REZNOR®

ErP 2021
ErP Lot 21
Seasonal Efficiency and
NOx compliant

PHOTON
GAS FIRED UNIT HEATER

INSTALLATION, COMMISSIONING AND SERVICING MANUAL

CE UKCA

These appliances meet the following EC directives:
Gas Appliances (Product Safety and Metrology etc (Amendment etc) (EU Exit) Regulations 2019)
The Eco design for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2020
Electromagnetic Compatibility Regulations 2016
Electrical Equipment (Safety) Regulations 2016
Supply of Machinery (Safety) Regulations 2008
Supply of Machinery (Safety) Regulations (A) 2011

Please read this document carefully before commencing installation, commissioning and/or servicing.
Leave it with the end user/site agent to be placed in their premises technical file after installation.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.
All work must be carried out by appropriately qualified persons.
The manufacturer does not take any responsibility in the event of non-observance of the regulations concerning the connection of the apparatus causing a dangerous operation possibly resulting in damage to the apparatus and/or environment in which the unit is installed.

PH45-LITKIT-UK
Literature Kit UK

MANUAL PART NO. D301310 ISS 9

NGH
NORTEK GLOBAL HVAC

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PHOTON Range

General product information

PHOTON is the latest generation of gas fired unit heaters, CE and UKCA certified to EN17082 for use in non domestic installations.

All models and sizes are available for use with natural gas (G20, G25 or G25.3). The type of gas, the input rate and the electrical supply requirement is shown on the heater rating plate. Check the rating plate to determine if the heater is appropriate for the intended installation.

This installation manual is shipped with the unit. Verify that the literature is correct for the model being installed. If the manual is incorrect for the heater, contact the supplier before beginning installation.

The instructions in this manual apply only to the models listed.

Installation should be carried out by a suitably qualified installer in accordance with these instructions and the current rules and regulations in force. The installer is responsible for the safe installation of the heater.

Using this manual

The symbols for 'Caution' and 'Warning' are used to highlight certain points throughout this manual.

Caution is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts.

Warning is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

Warranty

This equipment comes as standard with a manufacturers two year warranty (2 years parts, 1 year labour) unless agreed otherwise at the time of order. The warranty is void if:

1. The installation is not in accordance with these instructions.
2. Wiring is not in accordance with the diagram furnished with the heater.
3. The unit is installed without proper clearances wherever clearances are required regardless of the material being combustible.
4. The unit is installed without proper ventilation and air for combustion.
5. The equipment is used in atmospheres containing flammable vapours or chlorinated or halogenated hydrocarbons or any contaminant (silicon, aluminium oxide, etc.).
6. The unit has not been serviced and maintained in accordance with the information contained within these instructions.
7. An appliance is connected to a duct system or the air delivery system is modified in any way.

Ignoring the warning and caution notices and the advice from the manufacturer on installation, commissioning, servicing or use, will jeopardise any applicable warranty. This could also compromise the safe and efficient running of the appliance itself and thereby constitute a hazard.

The electrical isolator should only be used for maintenance purposes or in an emergency. It should not be used for closing down the main burner as it switches off the fan prematurely and may damage the heat exchanger, invalidating the warranty.

Important notice to installers

Before installation, carefully read these instructions and follow the processes explained by the manufacturer. These instructions are only valid for appliances designed to operate in Europe. If the country code and gas category on the appliance data label does not match the country of installation or the country codes and gas categories as shown in this instruction manual, it will be necessary to contact the distributor or manufacturer to provide the necessary information for the modification of the appliance to the conditions of use for the country of installation.

Installing, commissioning, testing, programming and maintenance of these products must only be carried out by suitably qualified and trained technicians and in full compliance with all applicable regulations and current best practices.

Check if the appliance as described on the packaging label is in accordance with the correct type and model as specified on the data plate and complies with your customer order.

Check that the temperature ranges given and those of the location match. The appliance must be powered with a voltage corresponding to the value shown on the rating plate.

These units must be installed in accordance with the rules in force and local regulations / legislation as appropriate plus all local building codes. Installers should satisfy themselves that the gas pipework installation is carried out in accordance with all current legislation, Codes of Practice and recommendations.

Additionally it may be necessary to protect the gas valves which form part of the heater or burner assembly from potential pipe contamination particularly, but not exclusively, where copper gas pipework is used.

In instances where copper pipework is to be used for all or part of a gas pipework installation, including short length final connections then we advise that installers consult with the gas supplier or provider and satisfy themselves what additional precautions may be necessary.

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

Any reference made to Laws, Standards, Directives, Codes of Practice or other recommendations governing the application and installation of heating appliances and which may be referred to in Brochures, Specifications, Quotations, and Installation, Operation and Maintenance manuals is done so for information and guidance purposes only and should only be considered valid at the time of the publication.

The manufacturer cannot be held responsible from any matters arising from the revision to or introduction of new Laws, Standards, Directives, Codes of Practice or other recommendations.

G

Health and safety

Ensure that anchoring points are suitable for the weight and loading of the product and if required, add suitable reinforcement to the anchoring points area.

Due consideration should be taken for workplace safety, risk assessments and waste disposal.

Any modification of the product may be hazardous and the manufacturer is not liable for any damage or injury caused by improper use.

Do not use this appliance if any part has been immersed in water. Immediately call a qualified service technician to inspect the appliance and replace any gas control that has been immersed in water.

This appliance is not intended for use by persons (including children) with reduced sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Should overheating occur or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

This manual should be kept in a safe place for future reference.

For your safety, if you smell gas:

- **Do not try to light any appliance**
- **Do not touch any electrical switch, do not use any phone in your building**
- **Evacuate all personnel**
- **Contact your gas supplier immediately**

Do not store or use petrol or other flammable vapours and liquids in the vicinity of the appliance.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.

Read the installation, operation and maintenance instructions thoroughly before installing or servicing this equipment.

Installation, assembly, commissioning, service and maintenance procedures must be carried out only by suitably competent qualified persons.

Unauthorised modifications to the appliance, or departure from the manufacturer's guidance on intended use, or installation contrary to the manufacturer's recommendations may constitute a hazard.

Use only factory authorised parts and spares when replacement is required.

In case of persistent problems, contact your distributor.

Uncrating / preparation

Prior to crating and shipping, this unit was test operated and inspected at the factory and left in full operating condition. If the unit has incurred damage in shipment, document the damage with the transport company and contact your supplier.

After unpacking the appliance leave it fastened to the wooden blocks / pallet until just before siting to prevent damage to the unit.

Read this booklet and become familiar with the installation requirements of your unit.

Check if the local distribution conditions of electricity supply, type of gas and pressure of the appliance are compatible with the data plate.

The appliance must be installed in accordance with the current rules in force and any local or national regulations.

The requirements of the "Local Building Standards office", the premises "Insurance" undertaking and the "Fire Office" must also be observed.

Before commencing installation, ensure all necessary supplies, tools and manpower are available.

If the installation includes options such as downturn nozzles etc., install these options before the heater is suspended. Follow the instructions included in the option package.

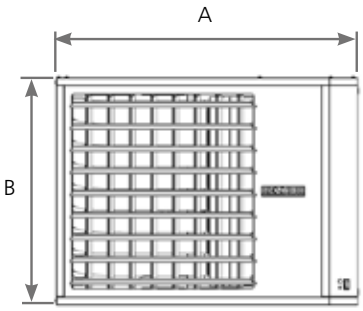
Technical Data

TD

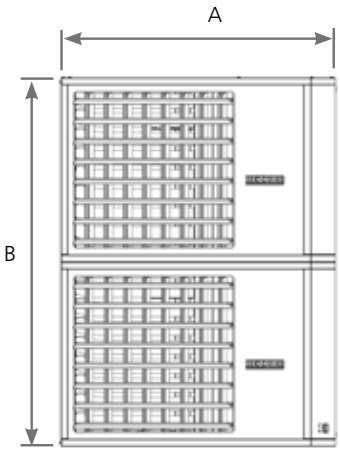
Model	PHOTON	10	20	25	35	45	55	65	70	100	120
Combustion Air and Flue Type [1]		B23 / B53 / C13 / C33									
Heat Input High Fire (HS) [2]	kW	11.28	22.50	32.40	38.80	51.60	64.80	77.40	86.00	119.00	144.00
Heat Input Low Fire (HS) [2]	kW	5.64	10.85	17.82	19.20	26.83	29.16	42.57	47.30	59.50	73.80
Heat Input High Fire (HI) [3]	kW	10.16	20.27	29.19	34.95	46.49	58.38	69.73	77.48	107.21	129.73
Heat Input Low Fire (HI) [3]	kW	5.08	9.77	16.05	17.30	24.17	26.27	38.35	42.61	53.60	66.49
Heat Output High Fire	kW	9.34	18.39	26.54	31.68	42.24	53.46	63.59	71.25	97.87	120.16
Heat Output Low Fire	kW	4.90	9.39	15.37	16.65	23.18	25.18	36.74	40.84	51.52	64.21
Gas Consumption High Fire (HS) G20 [4]	m^3/h	1.07	2.14	3.08	3.69	4.91	6.17	7.37	8.19	11.33	13.71
Gas Consumption Low Fire (HS) G20 [4]	m^3/h	0.54	1.03	1.70	1.83	2.56	2.78	4.05	4.50	5.67	7.03
Gas Consumption High Fire (HS) G25 [4]	m^3/h	1.25	2.49	3.59	4.30	5.71	7.17	8.57	9.52	13.18	15.94
Gas Consumption Low Fire (HS) G25 [4]	m^3/h	0.62	1.20	1.97	2.13	2.97	3.23	4.71	5.24	6.59	8.17
Gas Consumption High Fire (HS) G25.3 [4]	m^3/h	1.22	2.44	3.51	4.20	5.59	7.02	8.39	9.32	12.89	15.60
Gas Consumption Low Fire (HS) G25.3 [4]	m^3/h	0.61	1.18	1.93	2.08	2.91	3.16	4.61	5.13	6.45	8.00
Thermal Efficiency High Fire G20 (NCV)	%	91.9	90.7	90.9	90.6	90.9	91.6	91.2	92.0	91.3	92.6
Thermal Efficiency High Fire G25 (NCV)	%	91.0	91.0	90.5	90.7	90.8	91.5	91.0	92.1	90.8	92.1
Thermal Efficiency High Fire G25.3 (NCV)	%	90.6	90.7	90.7	90.5	90.8	91.4	91.1	91.8	90.9	91.8
Gas Connection [5]	BSP	½"			¾"						1"
Flue and Combustion Air Connection Collars (Indoor)	Ø mm	80		100				130			
Maximum Flue Length	m	9.0									
Airflow	m^3/h	1223	2533	3035	4120	4562	5877	7125	8681	10350	17552
Motor Speed	rpm	1443	1436	934	1328	1320	925	1335	1384	1332	1206
Temperature Rise at Maximum Airflow	K	23	22	26	23	28	27	27	24	28	20
Horizontal Throw	m	10	16	26	27	26	32	32	36	36	36
Noise Level [6]	dBA	46	48	49	51	51	51	56	59	60	62
Minimum mounting height [7]	m	2.5									
Total Electrical Rating	W	145	150	256	550	550	690	820	1000	1040	1900
Electrical Connection		230V / 1N / 50Hz									
Protection Grade	IP	IP20									
Net weight	Kg	43	63	84	89	99	121	122	135	168	258

1. Gas appliance classifications for approved venting methods are based on EN 1749:2020
2. Refers to gross calorific value of fuel
3. Refers to net calorific value of fuel
4. Natural gas: G20 Hs 37.78 MJ/m^3, G25 Hs 32.49 MJ/m^3, G25.3 Hs 33.2 MJ/m^3 @ 15°C and 1013.25 mbar
5. There is a difference between the gas connection diameter and the diameter of the supply line. Always use the most adequate diameter of the supply line to minimize the pressure drop through the gas pipes. If necessary, reduce the diameter of the supply line at the inlet of the unit
6. Sound pressure measured in dB(A) : at 5m distance of the heater with A=160m^2 & Q=2
7. Minimum height from floor to bottom surface of heater for safe use of heater. Positioning of unit heaters for proper performance is application dependent. Operation is affected by other air moving equipment in the space, obstructions to the airflow, draughts and/or close proximity to doors or windows, etc. Care should be taken to avoid mounting the heaters higher than these recommendations, unless downturn nozzle options are used, as significant stratification may occur resulting in poor floor coverage and higher energy losses through the roof structure. Isothermal conditions +/- 20°C ambient air temperature, discharge louvres zero deflection, v = 0.5m/s. The air throw will be influenced by the height of the building, mounting height of the unit, ambient temperature & adjustment of the louvres.

