

INSTALLATION MANUAL

AIR HEATER

TYPE DXC



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1 Introduction

This manual is intended for the gas, electrical and mechanical installer.

This document gives instructions on how to use and maintain the air heater. It is most important to follow the instructions in this document for safe operation of this air heater.

It is important to read this document before starting the installation process. Store this document close to the air heater for quick reference.

1.1 Symbols used in this manual

DANGER! Indicates a dangerous situation that would lead to death or severe injury.

WARNING! Indicates a potentially dangerous situation that could lead to death, severe injury or serious product damage.

CAUTION! Indicates a potentially dangerous situation that could lead to injury or product damage.

NOTICE Indicates important information that is not directly related to safety.

1.2 Warranty

NOTICE Using, installing or maintaining this air heater in any other way than described in this manual may cause damage that voids the warranty.

NOTICE Failing to follow the safety instructions in this manual can lead to damage to the air heater or the installation and void the warranty.

2 Safety instructions

Always follow the safety instructions in this chapter when installing, using or performing maintenance on this air heater:

2.1 Installation

CAUTION! This air heater must be installed and maintained by an authorized, qualified and competent installer, using calibrated equipment.

NOTICE This air heater must be installed and maintained in accordance with this manual, national and local building regulations and local health and safety regulations.

2.1.1 Protection against dust

CAUTION! Cover the air heater while spreading sawdust on the floor. This prevents large amounts of dust from accumulating on the heater.

CAUTION! The air heater can be used in a dusty environment (e.g. a poultry shed) if they are cleaned and maintained more frequently.

2.1.2 Temperature

CAUTION! Do not install the heater in places where the temperature can rise above 40°C. Higher temperatures cause the internal components to degrade much faster.

NOTICE Air heaters installed in very cold environments may form condensate in the flue system. Make sure a condensate discharge is installed.

2.1.3 Corrosive vapours

WARNING! Do not install the air heater in areas that contain any corrosive or explosive vapours. Corrosive vapours (e.g. containing Chlorine) that are sucked into the air intake will cause corrosion of the heat exchanger and a leakage of condensate and flue gas. This is also the case for the room thermostat.

2.2 Use

CAUTION! Make sure the area around the air heater is dry when performing maintenance on the air heater.

CAUTION! Always close the doors and inspection hatches of the air heater, except when adjusting and checking the appliance.

2.3 Maintenance & Cleaning

Frequent maintenance and cleaning of the air heater is necessary to ensure safe and proper operation. Failure to do so could lead to damage to the heater or its surroundings and void the warranty.

CAUTION! Air heaters installed in a dusty and/or wet environment must be maintained and cleaned more frequently.

CAUTION! Air heaters installed in poultry sheds must be maintained and cleaned after every breeding cycle.

2.3.1 Protection from water (IP class)

WARNING! Never use water when cleaning electrical parts.

This air heater is protected against splash water and has an IPX4B classification.

WARNING! Do not use a pressure washer to clean parts that contain electronics, such as the electric motor or the machine cover.

2.3.2 Disinfecting fluids

CAUTION! Some aggressive disinfection fluids can damage the heater. When using such fluids, cover the heater while disinfecting the shed.

2.4 Children and vulnerable users

WARNING! This air heater can be used by children aged 8 years and above and by persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, if they are supervised or instructed concerning use of the appliance in a safe way and understand the hazards involved.

WARNING! Children shall not play with the air heater.

WARNING! Children shall not clean and maintain this air heater without supervision.

3 Technical specifications

3.1 Performance

Technical specification	Unit	Type DXC v4.1		
		DXC60	DXC80	DXC100
Net nominal heat input (max.)	kW	65.5	83.0	108
Net nominal heat input (min.)	kW	44.0	53.5	73.5
Heat output (max.)	kW	59.9	75.9	99.1
Heat output (min.)	kW	39.4	47.9	65.8
Efficiency at max. power	%	91.5	91.5	91.8
Efficiency at min. power	%	89.5	89.5	89.5
Air output (max.)	m ³ /h	6000	8000	10,000
Throw horizontal (max.)	m	40	45	50
Gas connection	G"	3/4"	3/4"	3/4"
Electrical connection (50 Hz)	V	230	230	230
Electrical power consumption	kW	0.8	0.9	1.4
Stand-by electrical power consumption	kW	0.004	0.004	0.004
Electrical current (max.)	A	3.5	3.9	6.1
Protection class	-	IPX4D		
NOx emission (GCV)	mg/kWh	139	126	135
NOx class	-	3	3	3
Flue gas amount (max.)	kg/h	122	150	199
Chimney flue pressure (max.)	Pa	25	40	60
Pressure switch point	Pa	180	160	180
Thermostat connection	-	2-wire low voltage communication bus or ON/OFF		
Flue length (max.)	m	9	9	9
Weight	kg	140	150	175

3.2 Gas types

3.2.1 Natural gas G20

Specification	Unit	Natural gas G20		
Nominal supply pressure	mbar	20		
Supply pressure (min. - max.)	mbar	17-25		
Gas category	-	II ₂ H ₃ P B/P NL: II ₂ EK ₃ B/P DE: II ₂ ELL ₃ B/P BE: I ₂ E(s), I ₂ Er FR: II ₂ Er ₃ B/P PL: II ₂ ELwL ₃ B/P		
Class	-	B22, C12, C32		
Specification	Unit	DXC60	DXC80	DXC100
Gas consumption	m ³ /h	6.9	8.8	11.4
Burner injectors	n x Ømm	5x 3.7	6x 3.7	8x 3.7
Burner pressure high	mbar	6.5	7.4	7.7
Burner pressure low	mbar	3.0	3.2	3.5
CO ₂ High (indication)	%	8.3	8.3	8.3

3.2.2 Propane

Specification	Unit	Propane G31 (P)		
Nominal supply pressure	mbar	30-50		
Supply pressure (min. - max.)	mbar	25-50		
Gas category	-	II ₂ H ₃ P B/P NL: II ₂ EK ₃ B/P DE: II ₂ ELL ₃ B/P BE: I ₃ P FR: II ₂ Er ₃ P PL: II ₂ ELwL ₃ B/P		
Class	-	B22, C12, C32		
Specification	Unit	DXC60	DXC80	DXC100
Gas consumption	kg/h	5.2	6.6	8.6
Burner injectors	n x Ømm	5x 2.3	6x 2.3	8x 2.3
Burner pressure high	mbar	17.5	19.5	18.5
Burner pressure low	mbar	8.0	8.1	8.5
CO ₂ High (indication)	%	9.2	9.2	9.5

3.2.3 Butane / LPG

Specification	Unit	Butane / LPG G30 (B/P)		
Nominal supply pressure	mbar	30-50		
Supply pressure (min. - max.)	mbar	25-50		
Gas category	-	II ₂ H ₃ P B/P NL: II ₂ EK ₃ B/P DE: II ₂ ELL ₃ B/P BE: I ₃ B/P FR: II ₂ Er ₃ B/P PL: II ₂ ELwLs ₃ B/P		
Class	-	B22, C12, C32		
Specification	Unit	DXC60	DXC80	DXC100
Gas consumption	kg/h	3.9	5.0	6.5
Burner injectors	n x Ømm	5x 2.3	6x 2.3	8x 2.3
Burner pressure high	mbar	13.5	15.0	14.5
Burner pressure low	mbar	6.0	6.0	6.5
CO ₂ High (indication)	%	9.2	9.2	9.2

3.3 Dimensions

The dimensions of this air heater can be found in figure 1.

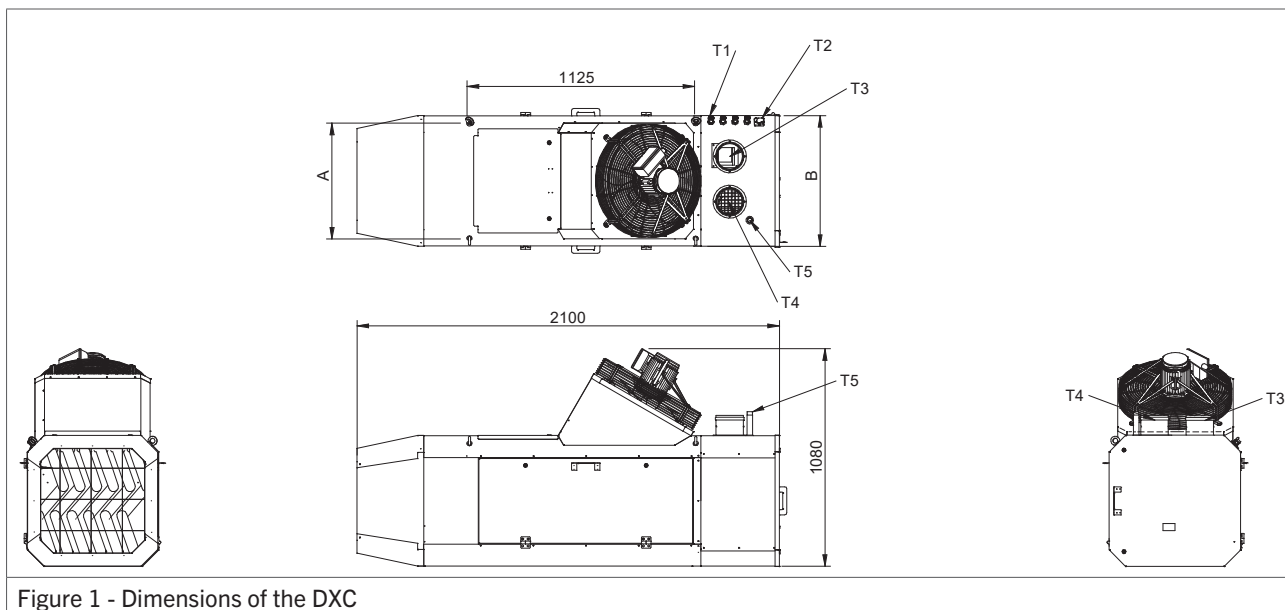


Figure 1 - Dimensions of the DXC

Dimension	Unit	DXC60-80	DXC100
A	mm	575	650
B	mm	740	815
T1	-	Electrical supply	
T2	-	Function switch	
T3	-	Flue discharge	
T4	-	Flue supply	
T5	-	Gas supply (¾")	

4 Installation

4.1 Preparation

Before installation, please use the data badge to check:

- if the heater is in accordance with the order;
- if the heater is suitable for the local present provisions (gas type, gas pressure, electrical supply etc.)

