pa
Bend 45°, R = 0.5 D	10.0 Pa	12.5 Pa
Roof duct 1.25 m	40.0 Pa	40.0 Pa
The concentric system 110/150 mm has been tested. The test result show a maximum length of 10 meters horizontally, including 1x bend of 90' and a standard roof duct. Using the system 100/150 mm will reduce the maximum length to 8 meters. **Please note each additional bend shortens the total length with a meter in length.**		

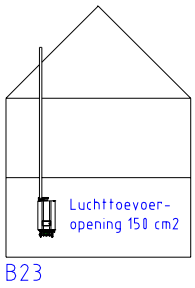
1.8.2. "2 pipe" system

"2 pipe" system	Ø 110 mm	Ø 100 mm
Type 80		
Tube per metre	3,7 Pa	4.6 Pa
Bend 90°, R = 1.5 D	3.7 Pa	4.6 Pa
Bend 90°, R = 0.5 D	6.0 Pa	7.5 Pa
Bend 45°, R = 1.5 D	3.0 Pa	3.8 Pa
Bend 45°, R = 0.5 D	5.0 Pa	6.2 Pa
Roof duct	20.0 Pa	25.0 Pa

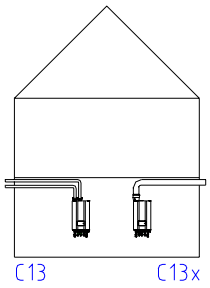
1.9. Configurations

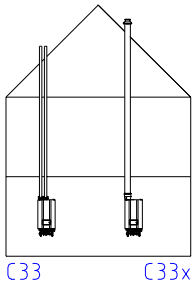
Preferably use flue tube materials, roof ducts and exterior wall ducts with a quality mark.
For the use of plastic exhaust pipes both units are protected with a flue gas temperature sensor.
In normal operation the application may produce a visible white condensing "plume".

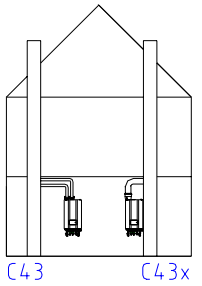
The TWIN is approved for application on the drain systems:
B23, C13(x), C33(x), C43(x), C53, C63(x), C83(x).

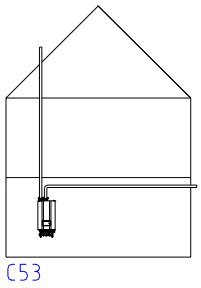


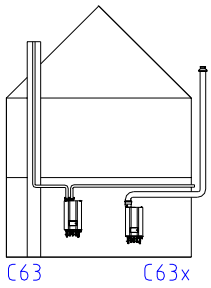
B23

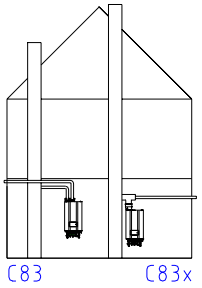

C13 C13x


C33 C33x


C43 C43x


C53


C63 C63x


C83 C83x

1.10. Regulations

In case of non-compliance with the regulations, no claims can be made against the guarantee conditions.

General safety regulations
The installation may only be performed by a recognised installer.
Take note that internal parts of the unit can carry a dangerous electrical voltage (230 Volt).
Take note that the unit, the various pipes and the flue gas exhausted by the unit can reach high temperatures (up to 90°C).
Before carrying out maintenance activities in or on the unit, you must close the gas tap, switch off the electricity supply and pull the mains plug out of the socket.

Environmental conditions
The area in which the unit is installed must satisfy the applicable regulations.
The wall must be able to bear the weight of the unit (loaded weight approx. 40 kg).
If you use a different assembly surface than a bricky wall of sufficient thickness, you must select suitable fixtures yourself and properly install the unit.
The unit may not be fitted in a chemically aggressive environment.
The unit with air feed and flue gas exhaust satisfies the requirements of protection class IP44 and may therefore be installed in a wet area.
Although the unit is fitted with an internal frost protection, it may not be exposed to extremely low ambient temperatures (lower than -10°C).

Standards / Guidelines
With the installation of the unit, all local regulations must be followed, where applicable, including the provisions of the following standards and guidelines:

- Building Regulations
- Regulations for natural gas installations
- Regulations for LPG (if applicable)
- Guidelines for existing gas installations
- Safety requirements for central heating installations
- Safety provisions for low voltage installations
- General regulations for drinking water installations
- Water authority regulations
- Ventilation in dwellings
- Supply of combustion air and exhaust
- House sewerage in homes and dwellings
- Fire Brigade regulations
- Factory Act regulations
- Regulations applicable to HWS water Ask for the locally applicable regulations at the local water company as they are different in some areas

CHAPTER 2. INSTALLATION

2.1. Mounting

Before unpacking the unit, check whether the type of gas to be used corresponds with the specification on the packing. If you have any questions, contact your supplier.

To prevent back injury, take account of the fact that the weight of the unit is roughly approx 65 kg. Care should be taken when unpacking and mounting the appliance.

2.1.1. Bracket

To mount the appliance on a brick wall of sufficient thickness, use the bracket supplied.

When you have determined the place of assembly, proceed as follows:

- Draw the position of the bracket onto the wall.
- Use a masonry drill of 6 mm diameter to drill the holes with a sufficient depth in the wall.
- Fit the plug's in the drilled holes.
- Fix the bracket with the screw supplied.

2.1.2 Adapter

2.1.2.1. "Concentric flue and air" system

Mount one of the adapter systems onto the boiler.

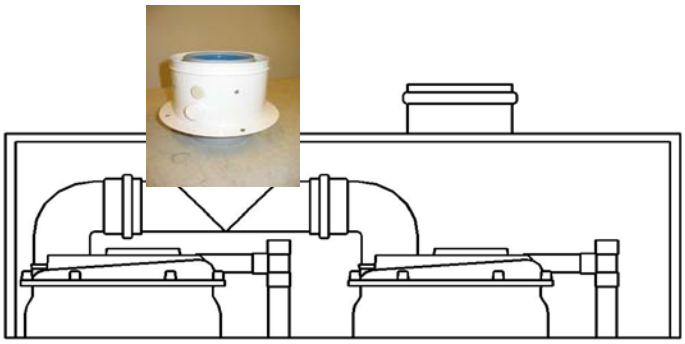
Adapter Muelink & Grol 100/150 (art. N00M990080)

Adapter Cox Geelen 110/150 (art. N00M990082)

- Fit either the **Muelink & Grol adapter** for the connection of a concentric air intake and exhaust gas outlet system of **100/150 mm** or the **Cox Geelen adapter** for the connection of a concentric air intake and exhaust gas outlet system of **110/150 mm** on top of the boiler.
- Fit later the concentric pipes onto the adapter concerned.

2.1.2.2. "2 pipe" system (100/100)

Use the adapter 100/150 (Muelink & Grol) also for connection of a "2 pipe" system (100/100) system and use the sealing ring supplied to seal the air intake.



When the flue tube and air supply are connected eccentrically, proceed as follows:

- Fit the flue tube of diameter 100 mm in the opening, in the adapter on top / left hand side of the boiler.
- Fit the air supply of diameter 100 mm in the flange on top / right hand side of the boiler.

2.1.3. Boiler

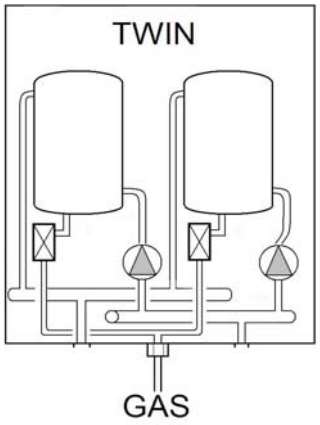
To prevent back injury, take account of the fact that the weight of the unit is roughly approx 65 kg. Care should be taken when unpacking and mounting the appliance.

- Mount the appliance (TWIN boiler and adapter) onto the bracket.
- A-line the boiler horizontally.
- Fix the position.

2.2. GAS

Make sure that the gas pipe work does not contain dirt, particularly with new pipes.

Failure to install gas-appliances correctly could lead to accidents and prosecution. It is in your own interest, and that of safety, to ensure that the law is complied with.

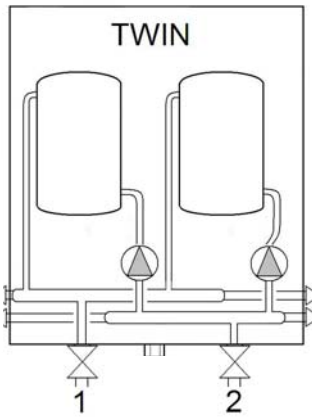


G¾" (male thread)

- The appliance has to be connected in accordance with the current regulations.
- Supply pipe works to be sized in accordance with relevant regulations.
- We advise a gas filter be fitted in the gas supply line in order to prevent contamination of the gas valves.
- Connect the gas pipe to the gas connection positioned under the appliance in the middle. The appliance is equipped with male gas thread G¾".
- Install the gas pipe stress free.
- Include the gas pipe with an approved stopcock.

2.3. WATER

Both of the heat units are parallel jointed to central flow- and return water collectors.



WATER
G1¼" (male thread)

Connect the central heating **flow** pipe to **pos 1** with G1¼" male thread of the the collector on the far side.
Connect the central heating **return** pipe to to **pos 2** with G1¼" male thread of the collector on the nearr side.