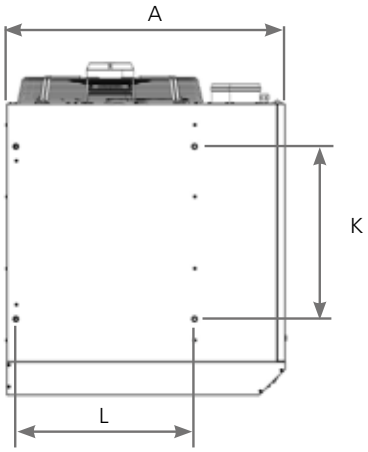
Dimension Diagrams



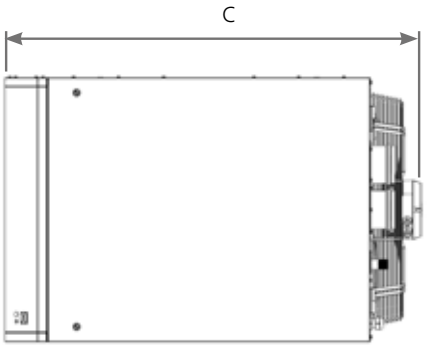
Front View Photon 10-100



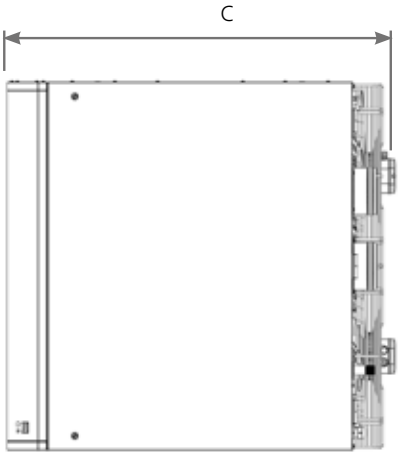
Front View Photon 120



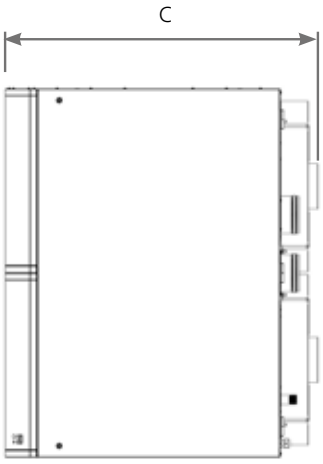
Plan View Photon 10-120



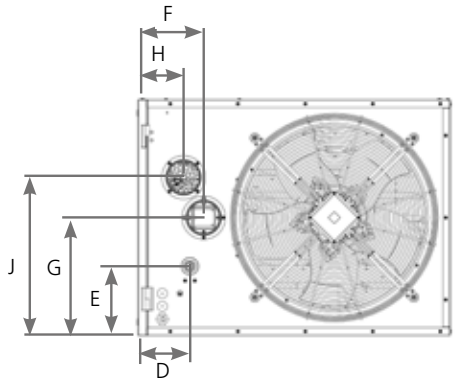
Side View Photon 10-70



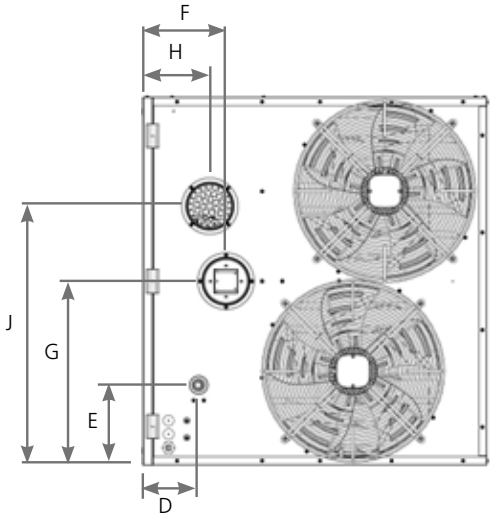
Side View Photon 100



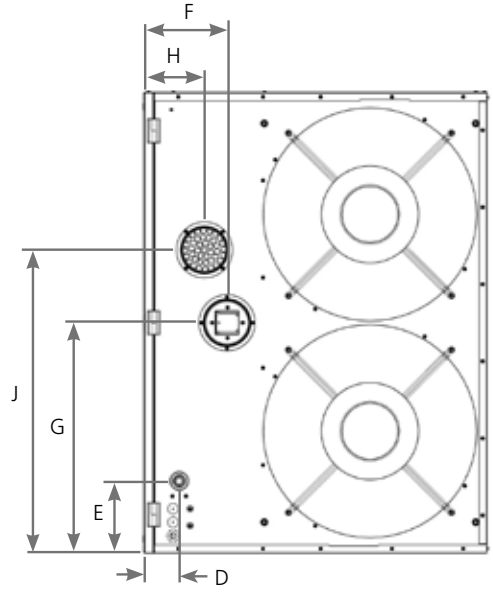
Side View Photon 120



Rear View Photon 10-70



Rear View Photon 100



Rear View Photon 120

Dimension Tables

Unit Dimensions

TD

Dimensions											
Model	**PHOTON**	**10**	**20**	**25**	**35**	**45**	**55**	**65**	**70**	**100**	**120**
Unit Width A	mm	700	700	970	970	970	970	970	970	1010	1010
Unit Height B	mm	380	660	520	520	520	733	733	800	1080	1360
Overall Length C	mm	810	840	1160	1180	1180	1160	1190	1160	1140	1160
Side to Gas Connection Centre D	mm	73	96	180	174	179	158	154	154	163	101
Bottom to Gas Connection Centre E	mm	198	257	124	134	134	215	215	224	236	213
Side to Flue Connection Centre F	mm	185	185	204	204	204	204	204	204	244	244
Bottom to Flue Connection Centre G	mm	186	326	260	260	260	367	367	400	540	680
Side to Air Inlet Centre H	mm	109	109	141	141	141	141	141	141	197	177
Bottom to Air Inlet Centre J	mm	291	431	385	385	385	492	583	616	760	895
Top Suspension Centres K	mm	350	350	600	600	600	600	600	600	600	600
Top Suspension Centres L	mm	413	413	623	623	623	623	623	623	623	623

Combustion air, flue and gas connections

Connection Sizes											
Model	**PHOTON**	**10**	**20**	**25**	**35**	**45**	**55**	**65**	**70**	**100**	**120**
Gas connection diameter	BSP	½"			¾"						1"
Combustion air inlet diameter	mm	80		100				130			
Flue diameter	mm	80		100				130			
Maximum Flue Length	m	9.0									

Clearance distances

Clearance Distances											
Model	**PHOTON**	**10**	**20**	**25**	**35**	**45**	**55**	**65**	**70**	**100**	**120**
Top clearance	mm	50	50	50	100	100	100	100	100	100	100
Rear clearance	mm	450	450	450	450	450	450	450	450	450	450
Bottom clearance *	mm	50	50	50	100	100	100	100	100	100	100
Side clearance	mm	50	50	50	100	100	100	100	100	100	100
Service panel clearance	mm	850	850	850	850	850	850	850	850	850	850

* Heaters can be base mounted on suitable non combustible supports.

A minimum 150mm clearance distance MUST be maintained at all points around the entire flue system.

Installation

I

Heater location

Flue requirements may affect the location of the heater. Refer to the "Combustion air supply / flue arrangement" section before making a final determination.

The flue pipe and accessible heater surfaces will be hot under normal operation and will cause burns if touched. Suspend the heater such that these components cannot be touched.

For best results, the heater should be placed with certain rules in mind:

- Always ensure that the minimum clearances detailed previously are maintained.
- When possible, heaters should be arranged to blow toward or along exposed wall surfaces.
- Suspended heaters are most effective when located as close to the working zone as possible, but care should be exercised to avoid directing the discharged air directly on to room occupants.
- Partitions, columns, counters or other obstructions should be taken into consideration when locating the unit heater so that a minimum quantity of airflow will be deflected by such obstacles.
- When unit heaters are located in the centre of the space to be heated, the air should be discharged toward the exposed walls.
- In large areas, unit heaters should be located to discharge air along exposed walls with extra units provided to discharge air in toward the centre of the area. For optimum results heaters are best used in conjunction with recirculating air fans suspended at high level. Contact the manufacturer / distributor for more details.
- At those points where infiltration of cold air is excessive, such as at entrance doors and shipping doors, it is desirable to locate the unit so that it will discharge directly toward the source of cold air, typically from a distance of 4.5 to 6.0 metres. Alternatively, air curtains can be installed. Contact the manufacturer / distributor for more details.

Hanging the heater

Do not locate the heater where it may be exposed to water or where the ambient temperature exceeds 40°C.

Ensure that the structural elements, which will be used to suspend or support the appliance, are adequate to carry the weight of the appliance and its ancillary components i.e. the flue system. Unit weights are given in the technical data section previously.

Sufficient space must be provided around the heater for servicing and clearances for safety.

Ensure that the unit heater is installed in a level plane.

Always provide a minimum clearance of 600mm at an open air intake (inlet side)

Suspend the heater only from the threaded nut retainers or with a suspension kit provided by the manufacturer.

Do not suspend the heater from the heater cabinet panels.

Do not add additional weight to the suspended heater.

The minimum safe mounting height is 2.5 metres.

The unit heater is delivered on a pallet; leave the unit on the pallet until you are ready to hang it. If the bottom of the unit is not protected or supported prior to installation, damage can occur.

The heater is supplied with four point suspension. All points must be used. Two threaded nut retainers are provided on each side of the top of the heater. See Figure 1 for hanger rod size.

Be sure that the threaded hanger rods are locked to the heater as illustrated in Figure 1. Recommended maximum hanger rod length is 1.8m. Where longer drops are required, ensure that restraints are fitted to prevent excess lateral movement and supports are adequately sized.

A wall mounting bracket kit is available to offer mounting alternatives. Please contact the manufacturer / distributor for details.

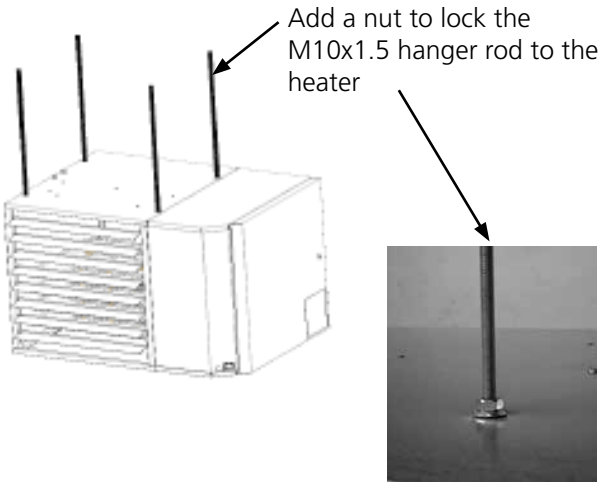


Figure 1 Suspending the heater with rods from the threaded nut retainers

Combustion air supply / flue arrangement

Photon unit heaters may be installed as a Type C room sealed heater requiring both a combustion air inlet pipe and a flue pipe (Type C13, C33 only) or as a Type B forced draught heater where the combustion air is taken from the room space the heater is installed in and which requires only a flue pipe exhausting to outdoors (Type B23 or B53 only). All products of combustion must be flued to outdoor atmosphere.

The unit heaters are designed to operate safely and efficiently with either a horizontal or vertical flue system when installed according to the specific requirements and instructions.

If the heater is replacing an existing heater, be sure that the flue is of the correct size and that the existing flue is in good condition. A correctly sized flue system is required for safe operation of the heater.

For testing, the flue pipe should include a sealable test point. Ideally the test point should be at least 450mm away from the air heater flue connection socket. However if a concentric flue is attached directly to the connection sockets then the combustion should be tested through the flue outlet collar via a drilled test point which must be securely plugged on completion.

Follow the flue pipe manufacturer's installation instructions for making joints, including connections to the air heater, for passing through a building element and for support requirements.

Gasket sealed single wall seamless aluminium or stainless steel flue pipes are required. All joints must be sealed to prevent the products of combustion from leaking into the building.

The products of combustion from the unit heater must be flued to the outside of the building.

A properly sized flue system is required for safe operation of the unit heater.

An improperly sized flue system can cause unsafe conditions and/or create condensation.

Failure to provide proper flueing arrangements could result in death, serious injury and/or damage to property.

It is important to ensure that there is an adequate air supply at all times for both combustion and heating requirements. Modern buildings involve greater use of insulation, improved vapour barriers and weather proofing. These practices mean that buildings are sealed much tighter than in the past.

Proper combustion air supply for a power vented Type B installation requires ventilation of the heated space. Natural infiltration of air may not be adequate. Use of exhaust fans aggravates this situation. It is important to ensure that there is adequate combustion air supply at all times. Reliance on doors and windows is not permitted.

Always ensure that an adequate inlet for fresh air for combustion is provided sized to suit the total installation of any combustion apparatus.

The flue MUST be installed in accordance with national and local regulations.

Type B appliances

If the unit heater is to be installed as a Type B appliance, air for combustion will be taken from within the space where the heater is installed.

Single wall seamless aluminium or stainless steel flue pipes are required. All joints must be sealed to prevent the products of combustion from leaking into the building. If the flue passes through a combustible element of the building it must be enclosed in a sleeve of non-combustible material and separated from the sleeve by a minimum of 25 mm air break. The temperature of any combustible material near to the flue must not exceed 65°C when the heater is in operation. The flue must be at least 150 mm away from any combustible material.

Single wall flue pipe exposed to cold air or run through unheated areas should be insulated. Where condensation is unavoidable, provision must be made for the condensation to flow freely to a point to which it can be released, i.e. a drain or gully. The condensation drain from the flue must be constructed from non-corrodible material not less than 20 mm diameter. Copper or copper based alloys must not be used for condensation drains.

Vertical flue runs greater than 3m long will require a condensate drain fitting between the flue outlet of the heater and the vertical flue pipe. Alternatively, insulated flue pipe should be considered.

Horizontal flue runs should be installed with a slight gradient of approximately 5° towards the terminal. Due consideration should be given to the possibility of condensation from the flue freezing on any footpaths that pass below the terminal.

It is important to ensure that there is an adequate air supply at all times for both combustion and heating requirements.

Ensure that the air combustion inlet opening at the rear side of the unit cannot be obstructed.

When these units are installed in Type B applications, air for combustion is taken from the space in which it is installed. Do not restrict the combustion air intake.

Ensure that an adequate clean air supply for combustion and ventilation is provided within the building in accordance with the relevant rules and regulations in force.

Roof B23 / B53

Wall B23 / B53

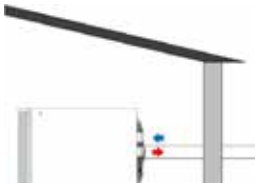
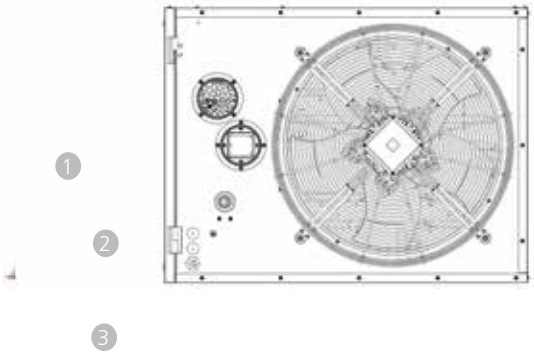


Figure 2 Approved appliances Type B



1. Combustion air inlet collar with grille
2. Flue pipe outlet collar
3. Gas connection

Figure 3 Connections on rear of unit

Type C appliances

Unit heaters used in a balanced flue application are designed to be fitted with a combustion air inlet duct that obtains outdoor air and a flue pipe that exhausts flue products to outdoors.

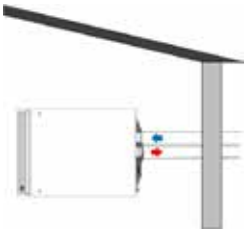
Single wall seamless aluminium or stainless steel flue pipes are required. All joints must be sealed to prevent the products of combustion from leaking into the building. If the flue passes through a combustible element of the building it must be enclosed by a sleeve of non-combustible material and separated from the sleeve by a minimum of 25 mm air break. The temperature of any combustible material near to the flue must not exceed 65°C when the heater is in operation. The flue must be at least 150 mm away from any combustible material.

Single wall flue pipe exposed to cold air or run through unheated areas should be insulated. Where condensation is unavoidable, provision must be made for the condensation to flow freely to a point to which it can be released, i.e. a drain or gully. The condensation drain from the flue must be constructed from non-corrodible material not less than 20 mm diameter. Copper or copper based alloys must not be used for condensation drains.

Vertical flue runs greater than 3m long will require a condensate drain fitting between the flue outlet of the heater and the vertical flue pipe. Alternatively, insulated flue pipe should be considered.

Horizontal flue runs should be installed with a slight gradient of approximately 5° towards the terminal. Due consideration should be given to the possibility of condensation from the flue freezing on any footpaths that pass below the terminal.

I



C13 Wall

C33 Roof

Figure 4 Approved appliances Type C

Photon Model		10	20	25	35	45	55	65	70	100	120
Heater socket and flue diameter	mm	80		100				130			
Maximum straight length two pipes (combustion air inlet and flue outlet pipe) with wall or roof terminal (Type C appliance	m	9.0									
Maximum straight length single pipe (flue outlet pipe) with wall or roof terminal	m	9.0									
Equivalent length of 45° elbow	m	0.75									
Equivalent length of 90° elbow	m	1.5									
Minimum flue length	m	1.0									

Table 1 Flue Diameter and Flue Pipe Lengths

Photon Model		10	20	25	35	45	55	65	70	100	120
Flue Gas Temperature High Fire ΔT	°C	161.1	179.9	176.3	182.6	176.9	163.9	170.5	152.8	171.1	146.8
Flue Gas Temperature Low Fire ΔT	°C	65.0	71.1	78.7	68.2	74.7	72.8	76.9	75.8	72.1	61.0
Mass Flow Rate Flue Gases High Fire G20	kg/h	7.92	17.48	24.96	29.52	40.08	49.51	60.12	72.41	86.84	98.97
Mass Flow Rate Flue Gases High Fire G25	kg/h	9.12	15.45	25.47	29.01	39.73	55.64	55.72	62.18	97.41	126.10
Mass Flow Rate Flue Gases High Fire G25.3	kg/h	9.61	15.38	24.84	28.29	30.73	52.83	57.64	64.86	101.38	112.72
Flue Pressure at Maximum Flue Resistance	Pa	3	6	70	10	19	18	11	14	23	6

Table 2 Flue Gas Properties

Gas connection

A competent and/or qualified engineer is required to either install a new gas meter to the service pipe or to check that the existing meter is adequate to deal with the rate of gas supply required. Installation pipes should be fitted in accordance with national standards so that the supply pressure, as stated in the technical data section will be achieved.

