

AQUAIR S SERIES

of Water to Air Space Heaters



INSTALLATION, COMMISSIONING & SERVICING INSTRUCTIONS

Aquair S-16

Aquair S-20

These instructions are to be left with the User

**UK
CA**



**Johnson
& Starley**

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In the interest of continuous development Johnson and Starley reserves the right to change specification without prior notice.
Johnson and Starley prides itself on its ability to supply spare parts quickly and efficiently.

1. FEATURES

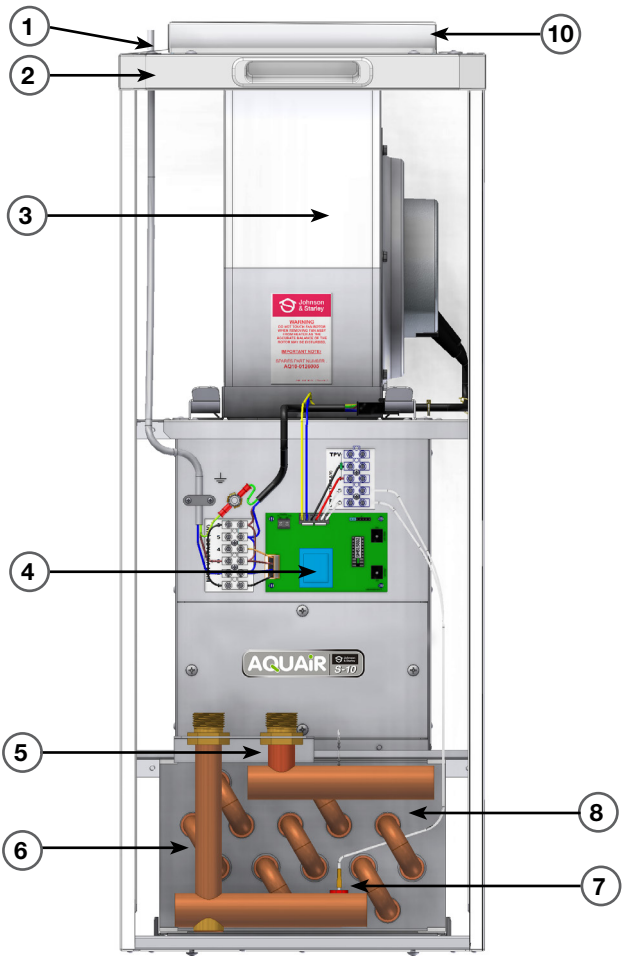


FIGURE 1A. DOWNFLOW CONFIGURATION

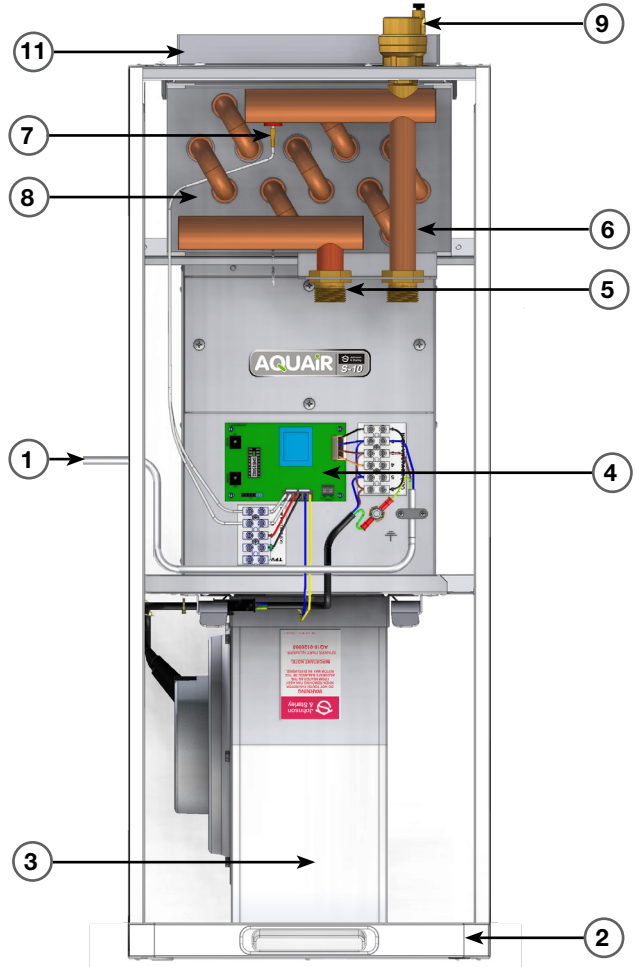


FIGURE 1B. UPFLOW CONFIGURATION

AQUAIR S FEATURES

1	Mains Supply
2	Air Filter
3	Air Circulation Fan with EC technology
4	PCB Control Board
5	Hot Water Return to Heat Source

6	Hot Water Flow from Heat Source
7	Flow Sensor
8	Heat Exchanger
9	Air Vent
10	Finger Guard
11	Spigot Frame

2. CARTON CONTENT

ITEM	DESCRIPTION	QTY.
1	Aquair S Unit	1
2	Decal	2
3	Installation Instructions	1
4	User Instructions	1

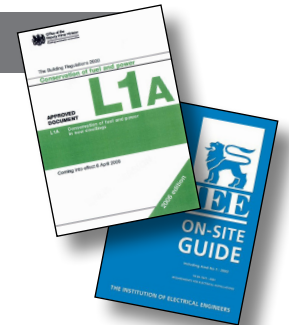
3. GENERAL DESCRIPTION

- 3.1 AQUAIR S is a “water to air” heat exchanger unit with a heat output of 10, 16 and 20 kW (assuming a hot water supply at 80 °C is available). It is supplied as a downflow unit but it is also suitable for upflow installations. When used in upflow installations an “air vent” (see 9.6.2) must be fitted to the heat exchanger. Modairflow control is incorporated. A wire mesh filter is fitted as standard. The unit requires a supply of hot water at a minimum temp. of 60 °C. Water connections are left or right handed through knockouts in the sides of the cabinet.
- 3.2 The air is drawn in through the air filter or Cleanflow air cleaner (if fitted) and the heat exchanger by a centrifugal fan, and it is discharged through the opposite end of the unit. A Summer Air Circulation switch (optional) allows the facility to supply unheated air to the air outlets during warm weather. An external timer (not provided) will be required if it is necessary to set the periods of operation.
- 3.3 The Aquair S unit has been designed to allow downflow and upflow configurations. It also allows the airflow to be redirected through the side of the unit via a Side Return Air kit.