Before leaving the factory, the air heater has been tested for safety and has been set to the operating settings. It has been configured for the type of gas that is stated on the data badge. Should there be any doubt about the settings that apply to your situation, please contact your supplier.

4.1.1 Standards

NOTICE The installation must comply with all applicable local and national standards.

NOTICE The air heater must be installed in accordance with the relevant requirements of the Gas Safety regulations, Electrical installation regulations and or other local regulations that may apply.

For United Kingdom only:

NOTICE The air heater must be installed in accordance with the relevant requirements of the Gas Safety regulations, Electrical installation regulations and or other local regulations that may apply (e.g. The Institute of Gas Engineers IGE UP-1 and 2, BS6230, BS5440 building regulations and the IIE regulations that incorporate the gas safety regulations).

4.2 Positioning the air heater

Keep the following requirements in mind when choosing a location to install your air heater:

WARNING! Never install an air heater close to flammable materials.

- Keep sufficient distance between the heater and any obstructions. This is both for safety reasons and to allow access for service and maintenance (figure 2).
- Make sure the air flow to and from the heater is free from obstacles at least 5 metres in front of the heater. Also make sure the air intake is free from obstacles.

- Make sure enough space remains to open the door of the air heater.
- Make sure the wall can support the air heater.
- Ensure sufficient clearance distance for the flue system.

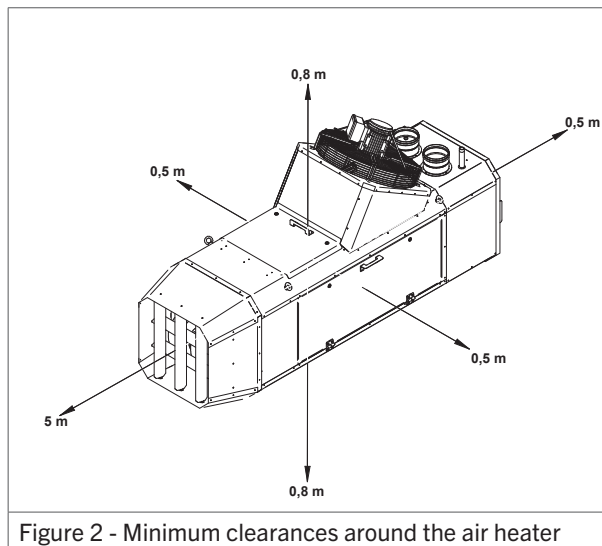


Figure 2 - Minimum clearances around the air heater

4.2.1 Orientation

- Install the heater horizontally without an inclination (figure 3).

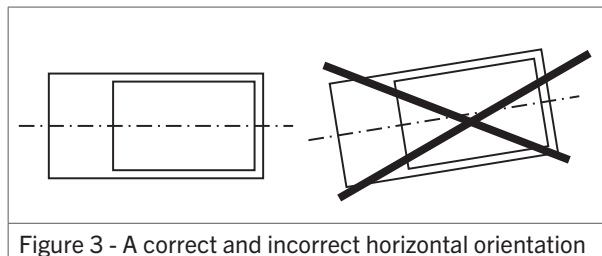


Figure 3 - A correct and incorrect horizontal orientation

4.3 Gas type & connection

The unit is suited for natural gas, propane or butane (LPG).

The specific gas type that a heater is set up for can be found on the packaging labels and on the heater badge. The heater can be converted to another gas type. Contact your supplier for more information.

The working and standing supply pressure must be a minimum of 17 mbar, and a maximum of 50 mbar, measured at the inlet pressure nipple of the gas control in the heater.

NOTICE The supply line's manual isolation valve must be placed within reach of the heater.

NOTICE All gas supply lines must be mounted without any mechanical tension.

NOTICE Always clean the inside of a gas supply line before connecting it to the air heater. Place a gas filter in the supply line when needed.

CAUTION! When using pressures above 60 mbar to test the supply lines, always close the manual isolation valve of the air heater.

For United Kingdom only:

The supply line for gas must comply with the Gas Engineers publications UP-1 and UP-2, as well as with BS 6891.

4.4 Electrical connection

The electrical installation must comply with local and national requirements as well as IEE regulations.

4.4.1 Power supply

The air heater requires an earthed power supply of 230 V/ AC. A supply of 400 V/AC + Neutral is optional. The control circuit is a two wire low voltage bus communication.

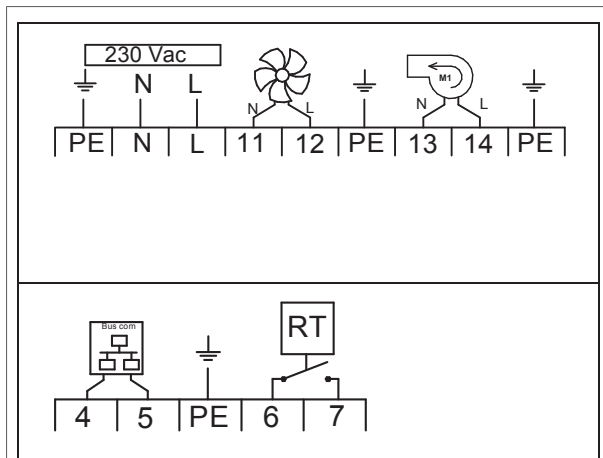


Figure 4 - The air heater's connection clamps

A supply cord with a connection plug is supplied with the air heater.

NOTICE Make sure you do not damage the supply cord. A damaged cable needs to be replaced by a qualified person immediately.

4.4.2 Fuse

One fuse is present on the air heater's control board (see the electrical wiring diagram in §11).

- When replacing this fuse, always use one of the same type (5AT).

4.5 Room thermostat

The air heater can be controlled in two ways:

- by an ON/OFF signal;
- through a bus communication system with an external interface.

4.5.1 Installation requirements

Following these requirements when placing the thermostat to ensure the heater functions correctly:

- Make sure that air can circulate around the thermostat.
- Make sure the sun does not shine directly upon the thermostat.
- Do not place the thermostat on a cold wall.
- Place the thermostat on an inner wall free from draught.
- Never place the thermostat within the throw of the heater.
- Never mount the thermostat near the aerials of internal communication networks. These emit radiation that can disturb the thermostat. Keep several meters distance.

In all cases, the communication between the heater and the thermostat is based on a two wire, low-voltage connection. (see the electrical wiring diagram in §11). Follow these instructions to prevent malfunction of the installation and damage to the thermostat or air heater:

- Use a cable with the following specifications:
 - Signal cable.
 - Shielded and twisted.
 - Minimum dimensions: 1 x 2 x Ø0,8 mm².
 - Maximum length: 200 m.

CAUTION! Keep the thermostat cable separated from the mains cables.

CAUTION! Connect the cable's earth shield only to the earth terminal inside the air heater. Do not connect the other end of the cable's earth shield.

NOTICE A cable with a thickness of less than 0.8 mm will result in a poor signal.

NOTICE A cable that is not shielded and twisted may result in a disturbed communication in an EMC-unfriendly environment.

4.5.2 Bus communication system installation

To connect the air heater to a bus communication system, do the following:

1. Connect the two control wires to terminals 4 and 5 (see figure 5 or the electrical wiring diagram in §11).
2. Set the S1 and J14 switches on the control unit as follows (figure 6/7):
 - a. Set S1 to 1.
 - b. Set J14 to 1.

NOTICE The air heater must be switched off when setting the switches. Otherwise the settings will have no effect.