It is the responsibility of the competent engineer to ensure that other relevant standards and codes of practice are complied with in the country of installation. Pipes of smaller size than the heater inlet gas connection must not be used. The complete installation must be tested for soundness as described in the country of installation. Support gas piping with pipe hangers, metal strapping, or other suitable material.

Do not rely on the unit to support the gas pipework installation.

Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

This appliance is designed for a maximum gas supply pressure of 50mbar. When pressure testing the supply piping with test pressures above 50mbar, disconnect the heater and manual valve from the gas supply line that is to be tested. Cap or plug the supply line.

All sealing products must be resistant to the action of liquefied petroleum gas or any other chemical constituents of the gas being supplied.

Install a ground joint union and manual shut-off gas cock upstream of the unit control system.

The unit is equipped with a nipple that extends outside the cabinet.

Check that the gas category is in accordance with the data described on the air heater.

Ensure that a gas supply line includes a filter and has been tested and purged in accordance with prescribed practice prior to commissioning and taking the air heater into service.

This appliance is equipped for a maximum gas supply pressure of 50mbar.

Never use a flame to test for gas soundness.

PHOTON unit heaters are designed to operate on natural gas (G20, G25 or G25.3). Check that the gas supply, gas category and gas inlet pressure is in accordance with the information given on the unit data plate. To let the unit function at maximal heat output, the gas supply pipe MUST be correctly sized. Close to the air heater a gas tap with coupling must be mounted for servicing (see figure 4).

The unit is equipped with a nipple that extends outside the cabinet. The gas connection is ½-, ¾-, or 1-inch, depending on the size of the unit.

The whole of the gas service installation including the meter must be inspected, tested for soundness and purged in accordance with appropriate requirements by a qualified person.

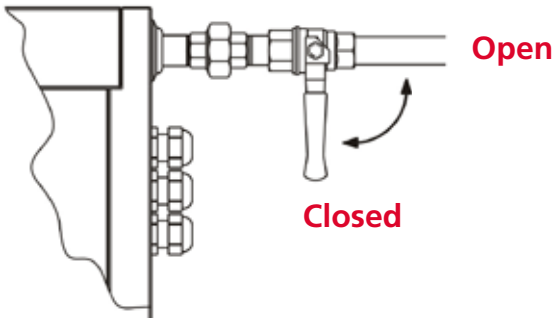


Figure 4 Gas Connection Details

Country	Gas Category	Gas Type	Nominal Supply Pressure (mbar)	Maximum Supply Pressure (mbar)	Minimum Supply Pressure (mbar)
AT, BG, CH, CY, CZ, DK, EE, ES, FI, GB, GR, HR, IE, IT, LT, LV, NO, PT, RO, SE, SI, SK, TR	I_{2H}	Natural Gas (G20)	20	25	17
LU, PL, RO	I_{2E}	Natural Gas (G20)	20	25	17
BE	$I_{2E(R)B}$	Natural Gas (G20 / G25)	20 / 25	25 / 30	17 / 20
FR	I_{2Esi}	Natural Gas (G20 / G25)	20 / 25	25 / 30	17 / 20
DE	I_{2ELL}	Natural Gas (G20 / G25)	20 / 20	25 / 30	17 / 18
NL	I_{2EK}	Natural Gas (G20 / G25.3)	20 / 25	25 / 30	17 / 20

Table 3 Gas Supply Details

Electrical supply and connections

The electrical installation may only be carried out by an appropriately qualified person in accordance with the current Rules and Regulations in force.

This appliance must be earthed.

Check that the electrical specification is in accordance with the specified data on the air heater. All electrical connections must be made in the heater control compartment (refer to Figures 6 and 7). Connections must be in accordance with the terminal markings and the wiring diagram affixed to the unit.

The maximum cable inlet size is 6mm^2.

The minimum external control required for the unit is a room thermostat capable of providing a 0-10V DC signal to the burner. It is essential that the main input line and neutral to terminals L and N remain live at all times even when the unit is switched off to ensure correct operation of the unit and to let the fan operate independent of the heating control. Never incorporate controls that isolate the appliance electrically.

The supply line to the heater should include a mains switch / isolator adjacent to the appliance.

The minimum clearance distance between the contacts must be more than 3 mm.

Check that the air heater is well earthed and that an earth leakage test is carried out.

An external green indicator light is fitted on the heater section to signify when the burner is ON.

An external burner reset switch with red indicator light is fitted on the unit. To add a remote reset button, make connections to the terminals in the heater as indicated on the wiring diagram.

If the reset button requires activating for any reason, the cause must be determined. After determining and correcting the problem, restart the heater and monitor for a period long enough to ensure proper operation (approximately 5 minutes).

Ensure that all cables and installers wiring are appropriately fixed and that they do not touch the flue or combustion collector box.

To ensure that the unit is airtight, all unused cable couplings must be hermetically sealed.

Permanent damage can occur to the ignition controller when faulty/incorrect connections to the thermostat, reset switch or burner failure lamp are made!

Switching of wires for reset switch and flame failure will destroy the ignition controller.

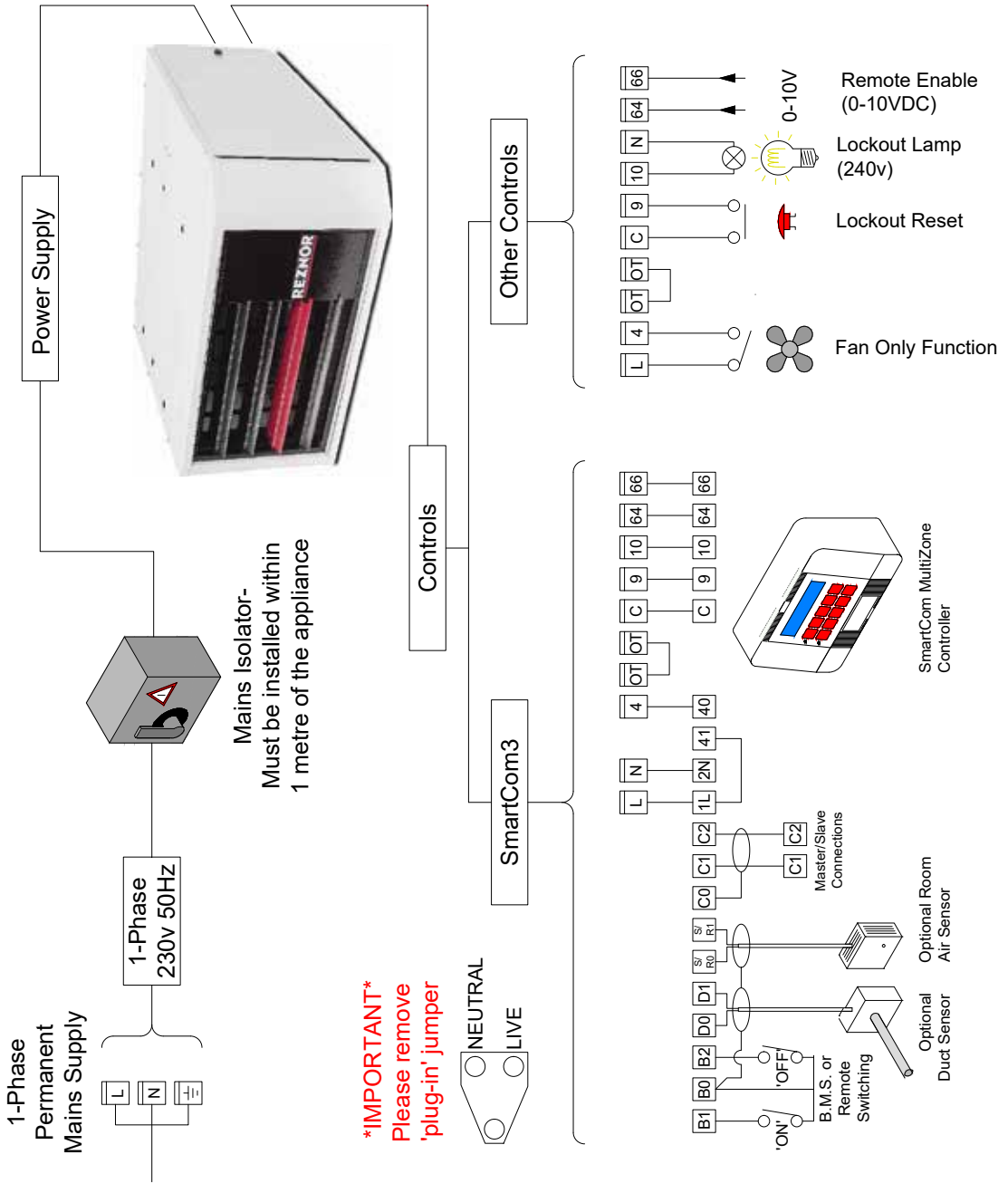
Thermostat controls

Ancillary controls are required to provide timed heat cycles, room comfort temperature level, frost protection, override air circulation etc. These are not included with the appliance and should be ordered separately.

Do not attempt to control more than one unit heater from a single thermostat or control panel unless a properly wired relay is fitted. Follow the instructions supplied with such panels.

The location of the room thermostat or sensor is very important. It should not be positioned on a cold wall or cold surface. Avoid location in draughty areas or where it may be influenced by heat sources e.g. the sun, process plant, etc. The thermostat should be mounted on a vibration free surface and mounted about 1.5 metres above floor level. Follow the thermostat manufacturers instructions. The thermostat must be suitable for potential free contacts.

Wiring Connections



Legend:

- Heater Terminals
- Controls Terminals

Notes:

1. Link wires MUST be fitted where shown solid.
2. Terminals shown may not be in numerical order. Unused terminals may not be shown at all.
3. 1-Phase supply cable 2.5mm² minimum.
4. Controls cables 0.75mm² for up to 200 metre run.
5. SmartCom sensor & remote 'on' use 6A screened mains cable up to 100 metre run.
6. SmartCom master-slave network communication by screened twisted pair cable. (e.g. Belden 9841) Connect screen to terminal C0.
7. Fuse rating must be sufficiently sized to handle heater & motor loadings.

900717 - Photon Control Interconnections EN

Figure 5 Wiring Connections

Commissioning and operation

PHOTON unit heaters must be commissioned before putting into service.

On firing of a new unit the tubes will glow red. This will diminish over time as the bright new tubes begin to oxidise and darken. It may take some time to fully oxidise the tubes; this being dependent on the frequency / amount the unit is fired.

Pre-start checks

Prior to starting up the unit, carry out the following checks:-

- Do not use this appliance if any part has been subjected to water ingress. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control.
- Check unit suspension. The unit must be secure.
- Verify that no other parts are fitted which are not individually supported and secured.
- Check gas pipework for leaks and correct gas line pressure.
- Purge gas lines of trapped air.
- Check electrical wiring and ensure that wiring conforms to the wiring diagram. Be sure that all cables are correctly sized to meet the requirements of the units.
- Verify that the appliance is earthed by conducting an earth continuity test.
- Ensure that fuses are of the correct rating and fuse value.
- Check polarity. Verify that line voltage exists between the live terminal L1 and earth ground.
- Check ignition controller program key matches the resistance value as shown in Combustion data table for the heater model.
- Ensure that the air discharge louvres are open.
- Check that no combustibles are near to the unit. The applicable requirements are in the location and installation section of this manual.
- Check vent system to be sure that it is installed according to the combustion air supply instructions given in the installation section of this manual.
- Press LC3 thermostat reset button to ensure it is not in lockout.

C

Start up

For your safety, follow the instructions exactly otherwise damage or injury could occur!

During start up all gas services (up to the gas meter) must be checked again for gas soundness to ensure no leaks are present.

1. Turn on the gas supply and check for gas leaks. Ensure that all pressure test points are closed and gas tight.
2. Switch on the electrical supply.
3. Set the room thermostat to call for heat at high fire (10V).
4. If the red light next to the lockout reset switch is illuminated, press and hold it for 3 seconds, then release. If the light does not go off see Fault Finding section.
5. From initial power up there can be a delay of up to 2 minutes before the heater will respond to a heat demand. During this time, the ignition controller performs a self diagnostic routine.
6. The combustion fan will now run and the burner will automatically light after about 35 seconds. The air circulation fan will run within 30 seconds.
7. If the installation is new, 3 start-up cycles may be necessary due to air still being present in the gas pipe. Should the air heater still not light, refer to Fault Finding section.

8. The gas pressure must correspond to the data in table 3. If the gas pressure is higher than 50mbar, a pressure regulator must be installed. If the gas pressure is lower than the minimum as shown on the data plate, check the supply pipework to ensure it is correctly sized. Gas pressure should be checked with the appliance running at maximum heat load.

C When overheating occurs, shut the manual gas tap before turning off the electric power.

Air / gas ratio controls

PHOTON appliances are fitted with air-gas ratio control devices with two adjustments - throttle and offset.

Throttle is adjusted at high fire.

Offset is adjusted at low fire.

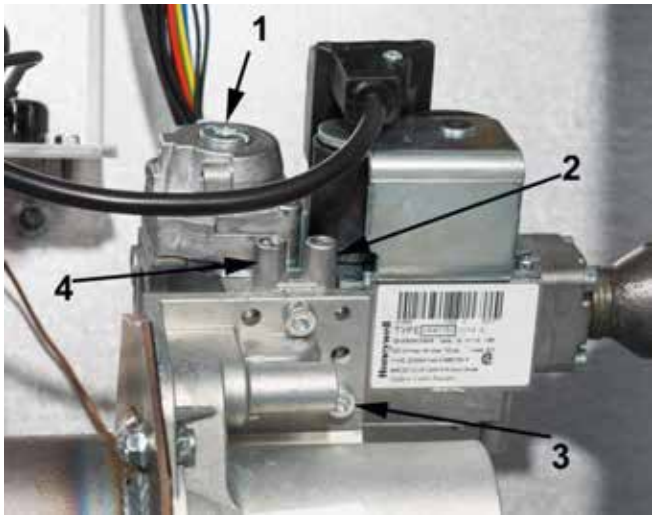
Gas valve adjustment

All units are set before leaving the factory. Any modification must be carried out by a suitably qualified technician.

Models 10-70

To adjust the throttle use a 4mm hex key on the screw located on the venturi. Rotate counter clockwise to increase %CO2. Rotate clockwise to decrease %CO2.

To adjust the offset, use a T40 Torx key to remove the protection cap on the gas valve. Rotate counter clockwise to decrease pressure / %CO2 and rotate clockwise to increase pressure / %CO2. Refit cap after adjustment.



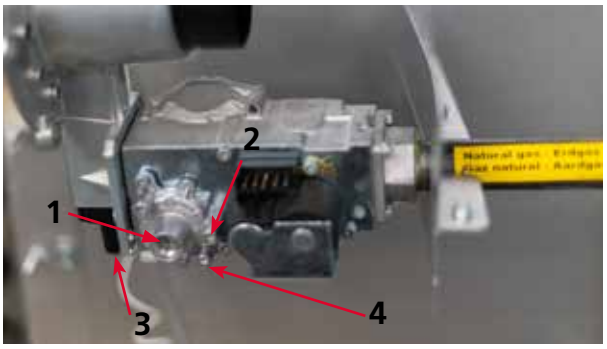
1 - Offset adjustment (low fire)
2 - Inlet pressure measuring point
3 - CO2 / throttle adjustment point (high fire)
4 - Offset pressure measuring point

Figure 6 Gas valve adjustment models 10-70

Model 100

To adjust the throttle use a 4mm hex key on the screw located on the venturi. Rotate clockwise to increase %CO2. Rotate counter clockwise to decrease %CO2.

To adjust the offset, use a T40 torx key to remove the protection cap on the gas valve. Rotate counter clockwise to decrease pressure / %CO2 and rotate clockwise to increase pressure / %CO2. Refit cap after adjustment.