4. BUILDING STANDARDS & REGULATIONS

NOTE: Installation shall be in accordance with the following

- **Building Standards (Scotland) (Consolidation) Regulations**
- **Building Regulations Part L**
- **The Water Fittings Regulations or Water Byelaws in Scotland**
- **Model and Local Authority Byelaws**
- **BS 5720** Mechanical Ventilation and Air Conditioning in Buildings
- **BS 7671** Institute of Electrical Engineers (I.E.E) Wiring Regulations
- **Health & Safety Document No. 635**
- **The Electricity at Work Regulations, 1989**



IMPORTANT: This appliance is CE certificated for safety and performance. It is important that no modifications are made to this appliance, unless fully approved in writing by Johnson & Starley Ltd. If in doubt, please Ring Johnson & Starley Ltd on Telephone 01604 762881.

- * The manufacturer’s instructions supplied must not be taken as overriding any statutory requirements.
- * It is important that the system is flushed thoroughly before the appliance is left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system and to prevent the boiler from becoming a trap for system debris. Once the system has been flushed, an inhibitor (suitable for stainless steel heat exchangers) should be added. Appropriate inhibitors are available, for example Sentinel, Fernox and Salamader.
- * We also recommend a Magnetic & Non Magnetic Filtration system be fitted between the last radiator and the boiler. This protects the boiler from debris blockages in the heat exchanger and prolongs the life of the boiler.
- * Failure to carry out the above procedure will invalidate the guarantee!

5. SAFETY INFORMATION

5.1 HANDLING THE UNIT

- 5.1.1 The weight of this appliance exceeds that recommended for a one-man lift. It will therefore be necessary to gain assistance at times during the removal from its packaging and during installation procedure. Manoeuvring the boiler may include the use of a sack truck and involve lifting, pushing and pulling.
- 5.1.2 It should be noted that this appliance may contain sharp edges. Care **MUST** be taken when handling the appliance to prevent injury. It is advised that engineers wear suitable P.P.E. when handling the unit.
- 5.1.3 Once the appliance has been fired beware that certain parts will be hot to the touch.
- 5.1.4 Do not install flues during rain, high winds or in severe weather conditions.

5.2 ELECTRICAL SUPPLY

- 5.2.1 Ensure the mains supply voltage, frequency, number of phases and power rating comply with details on the rating label.
- 5.2.2 All wiring must be in accordance with the appropriate standards.
- 5.2.3 Ensure safety regulations and practices are adhered to when installing and using this appliance.

6. DUCT INFORMATION

- 6.1 The duct system should be carefully designed (Guidelines taken from the British System Design Manual) to suit the needs specific to the heating requirements and building layout.
- 6.2 The duct work should be installed with the least number of fittings to minimise the airflow resistance and the ducting runs should be as straight as possible. They should be fully insulated and protected from any crushing. Ducting passing through unheated roof voids must be insulated.
- 6.3 It is an advantage to have all the compatible ductwork already installed and ready to connect to the appliance frame. The base duct must be constructed to support the weight of the unit. The appliance, duct work and blanking plate must be secured and sealed.

7. TECHNICAL DATA

ITEM		S-10	S-16	S-20
Nominal Rated Output	kW	10	15	20
"Air on" Temperature	°C	20	20	20
"Air off" Temperature	°C	67	67	67
Water Supply Temperature	°C	80	80	80
Water Return Temperature	°C	73	72	71
Water Flow Rate	l/s	0.4	0.5	0.6
Air Volume	m ³ /h	576	936	1224
Water Connections	bsp	¾	¾	¾
Maximum Water Pressure	Bar	3	3	3
Maximum Power Consumption	W	150	215	530
Dimensions (H/W/D)	mm	768 x 300 x 550	787 x 445 x 517	787 x 485 x 631
Return Air Frame	mm	204 x 380	359 x 351	366 x 372
Electrical Supply	A	230V, 50Hz, fuse rated at 3A		
Weight	kg	26	36.50	42.51

8. POSITIONING & PREPARATION

- 8.1 The unit should be positioned to suit any duct work. Mount on a plenum or frame strong enough to avoid any strain being placed on associated pipe and duct work.
- 8.2 Once the position of the unit has been decided, make sure all extra ancillaries are installed ready for the unit installation.
For a list of the ancillaries available contact Johnson & Starley Ltd, Telephone 01604 762881.
- 8.3 Make sure all the electrical cables are in place.
- 8.4 It is important that the system is flushed thoroughly prior to installation. Failure to do so could produce a blockage, cause damage to the system and reduce the efficiency. (as recommended in BS 7593)
IMPORTANT: The water system must be drained and flushed prior to the installation of the unit. A 'Y' strainer MUST be fitted on the flow to the Aquair. The boiler/heatsource must have the manufacturers recommended filter fitted. Failure to fit either of these will invalidate the guarantee.
- 8.5 Clearance of 450 mm is required at the front of the casing for servicing and replacement of the heat exchanger. It is recommended that provision be made for complete removal of the unit.
- 8.6 Sufficient clearance must be provided for the assembly of ducting and pipework.

9. INSTALLATION INSTRUCTIONS

- 9.1 The Aquair S unit is supplied as a downflow configured appliance as standard. It has been designed with the provision to be converted to an upflow unit.
- 9.2 The Aquair S-16 & S-20 appliances exceed the recommended weight for a one-man lift as detailed in the Manual Handling Operations, 1992 Regulations.
- 9.3 Once the unit has been unpacked, unscrew the transit plate from the base of the unit and discard.

NOTE: This unit could contain sharp edges and care **MUST** be taken when handling.

9.4 DOWNFLOW CONFIGURATION *See Figure 2*

- 9.4.1 Remove the filter to expose the two screws holding the door in place. Remove the screws and gently pull and lift the door off the unit.
- 9.4.2 Lift the appliance onto the plenum or base support and position correctly. Seal the joint with the appropriate sealing material.
- 9.4.3 The water connections to the unit should be by compression. Fittings that are suitable for the duty and isolation valves must be fitted to facilitate the removal of the heat exchanger assembly.
- 9.4.4 If a return air duct is not to be fitted, the top of the unit must be suitably guarded to prevent any blockage.
- 9.4.5 Once the installation is complete, stick the Aquair decal in position on the front cover, top left hand side.