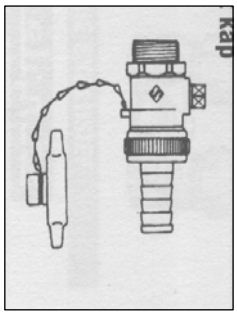
2.3.1. Safety valve

The boiler has been provided with a safety valve of 3.2 bar.

The discharge under the boiler should determinate facing downwards exterior to the building in a position where discharging water will not create danger or nuisance but remains in a visible position.

2.3.2. Filling and straining device

On the return collector of the boiler is a connection 1/2" BSP female thread for the filling and straining device.



Install the filling and draining device, packed with the boiler, onto this connection in the central heating return system. Do not use the safety valve as a drain. The safety valve may not close properly after passing contaminated system water.

2.3.3. Expansion vessel

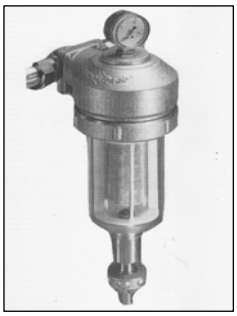
In the central heating return pipe, as near as to the boiler, an expansion vessel must be fitted.
The size of the expansion vessel must be determined on the basis of the central heating water temperature and the total water content the installation contains.

Example of Emmeti "Expansion vessel"

The pre-pressure depends on the installation height above the mounted expansion vessel.

5 meter - 0,5 bar
10 meter - 1,0 bar
15 meter - 1,5 bar

2.3.4. Dirt filter

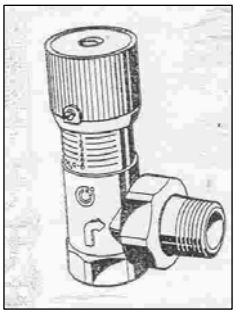


If it may be expected that the central heating water will be severely contaminated by under floor heating, fitting a 2 kg dirt fine filter in the return pipe is recommended. With this, possible contamination of the central heating water is prevented from ending up in one of the units.
Coopra cannot give any guarantee for damage to the unit that is caused by dirt in the system.

Example of PermaTrade "dirt filter" type PT-FM-25W

2.3.5. Differential bypass valve

A differential bypass valve must be installed on plants where it may happen that various heating units (radiators) are simultaneously excluded from the circuit because of the closure of control or zone valves. It ensures a recirculation proportional to the number of shut off valves, thus avoiding noise and keeping the pump pressure steady.



Example of Caleffi "Bypass valve" type 519500 (¾")

Mounting: The differential by-pass valve must be mounted in the installation between the flow and the return piping. It may be mounted both horizontally and vertically, provided that flow direction indicated by arrow is respected.

Adjustment: Rotate knob on the desired value of the graduated scale. The values correspond to the meters of pump head (m H2O). The advised knob setting is 2.5-3.0. Lock the screw on the groove knob.

2.3.6. Condensation discharge

Mounting: The siphon (packed with the boiler) fits onto the discharge pipe (Ø 32 mm) under the boiler. Tighten this connection with the sealing ring and fix the nut manually by hand.

The outlet of the siphon has to be connected to the drain with a tundish.

2.4. PUMP

2.4.1. Unit system pump

The TWIN 80C is equipped with 2x Wilo, type RS 15/7 internal circulation pumps. Depending of the cascade selection and heat demand one pump may run intermittent or both pumps may run simultaneously.

Use with a low velocity header (open header) can also be selected. In this case a larger secondary sided water output has to be taken into account, in order to affect the height of the water temperature.

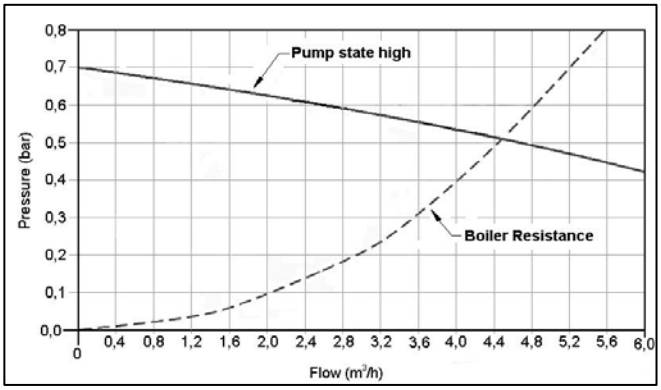
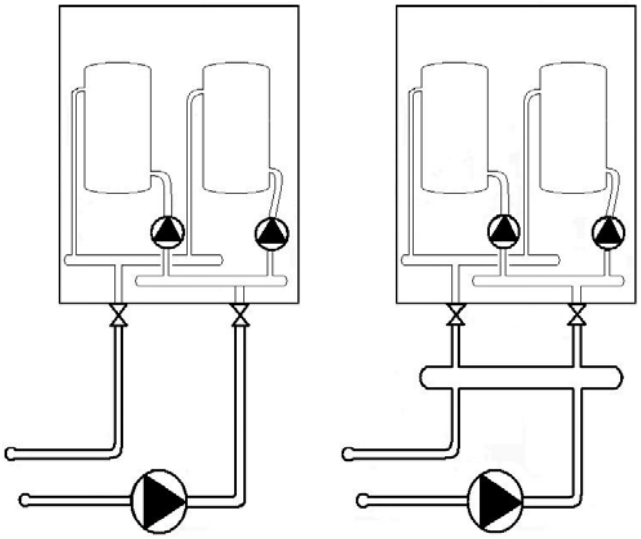
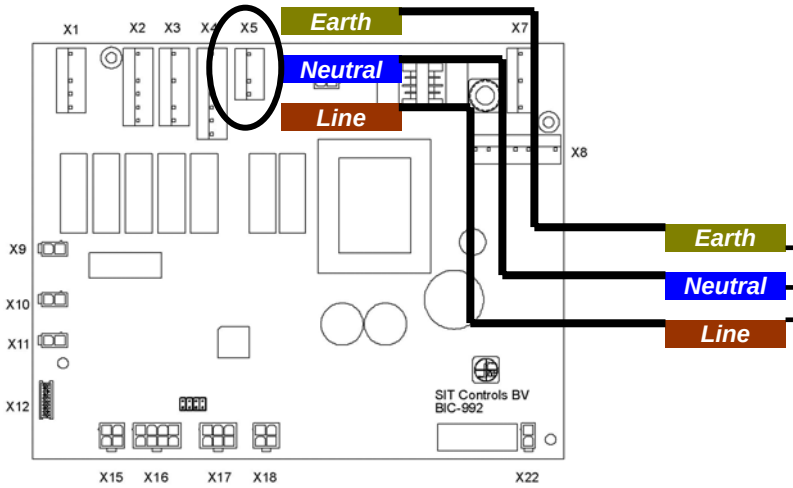


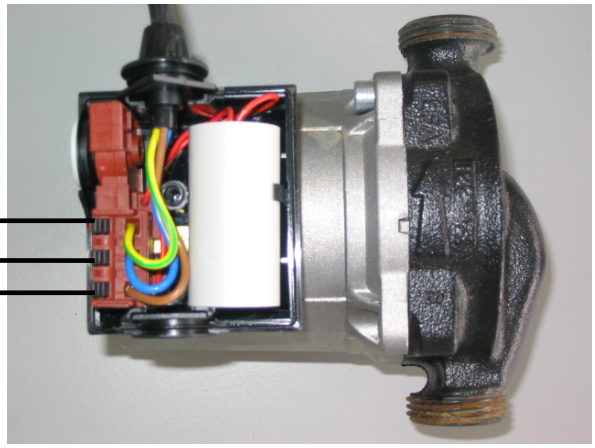
Fig.: Characteristic and the resistance graph of the application when both unit pumps run.



2.4.2. External system pump (option)

If the capacity of the unit pumps is insufficient, an extra external system pump can be installed with the appliance.
The maximum absorbed current consumption of the external circulation pump may be 275 W (1,2 Amp).
On command of the printed circuit board, an external second system-pump will switch with the internal boiler-pump simultaneously.
Note the internal pump will switch high/low/off (2-stage) while the external pump will switch on/off (1-stage).





Terminal X5
printed circuit board
4 way Molex header 0.2" pitch

External system pump
230VAC
max. 275W (1.2 Amp)

2.5. ELECTRICAL

2.5.1. Supply connection

If a **stationary appliance** is not provided with a **supply cord** and a plug or with other means for disconnection from the supply having a contact separation of at least 3 mm in all poles, the instructions shall state that such means for disconnection must be incorporated in the fixed wiring.
If a **stationary appliance** is provided with a **supply cord** and a plug in the instructions shall state that the appliance must be positioned so that the plug is accessible

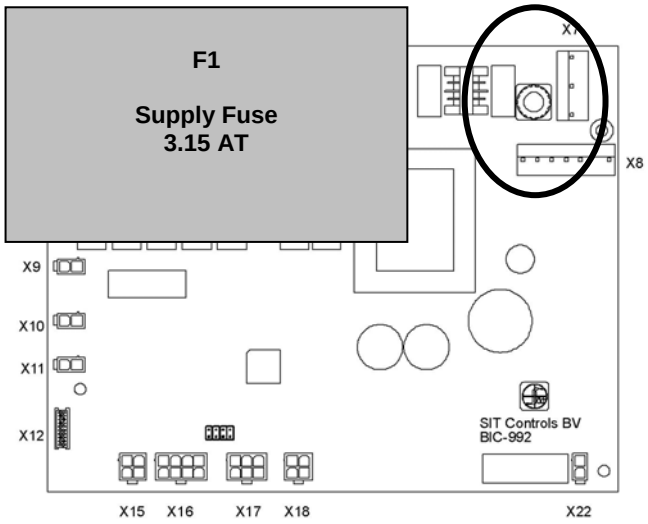
There must be an electrical outlet with Earth connection available at a maximum distance of 1 m from the unit.
The electricity connection (230 VAC) must consist of Line, Neutral and Earth and a good Earth connection (requirement for good ionisation operation of the appliance).
If the supply cord is damaged, it must be replaced by the manufacturer or is service agent or similarly qualified person in order to avoid a hazard.