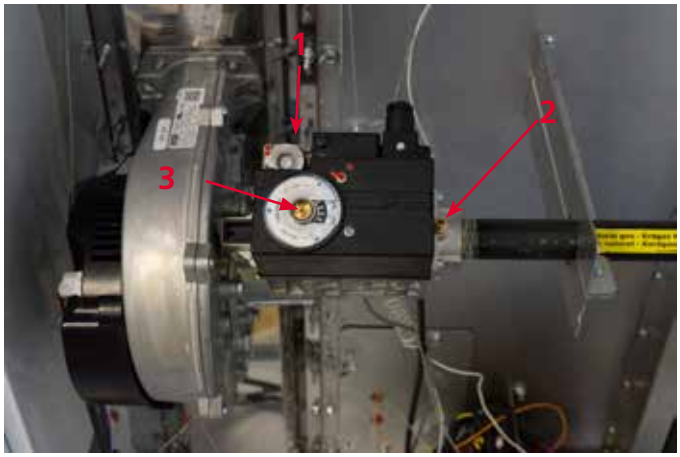
1 - Offset adjustment (low fire)
2 - Inlet pressure measuring point
3 - CO2 / throttle adjustment point (high fire)
4 - Offset pressure measuring point

Figure 7 Gas valve adjustment model 100

Model 120

To adjust the throttle use a flat blade screwdriver to remove the large round cover on top of the gas valve. Using a 3mm hex key on the screw located on the venturi, rotate counter clockwise to increase %CO2. Rotate clockwise to decrease %CO2.

To adjust the offset, use a T40 torx key to remove the protection cap on the gas valve. Rotate counter clockwise to decrease pressure / %CO2 and rotate clockwise to increase pressure / %CO2. Refit cap after adjustment. There is no pressure outlet measurement point on this gas valve.



1 - Offset adjustment (low fire)
2 - Inlet pressure measuring point
3 - CO2 / throttle adjustment point (high fire)

Figure 8 Gas valve adjustment model 120

Gas conversion

PHOTON unit heaters are designed to operate on natural gas types G20, G25 and G25.3.To modify for use on an alternative listed gas type, follow the commissioning guide and refer to the Combustion Data table for approximate throttle turns from G20 setup.

The data label needs to be updated after conversion. Using permanent ink place an 'X' in the box above the relevant gas type column to indicate the new gas setting. Obscure any previous indication.

Upon completion of conversion recommission the heater. Refer to the commissioning section for more details.

Commissioning checks

Commissioning requires the use of a CO/CO2 flue gas analyser with an inaccuracy < 0.1% and two pressure gauges.

C

For measuring gas pressure a resolution of 0.1 mbar or better is recommended.

For measuring offset pressure a low range gauge with a resolution of 1 Pa or better is required.

Read section on air-gas ratio control adjustment before proceeding.

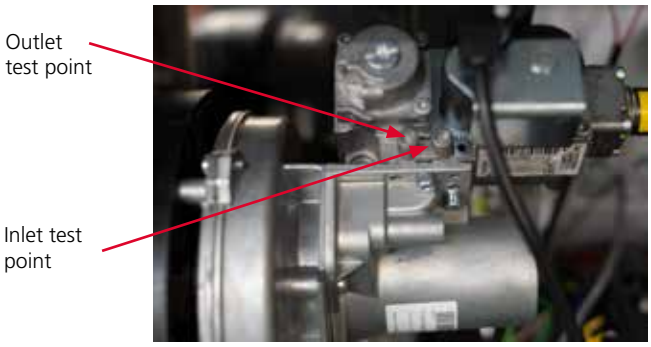
During commissioning the appliance %CO2 value should be compared to that shown in the Combustion Data Table.

1. Slacken screw in gas valve inlet pressure test point and attach gas pressure gauge.
2. Start the appliance following the start up procedure.
3. Ensure the thermostat is set to call for maximum heat (10V). For optimal appliance control during commissioning the 0-10VDC thermostat inputs can be substituted with a manually adjustable 0-10VDC generator wired into the burner terminals 66 & 64 (see wiring diagram).
4. Check gas supply pressure against the values on the data plate. If gas supply pressure is too low, shut-down the unit and correct.
5. Put CO/CO2 analyser probe into flue. Observe the CO/CO2 readings and adjust throttle screw until nominal high fire %CO2 value is achieved +/- 0.1%CO2 (see Combustion Data for details). If the venturi has been replaced it can be approximately set by fully closing and then adjusting the throttle a set number of turns as indicated in the combustion data table.

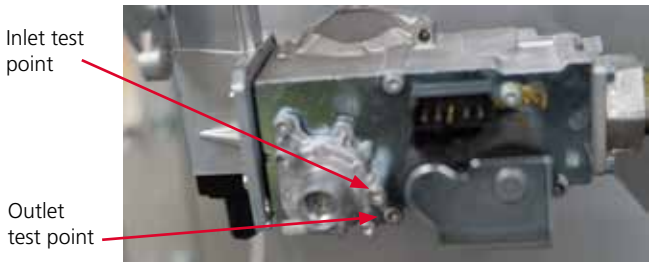
If the chamber insulation has been replaced the organic binders will burn off during the first few minutes of operation. This will result in a temporary increase in CO and CO2 readings.

6. Keep appliance running at full rate until completely stabilised and recheck %CO2. If necessary make further adjustments to throttle before proceeding.

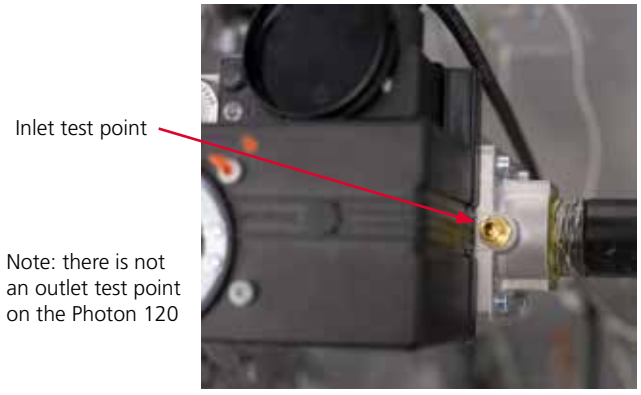
7. For models 10-100, slacken screw in gas valve outlet pressure test point and attach low range pressure gauge. Note, offset is a vacuum reading.



Gas pressure test points Photon 10-70



Gas pressure test points for Photon 100



Gas pressure test point for Photon 120

To set low fire adjust thermostat to call for minimum heat (1V):-

- Adjust offset screw to obtain nominal offset pressure +/- 5 Pa for models 10-100. (see Combustion Data for details). Note that there is no outlet pressure test port on the model 120 gas valve.
- Observe the CO/CO2 readings and adjust offset screw if needed to obtain nominal low fire %CO2 (+/-0.1%CO2).
- Return heater to high fire (10V) and recheck high fire %CO2 value. If necessary make any final adjustments to the throttle.
- Disconnect pressure gauges and tighten screws in gas valve test points.
- Remove heat demand and allow heater to shut-down.
- Reconnect thermostat connections if bypassed for commissioning.

Commissioning - hand over

Upon full and satisfactory completion of commissioning, a record of commissioning information should be left with the person responsible for the heater. The commissioning engineer must ensure that the user is familiar with the safe and efficient use of the heater, detailing the function of all controls and main components.

The user should be made aware of the following in particular: -

(i) Lighting, shutdown, and operational information.

(ii) Safety features, data plate, and labelling.

(iii) The requirement for regular inspection - especially if the heater is within a more demanding environment - and the need for regular servicing carried out by a suitably qualified person.

Model	Photon	10	20	25	35	45	55	65	70	100	120
CO2 at High Fire (Throttle) G20	%	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70
CO G20	ppm	< 50 ppm									
Throttle Turns from Closed	-	3.0 out	1.5 out	4.5 out	7.0 out	6.0 out	8.5 out	7.5 out	8.0 out	29.5 in	1.0 out
CO2 at Low Fire (Offset) G20	%	7.70	8.10	8.10	8.10	8.10	7.90	8.10	8.20	8.20	8.00
CO G20	ppm	< 50 ppm									
Low Fire Offset Pressure G20	Pa	-22	-45	-25	-54	-27	-77	-87	-105	-67	N/A
CO2 at High Fire (Throttle) G25	%	8.60	8.70	8.70	8.70	8.70	8.60	8.70	8.70	8.60	8.60
CO G25	ppm	< 50 ppm									
Throttle Turns from G20	-	2.0 out	1.5 out	1.75 out	2.5 out	2.125 out	3.0 out	2.5 out	3.0 out	7.5 in	0.5 out
CO2 at Low Fire (Offset) G25	%	7.70	8.10	8.10	8.10	8.10	7.90	8.10	8.20	8.20	8.00
CO G25	ppm	< 50 ppm									
Low Fire Offset Pressure G25	Pa	-32	-55	-24	-34	-26	-72	-105	-134	-66	N/A
CO2 at High Fire (Throttle) G25.3	%	8.60	8.70	8.70	8.70	8.70	8.60	8.70	8.70	8.60	8.60
CO G25.3	ppm	< 50 ppm									
Throttle Turns from G20	-	1.0 out	1.0 out	1.5 out	2.0 out	2.0 out	3.0 out	2.25 out	3.0 out	6.0 in	0.5 out
CO2 at Low Fire (Offset) G25.3	%	7.70	8.10	8.10	8.10	8.10	7.90	8.10	8.20	8.20	8.00
CO G25.3	ppm	< 50 ppm									
Low Fire Offset Pressure G25.3	Pa	-42	-60	-24	-33	-26	-70	-100	-140	-64	N/A
Flue Gas Temperature High Fire ΔT	°C	161.1	179.9	176.3	182.6	176.9	163.9	170.5	152.8	171.1	146.8
Flue Gas Temperature Low Fire ΔT	°C	65.0	71.1	78.7	68.2	74.7	72.8	76.9	75.8	72.1	61.0
Flue Pressure at Maximum Flue Resistance	Pa	3	6	70	10	19	18	11	14	23	6
Thermal Efficiency High Fire NCV	%	91.9	90.7	90.9	90.6	90.9	91.6	91.2	92.0	91.3	92.6
Thermal Efficiency Low Fire NCV	%	96.4	96.1	95.7	96.2	95.9	95.8	95.8	95.8	96.1	96.7
Ignition Controller Program Key	Ω	1,000	2,200	3,300	4,700	6,800	10,000	15,000	22,000	33,000	56,000

Table 4 Nominal Combustion Values with service door closed

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Operation

The appliance requires a 0-10VDC signal to control the burner. A value > 1.0VDC will indicate a heat demand and the combustion fan will start the pre-purge.

Before an ignition attempt the combustion fan slows to ignition speed. When the ignition speed has been reached the burner will attempt ignition.

If ignition is unsuccessful there will be another purge followed by ignition. The total number of ignition attempts before lockout is 3.

The spark electrode stays energised throughout the ignition attempt, even if the flame has been established.

Once the flame has been sensed the burner will run at the ignition speed for a few seconds to allow the flame to stabilise. Following flame stabilisation the fan speed will increase to high fire to allow the heat exchanger to warm up quickly.

After a short delay the air movement fan will start. Once warm up has completed the burner is released to the control of the 0-10VDC thermostat and will modulate to the requested heat demand.

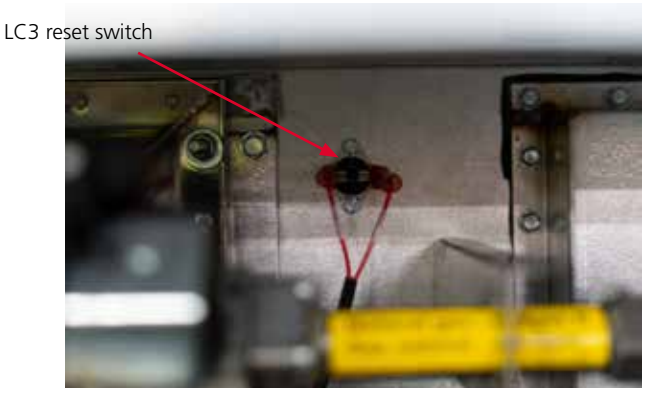
The burner will begin to modulate before the set temperature has been reached. At this point the burner rate will adjust according to the heat demand from the thermostat. When set point temperature is reached the burner will turn off and the appliance will post-purge to dissipate any residual heat.

If, for any reason, the burner flame is extinguished during a run cycle, an automatic attempt at re-ignition will take place. If after three ignition attempts the burner does not relight, safety shut down and lockout will occur. Manual intervention to reset will be necessary to put the unit back into service.

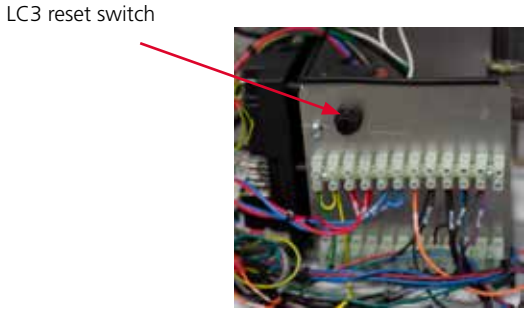
In the event of overheating for any reason, overheat controls operate to switch off the burner.

In case the heat exchanger's temperature is too high, the burner will be switched off by the LC1 limit control (first safety). The burner automatically switches on again after cooling down and re-start will take place.

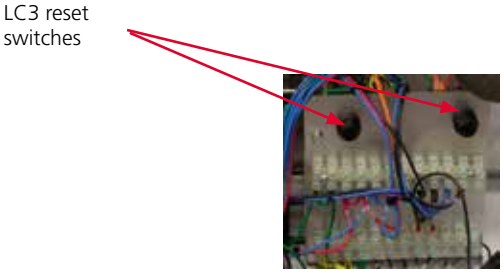
The limit control LC3, which operates at a higher temperature setting, switches off the burner to a lockout condition requiring a thorough check of the heater and a manual reset via the LC3 limit control body followed by the lockout reset switch. A cooling time of about 3 minutes is necessary before resetting.



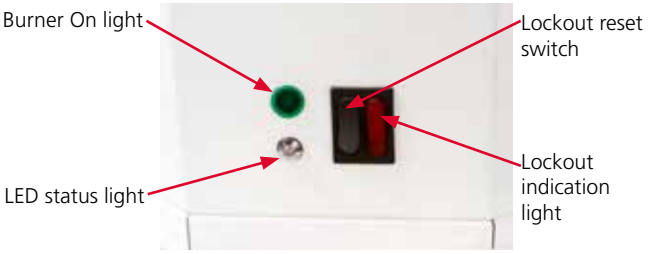
LC3 reset switch Photon 10-20



LC3 reset switch Photon 25-100



LC3 reset switches Photon120



Reset switch and status lights

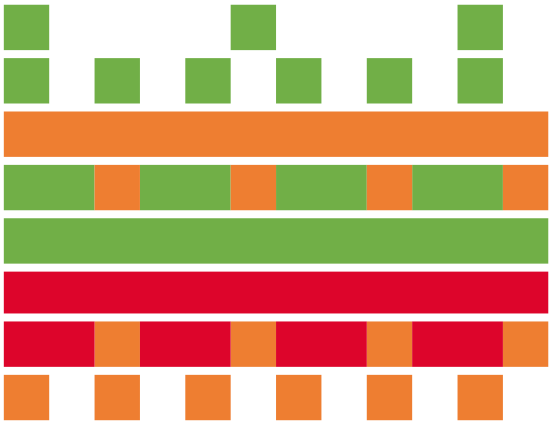
The appliance is fitted with an LED status light. This can be used to determine the current status of the appliance and help to diagnose fault conditions. See LED Status table below for more information.