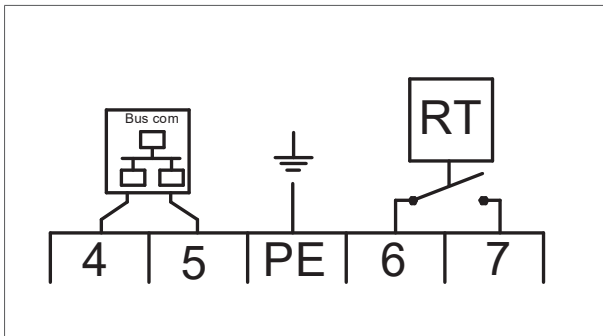


Figure 5 - Bus communication connection

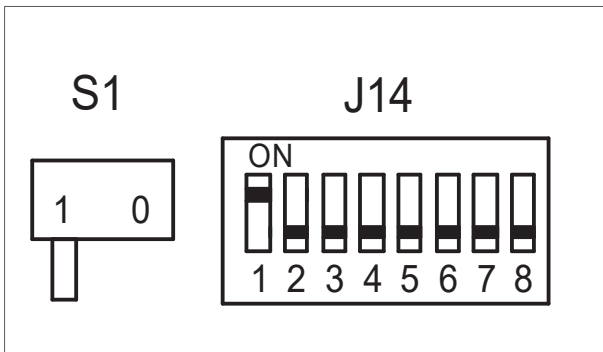


Figure 6 - Positions of the S1 and J14 switches

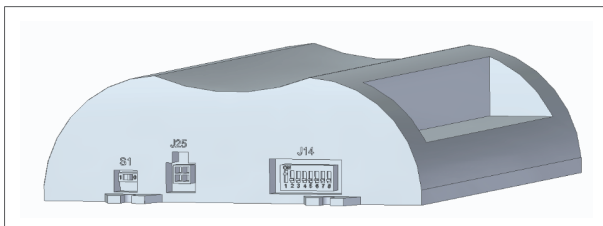


Figure 7 - Location of the S1 and J14 switches

4.5.3 Installation of multiple heaters on one control unit

An MTC or MTS room thermostat, or interface module can control up to 8 air heaters. To connect the air heaters, do the following (figure 8):

NOTICE This functionality does not apply to an ON/OFF thermostat.

1. Connect the two wires of the thermostat to terminals 4 and 5 of the first air heater.
2. Connect the first air heater to the second air heater.
3. Repeat for each subsequent air heater.

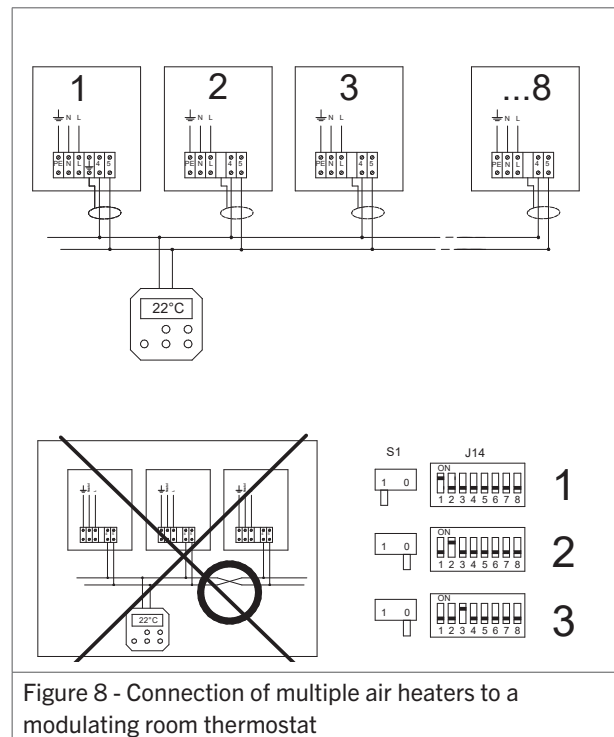
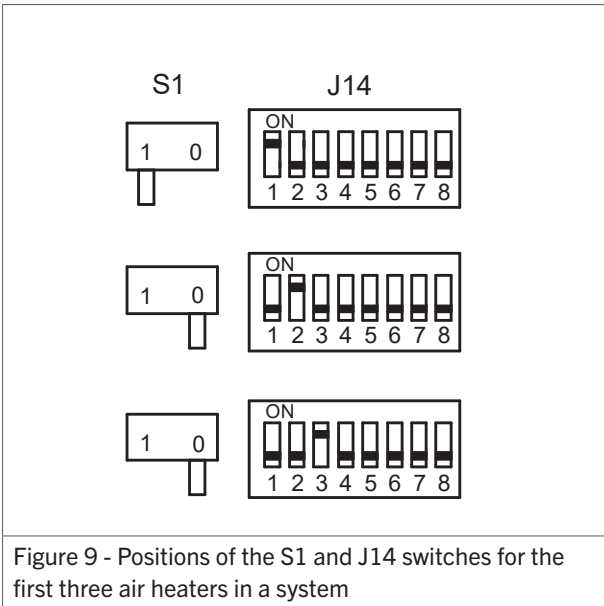


Figure 8 - Connection of multiple air heaters to a modulating room thermostat

Each air heater needs a unique number to be recognised by the room thermostat. This number can be set with the J14 switch on the control unit of each air heater:

1. Set the S1 and J14 switches on the control unit as follows (figure 9):
 - a. Set the S1 switch of the first air heater to 1.
 - b. Set the S1 switch of the other air heaters to 2.
 - c. Set the J14 switch of the first air heater to 1.
 - d. Set the J14 switch of the second air heater to 2, etc.



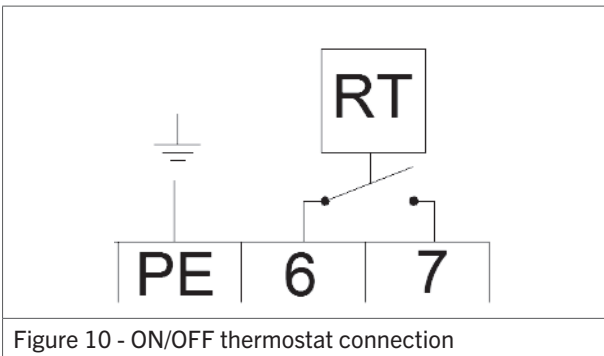
NOTICE If the J14 switch of more than one air heater is set to the same number, the system will not work.

NOTICE The air heater must be switched off when setting the switches. Otherwise the settings will have no effect.

4.5.4 ON/OFF thermostat installation

To connect the air heater to an ON/OFF room thermostat, do the following:

- Connect the two thermostat wires to terminal 6 and 7 (see figure 10 or the electrical wiring diagram in §11). This is a 24 V connection for the thermostat signal.



NOTICE Never combine these connections with the terminals 6 and 7 of other air heaters.

NOTICE Always use separate relays for each air heater.

NOTICE Do not connect an external power source to these terminals. These terminals need a dry contact.

5 Flue systems

To ensure safe and proper use, this air heater must be connected to a flue system. This flue system must be installed according to this manual as well as national and local regulations. A flue system consists of a flue terminal, piping and an optional condensate discharge system.

CAUTION! Do not use flue terminals for condensing appliances on non-condensing heaters. This can lead to water inside the flue system.

NOTICE Only use the prescribed flue material for the roof terminal, wall terminal and for the piping between the heater and the terminal. This is the only way the installation will be approved.

NOTICE Local regulations can require the flue terminal to be placed at least 0,6 m above roof level.

NOTICE Local regulations can require a minimum distance between the flue terminal and air ventilation openings on the building.

5.1 Flue terminals

The following flue terminals are compatible with this air heater:

Vertical discharge	
Flue terminal	Art. Nr.
DDV130/200	IA8305

Horizontal discharge	
Flue terminal	Art. Nr.
CT130/200	IA8312

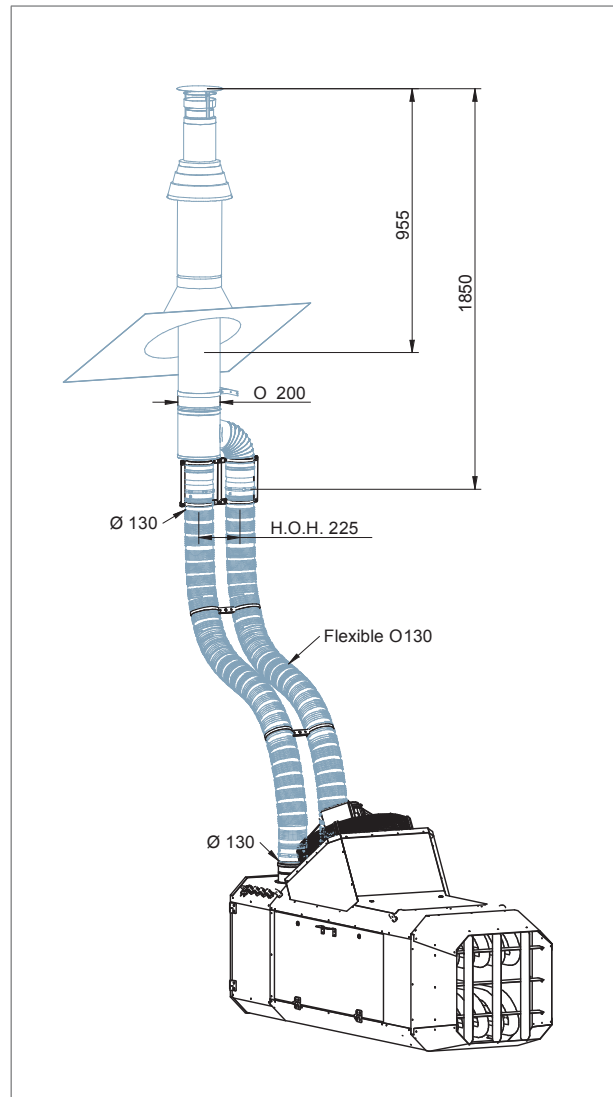


Figure 11 - Vertical flue terminal

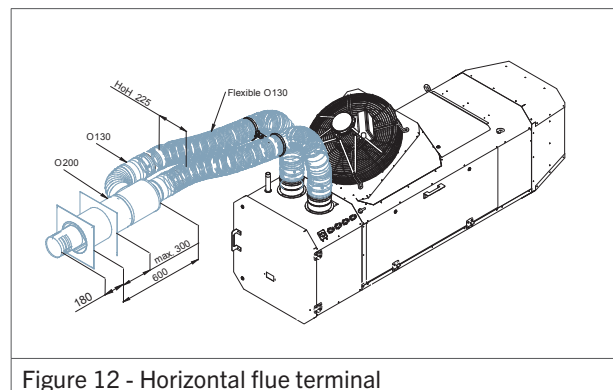


Figure 12 - Horizontal flue terminal

5.1.1 Flue material

Only use CE marked flue material from the manufacturers Muelink & Grol (M&G) and Burgerhout.