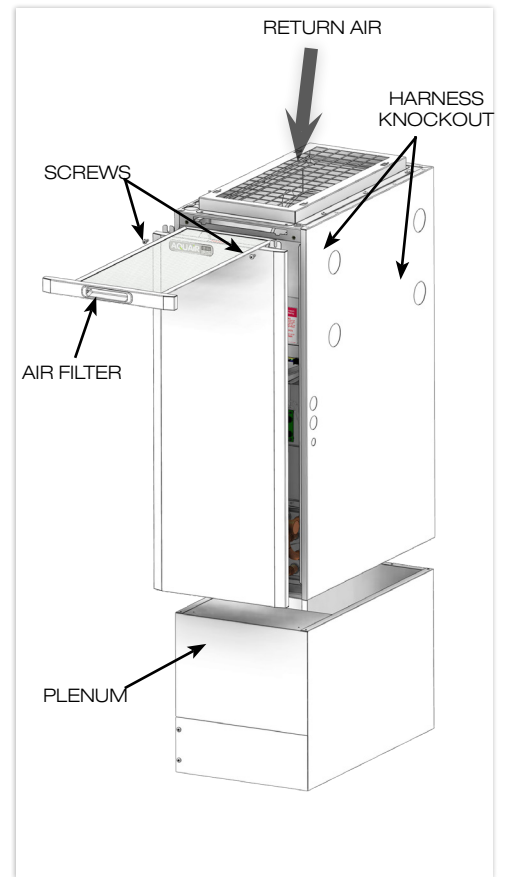


FIGURE 2. DOWNFLOW CONFIGURATION

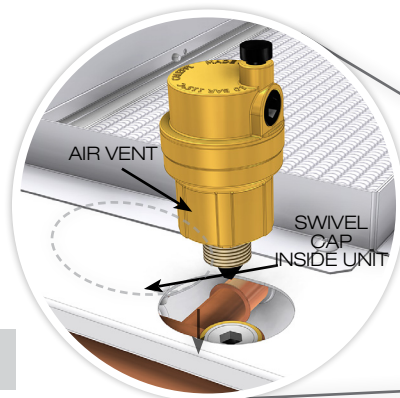


FIGURE 4. FITTING AUTOMATIC AIR VENT

9.5 UPFLOW CONFIGURATION *See Figure 3*

- 9.5.1 To fit the upflow configuration you need the additional Aquair Upflow Kit (AQUP).
- 9.5.2 Remove the filter to expose the two screws holding the door in place. Remove the screws and gently pull and lift the door off the unit.
- 9.5.3 Remove the 10 screws holding return air frame and remove.
- 9.5.4 Invert the unit so the air filter is at the bottom of the unit.
- 9.5.5 In the AQUP Kit use the new spigot frame and screw to the top of the unit to form the duct connection spigot.
- 9.5.6 Lift the appliance onto the plenum or base support and position correctly. Seal the joint with the appropriate sealing material.
- 9.5.7 If a return air duct is not to be fitted, the top of the unit must be suitably guarded to prevent any blockage.
- 9.5.8 Once the installation is complete, stick the Aquair decal in position on the front cover top left hand side.

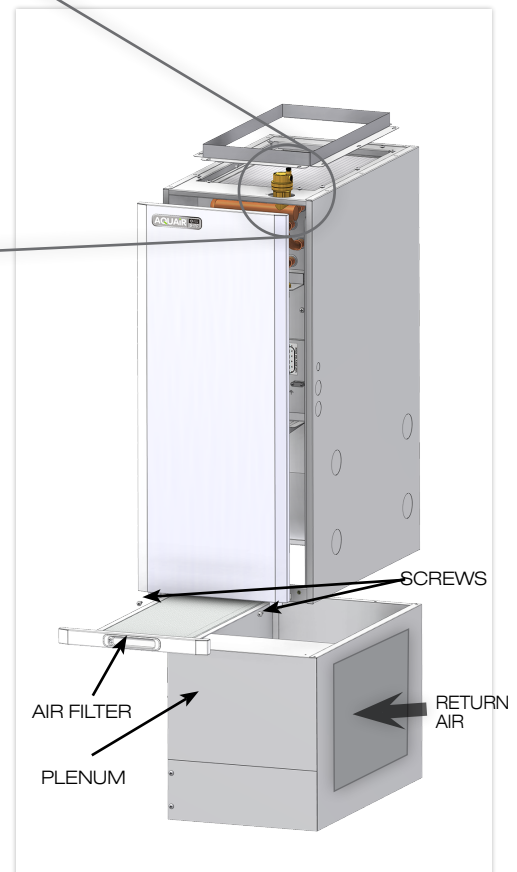


FIGURE 3. UPFLOW CONFIGURATION

9.6 WATER & ELECTRICAL CONNECTIONS

9.6.1 WATER CONNECTIONS

The water connections to the unit should be compression type fittings that are suitable for the duty of the appliance. Isolation valves must **be fitted to facilitate the removal of the heat exchanger assembly.**

9.6.2 UPFLOW AUTOMATIC AIR VENT

For upflow units an ALTECNIC 502 ROBOCAL Air vent (Part No. 1000-0302300) MUST be fitted to the top of the unit. This come as part of the AQUP Kit.

Any queries contact Johnson & Starley Ltd for details, Telephone 01604 762881.

9.6.3 To fit the vent, swivel the disc cap by breaking the paint seal, tap the disc and swivel. Remove the cap in the end of the flow pipe and screw in the air vent.

9.6.4 It is important that the system is flushed thoroughly before the appliance is left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system and to prevent the Aquair from becoming a trap for system debris. Failure to do so could produce a blockage, cause damage to the system and reduce the efficiency. This MUST comply with the water treatment guidelines.

After the system has been flushed, an inhibitor (suitable for stainless steel heat exchangers) should be added. Appropriate inhibitors are available, for example Sentinel, Fernox and Salamander. The manufacturer's instructions supplied must not be taken as overriding any statutory requirements.

A 'Y' strainer MUST be fitted on the flow to the Aquair. The boiler/heatsource must also have the manufactures recommended filter fitted. Failure to fit either of these will invalidate the guarantee

NOTE: Care must be taken with the heat exchanger matrix, as it is fragile and is easily damaged.

9.6.4 ELECTRICAL HARNESS

Re-route the harness cable through the side knockout. Use the grommet attached to seal the hole.

9.7 ANCILLARIES AVAILABLE

MODEL	UPFLOW KIT	CLEANFLOW	PASSIVE SIDE RETURN AIR KIT	SIDE AIR RETURN KIT	TOP SLOT FIT KIT
S-10	AQUP-10	CFA-10	SRAQ-10P	SRAQ-10	TSQ-10
S-16	AQUP-16	CFA-16	SRAQ-16P	SRAQ-16	-
S-20	AQUP-20	CFA-20	SRAQ-20P	SRAQ-20	-

NOTE: When using a side return air kit (with either the downflow or upflow configuration) you need a blanking plate to cover the existing opening.

10. RETURN AIR SYSTEM

10.1 The return air system should be constructed of fire-resistant material. It is important that the correct size of return air grilles and ducting is used. Refer to the table below for return air duct size, flexible duct size and the return air grille size at maximum output.

AQUAIR	DUCT EQUIVALENT SIZE	FLEXIBLE DUCT SIZE	RETURN AIR GRILLE
S-10	250 x 200mm (10" x 8")	300mm (12") dia	860cm ² (137in ²)
S-16	300 x 250mm (12" x 10")	350mm (14") dia	1266cm ² (196in ²)
S-20	400 x 300mm (16" x 12")	406mm (16") dia	2118cm ² (328in ²)

10.2 An adequate and unobstructed return air path is required from areas not served by a directly ducted return and to which warm air is delivered. All such rooms should be fitted with relief grilles which have a free area of 0.0088 m²/kW (1 in²/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and WCs.