If the display of the unit gives the status code 'U', this means the Line and Neutral connections are reversed.

2.5.2. Supply fuse

If Master fuse fails the Slave printed circuit board cannot get commands from the Master to take over processing.

If Slave fuse fails the Master printed circuit board wil operate normally and can heat the system with one single unit.



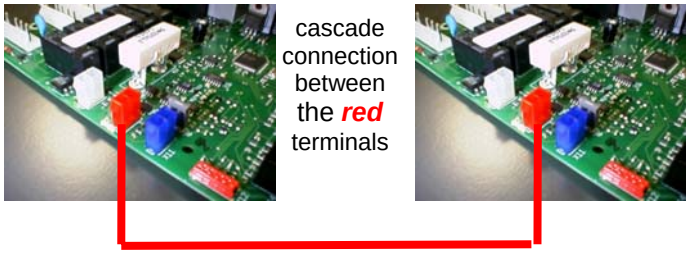
2.5.3. Input

Temperature sensors: 5Vdc ± 5%, R_{25} = 12kΩ, ß = 3980
Water pressure sensor: 12Vdc ± 20%, Ri = 100kOhm
0÷10V : Ri = 20kOhm
Room thermostat: 24Vac (standard)
Room thermostat: 230Vac (option)
OpenTherm: available on main board
1kHz, Manchester encoding conform specification 2.0
RS-485 : cascade input, SIT protocol
Ionisation: detection 100Vac

2.5.4. Output

Glow plug: single switched 230Vac
Gas valve: double switched 230Vac
Fan : 325Vdc
Pump: unit system pumps (2-stage speed operated)
In operation/lock-out LED: 10mA dc
External lock-out contact: potential free contact
External system pump 230VAC max. 275W (1,2 Amp)
External 3-way valve and HWS cilinder

2.5.5. Cascade connection of master and slave



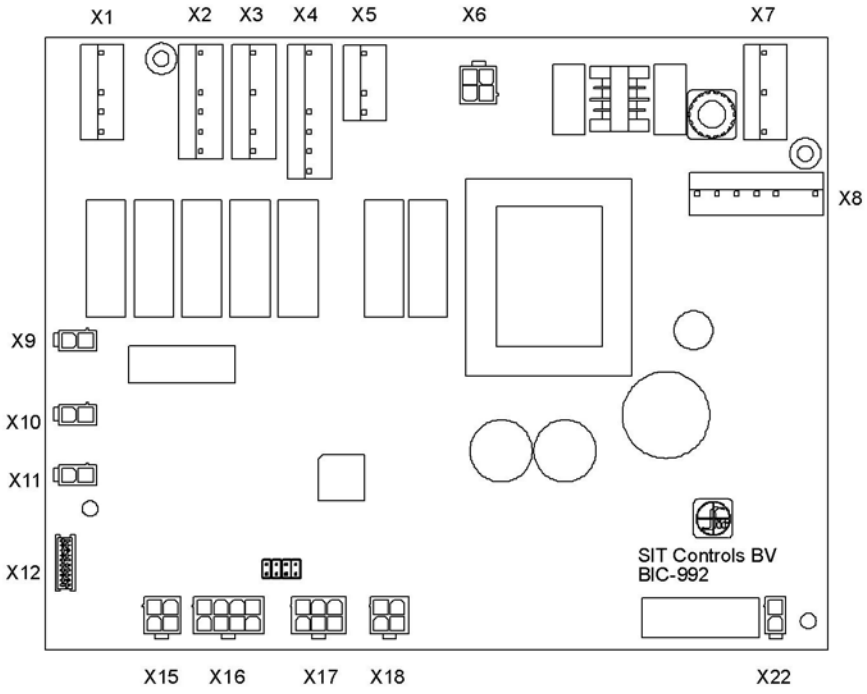
cascade connection between the ***red*** terminals

Bus protocol: RS-485 (TIA/EIA-485-A)
Polarity: phase depending
Wiring: 2 wires (A and B),
Twisted pair, no shield
Shut-off resistance: not needed
Galvanic isolation: not needed
Communication: 9600 Baud
Master and Slave: Connected to the same PE-Line

2.6. Lay-out BIC992

2.6.1. Connectors & pinning

X1	4-way	Molex header	0.2” pitch
X2	5-way	Molex header	0.2” pitch
X3	5-way	Molex header	0.2” pitch
X4	6-way	Molex header	0.2” pitch
X5	3-way	Molex header	0.2” pitch
X6	4-way	Molex Minifit	
X7	4-way	Molex header	0.2” pitch
X8	6-way	Molex header	0.2” pitch
X9	2-way	Molex Minifit (white)	
X10	2-way	Molex Minifit (red)	
X11	2-way	Molex Minifit (blue)	
X12	10-way	latch connector for display	
X15	4-way	Molex Minifit	
X16	8-way	Molex Minifit	
X17	6-way	Molex Minifit	
X18	4-way	Molex Minifit	
X19	2-way	Molex Minifit	
X20	2-way	Molex Minifit (black)	
X22	2-way	Molex Minifit (black)	



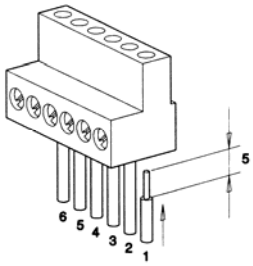
2.6.2. Table, pinning

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X15	X16	X17	X18	X19	X20	X22
1	PE	PE	PE	PE	PE	HSI	PE	PE	24V	RS-485 (B)	Open Therm	input			Ext. tank	0V	+12v	contact
2	N	N	N		N pump2		N	L1, fan	Rth	RS-485 (A)	Open Therm	12V+	outdoor	return	Ext. tank	0÷10V	Led 1K	contact
3	L			N’, gas valve	L pump2	ionisa-tion		L2, fan				12V-	flue	flow				
4	Rth			L’, gas valve		HSI	L	V-										
5		L1, pump		Max Th				Hall						return				
6				Max Th, 24Vdc				V+					outside	flow				
7													flue					
8																		

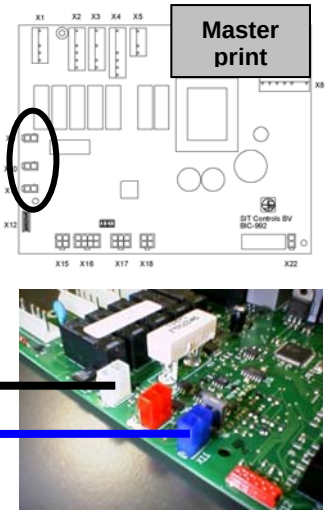
2.7. Green connector block

The external regulations are to be connected to the green connector block. All connections are volt-free contacts. Therefore, do not connect any voltage to this block!

1. Strip about 5 mm off the insulation of the wires of the connection concerned.
2. Stick the stripped ends of the wires into connections of the connection block involved.
3. Make sure that the wires do not make a short circuit.
4. Firmly tighten the screws in the connection block.



Green connector block	
contacts (1) - (2) room thermostat	24Volt on/off room thermostat or 0-10Volt input (if no regulation is used - bridge wire) **OpenTherm**
contacts (3) - (4) outdoor sensor	external outdoor temperature sensor (NTC of 12 kOhm at at 25°C)
contacts (5) - (6) external cylinder	10 kOhm sensor or 12 kOhm sensor or cylinder thermostat (on/off)



2.7.1. 24 Volt on/off room thermostat (standard)

- When the room thermostat is closed (heat demand), the set point (desired central heating flow temperature) rises at a rate of 2°C per minute until the maximum permissible central heating flow temperature is reached (21 minutes from minimum 25°C to 82°C).
- When the room thermostat is open (end of heat demand), the set point (desired central heating flow temperature) falls at a rate of 4°C per minute to the minimum central heating temperature (10.5 minutes from 82°C to minimum 25°C).

- ***Connect the 24 Volt room thermostat to the green connector block on contacts (1) and (2)***
- ***On the master print check the connection of the white terminal (default)***

2.7.2. 0-10 Volt input regulation (standard)

- The set point indicates whether there is a heat demand.
- The desired central heating flow temperature (set point) is given by the 0-10 Volt input.
- The regulation is field adjustable in the menu either on temperature (°C) or on boiler input (kW)

- ***Connect the 0-10 Volt regulation to the green connector block on contacts (1) and (2)***
- ***On the master print check the connection of the white terminal (default)***

2.7.3. OpenTherm (standard)

- The desired central heating flow temperature (set point) is indicated by the modulating OpenTherm room thermostat.
- With an outdoor temperature sensor, the measured outdoor temperature is sent to the OpenTherm room thermostat, which uses it to calculate the desired central heating flow temperature.