Use type Alu-fix with a minimum temperature class of T200 P1.

or

M&G's Stainless Steel SP Isoflex 0.10 flue material T200 P1.

Use flue pipes with the same diameter as the flue spigots on the heater.

Contact your supplier to purchase these flue materials.

NOTICE Different manufacturers use different connections systems for flue pipes. Do not combine systems from different manufacturers.

5.2 Flue length (max.)

The maximum straight length between the air heater and its flue terminal for both orientations is:

- Vertical: 9 meters.
- Horizontal: 6 meters.

Bends that are used in the connection between an air heater and the flue terminal cause a decrease in pressure:

- Using a 90° bend decreases the maximum length of the connection by 2 meters.
- Using a 45° bend decreases the maximum length of the connection by 1 meter.

For further information regarding the flue system, please contact your supplier.

5.3 Condensate in the flue system

Condensate can form in the flue system when the air heater is heating up. This condensate will evaporate if the heater is operating for a longer period of time. The forming of condensate depends on the following factors:

5.3.1 Air heater type

Condensate is especially likely to form in the smaller heaters (< 25 kW).

Condensate will most likely not form in the larger heaters (> 25 kW).

5.3.2 Air heater location

When an air heater burns frequently and is placed in a normally heated room (temperature above 15 °C), condensate is unlikely to form.

Air heaters placed in a room that needs to be just above 5 degrees will only burn for short periods at the time. Formed condensate will not evaporate in these short burning periods. The condensate will accumulate and eventually result in pressure switch errors. To prevent this:

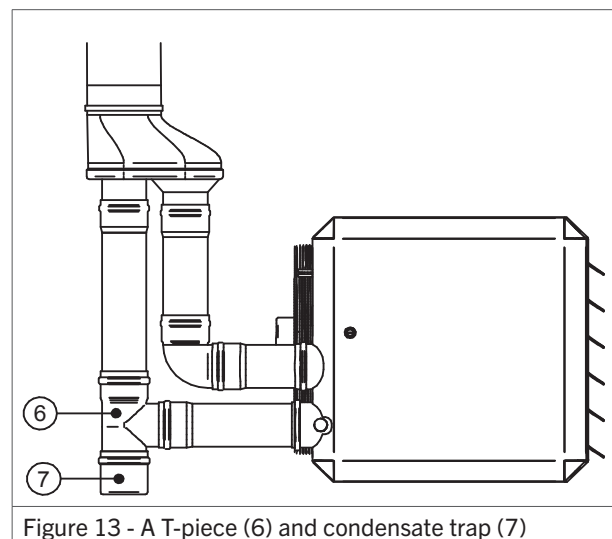
- Add a T-piece (figure 13).
- or
- Add a condensate drain (figure 14).

5.3.3 Flue pipe length

When the flue pipe is long and runs through a cold space, condensate can form. If the straight length of the flue pipe is longer than 4 meters, the condensate will not evaporate and accumulate in the heater. In this case. To prevent this:

- Insulate the flue pipes.
- or
- Place a condensate trap (figure 13).

	T-piece (6)	Condensate trap (7)	Condensate drain
Ø80 art.	IA8223	IA8225	IA8286
Ø100 art.	IA8176	IA8188	IA8288



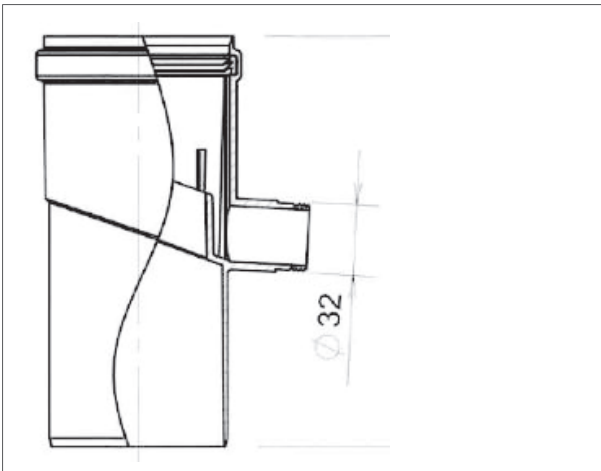


Figure 14 - Condensate drain

5.4 Installation of the flue terminal

There are flue terminals available for installation through a roof or through a wall.

NOTICE The flue terminal must be installed according to local and national regulations.


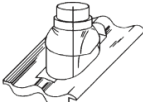
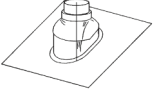
NOTICE Do not combine components or materials from different manufacturers.

5.4.1 Installation - Roof terminal

To install the flue terminal in the roof, do the following:

5.4.1.1 Preparation

1. Check all components for possible damage.
2. Determine the roofing type:

		
Flat roof flashing	Synthetic tile	Universal pitched roof flashing.

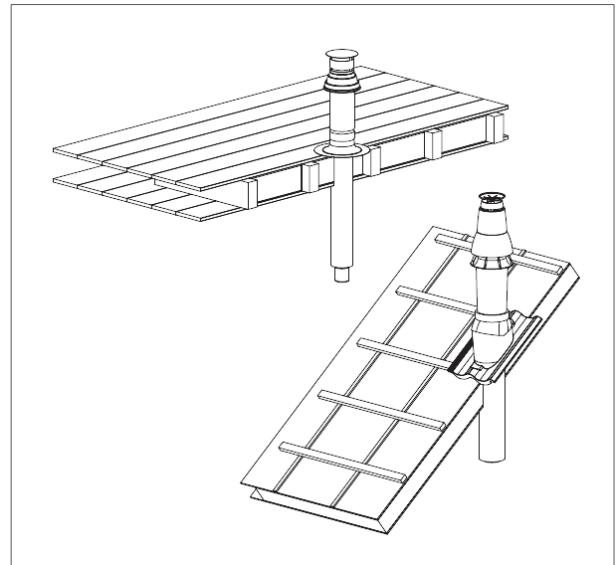
3. Determine where the flue terminal will be positioned.

5.4.1.2 Installation

1. Create a hole from the outside of the roof.

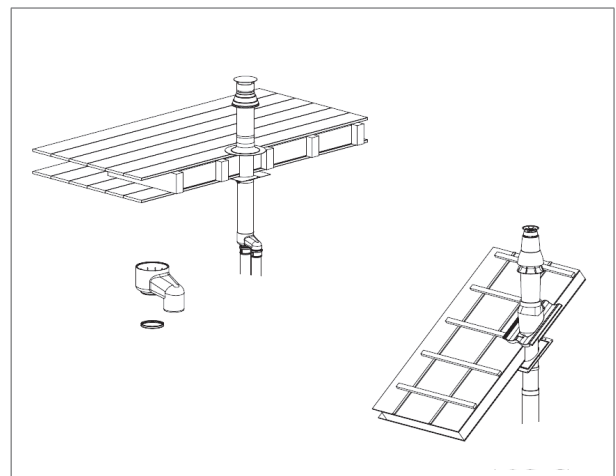
CAUTION! Make sure no debris or dust gets into the air heater.

2. Install the weather collar.
3. Carefully insert the flue terminal from the outside.



CAUTION! Do not rotate the cap.

4. Put the flue terminal into a vertical position. Use a level.
5. OPTIONAL - If desired, fit cover plates. These are supplied separately.
6. Place the supplied wall clamp around the flue terminal and fit it to the roof construction. Do not tighten the clamp yet.
7. Connect the gasket and the twin-tube connection. Make sure that the gasket is not damaged.



NOTICE Make sure the flue tube and the air inlet tube are not mixed up. The flue tube should be in the centre of the flue terminal.

8. Tighten the roof wall clamp.
9. Check if all steps have been carried out correctly.

5.4.2 Installation - Wall terminal

To install the flue terminal in a wall, do the following:

5.4.2.1 Preparation

1. Check all components for possible damage.
2. Determine where the flue terminal will be positioned.

5.4.2.2 Installation

1. Create a hole through the wall.

CAUTION! Make sure no debris or dust gets into the air heater.

2. Carefully insert the flue terminal from the outside.

CAUTION! Do not rotate the cap.

3. Put the flue terminal in a horizontal position. Use a level.
4. Mark the holes on the wall.
5. Drill the holes.
6. Insert screws to fix the terminal in place.
7. Seal the edges of the flue terminal with kit.
8. Fix the shield on the inside of the wall.

CAUTION! Make sure that the gasket is not damaged.