11. ELECTRICAL

11.1 The appliance is supplied with PVC sheathed, 3 core 0.75 mm² CSA rated at 6 A, connected to a terminal block and exiting through the casing at the top left hand front. The cable is suitable for a 230 V, 50 Hz single phase supply.

11.2 The means of isolating the appliance MUST be via a double pole switch with a contact separation of at least 3 mm in both poles, and fused at 3 A. If switched live is fitted, a triple pole switch should be used.

11.3 SUMMER AIR CIRCULATION

To run the fan at full commissioned speed in warm weather and in order to circulate the air, a single pole, volt free switch (not supplied) must be connected across terminals 3-4 (see circuit diagram Figure 4).

12. CIRCUIT DIAGRAM

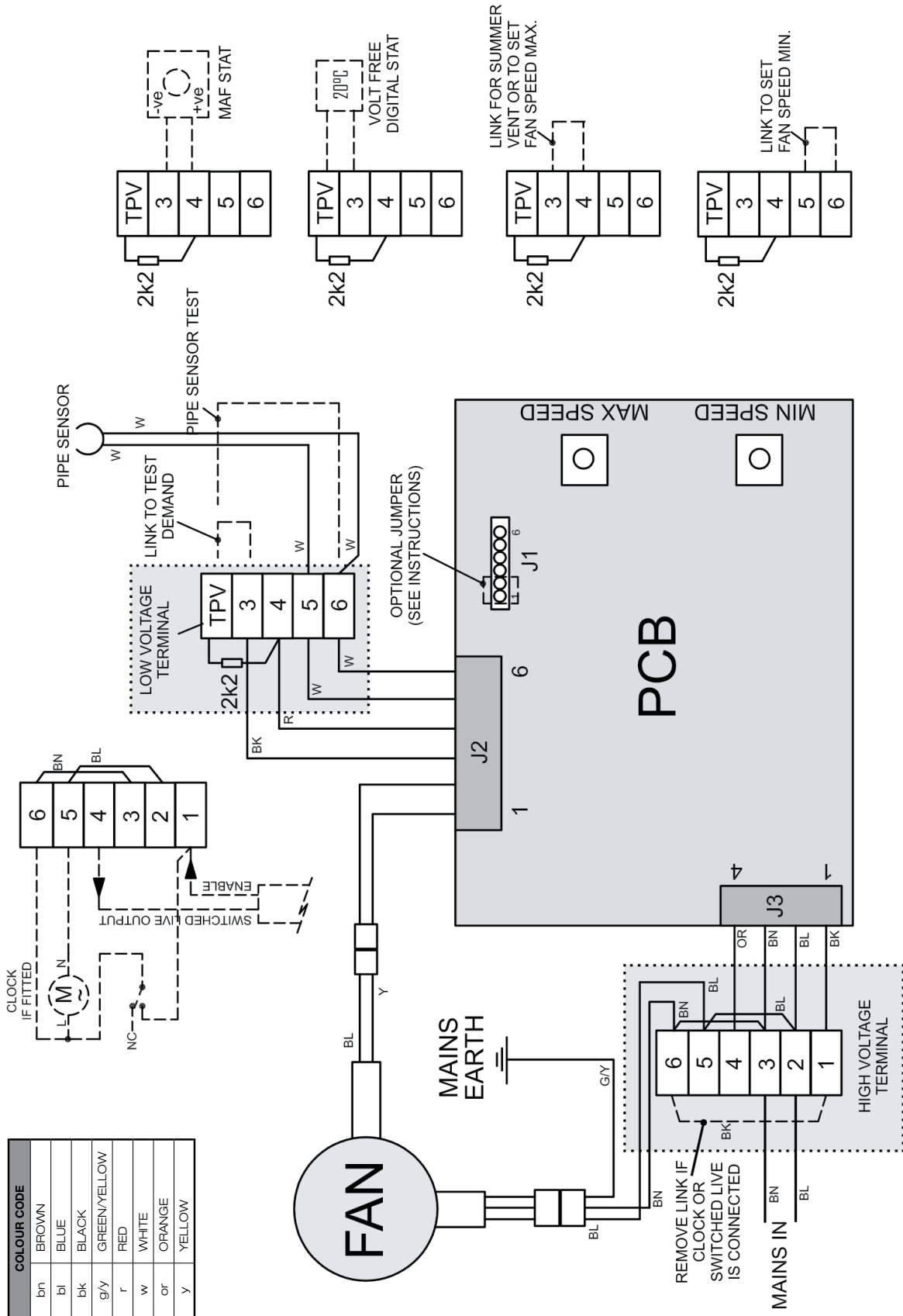
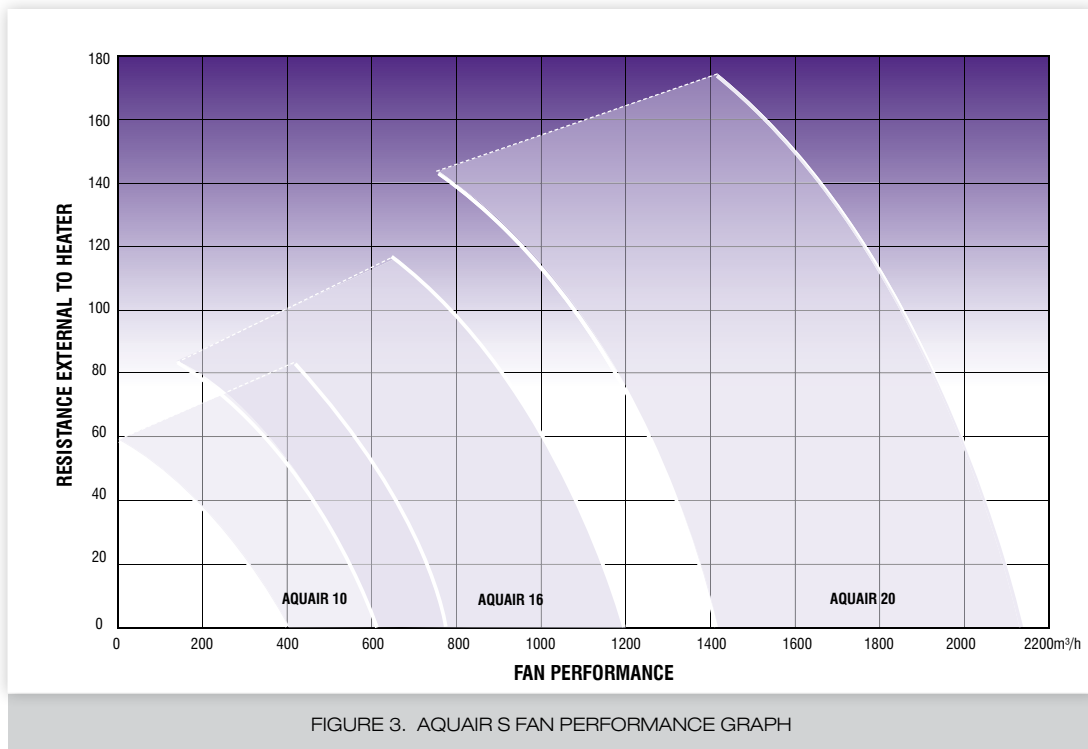