To turn off the air heater for a short period, turn the room thermostat to a lower setting (a voltage below 0.8VDC will be deemed as no heat demand). To relight, reset the thermostat.

To turn off the heater for a prolonged period, turn the room thermostat to lowest setting and turn off the gas supply to the appliance. Switch off electrical supply to the air heater only after the air circulation fan has stopped. To relight, follow the start up instructions.

Gas and electricity must only be turned off in case of emergency or for prolonged periods of shutdown of the air heater.

C



Standby

Pre-purge

Ignition

Stabilisation

Unit is functioning

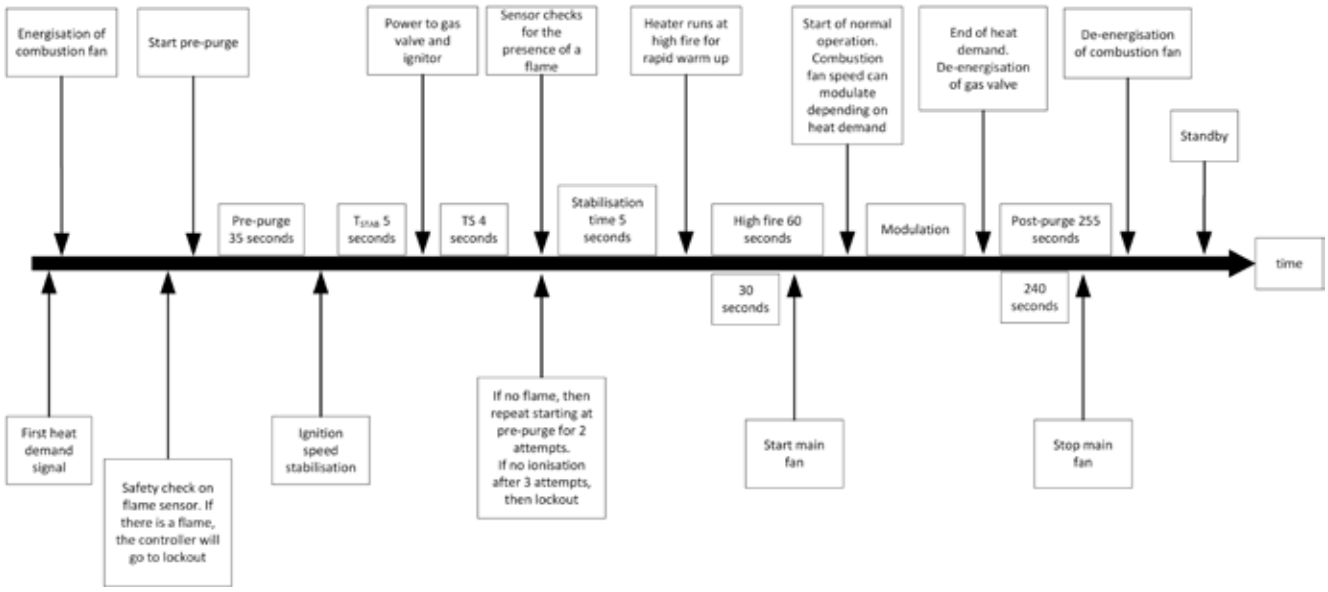
General lockout

Lockout due to LC3 over temperature

LC1 open or short circuit / program key error

Figure 9 LED Status

C

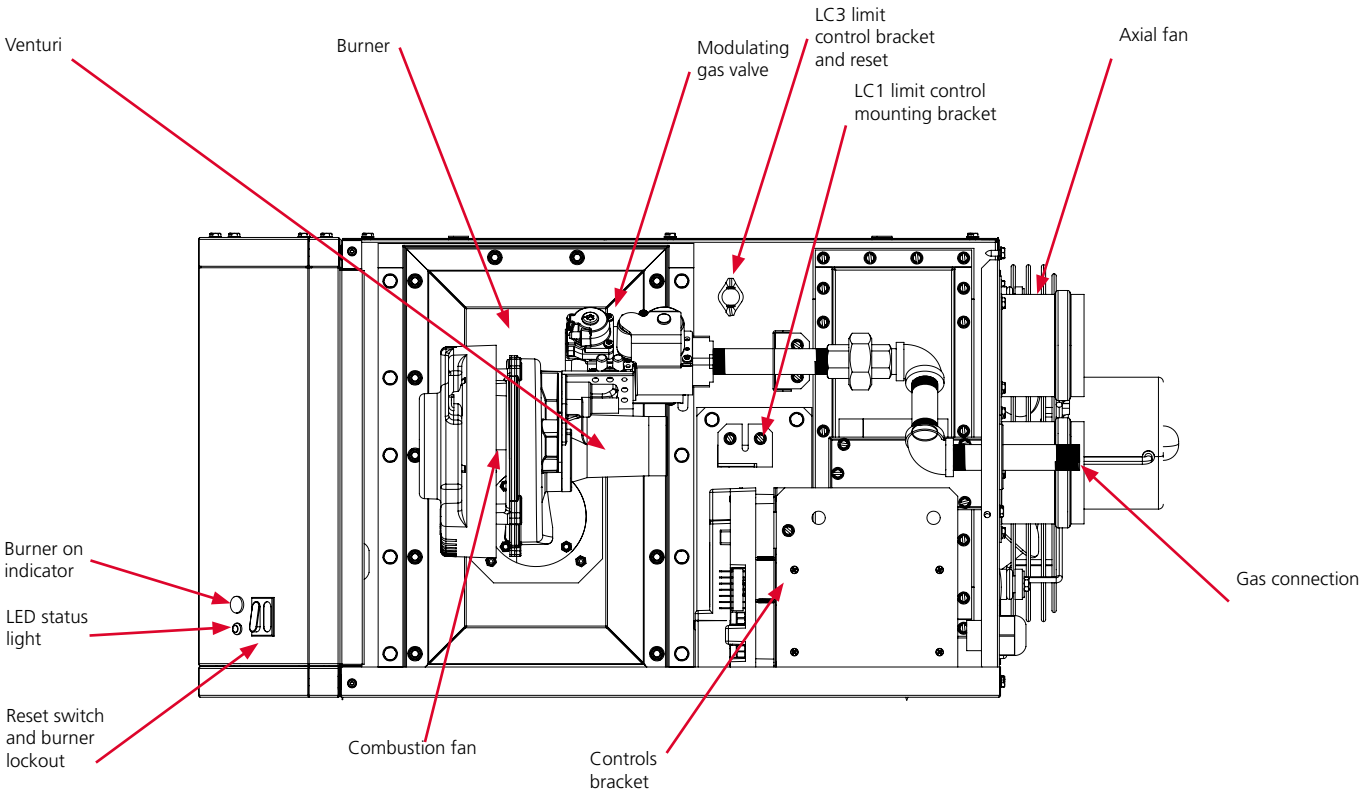


Start position	The system is not in lock-out and can proceed with the start up sequence upon a demand for heat
Pre-purge time	This is a period of 35 seconds during which the combustion fan operates prior to activation of the ignition device.
Safety time	The safety time is the delay between the gas valve being energised and the flame sensor checking for the presence of a flame. This is a period of 4 seconds. Note : if no flame is sensed, the burner controller will attempt ignition 3 times before going into lock-out mode.
Post-purge time	This is the time of 255 seconds between burner shut-down and the moment the combustion fan is de-energised.