9. Connect the gasket and the twin-tube connection.

NOTICE Make sure the flue tube and the air inlet tube are not mixed up. The flue tube should be in the centre of the flue terminal.

10. Check if all steps have been carried out correctly.

5.4.3 Installation of the flue system parts

This chapter gives the instructions for installing an ALU FIX flue system.

5.4.3.1 Requirements

The installation must follow these requirements:

- Minimum distance between the flue system and combustible materials of 40 mm.
- Minimum depth of female sockets of 40 mm.
- Minimum slope of horizontal piping of 50 mm/m (3°). This allows condensate to flow to the heater.

NOTICE Use brackets that match the flue system. Different manufacturers use different connection systems for flue pipes. It is not allowed to combine systems from different manufacturers.

5.4.3.2 Elements system ALU FIX thick wall

An ALU FIX flue system is created with four elements (figure 15).



Figure 15 - The elements of a flue system

5.4.3.3 Seals

The connection between the different flue elements must be made airtight and waterproof with silicon seals.

CAUTION! If the flue elements have been cut, make sure to clean and chamfer the edges. Sharp edges will damage the seals.

CAUTION! Do not drill or screw in the flue elements.

CAUTION! Do not try to seal the connections with kit, foam or tape.

CAUTION! Do not use grease, vaseline or oil to lubricate the installation.

CAUTION! Only use the lubricant allowed by the manufacturer to lubricate the connections. A maximum soap concentration of 1% is allowed.

NOTICE Follow the instructions from the manufacturer if the connections need to be fixed.

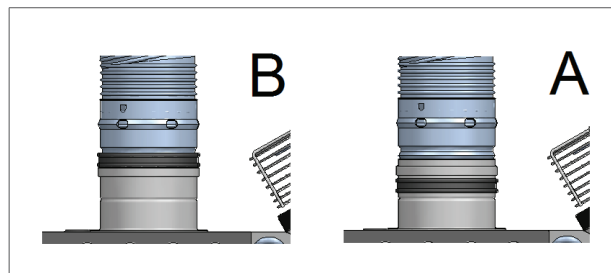


Figure 16 - Seal for protection against water

5.4.3.4 Installation

Take note of the following rules and requirements when installing a flue system:

CAUTION! Do not apply mechanical force on the parts during installation.

Requirements for horizontal and non-vertical piping:

- Maximum distance between brackets of 1 m.
- On tensile joints; maximum distance between brackets of 2 m.

Follow the manufacturer's instructions.

- Spread the brackets evenly along the piping.

Requirements for vertical piping:

- Maximum distance between brackets of 2 m.
- Spread the brackets evenly along the piping.

Always place a bracket on or near a bend or elbow piece, except if the flue pipes before and after the elbow piece are shorter than 0,25 m. In this case, fix the second element after the elbow with a bracket.

Every flue discharge system needs to be secured with at least one bracket. The first bracket needs to be within the first 0,5 m of the air heater.


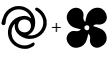

When installing a flue system inside a shaft, do the following:

1. Check the components for possible damage or blockage.
2. Check that the pipe is at the right slope (see Requirements).
3. Mark the flue pipes and fresh air pipes to avoid mixing them up.
4. Make sure that the pipes extend for at least 50 mm when passing through a wall or other obstacle.
5. Fix the last element before entering the shaft in place. If the last element is an elbow piece, the next element must also be fixed in place.
6. Check if ventilation openings and inspection hatches comply with national and local regulations.

6 Operating the air heater

6.1 Manual function switch

The air heater can be manually controlled with a function switch.

No.	Function	Symbol	Description
0	Off		The heater is off. The power to the electrical components is interrupted (neutral and live). The earth connection is not interrupted.
1	Auto		The heater is in standby mode and ready to use. It will start to burn when a thermostat connection is made.
2	Auto + fan		The heater is in standby mode and the fan is running continuously. The heater will burn when a thermostat connection is made.
3	Burn		The heater is burning continuously, independent from any other control settings.

6.1 Burner cycle

The air heater's display shows the current status of the burner cycle (figure 17).

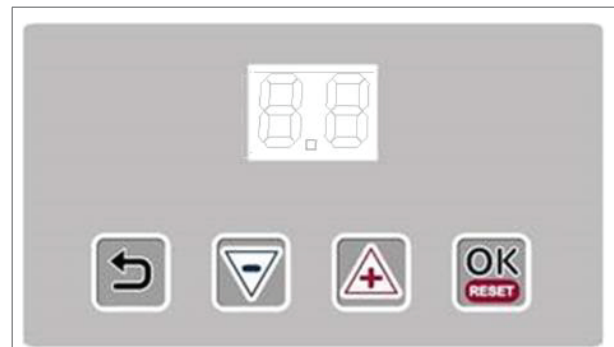


Figure 17 - Display of the air heater

Display	Status	Description
0	Stand-by	Waiting for heat demand.
1	Reset	Software reset.
3	Pre-check	Zero position check pressure switch.
4	Pre-purge	30 seconds of pre ventilation by the combustion fan. The pressure switch is checked.
5	Pre-ignition	Ignition without opening the gas valve.
6	Ignition	5 seconds of ignition. The gas valve opens.
7	Flame check	The air heater checks if the flame is present.
8	Burn	The heater fires up and starts to modulate.
9	Minimum	Before the flame stops, the burner will modulate to minimum power.
10	Burner off	The gas valve closes. The flame stops.
11	Post purge	Burner fan purges with fresh air. System fan cools the heat exchanger.

6.2 Minimum firing time

The heater will always fire for a minimum of 1 minute, even if the heat demand stops. This is to avoid a large amount of start and stops.

NOTICE The heater will try to ignite 2 times before it stops and gives an error.

6.3 Summer ventilation

The fan can be set to run in the summer. Follow the instructions in the user manual of the special Room thermostat.

6.4 Overheating protection

The air heater's heat exchanger and flue system are both protected from excessive temperatures.

6.4.1 Heat exchanger

An NTC sensor is located near (or on) the heat exchanger. This sensor monitors the heat exchanger temperature.

If the heat exchanger becomes too hot, this sensor will cause the heating process to stop. Depending on the temperature, the air heater performs the following actions:

- Step 1: Power reduction (when possible).
- Step 2: Burner stop, followed by an automatic restart when cooled down (display: E05 / E36).
- Step 3: Burner stop, followed by a Lock Out. A manual reset is required. (display L15).

NOTICE A manual reset can be done on the electronic circuit board or remotely with the special Room thermostat.

6.5 Flue passage check

The air heater is equipped with a pressure switch that checks the passage of combustion air through the heat exchanger. The pressure switch checks if there is sufficient movement of combustion air through the heat exchanger. If the pressure difference is too low, the air heater will stop. Error L-14 will be shown on the display.

7 Commissioning the air heater

7.1 Adjusting the settings

Prior to packaging, the safety and functioning of each air heater is checked in detail. It is also set to the right combustion efficiency.

In general, the heater does not need to be adjusted after installation. It is only necessary to perform a functional check and to obtain a flue gas analysis and record it for later reference.

CAUTION! Use only calibrated instruments to adjust the air heater.

CAUTION! Never carelessly turn the adjuster screws.

NOTICE Adjusting the control without a supporting flue gas analysis voids the warranty.

Only adjust the burner pressures if they differ more than 0,5 mbar from its setting.

7.2 Commissioning the air heater

Once the unit is installed according to this manual, the unit can be commissioned. To do so, follow these instructions:

1. Make sure the gas supply pipe is clean, gas tight and free from air.
2. Switch on the electric supply with the maintenance switch.

You are now able to observe the first start-up and become familiar with the functioning of the heater.

NOTICE If the gas line is not purged correctly, the heater will attempt to start twice before going into a lock-out condition. In this case, manual reset is necessary.

1. Instruct the end user of the about a safe use of the air heater:
 - a. The presence of gas
 - b. The location of the manual gas valve

2. Instruct the end user about the operation of the heater:
 - a. Lock-out indication
 - b. Reset
3. Instruct end user about the necessary maintenance.
4. Leave this manual with the end user.

3. Press the (–) button until 0 is displayed to exit the service. The air heater will always cool down the heat exchanger for several minutes.

The test mode will automatically end after 10 minutes.

7.2.1 First use – thermostat

To commission the air heater via the room thermostat, do the following:

- Put the thermostat in the highest position. The start sequence is always the same.

The air heater will burn for the minimal firing time (see §6.3 for more information).

7.2.2 First use - display

To commission the air heater via the display's manual test mode, do the following:

NOTICE The display's manual test mode will only work for maximum 10 minutes.

1. Press and hold the **Return** and (–) button for a few seconds (figure 18). The display will alternate between Lo and St. This means the heater will start up in Low fire.
2. Press the (+) and (–) buttons to toggle between Low and High fire (figure 18).