FIGURE 4. AQUAIR S CIRCUIT DIAGRAM

13. FAN PERFORMANCE



14. OPERATING MODES

14.1 HIGH TEMPERATURE MODE

- 14.1.1 For high temperature mode, the J1 pins 1 + 2 have NO jumper.
- 14.1.2 With a Thermista-stat connected (see note below), the fan will run when a water temp. of 60 °C is reached and it stops when the water temperature falls to 42 °C. The fan speed is controlled by the Thermista-stat demand.
- 14.1.3 With no Thermista-stat connected, the fan will run when a water temperature of 44 °C is reached, the fan speed is controlled by the water temperature. The maximum fan speed is reached when the water temperature is at 60 °C.

14.2 LOW TEMPERATURE MODE

- 14.2.1 For low temperature mode, J1 has a jumper across pins 1 + 2.
- 14.2.2 With the Thermista-stat connected, the fan will run when a water temperature of 33 °C is reached and it stops when the water temperature falls to 20 °C. The fan speed is controlled by the Thermista-stat demand.
- 14.2.3 With no Thermista-stat connected, the fan will run when a water temperature of 22 °C is reached, the fan speed is controlled by the water temperature. The maximum fan speed is reached when the water temperature is 32 °C.

NOTE: Thermista-stat to be ordered separately.

IMPORTANT: On installations where there is a single Boiler & Aquair, the Johnson & Starley preferred method of control is to link between TPV + 3 (see Figure 4) and to fit the thermostat and time control to the boiler. The Aquair will then operate according to the pipe temperature.

15. COMMISSIONING

- 15.1 Ensure the heater is correctly fitted with water and all air vented from the flow and return circuits.
- 15.2 Switch on electrical supply.
- 15.3 Setting maximum speed.**
 - 15.3.1 Make a short across Thermista-stat connections, if fitted, and adjust the fan speed as required, then remove the short.
- 15.4 Setting minimum fan speed.**
 - 15.4.1 Make a short across the pipe sensor and adjust the fan speed as required, then remove short.
- 15.5 WITH THERMISTA-STAT FITTED**
 - 15.5.1 Turn up Thermista-stat to call for heat.
 - 15.5.2 Check for 230V on switch live out.
 - 15.5.3 With the water at the required temperature, ensure fan starts.
 - 15.5.4 Allow the system to warm up and check temperature rise across unit is 40 °C.
 - 15.5.5 Set water differential to 20 °C using lock shield valve or equivalent.
 - 15.5.6 Turn off Thermista-stat and check there is NO 230V on switch live out.
 - 15.5.7 Check fan stops when water cools to required temperature.
- 15.6 WITH NO THERMISTA-STAT FITTED**
 - 15.6.1 With the water at the required temperature ensure fan starts.
 - 15.6.2 Allow the system to warm up and check temperature rise across unit is 40 °C.
 - 15.6.3 Set water differential to 20 °C using lock shield valve or equivalent.
 - 15.6.4 Check fan stops when water cools to required temperature.

16. SERVICING & MAINTENANCE

16.1 ROUTINE MAINTENANCE

IMPORTANT: Before carrying out any work on the unit, ALWAYS ENSURE THE MAINS ELECTRICAL SUPPLY IS ISOLATED FROM THE UNIT.

Remove the filter and unscrew the two retaining screws holding the front cover on the unit, gently pull it forward. Servicing and maintenance should be carried out at least once per year.

- 16.1.1 Check that the heat exchanger airways is free from obstructions. If necessary, clean with a vacuum cleaner from the air inspection panel, taking care to not damage the airways.
- 16.1.2 Check the condition of the external strainer, cleaning as necessary.
- 16.1.3 Check that the air filter is being regularly cleaned in accordance with the User Instructions.

16.2 PCB REMOVAL & REPLACEMENT

- 16.2.1 Disconnect the wiring at the PCB terminal block.
- 16.2.2 Release the 4 clips securing the PCB and withdraw the panel, disconnecting the fan supply lead at the fan tray terminal block.
- 13.2.3 Reassemble or replace in reverse order.

16.4 FAN REMOVAL

- 16.4.1 Disconnect the electrical connections.
- 16.4.2 Remove the screws securing the fan and withdraw on the location runners.
- 16.4.3 Reassemble or replace in reverse order.

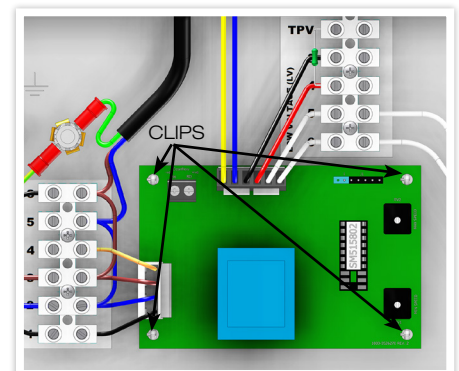


FIGURE 4. AQUAIR S PCB REMOVAL

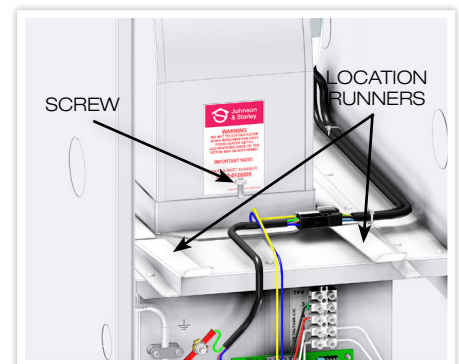


FIGURE 5. AIR CIRCULATION FAN REMOVAL

16.5 HEAT EXCHANGER REMOVAL

CAUTION: THE ELEMENTS OF THE HEAT EXCHANGER ARE VERY FRAGILE.

- 16.5.1 Close the isolation valves and drain down the unit.
- 16.5.2 Release the clip and the temperature sensor, remove the heat exchanger and its associated pipework from the unit.
- 16.5.3 Reassemble or replace in reverse order. Ensure all air locks are expelled, and check for water soundness.