- ***Connect the OpenTherm modulating room thermostat to the green connector block on contacts (1) and (2).***
- ***RE-PLUG the connector of the Master to the blue terminal (Master).***

2.7.4. Outdoor sensor (standard)

- When an external outdoor temperature sensor (heating) is connected, the sensor must be an NTC with a resistance of 12kOhm at 25°C

- ***Connect the outdoor sensor to the green connector block on contacts (3) and (4).***

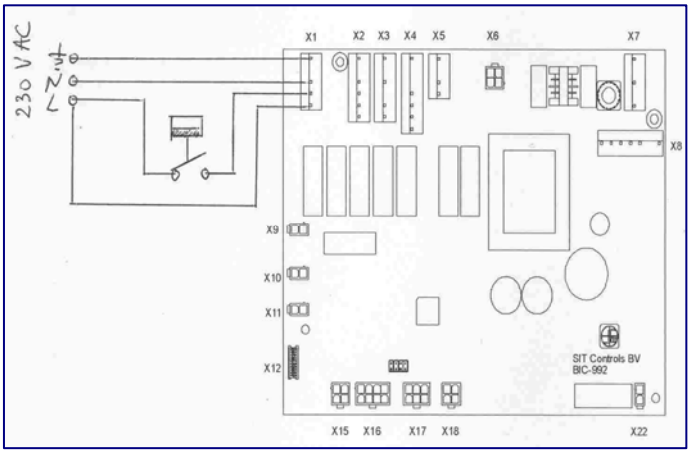
2.8 Options with installer responsibility

2.8.1.

2.8.2. 230 Volt room thermostat (installer responsibility)

All Coopra printed circuit boards have a terminal for connection of a line voltage 230 Volt room thermostat.

- ***At present Coopra does not supply any connection cable for this option.***



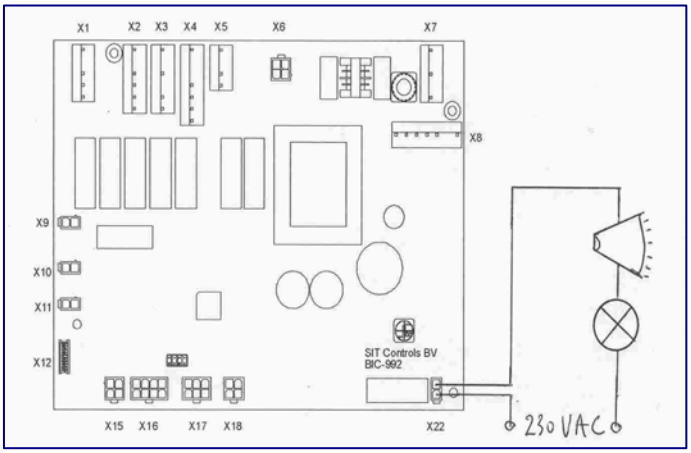
Pinning TERMINAL X1

pin	X1
1	PE = Earth
2	
3	N
4	230VAC room thermostat
5	L

2.8.3. Remote alarm (installer responsibility)

All Coopra printed circuit boards have a remote lock-out contact. This contact is potential free. The power for an external signal, lamp or siren, has to be from external.

- ***At present Coopra does not supply any connection cable for this option.***



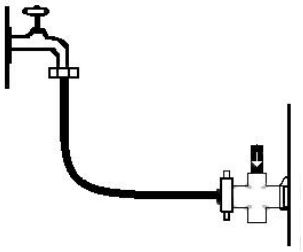
Pinning TERMINAL X22

pin	X22
1	contact
2	contact

CHAPTER 3. COMMISSIONING

3.1. Filling

If the unit is not yet filled with water, the display shows a flashing ‘P’ and the water pressure in bar.



The operational water pressure of the appliance is between 0.5 bar en 3.0 bar.
A good system is with a pressure of about 1.5 to 2 bar.

Proceed as follows:
1). Fully open all radiator taps.
2). Connect the water supply tube to the filling and draining device in the central heating system.
3). Fill the water supply tube with water. Let the air in the water supply tube escape; because you want to fill the system with water instead air.
4). Connect the fully filled water supply tube to the water tap.
5). Open both water taps with caution and fill the system.
6). When the water pressure is sufficient (> 1.3 bar), the flashing ‘P’ disappears from the display.
7). Close, after filling, the filling tap and remove the water supply tube.

3.2. Reading the water pressure

To read the water pressure directly from the display press and hold the “+” button 5 seconds.

The unit switches back to normal operation either automatically after about 5 minutes or by pressing "-" button.

3.3. Venting

After filling, the heating installation must be vented.

Follow also instructions from the installer of the system for the venting of possible other elements of the heating installation, such as under floor heating.

Proceed as follows:

1). Take care all pumps are **OFF**. Otherwise the pump(s) may move the air through the system constantly.
2). During the venting process you also may put the appliance main switch in the supply cable **OFF**.
3). Open the air bleed cocks of the radiators one at a time. Use an air bleed key for this. As soon as water comes out of the air bleed cock, shut the cock off again.

After venting of the system, the appliance and all pumps must be connected to the mains and be switched ON.

3.4. Chimney sweeper function

The chimney sweeper function has priority over the central heating and HWS regulation.

The chimney sweeper function is activated by simultaneously pressing the "+ and the – buttons" of the display in for longer than 5 seconds.

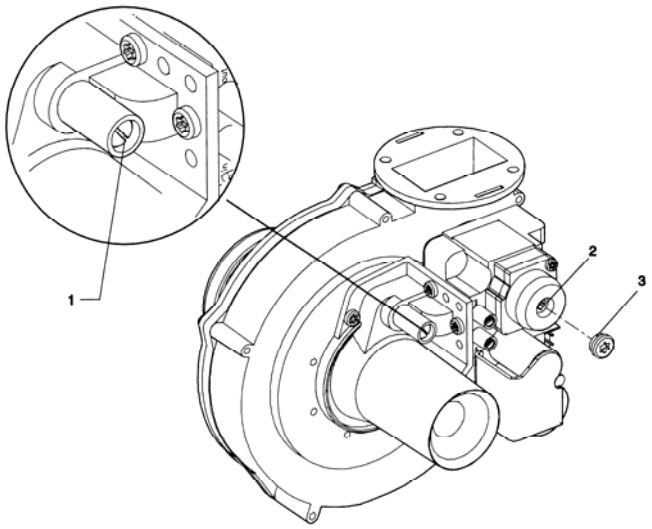
The ionisation current can be read in microamperes in the two right segments.

The capacity that is immediately released is the maximum central heating capacity.

Press the "- button" to go to low load.

Press the "+" button to switch back to full load.

3.5. Gas/Air Ratio



(1). **Venturi-screw** – Full load adjustment
Turn the venturi screw anti-clockwise to increase the CO_2 value, clockwise to decrease it.
(2). **Gas control screw** – Low load adjustment
Turn the screw anti-clockwise to decrease the CO_2 value on low load, clockwise to increase it.
(3). Cover screw

3.5.1. Pre-adjustment to be done in voltage-free condition:

- **LPG GAS – Turn venturi-screw clockwise ↻ completely down on its seat.**
  Then turn the venturi-screw anti-clockwise ↺ for 1/2 complete turns.
- **NATURAL GAS – Turn venturi-screw clockwise ↻ completely down on its seat.**
  Then turn the venturi-screw anti-clockwise ↺ for 3 complete turns.

PRE- ADJUSTMENT MEASUREMENT:
Distance between Venturi-screw (1) and the Top of the venturi-stud to be about:

- ✓ 12 mm for natural gas G25
- ✓ 14 mm for natural gas G20
- ✓ 16 mm for LPG gas G31

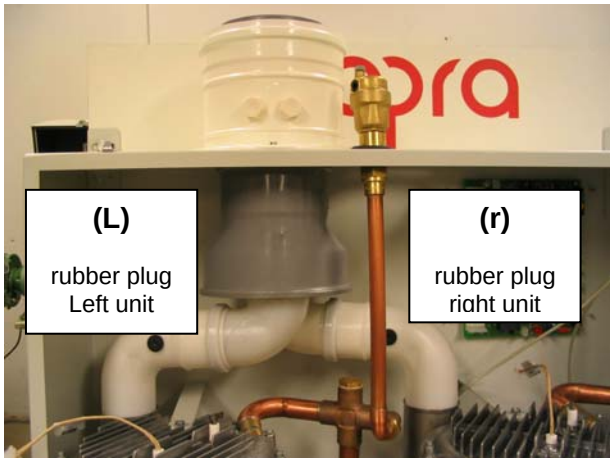
With a callipers vernier the distance between venturi-screw (1) and the Top of the venturi-stud (1) has to be measured to find the rough setting of the venturi-screw for full load, and depending of the used gas type.
The exact adjustment of the setting has to be made using the CO_2 analysing method as described below.

3.5.2. Final Gas/Air adjustment (CO_2 analysing)

The gas controls are set in the factory to the type of gas to be used. This type of gas is stated on the packaging and on the identification plate. To check the settings, you have to make a flue gas analysis.

Note that each unit has to be set according to the same procedure individually.

Proceed as follows:



Remove the rubber plug (L) or (r) from the flue tube concerned. It is not necessary to set the units in a certain order. Fit the measurement probe of a flue gas analyser (CO_2 meter) in the measurement opening of the flue tube canal concerned.

Adjusting full load
Make sure there is sufficient heat dissipation through the heating.

Activate the chimney sweeper function on full load.