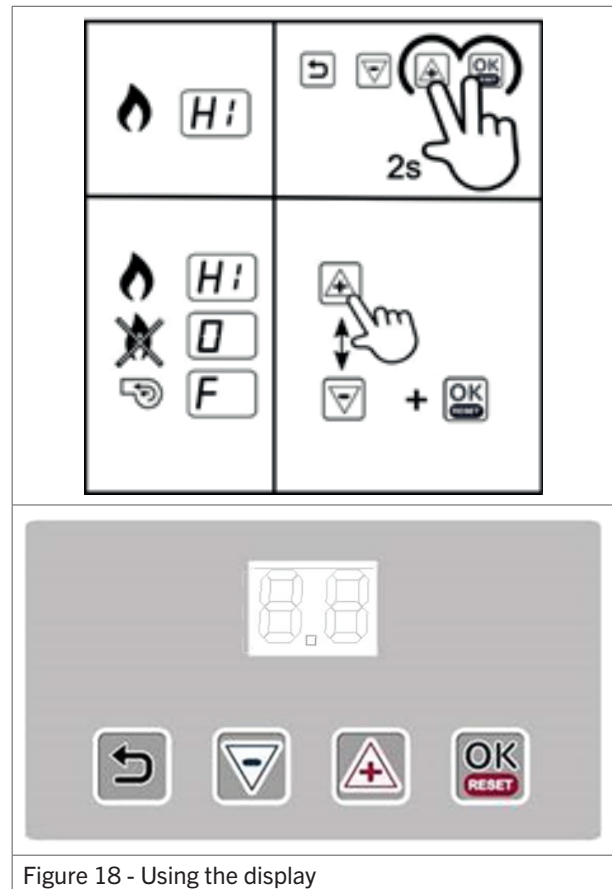


Figure 18 - Using the display

8 Combustion settings

In principle, it is not necessary to adjust the control shortly after commissioning the air heater. When the control does have to be adjusted after a period of use or after installing a new heater, this must be done by a qualified person using calibrated equipment.

DANGER! A poor adjustment can lead to overheating of the air heater and/or production of toxic carbon monoxide.

8.1 Adjusting the burner settings

The flow of gas to the burner is controlled with a gas valve. The valve must be set to a high and a low burner pressure. To adjust the burner pressures, do the following:

1. Look up the correct burner pressures (see §3.2).
2. Remove the cover from the gas valve. Use a (small) screwdriver.
3. Switch on the air heater on high fire (see §7.2).
4. Set the high burner pressure by turning the outside of the adjuster screw. Use a 10 mm wrench.
5. Set the air heater to low fire.
6. Set the low burner pressure by turning the inside of the adjuster screw. Use a screwdriver.

NOTICE Do not set the burner pressure lower than 3 mbar. This avoids problems with cross-lightning of the burner.

NOTICE Because the high and low burner pressures

influence each other, always check both burner pressures at least twice after any adjustment.

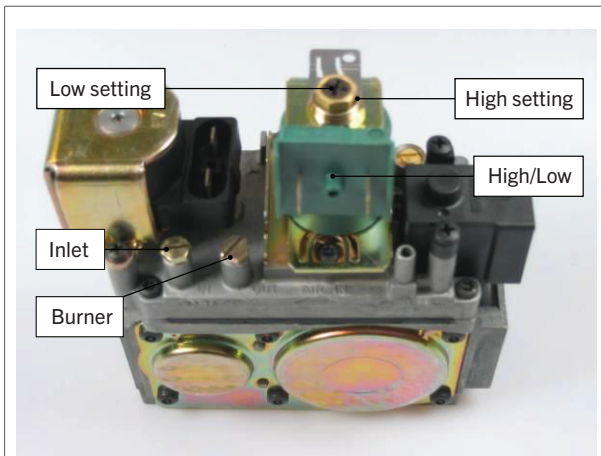


Figure 19 - Main parts of the gas valve

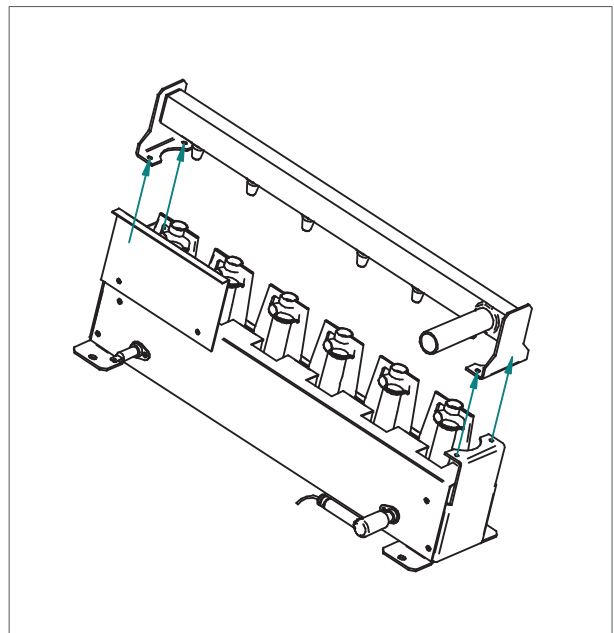
DANGER! Always measure the air heater's CO production. Too much CO usually means the gas mixture is too rich. Adjust this if necessary with the two adjusters (figure 19).

8.2 Converting to another gas type

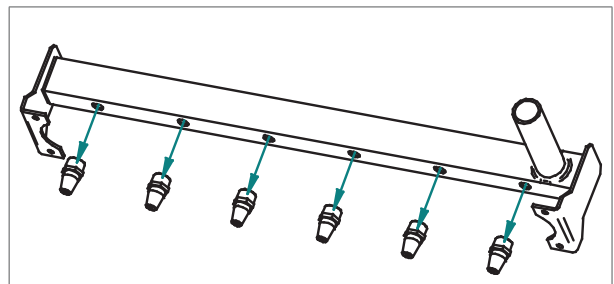
CAUTION! For safety reasons, the manufacturer recommends that the air heater is converted to another gas type only by the manufacturer, its representative or a qualified service technician. Contact your supplier for more information.

To convert the air heater to another gas type, the gas injectors on the burner unit have to be changed. A conversion kit is available for this:

1. Switch off the air heater.
2. Shut off the gas and electricity.
3. Disconnect the ignition and ionisation cables from the burner unit.
4. Disconnect the burner manifold from the gas valve. This is a clamp coupling.
5. Unscrew the screws that attach the burner manifold to both ends of the endplates of the burner unit.
6. Remove the burner manifold.



7. Remove the gas injectors from the burner tube.



8. Select the correct injectors (see §3.2).

NOTICE The injectors have a stamp that corresponds to the diameter of the injector. For example, 130 means 1.30mm and 210 means 2.10mm.

9. Apply the sealing paste from the conversion kit on the threads of the injectors.

CAUTION! Avoid paste from getting into the injectors.

10. Insert the new gas injectors.
11. Reattach the burner tube to the burner unit.
12. Mount the burner unit back into the air heater and reconnect all cables.
13. Expel air from the piping and check the gas valve and supply line for leaks.
14. Change the labels on the air heater with ones that have the correct values for the new gas type.
15. Attach an Attention sticker that notifies users that the air heater has been converted to another gas type.
16. Set the burner pressures (see §3.2).

9 Troubleshooting

If the air heater malfunctions, first check if the problem is caused by external circumstances (e.g. no supply power). If the problem is not caused by external circumstances, use the tables and instructions in this chapter to fix the air heater.

NOTICE Please remember the built in waiting times of the air heater; the signals of the LED's and the code on the display. Do not react too soon.

9.1 Volatile lock outs

The table below describes the volatile lock outs that can occur. These can only be reset by hand.

Display	Error type	Description	Case #
L-0	Internal error	Internal error	13
L-1	Ignition error	Flame lasts only 5 seconds after ignition	1
		No flame after ignition	2
L-2 and 3	Internal error	Internal error	13
L-4	E-error	E-error for more than 24 hours	12
L-8 to 12	Internal error	Internal error	13
L-13	Pressure switch error	Pressure switch is closed in stand-by mode	14
L-14	Pressure switch error	Pressure switch does not close during pre-purge	11
L-15	Overheating	Heat exchange sensor is overheated	3
L-17 to 19	Internal error	Internal error	13
L-20	Flame error	Flame detected after closing the gas valve	15
L-21	Flame error	Flame detected before closing the gas valve	16
L-22	Flame error	Flame failure during burning	5
L-25	Sensor error	Heat exchange sensor failure	4
L-27 to 31	Internal error	Internal error	13
L-32	Sensor error	Heat exchange sensor failure	4
L-33 to 38	Internal error	Internal error	13
L-43	Overheating	Heat exchange sensor is overheated too often	3

9.2 Temporary errors

The table below describes the temporary errors that can occur. These will disappear automatically after the cause has been resolved.

Display	Error type	Description	Case #
E-00 to 04	Internal error	Internal error	13
E-05	Overheating	Heat exchange sensor is overheated	3
E-06 to 13	Internal error	Internal error	13
E-14	Flame error	Flame detected when there shouldn't be one	16
E-15 to 20	Internal error	Internal error	13
E-21 and 22	Heat exchanger sensor error	Heat exchanger sensor not detected	4
E-27 and 28	Heat exchanger sensor error	Heat exchanger sensor short-circuit	4
E-34	Reset button error	Too many reset actions in a short timespan	9
E-36	Overheating	Heat exchange sensor is overheated	3
E-38 and 39	Heat exchanger sensor error	Heat exchanger sensor not detected	4
E-47 and 48	Heat exchanger sensor error	Heat exchange sensor short-circuit	4
E-49 to 64	Internal error	Internal error	13
E-65	Voltage too low	Supply voltage is too low for over 1 minute	
E-66	Voltage too high	Supply voltage is too high for over 1 minute	
E-67	Pressure switch error	Too many pressure switch errors	11
E-69	Configuration error	Heater configuration error	19

9.3 Warnings

The table below describes the temporary warnings that can occur. The heater may still be working, or stops until the cause has been resolved.