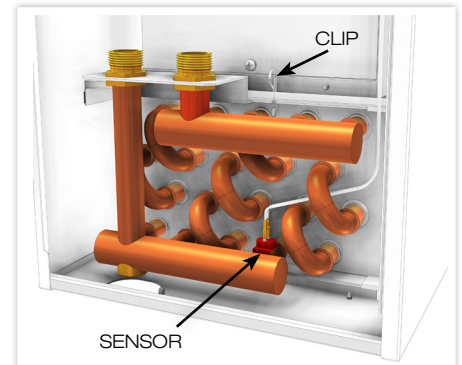


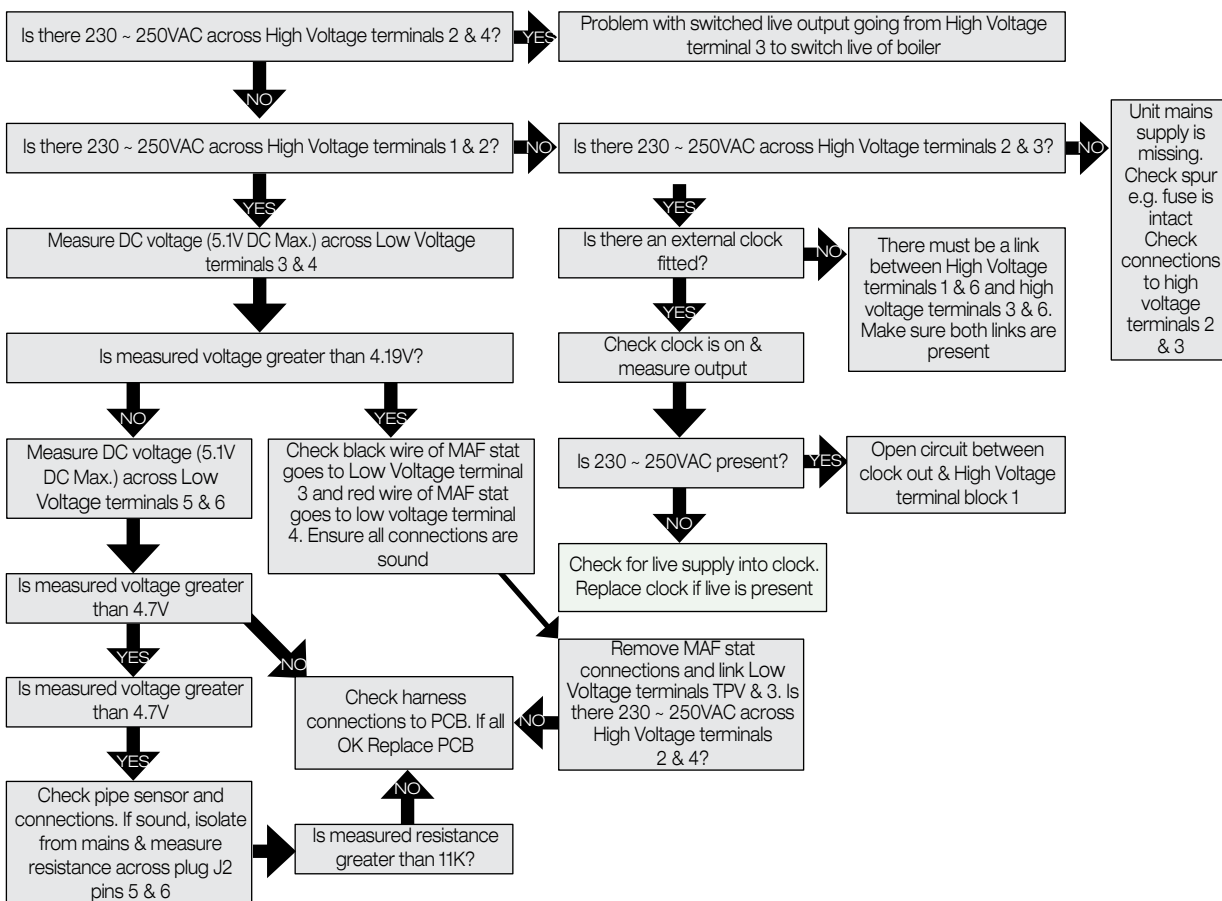
FIGURE 6. HEAT EXCHANGER REMOVAL

16.6 AIR FILTER REMOVAL

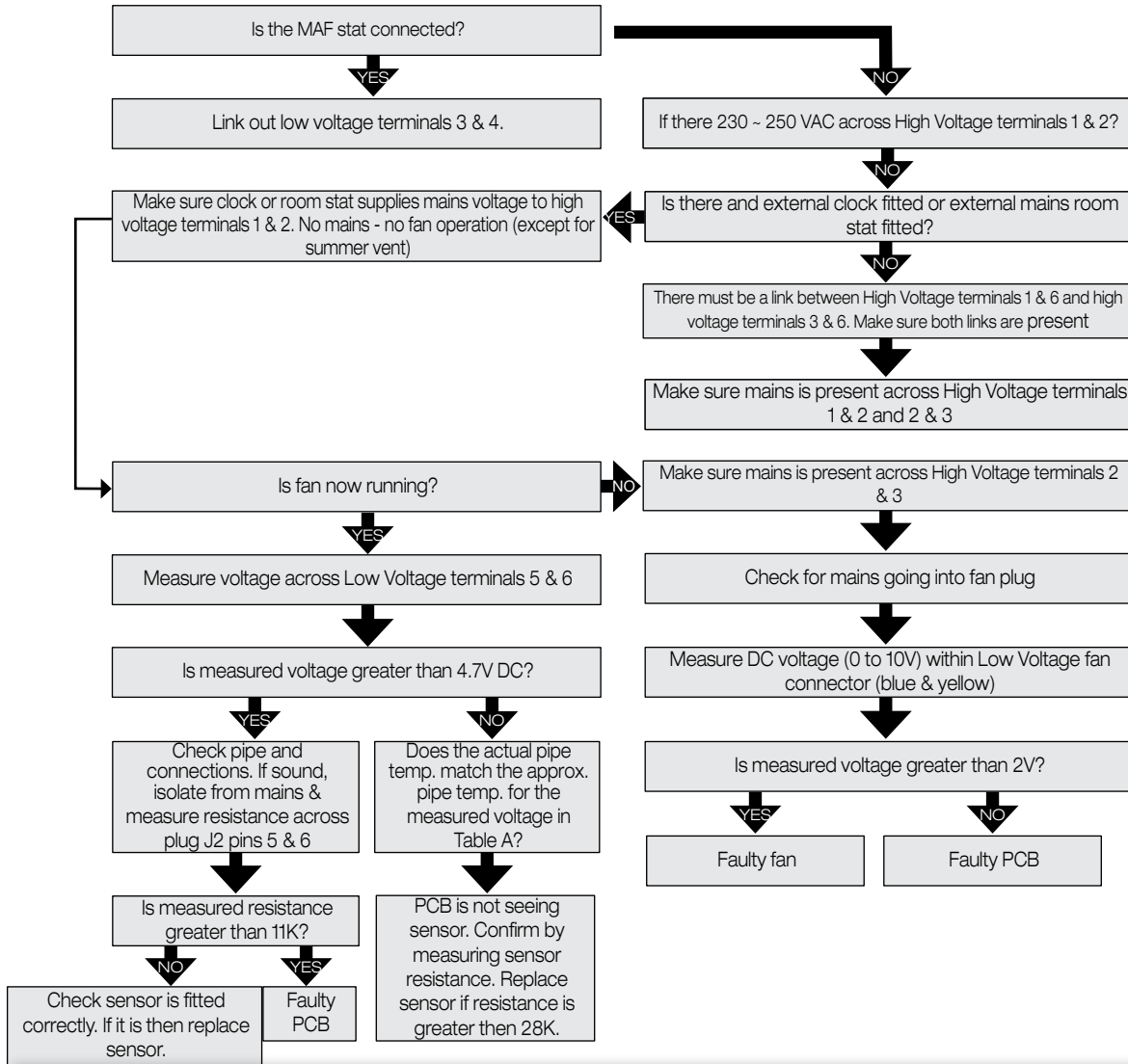
- 16.6.1 The air filter is removed by sliding it out from the front of the unit.