Figure 10 Ignition system timetable

Maintenance

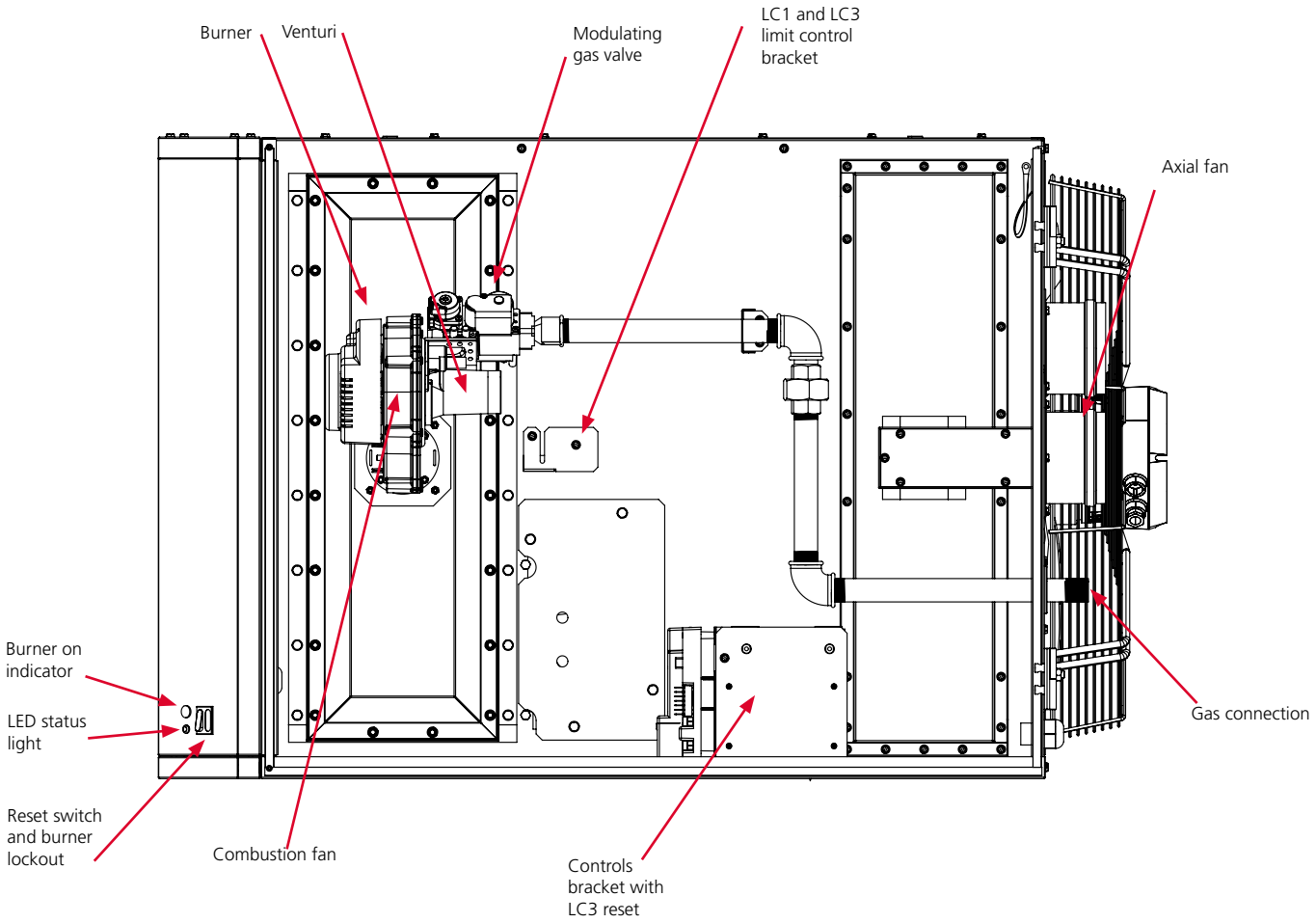
Photon 10-20 component layout



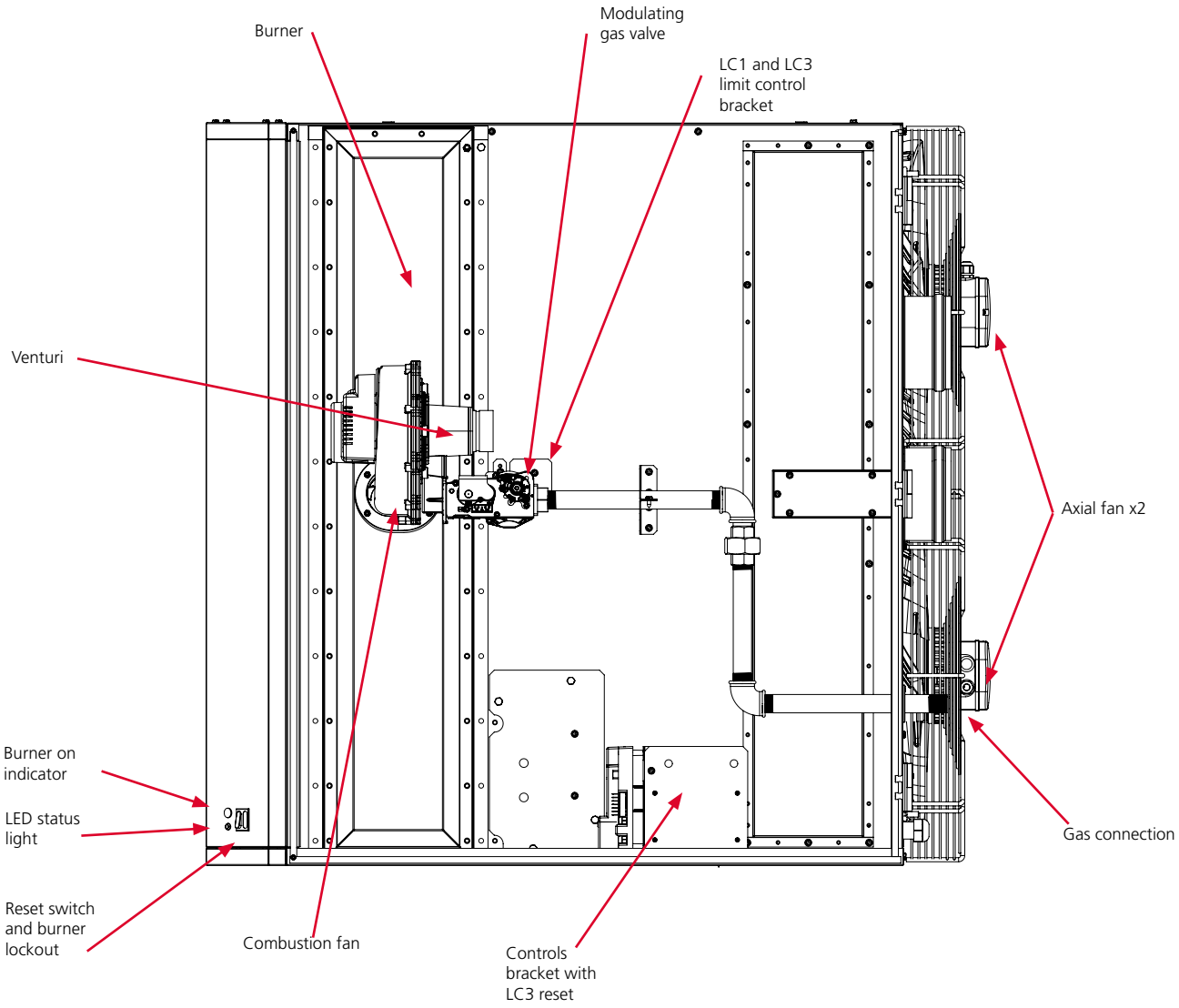
MS

Photon 25-70 component layout

MS



Photon 100 component layout



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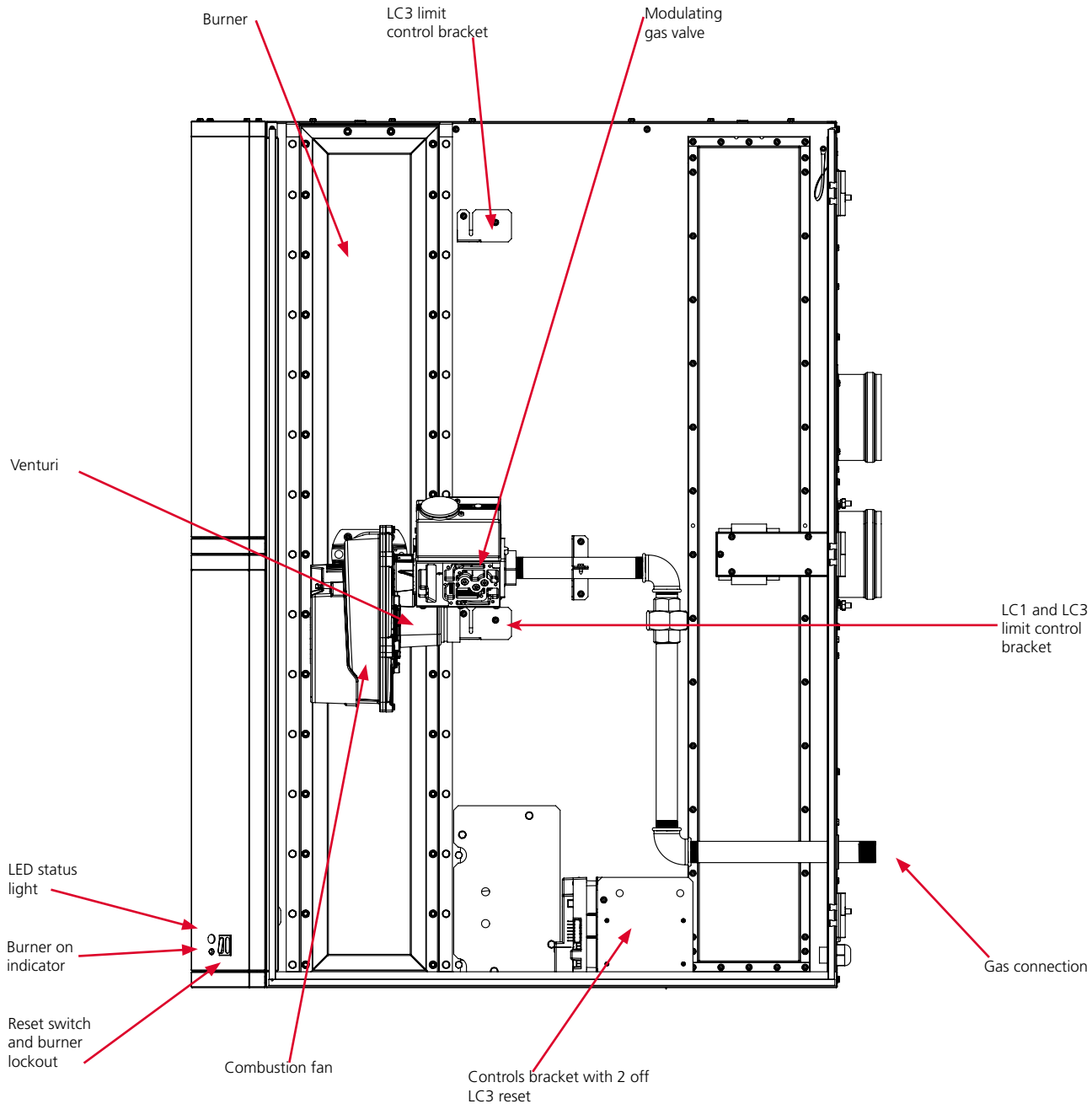
Photon 120 component layout



Maintenance schedule

Before commencing, turn off the main gas supply and switch off the main electricity supply after the air circulation fan has stopped.

Always consult your distributor at the slightest doubt.

The unit will operate with a minimum of maintenance. It is recommended that maintenance is carried out at least once a year by a suitably qualified person. More frequent servicing may be required dependent upon the environmental circumstances where the unit is installed. Regular inspection is necessary, especially in dirty areas, to assess the servicing frequency.

Check condition and security of flue and combustion air system. Check for security and worthiness of the suspension or mounting system.

The following procedures should be carried out at least once each year:

- Clean all dirt, lint, and grease from the fan and motor.
- Check the heat exchanger internally and externally for evidence of physical damage.
- Check the burner for scale, dust, or lint accumulation. Clean if required.
- Check the vent or vent/combustion air system for soundness. Replace any parts that do not appear sound.
- Check the wiring for any damage. Replace damaged wiring.

Heat exchanger maintenance

Remove any external dirt or dust accumulation. Visually check the heat exchanger for cracks and holes. If a crack or hole is observed, replace the heat exchanger.

Replacement of gas valve

1. Unplug the gas valve and combustion fan power cables.

2. Disconnect the gas supply union inside the cabinet and unscrew the gas pipe.

3. Unscrew the outer 8mm nuts securing the combustion fan to the burner.

4. Remove the gas valve / combustion fan assembly from the unit.

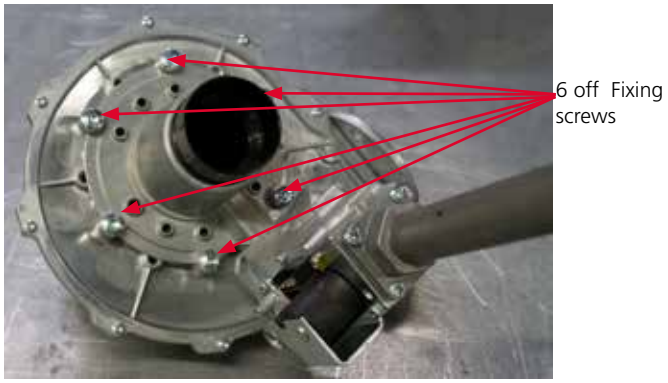
Photon 10-70 gas valve flange assembly

MS

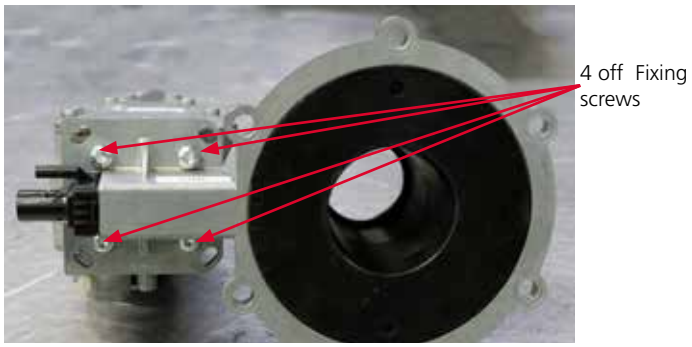
5. The gas valve can now be disconnected from the venturi by removing the fixing screws. There are 3 screws on Photon models 10-70 and 4 screws on Photon models 100-120. To gain access to the venturi fixing screws on the gas valves for the Photon 100 and 120 models, the combustion fan must be first removed.

MS

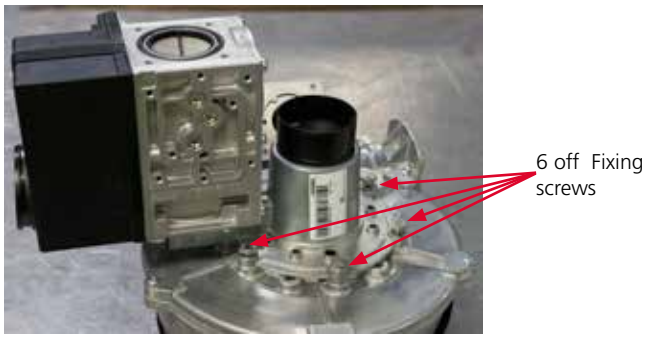
Photon 10-70 gas valve fixing screws



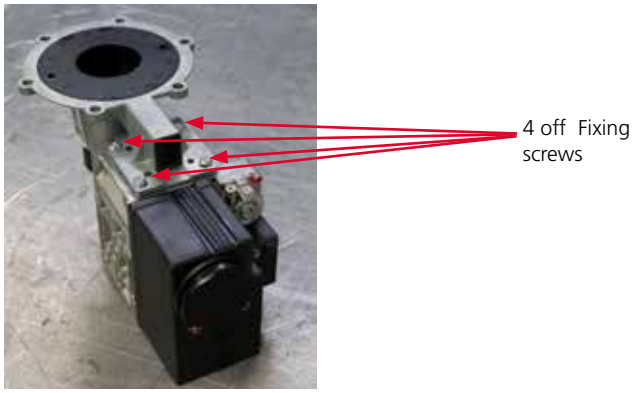
Photon 100 remove combustion fan to reveal gas valve fixing screws



Photon 100 gas valve fixing screws

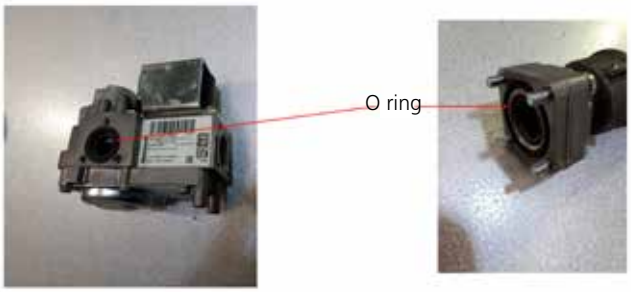


Photon 120 remove combustion fan to reveal gas valve fixing screws

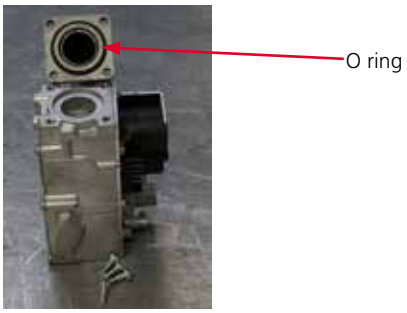


Photon 120 gas valve fixing screws

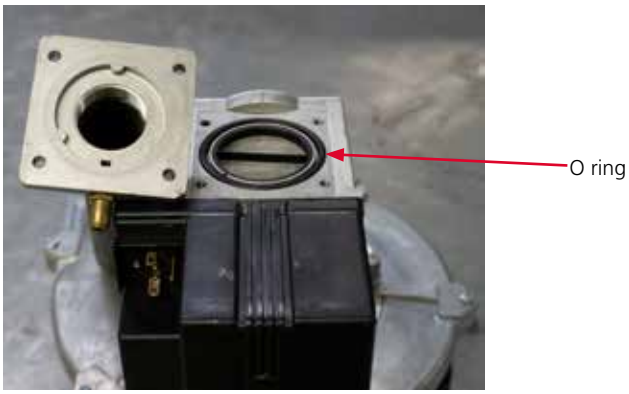
6. The gas supply pipe with flange can be removed by unscrewing the 4 fixings. Do not lose the o-ring seal.



Photon 10-70 gas valve inlet flange assembly



Photon 100 gas valve inlet flange assembly



Photon 120 gas valve inlet flange assembly

7. Refit gas valve in reverse order ensuring the o-ring is fitted between the gas valve and venturi.

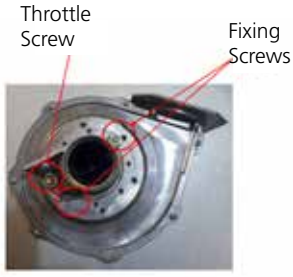
8. Follow start up and commissioning procedures.

Venturi cleaning and replacement

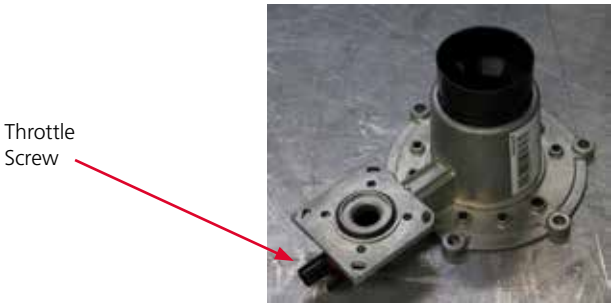
1. Clean the venturi inlet with a lint free cloth.

2. For replacement follow steps 1 to 5 from gas valve replacement.

3. Separate the venturi from the combustion fan by removing the fixings (2 screws models 10-70 and 6 screws models100-120 as per the photographs shown under gas valve replacement).



Photon 10-70 venturi



Photon 100 venturi

Photon 120 venturi

4. Before fitting new venturi, ensure throttle screw is fully closed (turn throttle clockwise for models 10-70 and anticlockwise for model 100. Do not overtighten. Model 120 has the throttle integrated into the gas valve.

5. Replace cork gasket (models 10-70) or o-ring (models 100-120) between combustion fan and venturi.

Photon 10-70 combustion fan

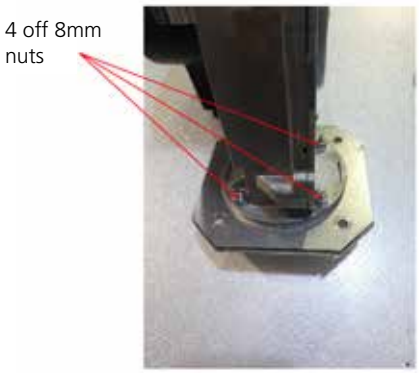
Photon 100-120 combustion fan

6. Refit remaining items in reverse order.

7. Follow start up and commissioning procedure.

Combustion fan cleaning and replacement

1. Follow steps 1 to 4 from gas valve replacement and step 3 from venturi replacement.
2. Clean fan body with a lint free cloth and blow any dirt out of the wheel using compressed air (air should not exceed 1.5 bar).
3. Check condition of fan wheel. If damaged replace fan.
4. On models 10-70 there is a mounting plate that will need to be transferred across to the new fan.
5. To remove unscrew the 8mm nuts.

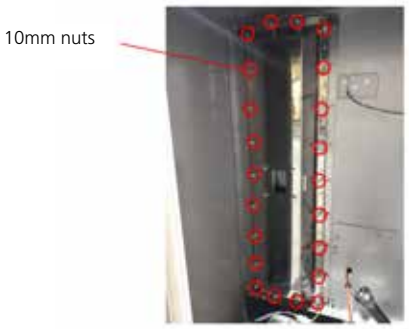


6. Attach new gasket to fan outlet flange (all models) and fit mounting plate (models 10-70 only)

7. Refit remaining items in reverse order.
8. Follow start up and commissioning procedure.

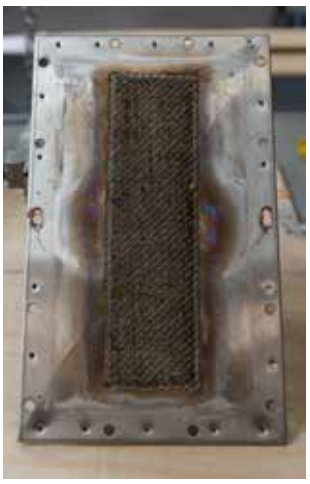
Burner cleaning and replacement

1. Follow steps 1 to 4 from gas valve replacement.
2. Unscrew the burner fixings with a deep 10mm socket.



3. The burner can now be removed.
4. Rinse the burner body with clean water and dry.
5. Inspect the burner for cracks, holes or splits in the mesh. If damaged the burner should be replaced.

Burner with face insulation in place



Burner with face insulation removed

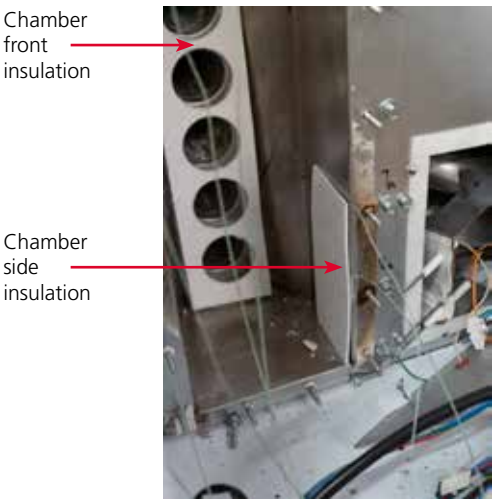
6. The burner mesh can be cleaned by either placing it under clean running water or by immersing it in a container full of clean water. The burner should be allowed to dry naturally or be blown dry using compressed air (drying air should not exceed 1.5 bar).
7. Replace the burner gasket if necessary.
8. Refit in reverse order.
9. Follow start up and commissioning procedure.