Read the CO_2 value on the analyser. If the value does not correspond with the value in the "CO_2 setting" table, carefully adjust the venturi-screw (1). Turn the venturi-screw anti-clockwise to increase the CO_2 value, clockwise to decrease it.

Adjusting low load

Activate the chimney sweeper function on low load

Read the CO_2 value on the analyser. If the value does not correspond with the value in the "CO_2 setting" table, carefully adjust the gas control adjusting screw (2). To do this, temporarily remove the cap (3) with the aid of a Torx-screw driver. Turn the screw anti-clockwise to decrease the CO_2 value on low load, clockwise to increase it.

CO_2 setting	full load	low load
Natural gas (G20, G25)	8,8 % CO_2	8,2 % CO_2

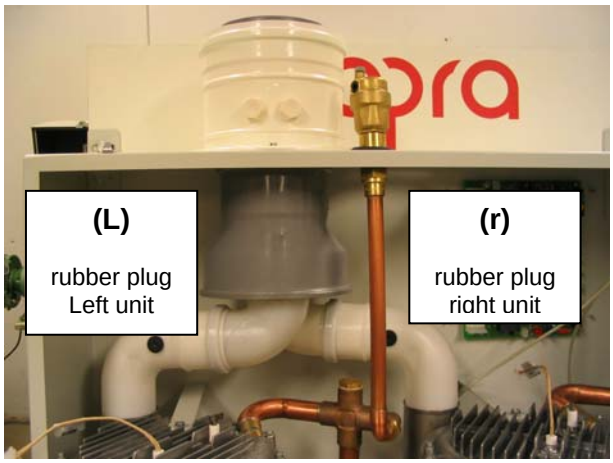
3.6. Conversion to LPG

High voltage!

The wiring of the pump, the three-way valve, fan and wiring of the gas control can be under a voltage of 230 VAC.

First: Always screw the venturi adjusting screw fully clockwise until it blocks.

Fit a flue gas analyser (CO_2 meter) in the measurement opening of the flue tube canal concerned.



Setting Full load on Propane as follows:

Unscrew the venturi adjusting screw 1/2 turns anti-clockwise. (A guide for the dimension from the top of the screw to the top of the support is given in the table).

Read the CO_2 value on the flue gas analyser. If the value does not correspond with the value for propane gas G31 (9,8% CO_2), carefully adjust the venturi-screw until the correct value is obtained.

Activate the chimney sweeper function on full load.

Read the CO_2 value on the analyser. If the value does not correspond with the value in the "CO_2 setting" table, carefully adjust the venturi-screw (1). Turn the venturi-screw anti-clockwise to increase the CO_2 value, clockwise to decrease it.

Adjusting low load

Activate the chimney sweeper function on low load

If the gas control is already properly adjusted for natural gas, then the low load will not need to be adjusted.
Activate the chimney sweeper function on low load.

Check the CO_2 value at minimum capacity for propane gas G31of about 9.2% CO_2.
If necessary, adjust the gas regulator screw until the correct value is obtained. Note that this setting is a critical one.

CO_2 setting	full load	low load
Propane (G31)	9,8 % CO_2	9,2% CO_2

3.7. MENU STRUCTURE

- ***Enter menu structure by pressing the Set/Reset button for 5 - 10 seconds.***
- ***Change the parameter(left segment) by pressing the Set/Reset button once, shortly.***
- ***Change the range value (two right segments) by pressing the "+" button or the "–" button.***
- ***To enter the view mode directly, press the "+" button for 5 – 10 seconds. The first upcoming reading is the system water pressure (8).***

User / Installer settings (TWIN 80C)			
Para-meter	**Description**	**Range**	**Factory settings**
C	Heating: Maximum flow temperature	25°C – 90°C	82°C
O	Heating: Pump post-running time	01-25 min, CO=24 hour	05 min
P	Heating: Maximum boiler input (percentage of maximum heating input of 74.0 kW)	33 – 100%	00 (100%)
h	Extended adjustments (password h=18)	10 – 99	10
r	Factory setting return mode; excluded are the settings under parameter "h" (enter this parameter by pressing "+" button for 5 sec)	= Factory setting = Customised setting	
u	0-10V regulation	0 = Regulation on temperature (°C) 1 = Regulation on boiler input (kW)	0 (4)
o	Cascade configuration	01 = Power configuration (input 14,6 – 74.0 kW) 00 = Comfort configuration (input 7,3 – 74.0 kW)	01 (4)
S	Pump mode	00 = Software = Always high = Always low	00 (4)
L	View mode of Left hand side unit (reading	**8 =** Water pressure (in bar) **1 =** Flow temperature (in °C) **2 =** Return temperature (in °C) **3** = 0÷10V **4 =** Outdoor temperature (in °C) **5 =** TWIN flow temperature (in °C) **6 =** Flue gas temperature (in °C) **7 =** Flame signal (in µA DC) **9 =** Last lock-out **A =** Last blocking (internal coding)	
r	View mode of right hand side unit (reading)	**8 =** Water pressure (in bar) **1 =** Flow temperature (in °C) **2 =** Return temperature (in °C) **6 =** Flue gas temperature (in °C) **7 =** Flame signal (in µA DC) **9 =** Last lock-out **A =** Last blocking (internal coding)	

Note: (4) does not return to factory settings

Extended adjustments To open the extended adjustments below please change parameter h=10 into h=18			
A	Printed circuit board configuration	1 = Slave 0 = Master 2 = Stand-alone	1 (4)
F/d	External HWS cylinder configuration	0 = TWIN 1 = Master only	0 (4)
H	Type of application	0 = central heating unit 2 = for external HWS cylinder 12kOhm (suitable for large volume cylinders) 3 = for external HWS cylinder 10kOhm (suitable for large volume cylinders)	0 (4)

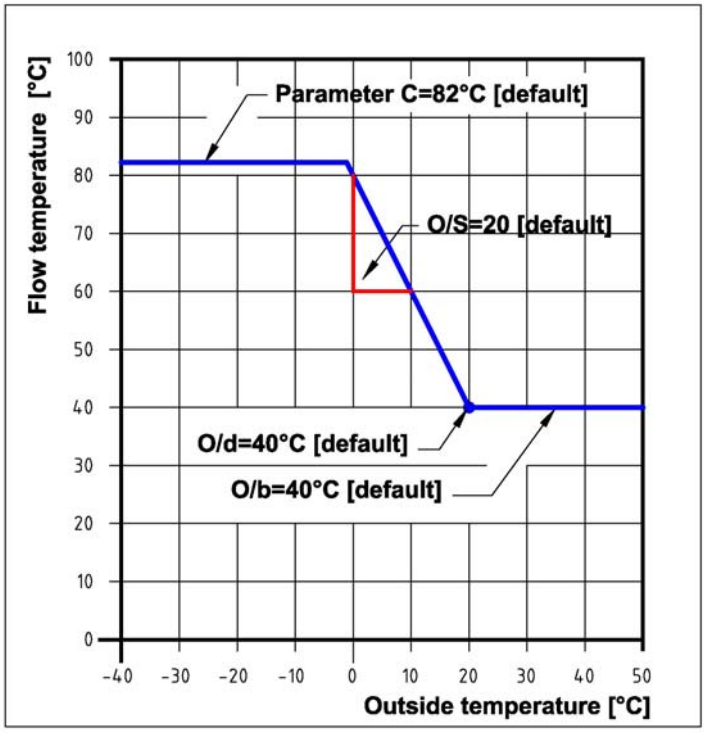
Note: (4) does not return to factory settings

3.7.1. Outdoor temperature sensor

Outdoor sensor **An outdoor temperature sensor (heating) must be an NTC with a resistance of 12 kOhm at 25°C** (connected to terminals (3) and (4) of the green connector block)			
Para-meter	**Description**	**Range**	**Factory settings**
C	Maximum flow temperature	25°C – 90°C	82°C
O/b (3)	Base temperature (minimum flow temperarure)	10°C – 70°C	40°C (4)
O/S (3)	Slope (flow temperature versus outdoor temperature)	01 – 100 (AO=100)	20 (4)
O/d (3)	Day reference temperature (set point flow temperature at outdoor temperature of 20°C)	0°C – 70°C	40°C (4)

Note: (3) Active when an outside sensor is connected, Note: (4) does not return to factory settings

Adjusting flow temperature curve



Parameter C : This parameter will set the ***maximal*** heating flow temperature (default 82°C).

O/b-value : This parameter will set the ***minimal*** flow temperature (default 40°C).

O/S-value : This parameter will set the ***slope*** of the curve; change of flow temperature depending on the outdoor temperature (default 20 = 2:1).

O/d-value : This parameter will set a ***specific point***; the flow temperature (default 40°C).at an outdoor temperature of 20°C.