17. FAULT FINDING

MAF STAT CONNECTED NOT CALLING FOR HEAT (BOILER NOT FIRING) WHEN MAF STAT ON MAXIMUM



FAN NOT OPERATING WHEN PIPE IS ABOVE 60°C

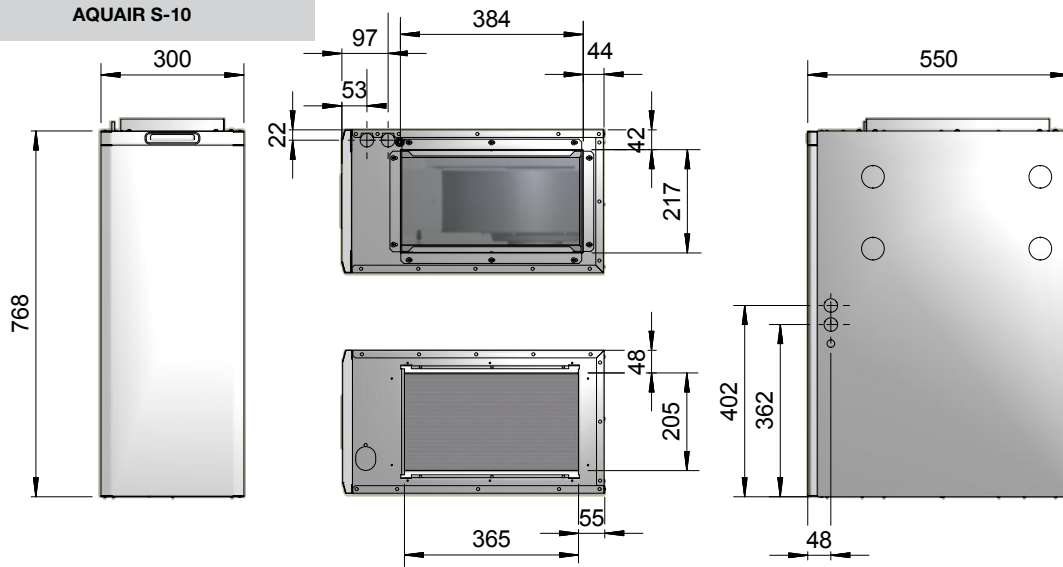


DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C
3.24	10	2.13	33	1.26	56	0.73	79
3.19	11	2.08	34	1.23	57	0.71	80
3.14	12	2.04	35	1.20	58	0.70	81
3.09	13	1.99	36	1.17	59	0.68	82
3.04	14	1.95	37	1.15	60	0.66	83
2.99	15	1.91	38	1.12	61	0.65	84
2.94	16	1.87	39	1.09	62	0.63	85
2.89	17	1.83	40	1.07	63	0.63	86
2.84	18	1.79	41	1.04	64	0.60	87
2.79	19	1.75	42	1.02	65	0.59	88
2.75	20	1.71	43	0.99	66	0.58	89
2.70	21	1.67	44	0.97	67	0.56	90
2.65	22	1.63	45	0.95	68	0.55	91
2.60	23	1.59	46	0.92	69	0.54	92
2.55	24	1.56	47	0.90	70	0.53	93
2.50	25	1.52	48	0.88	71	0.51	94
2.45	26	1.49	49	0.86	72	0.50	95
2.40	27	1.45	50	0.84	73	0.49	96
2.36	28	1.42	51	0.82	74	0.48	97
2.31	29	1.39	52	0.80	75	0.47	98
2.26	30	1.35	53	0.78	76	0.46	99
2.22	31	1.32	54	0.76	77	0.45	100
2.17	32	1.29	55	0.75	78		

