Supplement 23

MK-32 BURNER SERIES

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SECTION 1. Introduction

This supplement defines the maintenance and inspection requirements for the ULTRAMAGIC MK-32 burner series. Sections 1 to 5 detail the maintenance procedures and the parts used in the burner construction. Section 6 details the annual / 100 hour inspection and test requirements.

Refer to Unit Conversion Table (Supplement 10), whenever IS units are necessary.

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR 42.16 and 91.403 of the Federal Aviation Regulations.

1.1 Applicability

The information contained in this supplement applies to all ULTRAMAGIC MK-32 burners as defined by the following drawings:

Double Burner: 2062-0000
Triple Burner: 2063-0000
Quad Burner: 2064-0000

1.2 Replacement Parts and Procedures

The burner has been designed and constructed using carefully selected components and materials. In order to ensure the continued airworthiness of the burner, it is essential that only parts supplied by ULTRAMAGIC or by a supplier approved by ULTRAMAGIC be used. The use of parts from any other source is strictly forbidden.

Always quote the burner serial number and the spare parts reference codes shown in our Parts Catalogue or Online Shop (available in the ULTRAMAGIC website) to place an order.

Maintenance procedures must be carried out in accordance with the instructions contained in this supplement, unless alternative written instructions are provided by Ultramagic, S.A. on a particular basis.

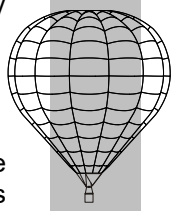
1.3 Approved Maintenance and Inspection Personnel

In order to ensure the continued airworthiness of the burner, maintenance and periodic inspection may only be carried out by ULTRAMAGIC, organisations approved by ULTRAMAGIC or by maintenance organisations or staff approved by the national airworthiness authority in the country of registration of the aircraft.

1.4 Welding and Welders

The burner is designed so that almost all the parts are replaceable without requiring welding. In accordance with that, this supplement does not define the procedures involving welding. However, if for any reason a repair requires the use of welding, the following limitations apply:

- All welding must be of the TIG (Tungsten Inert Gas) electric arc type.
- Always contact ULTRAMAGIC in order to provide advice on the setup, materials and techniques to be applied.



- All welding must be carried out by a welder approved to the appropriate standard by ULTRAMAGIC or the national airworthiness authority in the country of registration.

1.5 Maintenance Records

Whenever maintenance work of any kind is carried out on the burner, the work must be inspected and approved by a person or organisation approved by the national airworthiness authority in the country of registration. Maintenance work must be recorded by a suitable entry in the equipment maintenance record and must include the following information:

- A description of the work performed.
- The completion date of the work.
- The name of the person (and organisation if applicable) performing the work.
- The name of the inspector approving the work.
- Traceability with the origin of any spares or parts used.

1.6 Technical Support

If technical assistance is required, contact ULTRAMAGIC. Always quote the burner serial numbers involved.

1.7 Safety

When connected to a fuel cylinder, the burner is capable of generating a very large, high temperature flame. Exercise care when carrying out maintenance work and observe the following rules:

- Always wear protective eyeglasses.
- Observe the usual rules for the handling of LPG.
- Whenever the burner is to be leak / operationally tested using fuel, place it outdoors in a clear and well ventilated area. Check that the fuel pressure falls within the operational range.
- When test firing, wear suitable protective gloves.
- Always make sure that the burner has been completely vented of fuel before removing any components
- Always make sure that the burner is cool before commencing work.
- Never look down onto the coil when the burner is connected to a fuel cylinder or when pressure remains inside the burner.
- When test firing, never stand down wind of the burner.
- Prior to test firing, make sure that the area is clear of personnel and animals.
- When test firing, make sure that the burner is properly supported and not able to fall or tilt unexpectedly.
- Never smoke or allow naked flames or other sources of ignition near the burner.

1.8 Tools and Consumables

The MK-32 Burner is to be maintained using the appropriate tool for each job. The burner has been designed not to require special tooling for normal maintenance, thus it is not mandatory to use tools supplied by ULTRAMAGIC. However, always use the appropriate tool for its intended function.

Observe the general use of consumables as indicated on each section, such as Loctite Screwlock 222, Graphite grease, and Krytox grease (this last one only to be supplied by ULTRAMAGIC, unless otherwise stated in written).

1.9 Torque

The following table provides recommended torque values for most of the threaded assemblies present in the MK-32. These values are provided for guidance only; the use of dynamometric equipment is not mandatory, unless explicitly required on particular cases.