Burner chamber / tube insulation check and replacement

1. The insulation material is a mixture containing Refractory Ceramic Fibres (RCF) / Alumino-Silicate Wools (ASW). Do not handle until all safety instructions have been read.
2. Wear appropriate PPE such as gloves, protective clothing, eye protection, and respiratory protection. Follow all local regulations and industrial hygiene standards.
3. Handle insulation with care to minimise airborne dust.
4. Dispose of waste in accordance with local regulations, such as a landfill licensed for this purpose.
5. Unless wetted, such waste may be dusty and should be properly sealed in containers for disposal.
6. The Material Safety Data Sheet is available from the appliance manufacturer.
7. With the burner removed the integrity of the combustion chamber and tube insulation can be verified. It is normal for small superficial cracks to be present in the surface of the insulation.

MS

8. Remove any debris from inside the burner chamber. A vacuum with a minimum of M Class dust extraction rating can be used. Do not use compressed air.
9. Check the integrity of the insulation. Use a torch to inspect the insulation sleeves fitted into each tube. Broken tube inserts or the presence of deep cracks or warping indicate that the insulation needs to be replaced.
10. To remove the chamber insulation the burner probes must first be removed. See cleaning and replacement of burner probes for procedure.
11. With the burner probes removed the insulation block can be pulled out from the chamber. This will reveal two additional thin strips of insulation material. The first is located at the front of the chamber where the tubes are secured. The second is located on the lower right side of the chamber where the probes are normally located. It is recommended that both of these thin insulation strips are replaced whenever the cast insulation block is removed. Ensure the lower right insulation strip has the preformed holes lined up with the probe holes in the side of the chamber.



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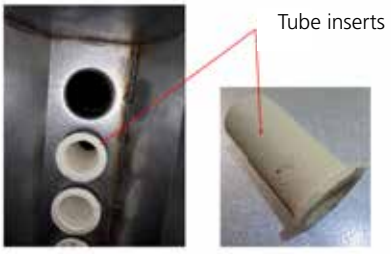
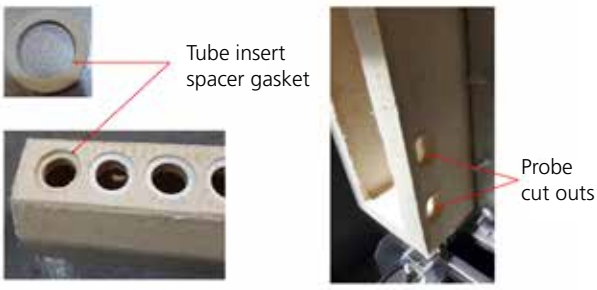
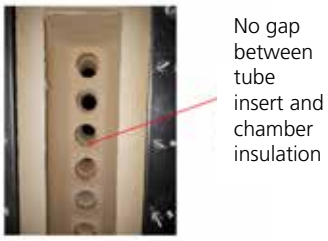
12. The tube inserts can now be accessed and withdrawn from the tubes.



13. Refit replacement tube inserts, tube insert spacer gaskets and chamber insulation ensuring the chamber insulation is correctly orientated, so the cut outs line up with the burner probe position.



14. Confirm the tube inserts slot into the corresponding recess in the front face of the chamber insulation block and gently pull them towards the chamber insulation. Ensure there are no gaps between the chamber insulation and tube inserts. Up to three tube insert spacer gaskets may be needed per tube insert.



15. Refit burner probes, ensuring probe gaskets are replaced.

16. Refit in reverse order.

17. Follow start up and commissioning procedure.

Replacement of burner probes

1. Open the access door on the side of the unit.

2. Disconnect the spark and flame sensor cables from the ignition transformer and ignition controller

3. Remove the probe assembly access panel via the 4 off 10mm retaining bolts on the inside of the heater next to the ignition control box.

4. The probe assembly can be seen on the left hand side with the access panel removed.

5. Remove the 2 off 10mm retaining bolts from the heat exchanger tabs.

6. Remove the probe assembly bracket.

7. Carefully place the two off replacement probe gaskets within the replacement probe kit onto the probe assembly bracket before refitting on to the unit.

8. Install the replacement probe bracket onto the side of the combustion chamber using the 10mm retaining bolts.

9. Check that the replacement gaskets are flat on the combustion chamber and there are no signs of damage.

10. Replace the probe assembly access panel using the 4 off 10mm retaining nuts.

11. Reconnect the spark and flame sensor cables to the ignition transformer and ignition controller

12. Replace the access panel on the side of the unit.

13. Re-instate the gas and electric supplies having checked that everything is in its' correct location and all associated screws and nuts are tight.

All gaskets associated with the Photon heater have been designed for SINGLE USE ONLY and MUST be replaced when carrying out the steps previously listed.

MS

Replacement of LC1 and LC3 safety thermostats (Models 25-120)

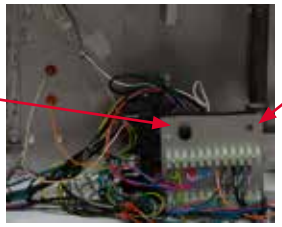
1. Disconnect LC1 and LC3 electrical connectors.

Typical LC1 connector

MS

Typical LC3 connector

2. Remove LC3 protective cap and lock nut. Note that there are two fitted to the Photon 120 unit.



3. Unscrew the 2 fixings from the mounting bracket.

4. Withdraw mounting bracket from heater.

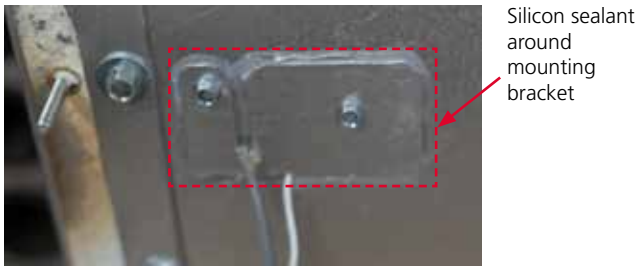
Thermostat mounting bracket

5. The thermostats can now be removed from the mounting bracket.

6. Replace one or both thermostats as needed. Ensure sensor is pushed up to the return at the end of the bracket and secured in place with the retaining clips. Replace clips if necessary. Ensure thermostat is held tightly by the retention clips. It may be necessary to close the clips with pliers before fitting the thermostat.

7. Refit all parts in reverse order. Press LC3 button to reset thermostat.

8. Seal gaps around thermostat mounting bracket with silicone sealant to maintain the integrity of the burner compartment.



9. Follow start up and commissioning procedure.

Replacement of LC1 and LC3 safety thermostats (Models 10-20)

1. LC1 replacement is exactly the same as for models 25-120.

2. To replace LC3, disconnect electrical connectors.

LC3 and panel location models 10-20

3. Unscrew the 2 fixing screws.
4. The thermostat can now be removed from the heater.
5. Replace thermostat and refit all parts in reverse order.
6. Press button on thermostat to reset.
7. Follow start up amd commissioning procedure.

Replacement of ignition controller

1. Disconnect all electrical connections.
2. Unscrew fixings located in the corners of the controller.
3. Remove program key and refit into new controller.
4. Fix new controller to electrical panel and reattach all wiring.
5. Follow start up and commissioning procedure.

Replacement of ignition transformer

1. Disconnect all electrical connections.
2. Unscrew fixings and remove transformer.
3. Refit in reverse order.
4. Follow start up and commissioning procedure.

Replacement of lockout circuit board

1. Disconnect all electrical connections.
2. Pinch circuit board retention clips to release.
3. Refit in reverse order.
4. Follow start up and commissioning procedure.

Replacement of fan relay

1. Disconnect all electrical connections, including blanking connector.
2. Unscrew fixings and remove relay.
3. Refit in reverse order, ensuring blanking connector is fitted to the normally closed terminal.

Blanking connector; this terminal will be live whenever the unit axial fan is NOT in operation so it must be covered.

4. Follow start up and commissioning procedure.

Replacement of air circulation fan

1. Open access door and disconnect fan motor cables.
2. Loosen cable gland and retract cable.
3. Unscrew fixings securing fan to rear of appliance.
4. The fan can now be removed from the unit. For safety reasons it is recommended to wear gloves when handling the fan.
5. Disassemble and replace parts as needed, then reassemble.
6. Be sure the fan blade is located in the correct position on the shaft. For Photon 10 and 20 replacement fans purchased before January 2026 refer to the diagram overleaf for siting the impeller on the shaft. For Photon 10 and 20 replacement fans purchased from January 2026, an instruction document is included with the replacement fan which details the correct spacing.

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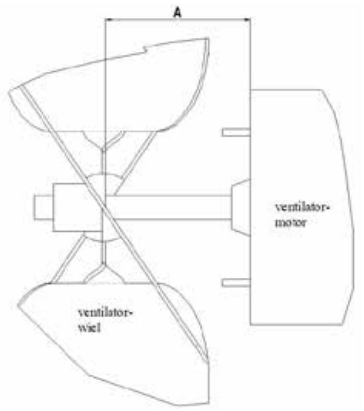


MS

Dimension A		
Model	10	20
Distance mm	50	49

7. Replace in reverse order.
8. Rotate the fan blade by hand to check for adequate clearance. If adjustment is required, loosen the mounting screws, reposition the fan guard and tighten the screws. Rotate the fan blade and recheck. Repeat as necessary.
9. Follow start up and commissioning procedure.

Flue and combustion air

Check the complete system at least once a year. The inspection should include all joints, seams, concentric adapters and the flue terminal cap. Replace any defective or heavily corroded parts.

Fan motor and fan maintenance

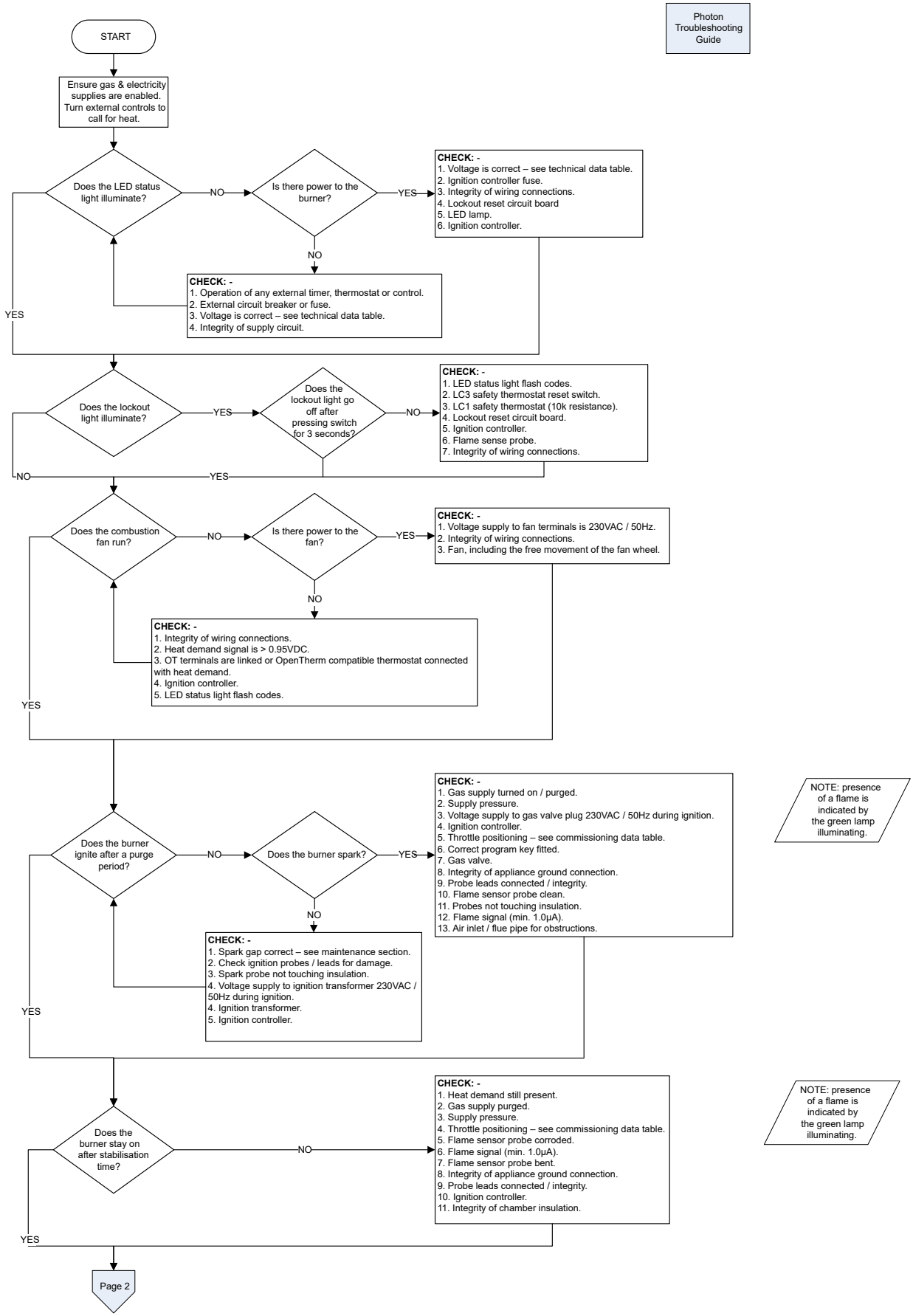
The fan motor is equipped with thermal overload protection of the automatic reset type.

Should the motor fail to run, it may be because of improper voltage characteristics. Make certain that the correct voltage is available at the motor.

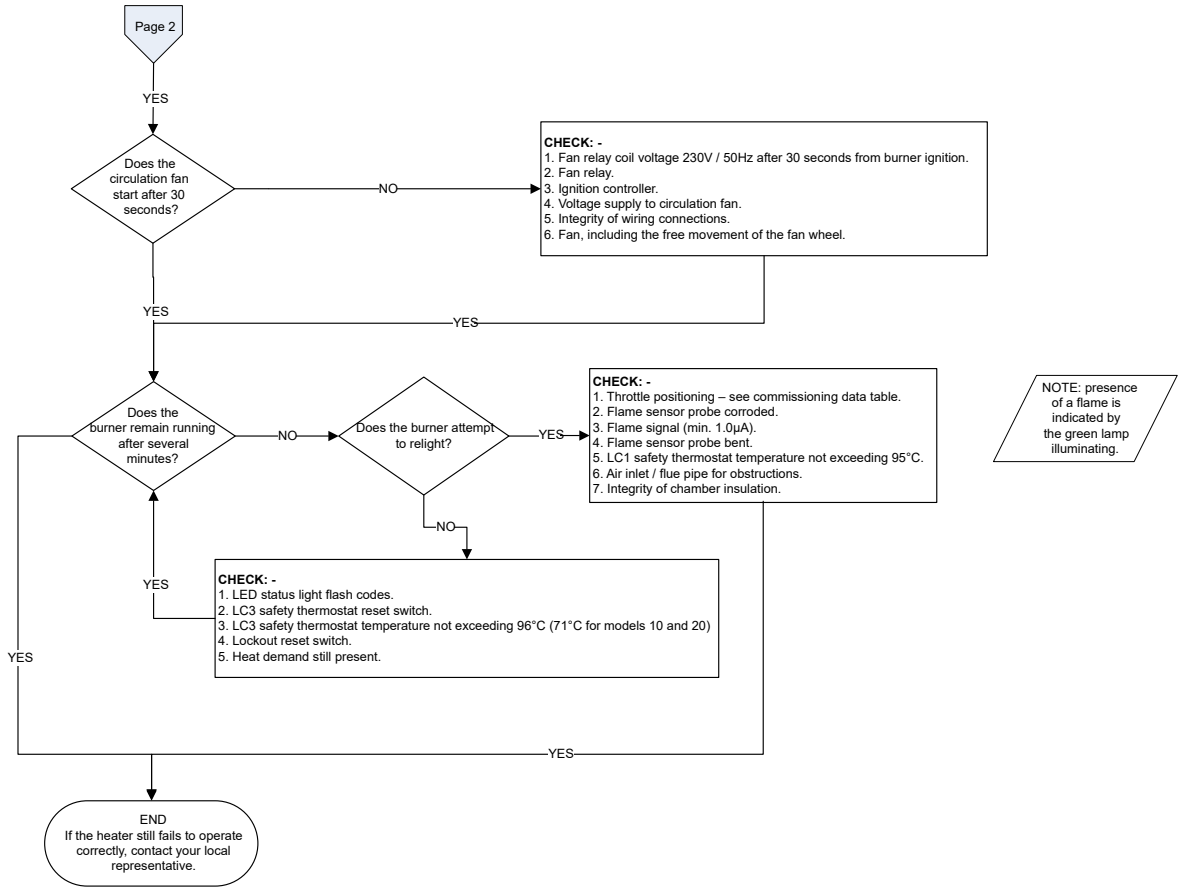
Remove dirt and grease from the motor, the fan guard and the fan blades. Use care when cleaning the fan blades to prevent causing misalignment or imbalance.