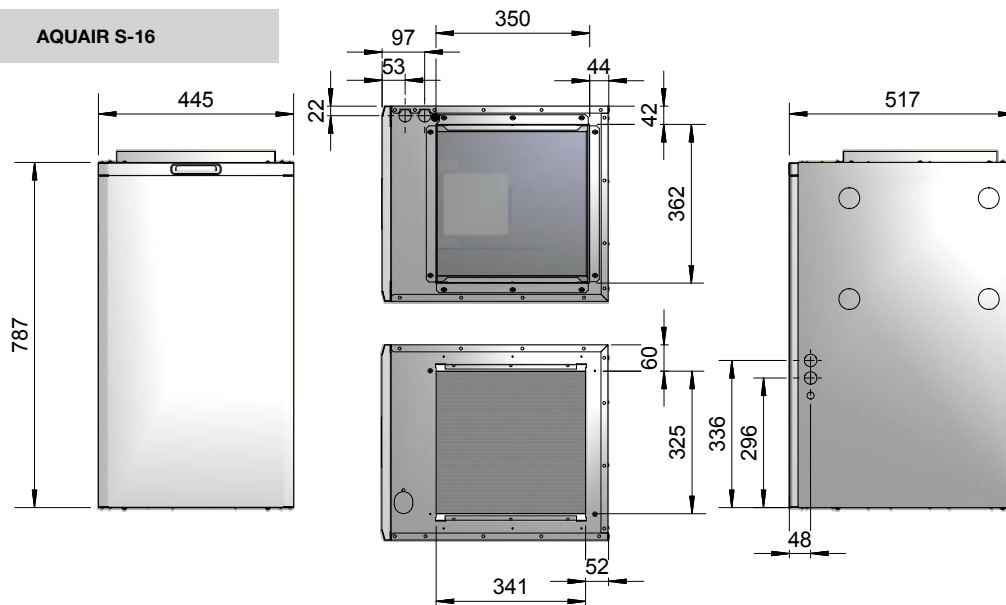
TABLE A

18. DIMENSIONS

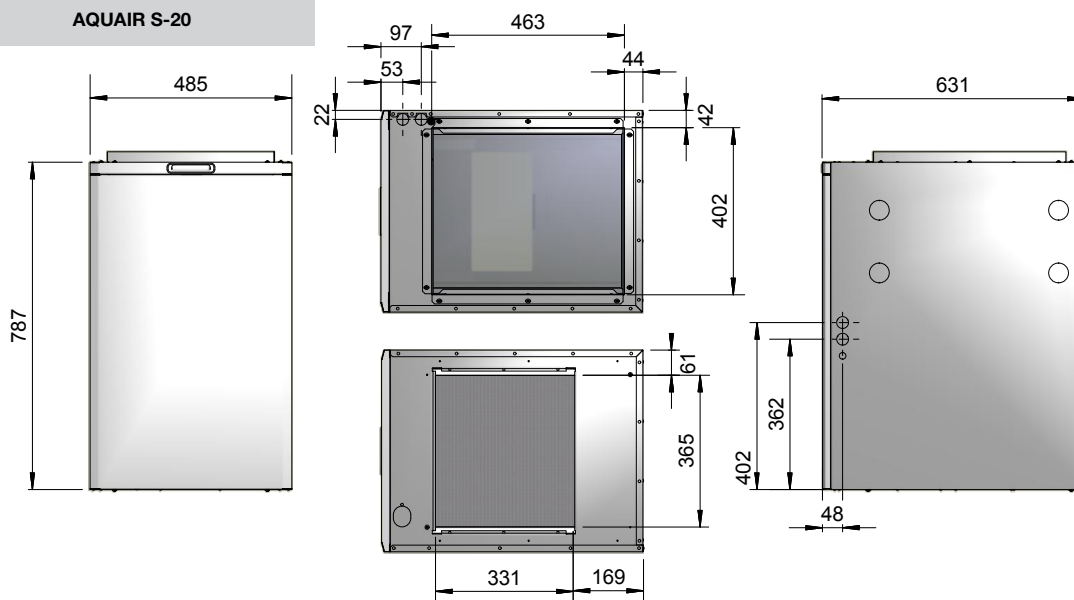
AQUAIR S-10



AQUAIR S-16



AQUAIR S-20



19. SPARES LIST

ITEM	DESCRIPTION	MODEL	QTY	PART No.	
1	Air Filter	S-10	1	AQ10-0182005	
		S-16	1	AQ16-0182005	
		S-20	1	AQ20-0182005	
2	Air Circulation Fan	S-10	1	AQ10-0126005	
		S-16	1	AQ16-0126005	
		S-20	1	AQ20-0126005	
3	PCB Board		1	1000-0526275	
4	Temperature Flow Sensor		1	1000-0526505	
5	Front Cover		1	AQ10-0199005	
6	Heat Exchanger	S-10	1	AQ10-0138005	
		S-16	1	AQ16-0138005	
		S-20	1	AQ20-0138005	
7	Thermista-stat		1	BOS01242	

NOTES

20. EXPLODED DIAGRAM

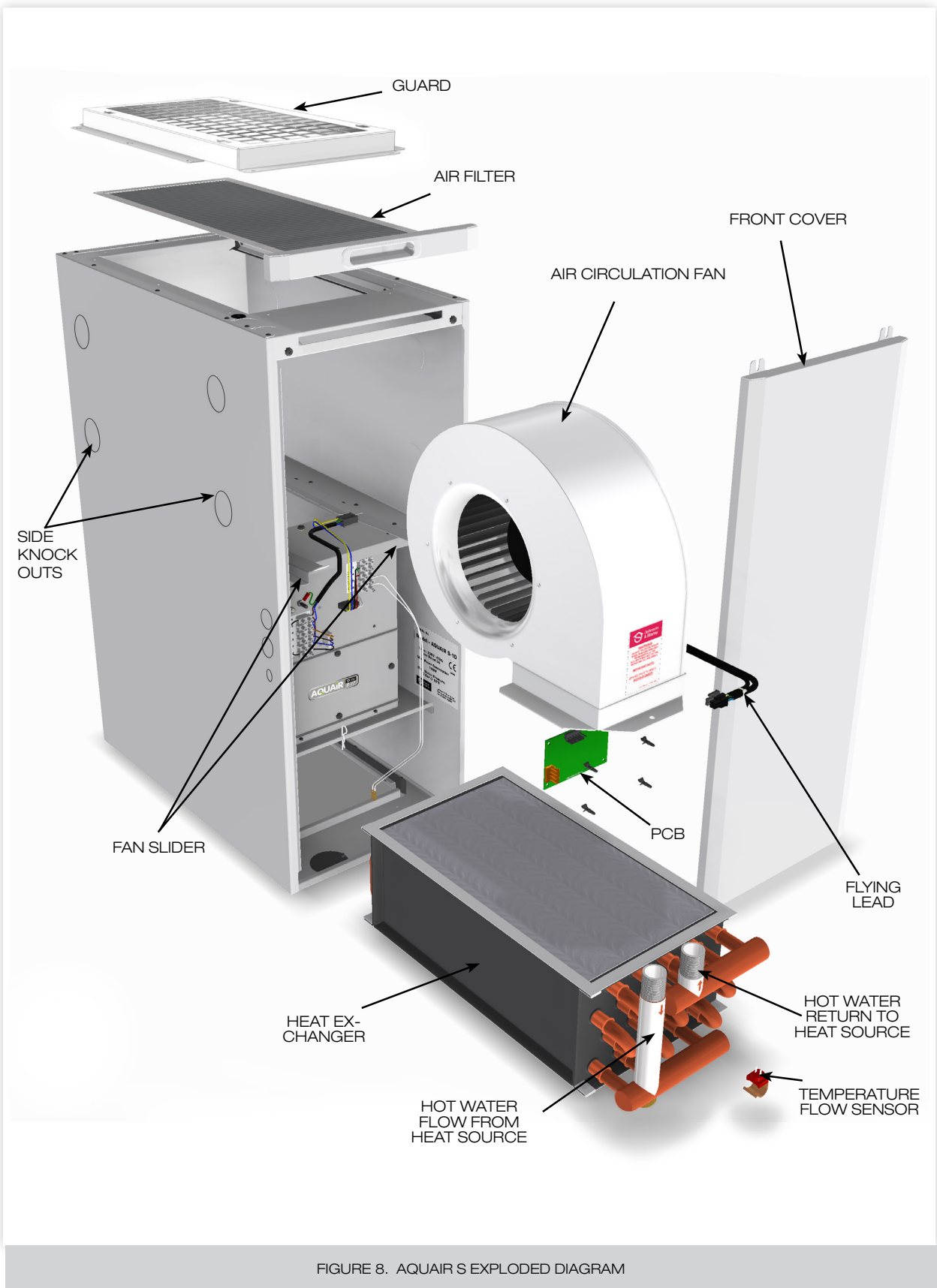


FIGURE 8. AQUAIR S EXPLODED DIAGRAM



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