3.7.2. Domestic hot water (3-Way valve is not included and is and is to initiate by installer)

external HWS cilinder **Boiler extended by installer with an external 3-way valve and external HWS cilinder (range H=2 or H=3)**			
Para-meter	**Description**	**Range**	**Factory settings**
b (2)	Set point exterrnal HWS cylinder	25°C - 70°C	60°C (4)
F (2)	Fill temperature external HWS cylinder	65°C - 90°C	85°C (4)

Note (2): Active when external HWS cylinder is connected; Note (4): does not return to factory settings

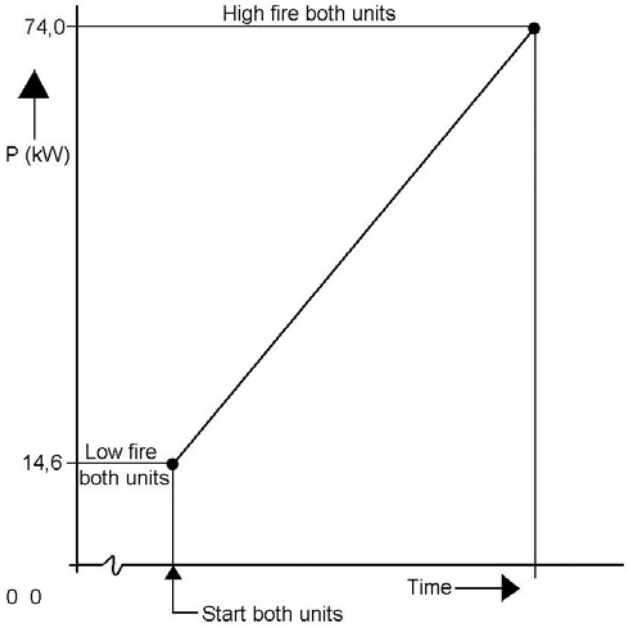
3.8. CASCADE

3.8.1. Power mode (default)

- ***Menu parameter "o" = 01 (default)***
- ***Both units run simultaneously.***

When the room thermostat or space unit indicates that heat is required for central or under floor heating, both units will heat simultaneously. The Master print calculates the system flow temperature and divides the necessary power over both units equally. The speeds of both fans are automatically adapted to the heat required, also with the use of an on/off thermostat.

When the room thermostat or space unit indicates that the desired temperature has been reached, the central heating water is no longer heated. The unit pumps will continue to run for a previously set time to distribute the heat evenly over the heating installation.



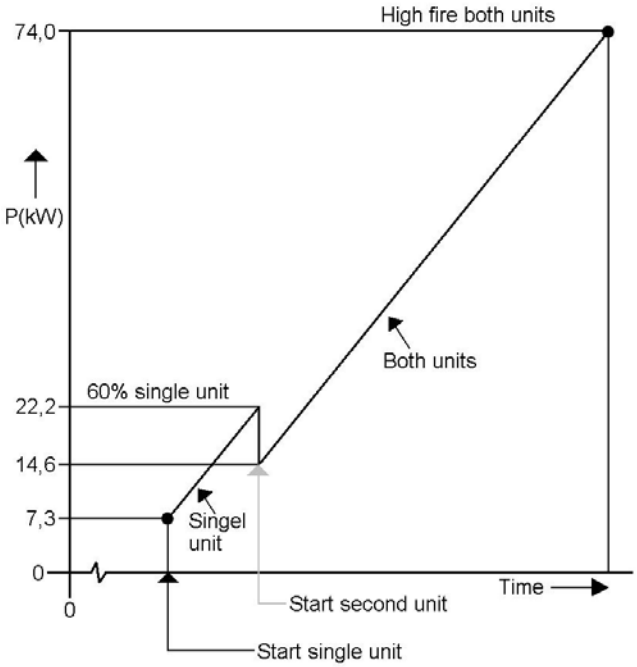
menu parameter "o" = 01	
Heat input (gross)	16.2 – 82.2 kW
Heat input (net)	14.6 – 74.0 kW
Nominal output at 80/60ºC	14.1 – 72.0 kW
Nominal output at 50/30ºC	15.6 – 75.3 kW
Efficiency at 80/60ºC (net)	Low load = 96.6 % High load = 97.2 %
Efficiency at 50/30ºC (net)	Low load = 106.9 % High load = 101.8 %

3.8.2. Comfort mode (field adjustable)

- ***Menu parameter "o" = 00***
- ***At low heat demand the units run independently.***

When the room thermostat or space unit indicates that heat is required a single unit will start-up, while the other unit remains stand-by. The unit priority will change each 24 hours.

When the heat required is twice low fire, the second unit will be started as well. Both units will heat simultaneously. The Master print calculates the system flow temperature and divides the necessary power over both units equally. The speeds of both fans are automatically adapted to the heat required, also with the use of an on/off thermostat.



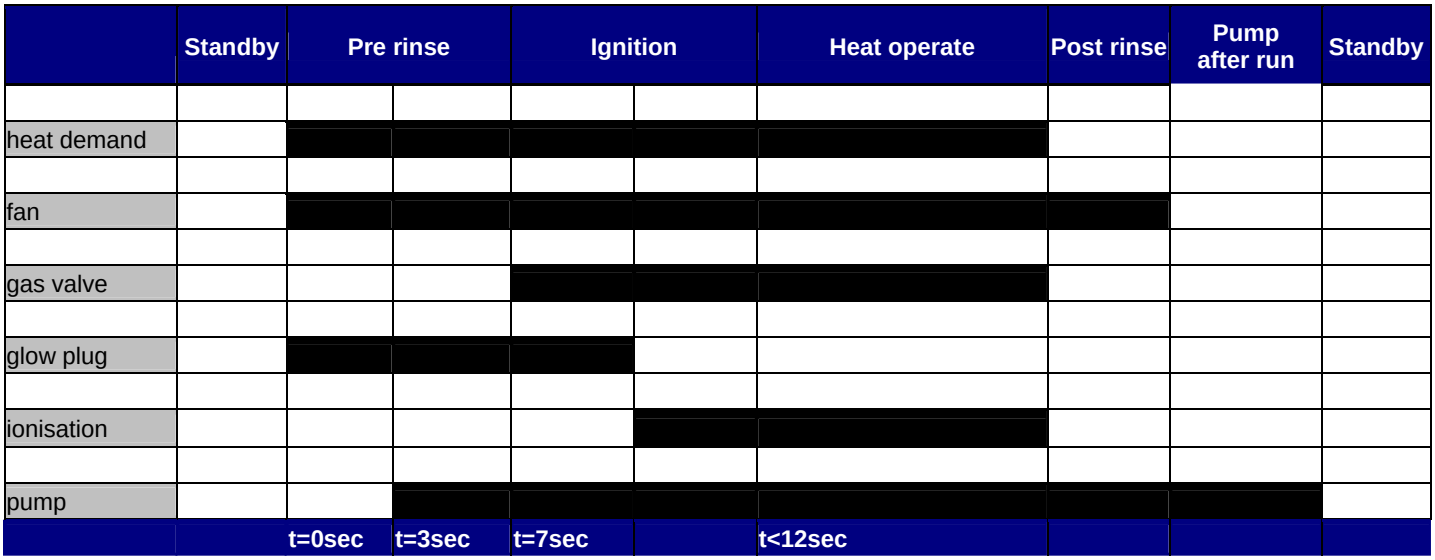
menu parameter "o" = 00	
Heat input (gross)	8.1 – 82.2 kW
Heat input (net)	7.3 – 74.0 kW
Nominal output at 80/60ºC	7.0 – 72.0 kW
Nominal output at 50/30ºC	7.8 – 75.3 kW
Efficiency at 80/60ºC (net)	Low load = 96.0 % High load = 97.2 %
Efficiency at 50/30ºC (net)	Low load = 106.3 % High load = 101.8 %

CHAPTER 4. FAULT FINDING

4.1 Boiler states

Burner is on **-** when the room thermostat is closed (heat demand)
- and when the actual flow temperature is 5°C below the set point (desired central heating flow temperature)
- and after 3 minutes anti-cycling time, if applicable, after a reciprocal stop.

Burner is off **-** when the room thermostat is open (end of heat demand)
- when the actual flow temperature is 3°C above the set point (blocking)
- or when the actual flow temperature is 3°C above the maximum permissible central heating temperature.



4.1.1. Standby
(Fan off - Gas valve off - Glow plug off - Ionisation off)

No heat demand.

Heat demand: During the standby, a check is made to see if there is heat demand. If so the boiler will go over to “pre rise”.

No heat demand: If the difference between flow and return temperatures is larger than ± 5°C, once per hour, the pump will be switched on for a maximum of 10 minutes to see whether the temperature difference goes to within ± 5°C.

4.1.2. Pre rinse
(Fan on - Gas valve off - Glow plug on - Ionisation off)

Combustion chamber is being pre-ventilated with air from the burner fan(s).

Fan: The fan is switched on at the purging speed (1350 rpm).

Glow plug: The glow plug is switched on at the same time as the fan.

Pump test: The pump is switched off for 3 seconds and the water pressure (static pressure) is measured. Then the pump is switched to high speed and the water pressure (active pump pressure) is also measured. If the difference between the active pump pressure and the static pressure is between 0.05 bar and 0.54 bar (0.64 for type 40 / TWIN) a correct water flow through the heat exchanger is present and the “ignition time” starts. If the pressure difference is outside this range, the pump test repeats each 15 seconds.

4.1.3. Ignition
(Fan on - Gas valve on - Glow plug on/off - Ionisation off/on)

The ignition sequence of the burner is initiated.

Fan: The fan is running at the ignition speed (2900 rpm).

Gas valve: The gas valve coil is activated and opens the safety valves.

Glow plug: The glow plug ignites the gas/air mixture from the burner.

Ionisation: As soon as an ionisation signal is measured, the glow plug is switched off and the boiler will go over to “in operation”. If there is no ionisation signal at the end of the safety time, a new start attempt is made, if this was not the last permitted (fourth) attempt.

4.1.4. heat operate
(Fan on - Gas valve on - Glow plug off - Ionisation on)

The burner is on in heating mode.