Unit operation

The combustion and correct operation of the appliance should be verified as a part of the normal service routine. Follow the steps in the start up and commissioning procedures to verify.


Photon Troubleshooting Guide
START
Ensure gas & electricity supplies are enabled. Turn external controls to call for heat.
Does the LED status light illuminate?
NO
Is there power to the burner?
YES
CHECK: -
1. Voltage is correct – see technical data table.
2. Ignition controller fuse.
3. Integrity of wiring connections.
4. Lockout reset circuit board
5. LED lamp.
6. Ignition controller.
NO
CHECK: -
1. Operation of any external timer, thermostat or control.
2. External circuit breaker or fuse.
3. Voltage is correct – see technical data table.
4. Integrity of supply circuit.
YES
Does the lockout light illuminate?
YES
Does the lockout light go off after pressing switch for 3 seconds?
NO
CHECK: -
1. LED status light flash codes.
2. LC3 safety thermostat reset switch.
3. LC1 safety thermostat (10k resistance).
4. Lockout reset circuit board.
5. Ignition controller.
6. Flame sense probe.
7. Integrity of wiring connections.
NO
YES
Does the combustion fan run?
NO
Is there power to the fan?
YES
CHECK: -
1. Voltage supply to fan terminals is 230VAC / 50Hz.
2. Integrity of wiring connections.
3. Fan, including the free movement of the fan wheel.
NO
CHECK: -
1. Integrity of wiring connections.
2. Heat demand signal is > 0.95VDC.
3. OT terminals are linked or OpenTherm compatible thermostat connected with heat demand.
4. Ignition controller.
5. LED status light flash codes.
YES
Does the burner ignite after a purge period?
NO
Does the burner spark?
YES
CHECK: -
1. Gas supply turned on / purged.
2. Supply pressure.
3. Voltage supply to gas valve plug 230VAC / 50Hz during ignition.
4. Ignition controller.
5. Throttle positioning – see commissioning data table.
6. Correct program key fitted.
7. Gas valve.
8. Integrity of appliance ground connection.
9. Probe leads connected / integrity.
10. Flame sensor probe clean.
11. Probes not touching insulation.
12. Flame signal (min. 1.0µA).
13. Air inlet / flue pipe for obstructions.
NOTE: presence of a flame is indicated by the green lamp illuminating.
NO
CHECK: -
1. Spark gap correct – see maintenance section.
2. Check ignition probes / leads for damage.
3. Spark probe not touching insulation.
4. Voltage supply to ignition transformer 230VAC / 50Hz during ignition.
4. Ignition transformer.
5. Ignition controller.
YES
Does the burner stay on after stabilisation time?
NO
CHECK: -
1. Heat demand still present.
2. Gas supply purged.
3. Supply pressure.
4. Throttle positioning – see commissioning data table.
5. Flame sensor probe corroded.
6. Flame signal (min. 1.0µA).
7. Flame sensor probe bent.
8. Integrity of appliance ground connection.
9. Probe leads connected / integrity.
10. Ignition controller.
11. Integrity of chamber insulation.
NOTE: presence of a flame is indicated by the green lamp illuminating.
YES
Page 2

FF


Page 2
YES
Does the circulation fan start after 30 seconds?
NO
CHECK: -
1. Fan relay coil voltage 230V / 50Hz after 30 seconds from burner ignition.
2. Fan relay.
3. Ignition controller.
4. Voltage supply to circulation fan.
5. Integrity of wiring connections.
6. Fan, including the free movement of the fan wheel.
YES
YES
Does the burner remain running after several minutes?
NO
Does the burner attempt to relight?
YES
CHECK: -
1. Throttle positioning – see commissioning data table.
2. Flame sensor probe corroded.
3. Flame signal (min. 1.0µA).
4. Flame sensor probe bent.
5. LC1 safety thermostat temperature not exceeding 95°C.
6. Air inlet / flue pipe for obstructions.
7. Integrity of chamber insulation.
NOTE: presence of a flame is indicated by the green lamp illuminating.
NO
YES
CHECK: -
1. LED status light flash codes.
2. LC3 safety thermostat reset switch.
3. LC3 safety thermostat temperature not exceeding 96°C (71°C for models 10 and 20)
4. Lockout reset switch.
5. Heat demand still present.
YES
YES
END
If the heater still fails to operate correctly, contact your local representative.

Spare Parts

Description	Part Number	Application
Ignition controller	1030137	10-100
Ignition controller	1031961	120
Ignition transformer	1030638	10-120
Probe replacement kit	1038443	10-20
Probe replacement kit	1038444	25-120
Gas valve	03-25800	10-65
Gas valve	03-25801	70
Gas valve	1030499	100
Gas valve	1030564	120
Gas valve lead	1030864	10-100
Gas valve lead	1030895	120
Venturi with gasket/o-ring	03-25700-055	10-20
Venturi with gasket/o-ring	03-25700-053	25
Venturi with gasket/o-ring	03-25700-002	35
Venturi with gasket/o-ring	03-25700-001	45
Venturi with gasket/o-ring	03-25700-051	55-70
Venturi with gasket/o-ring	1030764	100
Venturi with gasket/o-ring	1031374	120
Combustion fan Kit 10-25	1037269	10-25
Combustion fan Kit 35-70	1037270	35-70
Combustion fan Kit 100	1037271	100
Combustion fan Kit 120	1037272	120
Burner face insulation / burner gasket	1037190	10
Burner face insulation / burner gasket	1037191	20
Burner face insulation / burner gasket	1037192	25
Burner face insulation / burner gasket	1037193	35
Burner face insulation / burner gasket	1037194	45
Burner face insulation / burner gasket	1037195	55
Burner face insulation / burner gasket	1037196	65
Burner face insulation / burner gasket	1037197	70
Burner face insulation / burner gasket	1037198	100
Burner face insulation / burner gasket	1037199	120
LC3 safety thermostat	1030945	10-20
LC3 safety thermostat (2x model 120)	03-24959	25-120
LC1 safety thermostat	05-25167-5050	10-120
Lockout reset circuit board	03-25327-01	10-120
Lockout reset switch	60-61998	10-120
LED lamp	60-61997	10-120
Green lamp	28-50-038	10-120
Fan relay	30-61742-240V	10-120
Burner wiring harness	1030366	10-120

SP

Description	Part Number	Application
Premix burner	1030405	10
Premix burner	1030490	20
Premix burner	1030630	25
Premix burner	1030352	35
Premix burner	1030327	45
Premix burner	1030135	55
Premix burner	1030136	65
Premix burner	1030446	70
Premix burner	1030280	100
Premix burner	1030515	120
Axial fan assembly 10	1037267	10
Axial fan assembly 20	1037268	20
Axial fan assembly 25	01-27007-01	25
Axial fan assembly 35-45	1030858	35-45
Axial fan assembly 55	01-27011-01	55
Axial fan assembly 65	1030860	65
Axial fan assembly 70 & 120	1030812	70 & 120
Axial fan assembly 100	1030859	100
Axial fan cable gland	06-25524	10-120
Chamber Insulation Kit, Photon 10	1037350	10
Chamber Insulation Kit, Photon 20	1037351	20
Chamber Insulation Kit, Photon 25	1037352	25
Chamber Insulation Kit, Photon 35	1037353	35
Chamber Insulation Kit, Photon 45	1037354	45
Chamber Insulation Kit, Photon 55	1037355	55
Chamber Insulation Kit, Photon 65	1037356	65
Chamber Insulation Kit, Photon 70	1037357	70
Chamber Insulation Kit, Photon 100	1037358	100
Chamber Insulation Kit, Photon 120	1037359	120

SP

Information required for Ecodesign (ErP) Regulation 2016/2281 - G20

Model			PHOTON									
Item	Symbol	Units	10	20	25	35	45	55	65	70	100	120
Type of Fuel	-	-	Natural gas G20									
Capacity												
Rated Heating Capacity	Pnom	kW	9.3	18.4	26.5	31.7	42.2	53.5	63.6	71.2	97.9	120.2
Minimum Capacity	Pmin	kW	4.9	9.4	15.4	16.6	23.2	25.2	36.7	40.8	51.5	64.2
Electrical Power Consumption												
At Rated Heating Capacity	elmax	kW	0.026	0.053	0.062	0.071	0.087	0.090	0.102	0.122	0.251	0.432
At Minimal Capacity	elmin	kW	0.020	0.025	0.036	0.025	0.039	0.027	0.037	0.045	0.053	0.125
In Standby Mode	elsb	kW	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Useful Efficiency												
Useful Efficiency at Rated Heating Capacity	$\eta_{th,\ nom}$	%	82.8	81.7	81.9	81.6	81.9	82.5	82.2	82.8	82.2	83.4
Useful Efficiency at Minimum Capacity	$\eta_{th,min}$	%	86.9	86.6	86.2	86.7	86.4	86.3	86.3	86.3	86.6	87.0
Other Items												
Envelope Loss Factor	Fenv	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flame Consumption	Pign	kW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Emissions of Nitrogen Oxides (Input Energy (GCV)	NOx	mg/kWh	31	50	49	39	51	57	63	69	64	59
Emission Efficiency	$\eta_{s,\ flow}$	%	95.6	95.9	94.5	95.5	94.4	95.1	94.3	94.9	94.4	96.0
ErP Seasonal Space Heating Energy Efficiency	η_s	%	80.2	80.4	78.5	80.2	78.8	80.1	78.7	79.3	79.3	81.0
Thermal Efficiency at Rated Heating Capacity (NCV)	η	%	91.9	90.7	90.9	90.6	90.9	91.6	91.2	92.0	91.3	92.6

ErP

Information required for Ecodesign (ErP) Regulation 2016/2281 - G25

Model			PHOTON									
Item	Symbol	Units	10	20	25	35	45	55	65	70	100	120
Type of Fuel	-	-	Natural gas G25									
Capacity												
Rated Heating Capacity	Pnom	kW	9.2	18.4	26.4	31.7	42.2	53.4	63.5	71.4	97.4	119.5
Minimum Capacity	Pmin	kW	4.9	9.4	15.3	16.6	23.2	25.4	36.8	40.8	51.3	64.0
Electrical Power Consumption												
At Rated Heating Capacity	elmax	kW	0.026	0.053	0.062	0.071	0.087	0.090	0.102	0.122	0.251	0.432
At Minimal Capacity	elmin	kW	0.020	0.025	0.036	0.025	0.039	0.027	0.037	0.045	0.053	0.125
In Standby Mode	elsb	kW	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Useful Efficiency												
Useful Efficiency at Rated Heating Capacity	$\eta_{th, nom}$	%	81.9	82.0	81.6	81.7	81.8	82.4	82.0	83.0	81.8	83.0
Useful Efficiency at Minimum Capacity	$\eta_{th,min}$	%	81.6	86.5	86.0	86.5	86.3	87.0	86.4	86.3	86.3	86.8
Other Items												
Envelope Loss Factor	Fenv	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flame Consumption	Pign	kW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Emissions of Nitrogen Oxides (Input Energy (GCV)	NOx	mg/kWh	29	60	58	49	56	49	66	60	68	52
Emission Efficiency	$\eta_{s, flow}$	%	95.6	95.9	64.5	95.5	94.4	95.1	94.3	94.9	94.4	96.0
ErP Seasonal Space Heating Energy Efficiency	η_s	%	79.4	80.4	78.2	80.1	78.8	80.6	78.7	79.3	79.0	80.7
Thermal Efficiency at Rated Heating Capacity (NCV)	η	%	91.0	91.0	90.5	90.7	90.8	91.5	91.0	92.1	90.8	92.1

Information required for Ecodesign (ErP) Regulation 2016/2281 - G25.3

Model				PHOTON									
Item	Symbol	Units	10	20	25	35	45	55	65	70	100	120
Type of Fuel	-	-	Natural gas G25.3									
Capacity												
Rated Heating Capacity	Pnom	kW	9.2	18.4	26.5	31.6	42.2	53.4	63.8	71.1	97.4	119.1
Minimum Capacity	Pmin	kW	4.9	9.4	15.3	16.6	23.2	25.3	36.7	40.9	51.4	64.0
Electrical Power Consumption												
At Rated Heating Capacity	elmax	kW	0.026	0.053	0.062	0.071	0.087	0.090	0.102	0.122	0.251	0.432
At Minimal Capacity	elmin	kW	0.020	0.025	0.036	0.025	0.039	0.027	0.037	0.045	0.053	0.125
In Standby Mode	elsb	kW	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Useful Efficiency												
Useful Efficiency at Rated Heating Capacity	$\eta_{th,\ nom}$	%	81.6	81.7	81.7	81.5	81.8	82.3	82.1	82.7	81.9	82.7
Useful Efficiency at Minimum Capacity	$\eta_{th,min}$	%	86.0	86.3	86.1	86.5	86.4	86.9	86.3	86.4	86.4	86.7
Other Items												
Envelope Loss Factor	Fenv	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flame Consumption	Pign	kW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Emissions of Nitrogen Oxides (Input Energy (GCV)	NOx	mg/kWh	29	58	55	62	61	58	66	68	68	63
Emission Efficiency	$\eta_{s,\ flow}$	%	95.6	95.9	94.5	95.5	94.4	95.1	94.3	94.9	94.4	96.0
ErP Seasonal Space Heating Energy Efficiency	η_s	%	79.4	80.2	78.3	80.0	78.8	80.5	78.6	79.3	79.1	80.6
Thermal Efficiency at Rated Heating Capacity (NCV)	η	%	90.6	90.7	90.7	90.5	90.8	91.4	91.1	91.8	90.9	91.8

ErP

Disposal and recycling

	When the product reaches the end of its useful life, the person in charge of dismantling or disposing of the product shall do so in accordance with Waste Electrical and Electronic Equipment (WEEE) Regulations. Dispose of equipment at applicable recycling facilities for electrical and electronic equipment waste. Follow the rules in force for the relevant country. By disposing of this equipment through appropriate means, it will help prevent potential hazards to the environment and to human health, which could otherwise be caused by unsuitable waste handling. Recycling material from this product will help reduce environmental impact. Do not dispose old electrical and electronic equipment through household waste collection.

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Notes

This document replaces the previous Manual Part No. Reznor, Photon, Installation Manual, EN 2025-09, D301310 Iss 8
Current full Part No. D301310 Iss 9 **Reznor,** Photon, Installation Manual, EN 2026-01

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