Display	Error type	Description	Case #
A-02	Configuration error	Heater configuration error	19
A-07	Overheating	Heat exchange sensor is almost overheated	3

9.4 Instructions

After identifying the problem, use the Case number to find the possible cause in this paragraph.

Case 1: Flame lasts only 5 seconds after ignition.

- The flame is not detected:
 - Check the ignition/ionisation cable and the electrode. The cable should have a resistance of 1 kΩ.
- The air heater is not earthed properly.
- Appliance has been connected to a floating power grid (230V between phases without neutral). Connect an isolating transformer or order serviceset GA4010.
- The circuit board is defective.

Case 2: No flame after ignition.

- There is not enough gas pressure.
- The gas mixture is too poor:
 - Adjust the gas valve (see §8.1).
- The gas valve does not open:
 - During ignition, check for a 230 V voltage on the valve.
- Check if the ignition electrode sparks. If not:
 - Check the cable and electrode and replace them when damaged.
 - Check the burner control unit and replace it when it does not give a spark output.

Case 3: Heat exchange sensor or flue sensor is overheated.

- Check if the connectors J12 and J6 are plugged in correctly and if the connection J12[1-4] (optional overheating protection) is closed.
- Check if the system fan supplies enough air.
- Check the settings of the gas valve. The heater may be overfired. If so:
 - Adjust the burner pressure.

Case 4: Heat exchange sensor or flue sensor not detected, or short circuit.

L-25 refers to the heat exchange sensor. L-26 refers to the flue sensor, if applicable.

- The heat exchange sensor consists of two internal sensors. The readings of these sensors may differ too much:
 - Measure the resistance of each sensor. The resistance should be 20 kΩ at 25 °C and 25 kΩ at 20 °C.
 - If the measured values differ too much, replace the sensor.

Case 5: Too many flame failures while burning.

- The gas supply is not constant. This results in a drop in gas supply pressure while burning and causes the flame to extinguish.
 - Check the gas supply pressure while the heater is burning.
- The burner pressure for Low fire is too low. This causes the flame to extinguish because it is too small to be detected.
 - Check the burner pressure at Low fire and adjust if necessary (see §8.1).
- Recirculation of flue gas. Due to a problem with the flue terminal the flue gas is sucked back into the air inlet. This results into a lack of oxygen and causes the flame to stop.
 - Check the flue system and fresh air supply. Only certified, original parts should be used.

Case 9: Too many reset actions in a short timespan.

- This error will disappear after some time or if the main power is disconnected for a while.

Case 11: Insufficient air passage through the heat exchanger. Pressure switch does not close.

- Check if the combustion fan is running.
- Check if the flue system is blocked or restricted.
- Check the pressure switch and the connections.
- Check the heat exchanger for flue leakage.

Case 12: E-error for more than 24 hours.

- Switch the air heater off and on and check the error code.

Case 13: Internal error.

- Isolate the electrical supply and reenergise. If this does not help:
 - Replace the burner control unit.

Case 14: Pressure switch is closed in stand-by mode.

- Check if the contact is stuck. If so:
 - Replace the pressure switch.
- Check if there is water in the hose. If so:
 - Dry the hose.

Case 15: Flame detected after closing the gas valve.

- Check if the gas valve closes too slow. If so:
 - Replace the gas valve.
- Check if the ionisation electrode is wet. If so:
 - Dry, clean or replace the electrode.

Case 16: Flame detected before opening the gas valve.

- Check if there really is a flame before ignition. If so:
 - Replace the gas valve.
- Check if the ionisation electrode is wet. If so:
 - Dry, clean or replace the electrode.

Case 19: Heater configuration error

- The heater does not know which program to run, due to a mismatch between the burner control unit and the display. If so:
 - Contact your supplier.

9.5 Further troubleshooting

10 Maintenance

CAUTION! The air heater must be inspected and cleaned once a year by a qualified installer with sufficient knowledge about the device.

CAUTION! Sufficient maintenance is critical in circumstances such as high humidity, dust, high switching on/off frequency, etc.

10.1 Preparation

Before performing maintenance on an air heater that is already installed, do the following:

1. Set the thermostat to the lowest setting.
2. Close the manual gas valve.
3. Turn off the power supply to the air heater using the maintenance switch.

CAUTION! Always check for gas leaks after working on the air heater.

CAUTION! Do not use water when cleaning the air heater.

CAUTION! The heater must be electrically isolated during servicing.

Water can be used to clean the air heater.

CAUTION! Only the heat exchanger can be cleaned with a pressure washer. Do not use a pressure washer on the following parts:

When the air heater does start but shows a different problem than described above, check if the following problems apply.

9.5.1 Explosive ignition and/or frequent flame failures

- Check if the gas control settings are correct (see §8.1). A correct CO₂ value is important for a proper ignition.
- Check the ignition cable. It should have a resistance of 1 kΩ.
- Check the position of the ignition electrode. The spark has to be formed between the two electrodes, not between the electrode and the burner.

- The big fan motor on top of the air heater.
- The electronics housing.
- The temperature sensor in the front part of the air heater.

10.2 Basic maintenance

To perform basic maintenance on the air heater, do the following:

CAUTION! When cleaning parts of the air heater, use a dry cloth, brush, compressed air or a vacuum cleaner. Never use a steel brush.

1. Inspect the outside of the heat exchanger.
2. Clean the fan guard on the outside of the heater. Clean the fan blades if required.
3. Open the access panel.
4. Clean the inside of the air heater. Focus on the following parts:
 - Body
 - Fan blades and motor
 - Heat exchanger
 - Temperature sensor
 - Vane switch (if present)
5. Check if the wiring, nuts and bolts are properly secured and tightened.
6. Grease any parts and bolts that are regularly loosened for maintenance.
7. Open the manual gas valve in the supply line and check if the supply lines are air tight, do not leak and do not contain air.

Some checks can only be performed when the heater is running. Do the following:

1. Reconnect the air heater to the power supply.
2. Switch on the air heater.
3. Check if the heater operates without problems. See chapter if any errors occur.
4. Check the air heater's combustion efficiency. If necessary:
 - Adjust the burner settings (see §3.2).

10.3 Maintenance of the burner unit

The burner unit is an important part of the air heater and requires special maintenance.

To perform maintenance on the burner unit, do the following:

1. Disconnect the ignition and ionisation cables from the burner unit.
2. Disconnect the burner manifold from the gas valve. This is a clamp coupling.
3. Remove the burner assembly from the air heater.
4. Check the burner for damage, corrosion and alignment of the separate burners.
 - a. Clean with a brush.
5. If necessary, clean the electrodes.

CAUTION! Do not twist the electrode out of shape.

6. Check the inside of the heat exchanger for dirt and/or damage. If necessary:
 - Clean the heat exchanger.
7. Disassemble the motor part from the flue fan. The housing can remain on the heater.
8. Clean the inside of the flue fan.
9. Check the air supply and the flue discharge for dirt and clean it.
10. Reassemble the burner unit. If necessary:
 - Use new gaskets.

10.4 Extensive maintenance in poultry sheds

WARNING! Air heaters that are used in poultry sheds must be cleaned and inspected after every clean-out, before disinfection and the spreading of sawdust on the floor.

CAUTION! The heat exchanger can be cleaned with a pressure washer. Do not use a pressure washer to clean parts that contain electronics, such as the electric motor or the machine cover.

1. Use compressed air or a soft brush to clean the remaining parts from the air heater. Focus on the following parts:
 - a. The inside and outside of the body.
 - b. The fan blades and motor.
 - c. The temperature sensor.
2. Remove all dust from the motor. Accumulated dust acts as insulation and can cause the motor to overheat.
3. Use a brush to remove any baked on dust.
4. Clean the burner unit (see §10.3).
5. Switch on the air heater and let it heat for a while. This burns off any remaining dust particles.
6. Stop the heating process.
7. Cover the air heater when it is fully cooled off. This protects it from dirt or dust.
8. Make sure the air heater is electrically isolated.
9. Disinfect the poultry shed and spread the sawdust.
10. Remove the cover from the air heater. The heater is ready to be used.

11 Electrical wiring diagram

A complete electrical wiring diagram is shown in figure 20. The connections that are most important to the installation process are shown in figure 21.