Temperature test: To ensure the water flow through the heat exchanger a temperature test is activated. After each burner start, the difference between flow and return temperatures must be raised by 3°C within 20 seconds. If not, the boiler makes a restart. Eventually, after three restarts, the boiler runs into lock-out.

Pump monitoring: When the temperature difference between flow and return is greater than 30°C, the pump switches to a high speed. When the temperature difference drops below 10°C again, the pump switches back to a low speed. If the pump is on for a HWS demand (combi-boiler or external cylinder), the pump is continuously at high speed.

System water pressure monitoring: If the system water pressure changes by more than ± 0.27 bar (and ± 0.3 bar with changing pump speed) within 4 seconds, the regulation will block and switch over to the pump test program. This test is defeated with switching over from heating to hot water operation and reverse for 16 seconds.

4.1.5. Post rinse
(Fan on - Gas valve off - Glow plug off - Ionisation off)

Combustion chamber is being post-ventilated with air following boiler operation.

At end of heat demand (burner stop) the regulation runs into post-rinse. The fan runs at the last demanded speed for 20 seconds.

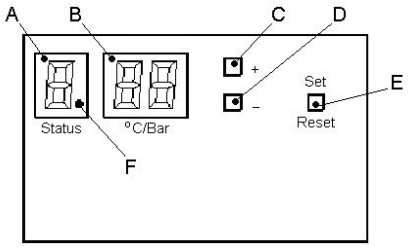
4.1.6. Pump after run
(Fan off - Gas valve off - Glow plug off - Ionisation off)

The pump is mixing the heating water over the system.

The pump continues to run over the heating circuit for a certain time period (adjustable, with minimum of 1 minute and maximum of 24 hours).

4.2. Status indications

A = *Status display*
B = *Reading*
C = *"+" button*
D = *"-" button*
E = *Set/Reset*
F = *Flame present*



The left segment (A) indicates:
- status code or
- parameter value in menu mode

The two right segments (B) indicate:
- temperature or system water pressure or
- parameter value (in menu mode)

A dot on the status display indicates: The flame on burner is present.

4.2.1. Status indication during "normal operation mode"

During normal operation, the status display shows a ***continuous*** indication

Status code	description	action	repair
--	initialisation	after restoration of supply power, pre-purging	
O continuous	stand-by	- no heat demand, pump off, burner off - once per hour, the difference between flow and return temperatures must be less than 5°C. If this is not the case, the pump will be switched on	boiler not required to be on
c continuous	Heating post-running, pump on, burner off	- end of heat demand - pump is in post-running mode, time-adjustable in menu	
h continuous	DHW combi-boiler and HWS external cylinder post-running, pump on, burner off	- end of heat demand - pump is in post-running mode, mixing the primary heat exchanger and internal tank for ½ minute	
C continuous	Heating heat demand, pump on, burner off	- burner is in starting-up sequence - burner starts within 10 seconds	
	blocked burner caused by the 3 minutes anti-cycling timer	- heat demand (heating), pump on, burner off - however, burner is blocked caused by the anti-cycling timer	burner starts after 3 minutes anti-cycling time
	blocked burner caused by maximum working temperature blocking (97°C)	If the flow sensor temperature or return sensor temperature exceeds 97°C, the burner is switched off	block removes when the actual flow temperature becomes 5°C below the maximum working temperature
	blocked burner caused by set point temperature blocking	burner is off when the actual flow temperature is 3°C above the set point (desired central heating flow temperature may be between 25°C - 90°C)	block removes when the actual flow temperature becomes 5°C below the set point
	blocked burner caused by difference temperature blocking (flow / return difference < –5°C)	If the temperature difference between flow and return sensor becomes less than –5°C negative, the burner is switched off	block removes when the temperature difference between flow and return sensor becomes within –5°C
	blocked burner caused by difference temperature blocking (flow / return temperature > 45°C)	If the temperature difference between flow sensor and return sensor becomes greater than 45°C, the burner does not fire-up	block removes when the temperature difference between flow and return sensor becomes less than 20°C
	blocked burner caused by high glow plug protection counter	- at each ignition the glow plug protection counter is incremented. If the glow plug counter is too high, the boiler start will be delayed	in time the glow plug protection counter removes automatically

	number	- glow plug protection counter is decremented 1 step per minute	
d continuous	DHW combi-boiler heat demand, pump on, burner off	- burner is in starting-up sequence - burner starts within 10 seconds	
b continuous	HWS external cylinder heat demand, pump on, burner off	- burner is in starting-up sequence - burner starts within 10 seconds	
C. continuous	Heating burner is on in heating mode	heat demand (heating), pump on, burner on, boiler is operating	
d. continuous	DHW combi-boiler burner is on in hot water mode	heat demand (internal tank), pump on, burner on, boiler is operating	
b. continuous	HWS external cylinder burner is on in hot water mode	heat demand (external cylinder), pump on, burner on, boiler is operating	
P/C. continuous	Heating burner limited to low load caused by low water pressure (0.2-0.5 bar)	- heat demand (heating), pump on, boiler is operating - however, with a system water pressure between 0.2 and 0.5 bar, the burner is limited to low load	fill the system with water to a water pressure of 1.5 - 2.0 bar
P/d. continuous	DHW combi-boiler burner limited to low load caused by low water pressure (0.2-0.5 bar)	- heat demand (internal tank), pump on, boiler is operating - however, with a system water pressure between 0.2 and 0.5 bar, the burner is limited to low load	
P/b. continuous	HWS external cylinder burner limited to low load caused by low water pressure (0.2-0.5 bar)	- heat demand (external cylinder), pump on, boiler is operating - however, with a system water pressure between 0.2 and 0.5 bar, the burner is limited to low load	
A/C. continuous	Heating burner limited to low load caused by high flue gas temperature (> 90°C)	- heat demand (heating), pump on, boiler is operating - however, with a flue gas temperature above 90°C, the burner is limited to low load.	burner action restores automatically when the actual flue gas temperature descends 80°C - check flue gas sensor - check the water flow - check primary heat exchanger
A/d. continuous	DHW combi-boiler burner limited to low load caused by high flue gas temperature (> 90°C)	- heat demand (internal tank), pump on, boiler is operating - however, with a flue gas temperature above 90°C, the burner is limited to low load	
A/b. continuous	HWS external cylinder burner limited to low load caused by high flue gas temperature (> 90°C)	- heat demand (external cylinder), pump on, boiler is operating - however, with a flue gas temperature above 90°C, the burner is limited to low load	
o continuous	frost protection 8°C (heating), pump on, burner off	If the flow sensor temperature is below 8°C, the regulation starts the pump	frost protection is finished, when the temperature of the return sensor is above 15°C
o. continuous	frost protection 3°C (heating), pump on, burner on	If the flow temperature goes below 3 °C, the regulation starts the burner to low load	

4.2.2. Status indication during "blocking action"

What is a blocking action?
The regulation blocks the burner till conditions are within certain requirements.
During blocking operation, the display status shows a ***continuous*** indication. Each blocking action will stay during the 3 minutes anti-cycling time.
Most blocking actions restore automatically. However, some need to be repaired or can be restored by interrupting the supply power.

Status code	description	action	repair
U continuous	supply Line and Neutral reversed	- Line and Neutral are exchanged - no good Earth present	- reverse Line / Neutral - check wiring
1 continuous	flow sensor open circuit	broken flow sensor, or wiring interrupted, or wiring not correctly connected.	- replace flow sensor - check wiring
1. continuous	flow sensor short circuit	faulty flow sensor, or wiring interrupted, or wiring not correctly connected	- replace flow sensor - check wiring
2 continuous	return sensor open circuit	broken return sensor, or wiring interrupted, or wiring not correctly connected	- replace return sensor - check wiring
2. continuous	return sensor short circuit	faulty return sensor, or wiring short circuit or contact to earth	- replace return sensor - check wiring
4 continuous	flue gas sensor open circuit	boiler will work without having a flue gas sensor as well, unplug the sensor, and interrupt the supply power	- replace flue gas sensor - check wiring
A continuous	blocked burner caused by high flue gas temperature (>100°C)	If the flue gas sensor exceeds a temperature of 100°C, the burner is blocked	burner action restores automatically when the actual flue gas temperature descends 80°C - check flue gas sensor - check the water flow - check primary heat exchanger
H continuous	blocked burner caused by high flow temperature (>105°C), while the burner was off	If the flow sensor exceeds a temperature of 105°C, while the burner is off, the burner is blocked	burner action restores automatically when the actual flow temperature becomes 5°C below the set point
P continuous	pump test at each burner start (pump test repeats each 15 seconds)	- at each burner start the boiler is doing a pump test program. The boiler is starting and stopping the pump and measuring the actual pressure sensor water pressures - the burner does not start when the difference between the active pump pressure and the static pressure is less than 0.05 bar or more than 0.54 bar (0.64)	pump test ends when a test pressure difference is obtained between 0.05 and 0.54 bar (0.64 bar for boiler type 40) - no water flow (system water flow may be blocked by thermostatic valves or zone regulation) - check pressure sensor - check pump