Thread	Male Material	Female Material	Recommended Torque [N·m]	Joint / Component
M5	St Stl	Alu	4.3	Valve block to block cover Handle bar support Pressure gauge connector to valve block Coil centre column to Valve block
M5	St Stl	St Stl	4.4	Liquid valve handle
M6	St Stl	Copper	4.3	Can to Hanger
M6	St Stl	St Stl	7.4	Can to Coil strip Can to Valve block
M6	St Stl	Brass	7.4	Main/Liquid Valve seat to Valve stem
M6	Brass	Brass	2.3	Pilot light Jet
M6	St Stl	Alu	2.5	Coanda type jet ring Piezo support grub screw
M8	St Stl	St Stl	15	Pressure gauge felt compressor Cap
M20	St Stl	Alu	20	Liquid jet
M20	St Stl	St Stl	45	Blank nut to Coil centre column
M27	St Stl	Brass	20	Liquid pilot light regulator body
M27.5	St Stl	St Stl	20	Liquid pilot light regulator body

SECTION 2. Airworthiness Limitations

2.1 Approval Statement

This manual provides the maintenance information required by EASA CS-31HB .82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

There are no components in the MK-32 Burner Series which must be replaced after a fixed length of time.

2.3 Inspection Interval

The maximum inspection interval for the burner is 100 hours operation or one year; whichever is the sooner. The requirements for this inspection are defined in section 6.

SECTION 3. Technical Description

3.1 General

The burner is a device for converting the fuel stored in the fuel cylinders into heat energy. This energy is used to heat the air inside the balloon envelope and thus provide the means of inflation and altitude control during flight.

Fuel is supplied to the burner through the flexible hoses. The fuel enters a machined valve block whereupon the fuel is distributed to the various valves and pressure gauge in readiness for use. The burner assembly is to be fed from at least two independent supplies.

The burner pot is provided with the following major features/functions:

- Burner can
- Main Burner Vaporising coil
- Liquid Fuel hose
- Main valve assembly
- Liquid valve assembly
- Pilot Light assembly

- Igniter assembly
- Pressure gauge assembly
- Liquid fire jet assembly

Burner pots are mechanically connected by the handle bar and hanger assemblies. The complete burner is then mounted onto the supporting frame by means of a gimbal block fitted to the hanger bracket.

The burner Main and Liquid valve handles are designed to enable their independent use, but also their simultaneous activation. This last feature implies approximately double power output through single hand operation.

Note that all burner maintenance work must be conducted in a clean environment.

The burners are constructed on a modular basis and utilise common components and assemblies. For simplicity therefore, a single pot will be described and the differences associated with the double, triple and quad will be described separately.

The burner in double configuration may be seen in Figure 1 and the features and functions detailed above are described in the following paragraphs:

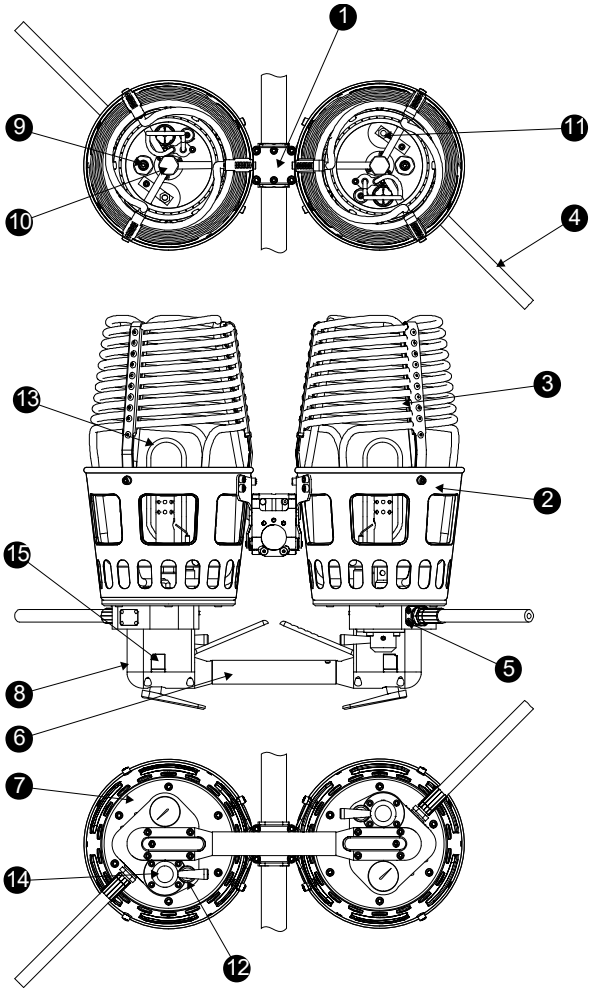
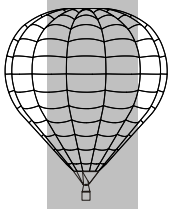