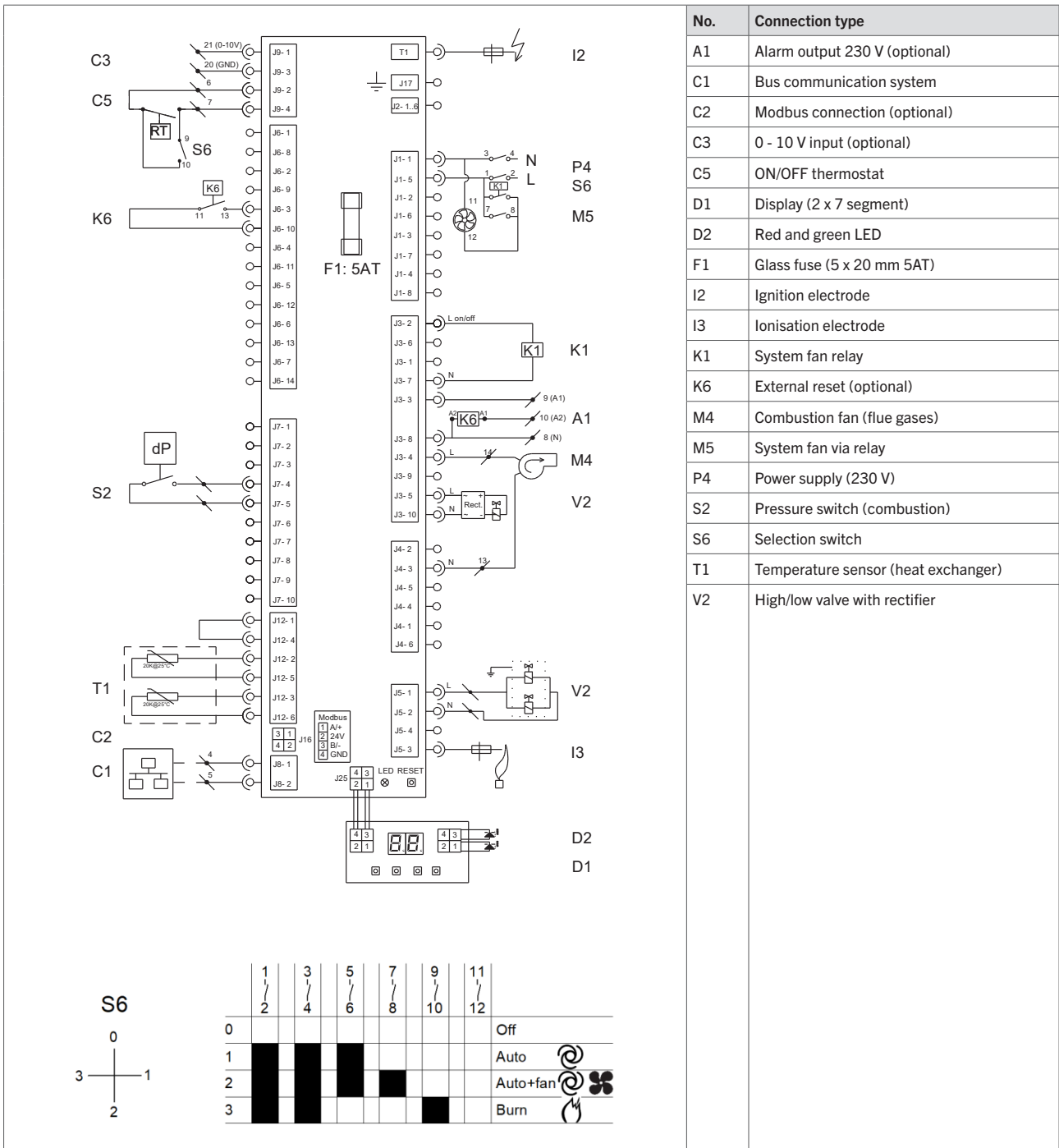


Figure 20 - Electrical wiring diagram DXC60-100

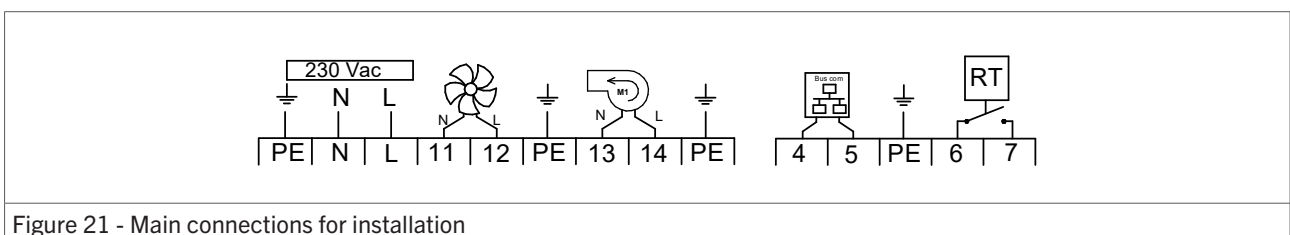


Figure 21 - Main connections for installation

12 Exploded view and spare parts

The parts of the air heater are shown in an exploded view in figure 22. The table below describes each part and shows the correct article number for a replacement part.

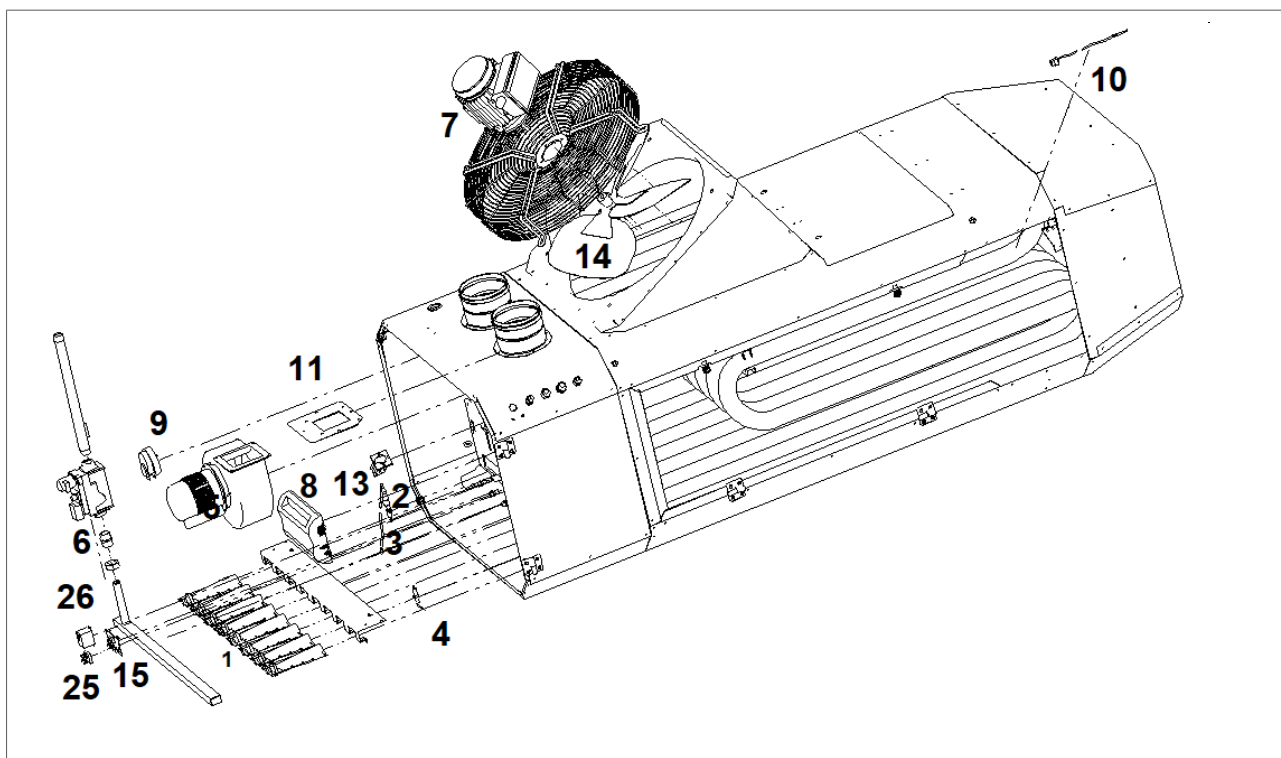


Figure 22 - Exploded view of the DXC60-100

No.	Description	DXC60	DXC80	DXC100
1	Burner	IB3204	IB3204	IB3204
2	Ignition electrode	GA3400	GA3400	GA3400
3	Ignition cable	IB3929	IB3929	IB3929
4	Ionisation electrode	GA3402	GA3402	GA3402
5	Combustion fan	GA4516	GA4516	GA4517
6	Gas valve	GA3314	GA3314	GA3314
7	System fan	IP4811	IP4801	IP4813
8	Burner control unit (EBM966)	GY5901	GY5901	GY5901
9	Pressure switch	IB3904	IB3911	IB3904
10	Heat exchange sensor	GY3935	GY3935	GY3935
11	Gasket set	GA6716	GA6716	GA6716
13	Selection switch	GD5284	GD5284	GD5284
14	Fan blade	IK4212	IK4214	IK4223
15	Display PCB	GY5902	GY5902	GY5902
25	Rectifier block	GY3921	GY3921	GY3921
26	Fan relay	IK5200	IK5200	IK5200

13 Declaration of conformity

Winterwarm Heating Solutions B.V.

Industrieweg 8

7102 DZ, Winterswijk

The Netherlands

Declares that air heater types:

- DXC60, DXC80 and DXC100
 - CE PIN: 0063BR3344

Are in accordance with the essential requirements of the relevant EU directives, being:

- 2016/426/EU (GAR) relating to appliances burning gaseous fuels
- 2014/35/EU (LVD) relating to the electric safety of appliances
- 2014/30/EU (EMC) relating to electromagnetic compatibility of appliances
- 2006/42/EG (MD) relating to the safety of machinery

Goods should be installed and used in accordance with our instructions and with the applicable local and international rules. Installation should be done by an authorized, qualified and competent installer.

Winterswijk, July 1st 2019



Ir. M. Fiselier

Manager Research and Development