P/C continuous	<u>Heating</u> 1). low water-pressure (< 0.2 bar) 2). high water pressure (> 3.0 bar)	Ad 1). with water pressure below 0.2 bar, the regulation blocks with alternately a continuous P and the normal status. The two right segments show the actual system water pressure. Ad 2). with water pressure above 3.0 bar, the regulation blocks with alternately a continuous P and the normal status. The two right segments show the actual system water pressure.	Ad 1). blocking mode releases after filling the system to a system water pressure above 1.3 bar Ad 2). blocking mode releases when the system water pressure descends below 2.9 bar
P/d continuous	<u>DHW combi-boiler</u> 1). low water-pressure (< 0.2 bar) 2). high water pressure (> 3.0 bar)		
P/b continuous	<u>HWS external cylinder</u> 1). low water-pressure (< 0.2 bar) 2). high water pressure (> 3.0 bar)		
nc continuous	internal software blocking	the software was interrupted in the middle of a sequence	interrupt 230V supply power
9 continuous	sensor malfunction (flow sensor, return sensor, tank sensor, outdoor sensor)	sensor with incorrect temperature measurement between 97-115°C. The actual temperature differs.	replace the sensor concerned
J continuous	**see C** continuous		(TWIN only)
E continuous	no slave recognised		(TWIN only)
b/r continuous	HWS right unit		(TWIN only)

4.2.3. Status indication during "lock-out"

- gas valve ***off***
- glow plug ***off***
- ionisation ***off***
- fan ***off*** (some lock-outs, post rinse for 1 minute)
- pump ***on*** (max 24 hr)

What is a lock-out?
During lock-out operation, the display status shows a ***flashing*** indication. The regulation may lock-out for safety reason or after four consecutive failed start attempts.
Most lock-out operations can be restored by pressing the 'Set/Reset' button. It is advised not to ask installer for help after using this button several times in a row. Some lock-out operations need an interruption of the supply power.

Status code	description	action	repair
1 flashing	boiler does not pass temperature test	- after burner start, the temperature difference between flow sensor and return sensor must be raised by 3°C within the first 20 seconds. If the difference is not made, the burner is restarted. - after three restarts, within one heat demand, the boiler runs into lock-out.	- check both flow and return sensors for function - check flow of system water (blockage in pump area)
2 flashing	too many re-start during operation	- If during operation the ionisation fails, the gas valve shuts off immediately and a restart is made. If this failure causes a third restart within the burner demand, the boiler runs into lock-out	- check flame stability - check flame signal - check ionisation wiring - blocked condensation discharge (condensate try full with water)
3 flashing	internal communication error	- internal regulation fault - A/D conversion fault - external component fault	- interrupt 230 V supply power - replace printed circuit board
4 flashing	low flue gas temperature (–25°C)	f the flue sensor measures a temperature below –25°C, the boiler runs into lock-out	check flue gas sensor
5 flashing	fan speed malfunction	- If the measured fan speed, in operation, deviates from the desired fan speed, the burner will be switched off, and post-purge will start. If this blocking action lasts for more than 1 minute, the boiler runs into lock-out - If the measured fan speed exceeds the maximum fan speed, the regulation blocks. If this blocking action lasts for more than 1 minute, the boiler runs into lock-out - communication fault - broken fan motor - printed circuit board failure	- check the fan for functioning - check the fan coil resistance on the two outermost terminals (R = 115 Ohm at room temp) - check if the printed circuit board powers 230 VAC on the two outermost contacts of the fan connector during start
6 flashing	N/A		
7 flashing	gas valve malfunction	- communication fault - broken gas valve coils - printed circuit board failure	

8 flashing	false flame signal	- If during standby a false flame signal is detected for more than 5 seconds, the boiler runs into lock-out - If a false flame signal is detected with closed gas valve for more than 5 seconds, the boiler runs into lock-out - If a false flame signal is detected during pre-rinse / post-rinse, the regulation blocks. If the false flame signal lasts for more than 5 seconds, the boiler runs into lock-out	check ionisation system
9 flashing	successful software update	after successful programming of the printed circuit board status code shows flashing 9	press set/reset button
A flashing	lock-out, caused by high flue gas sensor temperature (> 105°C)	If the flue gas sensor exceeds a temperature of 105°C, the burner locks-out	why is the flue gas temperature exceeding 105°C? The burner was already on low load at 90°C and blocked at 100°C, was it?
E flashing	internal interlock fault	- software problem (to be restored by supply interruption) - hardware problem (cannot be restored by supply interruption) is mostly a broken printed circuit board.	replace printed circuit board
H flashing	lock-out, caused by limiter, high flow temperature (> 105°C)	If the flow sensor exceeds a temperature of 105°C, the regulation runs into lock-out	- check flow sensor - check system water flow - check pressure sensor
F flashing	too many start attempts successively (four failed start attempts in a row)	-at each burner start, while the fan runs at the ignition speed (2700 rpm), the gas valve opens and a flammable gas/air mixture is supplied to the burner. The glow plug ignites the gas/air mixture at the surface of the burner. If there is insufficient ionisation current measured at the end of the safety time, a new start attempt will be made. After four failed consecutive start attempts, the regulation locks-out.	- no voltage supplied from printed circuit board (210 Vdc) to gas control coils (broken board or supply power too low). - gas inlet pressure too high, so the gas control valves remain closed on its seats (max. inlet pressure 60 mbar). - defective gas control coils (R = 4.1 kOhm at room temp). - check glow plug (R = 1.0 – 1.4 kOhm at room temp). - incorrect burner ignition (adjust gas/air mixture). - ionisation probe or ionisation cable makes short circuit with earth (correct ionisation current 6 to 13 micro Amps). - ionisation probe with insulation layer (clean with sandpaper)
O flashing	open gas valve circuit	open circuit of the gas valve cable connector bridge, terminal X4 of the printed circuit board	repair short circuit bridge of gas valve cable connector

4.2.4. Chimney sweeper function (temporarily display for service purposes)

Chimney function has priority over the heating functions

Status code	description	action	repair
C FLASHING	chimney sweeper function	- flashing left segment  = high load - flashing left segment  = low load The two flashing right segments show the ionisation current in microamperes	- chimney sweeper function removes after 10 minutes automatically - chimney sweeper function removes manually by pressing set/reset button

CHAPTER 5. PERIODICAL MAINTENANCE

High voltage!

The wiring of the pump, the three-way valve, fan and wiring of the gas control can be under a voltage of 230 VAC.

After the first year, have a certified installer or maintenance man inspect the appliance. He can ascertain the maintenance deadline on the basis of the inspection and circumstances.

5.1. Checking the CO_2 percentage

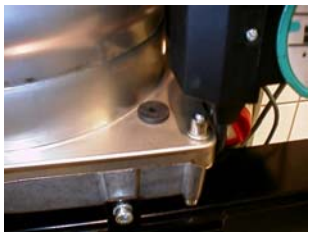
The nominal value for natural gas at full load is 8.8% CO2.

The unit does not need to be cleaned if the measured CO_2 percentage at full load is within 8.8% CO_2 and 9.4% CO_2.

5.2. Measuring the load of the unit

A load drop can be the consequence of a clogged flue gas channel or a clogged air intake channel. Check whether this is the case by measuring the load on the unit. First set the central heating capacity "P" to 100% in the menu. Let on the unit burn on chimney sweeper function at full load. Measure the gas consumption. If the ascertained deviation in load is no more than 15% of the nominal value, the flue gases can be sufficiently exhausted and there is no clogging. At the end of the check, reset the central heating capacity "P" in the menu to its customer-specific value.

5.3. Cleaning the condensation water drain



There is an opening for this purpose on the top of the vapour tray. First remove the rubber sealing plug; rinse the vapour tray and drain with clean tap water. When no more impurities are removed, the vapour tray is clean. Also clean the trap.

5.4. Ionisation probe

When the unit burns on chimney sweeper function, the ionisation current can be read directly on the display.

Correct ionisation current
Full load: 6 µA DC to 13 µA DC
Low load: 3 µA DC to 13 µA DC

The ionisation probe is a part that wears. An insulating layer can be formed in the flame at high temperature. This layer can be removed with fine sandpaper.

5.5. Water pressure

It is possible to read the water pressure directly from the display. To do this, press the "+" button 5-10 seconds.

Check the water pressure; top up and de-aerate as necessary. Press the ‘plus’ button in for at least 5 seconds to see the actual water pressure in bar on the display.
Press briefly on the ‘min’ button to return to operational mode.

CERTIFICATE

Number **E 1170**

CE 0063

GASTEC Certification B.V. hereby declares that the **condensing boilers**, types

80C, 40C, 30K, 30B, 30C, 15B, 15C

made by **Coopra Advanced Heating Technologies b.v,**

in **Dordrecht, The Netherlands,**

meet the essential requirements as described in the **Directive on appliances burning gaseous fuels (90/396/EEC)**, and in the **Directive on efficiency requirements (92/42/EEC).**

PIN : 0063AT3070
Report number : 171070
Appliance type : B_{23}, $C_{13(X)}$, $C_{33(X)}$, $C_{43(X)}$, C_{53}, $C_{63(X)}$ $C_{83(X)}$

For corresponding appliances of marketeers, see MATRIX Black Labels.

Categories : I_{2L}, I_{2H}, I_{2E}, $I_{2(S)B}$, I_{2ELL}, I_{3P}, $I_{3B/P}$, I_{3B}

Mentioned product will be marketed

AL	(Albania)	DK	(Denmark)	IS	(Iceland)	PL	(Poland)
AT	(Austria)	EE	(Estonia)	IT	(Italy)	PT	(Portugal)
BA	(Bosnia–Herzegovina)	ES	(Spain)	LT	(Lithuania)	RO	(Romania)
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Apeldoorn,

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RvC

05/165

Take the time to read this document carefully before installing or using the unit. Always keep this document near the unit.

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