Figure 1 - General Assembly Identification

ITEM	DESCRIPTION	SECTION
1	ULTRAMAGIC GIMBAL BLOCK	3.2
2	BURNER CAN	3.3
3	VAPORISATION COIL	3.4
4	FUEL HOSES	3.6
5	LIQUID FUEL INLET POST	N/A
6	HANDLE BAR ASSEMBLY	N/A
7	BLOCK MAIN ASSEMBLY	N/A

8	VALVE BLOCK ASSEMBLY	N/A
9	LIQUID/WHISPER FIRE VALVE ASSEMBLY	3.8
10	CENTRE COLUMN ASSEMBLY	3.5
11	PRESSURE GAUGE ASSEMBLY	3.10
12	IGNITER ASSEMBLY	3.9
13	PREHEATER ASSEMBLY	3.13
14	PILOT LIGHT ASSEMBLY	3.12
15	FILLER BLOCK / HYDRAULIC ACTUATOR ASSEMBLY	3.16



3.2 Burner Gimbal Block Assembly

The burner is provided with a centre gimbal block assembly allowing two-axis movement of the burner. With the exception of the burner gimbal mounting, the gimbal block assembly is standard to the ULTRAMAGIC range of burners and maintenance instructions are provided in a separate maintenance supplement. The burner gimbal block assembly and mounting configuration may be seen in Figure 1.

3.3 Burner Can

The burner can is a welded stainless steel construction. It provides a degree of mechanical protection to the components mounted inside the burner. The can is mounted onto the valve block using screw fixings and an interface gasket providing water sealing. The can provides the mechanical support for the vaporisation coil and attachment to the gimbal mounting arrangement. The can may be seen in Figure 1.

3.4 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve using a machined coil column and bonded washers fitted on top and below the coil inlet fitting. The function of the coil is to preheat the fuel before leaving the jet ring in readiness for combustion. The coil is a three-start, welded assembly and is constructed from stainless steel tube, with riveted coil supports, ended by a special jet ring with machined jet holes. This jet ring is used at the same time as the support for the water slurper tube assembly. The function of the slurper tube is to “suck” water formed during the combustion process from the valve block and dispel it into the main burner jet. The outlet of the tube is placed directly in the fuel stream exiting the jet ring. When the main burner is fired, the flow of fuel over the tube causes low pressure to be created in the tube with the result that any water below the tube is sucked up and vented into the jet stream. The assembly consist of a small bore tube mounted in a boss. The tube is secured to the boss by means of an Allen screw. Loosening this screw allows the tube to be adjusted in order to achieve optimum performance. The boss assembly can be either welded or screwed to the jet ring.

The three vertical riveted strips are connected to the can edge using screws. One of the strips is mechanically connected also to the burner hanger assembly.

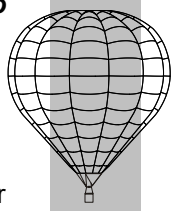
When the main valve is opened, fuel enters the coil through the inlet tube. The fuel rises through the inner coil to the top of the burner and then descends through the outer coil spiral until it exits through the jet ring. The vaporisation coil configuration may be seen in Figure 1.

3.5 Coil Connection Column

The interface to the vaporisation coil is through a machined column, which is hold against the valve block bore by means of three screws. The column is provided with a precision-machined neck to accommodate the coil inlet fitting, which is mechanically fixed to the column using a blind nut above. The coil connection column may be seen in Figure 5.

Note that the coil connection column is used to create the seal to the main valve and removal of the column will therefore break the pressure integrity of the burner. It is

very important therefore to ensure that the burner is completely vented of fuel prior to removal of these components.



3.6 Fuel Hoses

The fuel hoses link the burner to the fuel cylinders. They are constructed with a multilayer tubular structure which combines nitrile rubbers and steel meshes, being terminated with a choice of REGO®, TEMA® or Fastflat self-sealing connectors. The hoses are specially selected to withstand the operational fuel pressures and the wear and tear associated with use and handling. The fuel hose is supplied as a pre-fabricated assembly using armoured hose and swaged end fittings. The date of manufacture is engraved on the hose end fittings for traceability purposes.

The process of swaging the end fitting onto the hose requires the use of special tooling. The use of any fuel hose other than that supplied by ULTRAMAGIC is therefore strictly forbidden.

3.7 Main Valve Assembly

The main valve is used to control the main burner function of the burner by the activation of a “squeeze” type handle. The main valve is a single action and operation of the valve handle activates the main fire function only. The valve is a plunger type and uses a special sprung loaded rubber seal, bearing against a machined seat beneath the Coil connection column to create the seal. When the valve handle is operated, the rubber seal splits from the seat and allows the flow of fuel.

The valve stem is housed in a machined brass valve bonnet. A pressure tight seal is achieved between the stem and bonnet with the use of two “O” seals and a primary sprung loaded seal. The bonnet is sealed to the valve block using an “O” seal fitted in a machined groove in the bonnet mating face. The main valve configuration may be seen in Figure 6.

Main valve may optionally be added with a locking mechanism that keeps the valve handle triggered open when a button is pushed meanwhile, freeing pilot’s hand. The lock is released after a further handle squeezing. The opening run of the locking position is adjustable.

Valve assembly can also embody a double-action system similar to that from the Powerplus range of burners, permitting the controlled simultaneous activation of the liquid jet while main blast handle is operated. Assembly requires the use of specific parts including a cam system linking both valves.

3.8 Liquid Valve Assembly

The function of the liquid valve is similar to the main valve described above and the method of sealing is identical. The liquid valve is a single action and operation of the liquid valve handle activates the liquid fire function only.

The design of the rubber seal, its seat and the valve stem is identical to that of the main valve. It differs only on the handle mechanism, which is, however, of squeeze action as well.

The liquid valve configuration may be seen in Figure 6.

3.9 Igniter Assembly

The Igniter Assembly is a “cartridge” type and is simply inserted into the bore provided in the valve block. The assembly is held in position by a grub screw positioned in the side of the valve block. The assembly is provided with an “O” seal to prevent the seepage of water from the upper surface of the valve block during operation.

The assembly consists of a tube in which are housed a piezo igniter and an electrode permanently mounted in temperature resistant ceramic. The electrode and piezo igniter are electrically connected by a compression spring. When assembled, the piezo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

Upon operation of the piezo igniter button, a high voltage spark is produced between the electrode and a tag mounted on the side of the pilot light causing the pilot light to ignite.

The igniter assembly configuration may be seen in Figure 10.

3.10 Pressure Gauge Assembly

The pressure gauge is mounted inside a machined bore in the valve block. Access to the gauge is from the upper surface of the valve block.

A pressure tight seal is achieved with the use of PTFE tape and a taper thread on the gauge rear. The gauge is screwed into a special retaining block fitted to the upper surface of the valve block. The retaining block is secured to the valve block by a single screw fixing. The retaining block also functions as a fuel link to the pressure gauge and the interface to the valve block is therefore sealed using an “O” seal. When in position, the inlet to the gauge is positioned in a tapping from the main fuel feed within the valve block. The gauge therefore provides an indication of the fuel cylinder pressure as soon as the fuel cylinder valve is turned on.

The face of the gauge is provided with a colour coded banding indicating the safe operating pressure range of the burner.

The gauge is fitted with a flow restrictor mounted in the rear. The restrictor is designed to protect the gauge from sudden pressure surges and to limit the fuel flow rate in the unlikely event of a gauge failure.

The pressure gauge configuration may be seen in Figure 9.

3.11 Liquid Fire Jet Assembly

The liquid fire jet assembly is mounted on the upper face of the valve block. The jet controls the flow of fuel when the liquid valve is operated. The assembly consists of a machined body fitted with a duct with multiple holes at the outlet. The body is sealed to the valve block using an “O” seal fitted in a machined groove on the underside of the jet body. The liquid fire jet configuration may be seen in Figure 1.

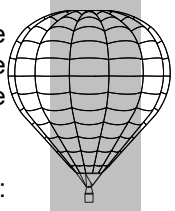
Note that the jet body is used to make the seal to the liquid valve jet and removal of the jet will therefore break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to carrying out any work on the liquid fire jet.

3.12 Pilot Light Assembly

The MK-32 Burner introduces a single-assembly pilot light concept, which enhances its access for maintenance as well as its changeability.

The pilot light assembly is offered with a choice of variants, depending on the needs of the customer. All variants are designed to fit onto the same bore in the main block. Its seal is provided with a couple of o-rings, and is hold in place by a set of screws. All the assemblies provide a pilot light torch and an on/off valve function to control the feed of fuel to the pilot light. Each of the variants and its particularities is described next.

3.12.1 Liquid Pilot Light Assembly



The Liquid Pilot Light is the standard choice of the MK-32 burner. Its name is given by the use of liquid fuel as source. This feature involves the presence of a regulator, which vaporizes the fuel needed and provides a constant output flow of fuel vapour, regardless of the pressure of the sourced fuel.

The liquid pilot light consists of three main subassemblies, named from top to bottom: Torch, Regulator and Valve.

The torch is meant to protect the stability of the pilot light flame against turbulences and wind gusts, ensure a proper mixing of fuel / air and allow the ignition of the flame as a result of the spark from the piezo.

The regulator subassembly consists of a lower body which screws in to the valve block, a sprung loaded piston and an upper body fitted with a small jet.

The regulator sub-assembly is screwed in to the upper surface of the valve block. An “O” seal fitted in a machined groove on the underside of the lower body forms the seal between the regulator and the valve block. The lower body is provided with a seal seat and this forms the seal between the on/off valve sub-assemblies.

When the valve handle is operated, fuel enters the lower body through a small hole. Fuel passes through a small hole in the piston and exits in to the chamber between the piston and the upper body. The sudden increase in volume causes the fuel to vaporise. The fuel pressure in the chamber forces the piston down thus closing off the fuel inlet. Vaporised fuel in the upper chamber is vented off through the jet to the pilot light assembly. As the pressure in the chamber falls, the spring forces the piston to move forward and the cycle is repeated.

The piston is fitted with a small lower seal, which closes off the flow of fuel. A larger “O” seal is fitted inside the upper body and forms the seal between the piston and the body.

The on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat, similar (but not identical) to the main and liquid valves. The stem is sealed to the bonnet using two “O” seals. An “O” seal fitted in a machined groove in the bonnet mating face seals the bonnet to the valve block. Rotation of the knob causes the stem to move backward thus breaking the seal to the regulator lower body.

Note that the regulator lower body is used to create the seal to the regulator on/off valve. Removal of the regulator lower body will break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to removal.

3.12.2 Vapour Pilot Light Assembly

When fitted, the Vapour Pilot Light completely replaces the standard Liquid Pilot Light fitted in the burner valve block. Its valve controls the supply of vapour fuel, taken directly from a master-type fuel cylinder and supplied with a dedicated hose, to the pilot light.
Similarly to the liquid version, the on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat. The stem is sealed to the bonnet using two O-Rings. Rotation of the knob causes the stem to move backward thus breaking the seal to the pilot light upper body. Note that the regulator is omitted in this version as the fuel is already available in vapour phase.
The body is secured to the valve block using the same four fixings as used to secure the standard Pilot Regulator Valve.

3.12.3 Oxygen assisted Pilot Light Assembly

The so called Oxygen Assisted Pilot Light consists of a Vapour Pilot Light design derived from the assembly described above, which has been added with a second independent circuit intended for an auxiliary supply of Oxygen to the pilot light flame. This is of particular interest to

enhance the performance and stability of the flame in atmospheres with a poor content of Oxygen (high altitude flights).

The pilot light on/off valve in the burner allows the control of the flow of vapour fuel, whist oxygen is controlled from the valve in the source.

3.13 Pre-heater and Filter Assembly

On the Liquid Pilot Light assembly, fuel to the pilot light regulator is supplied by a dedicated tapping in the valve block. Prior to entering the pilot regulator, the fuel passes through a preheater tube assembly and a filter. The filter is fitted underneath the preheater base allowing it to be removed easily for maintenance. The assembly is screwed in to the upper surface of the valve block and is sealed using two Viton O-Rings fitted in two grooves in the mating face.

Burners equipped with a Vapour or Oxygen Pilot Light may continue to mount the preheater (although not used) or fit a blanking plate, as its presence is not required.

3.14 Triple Burner

The MK-32 triple burner utilises identical components and assemblies to the double burner. In the triple configuration, an additional burner “pot” is added to the double thus forming a triangular configuration.

The triple burner utilises a centrally positioned hanger assembly to secure the three burner pots together. In addition, an aluminium “T” handle, linking all three pots together replaces the burner handle.

3.15 Quad Burner

The quad burner is effectively two double burners placed side by side. The burners are secured using a centrally mounted hanger assembly and a single “H” handle linking all four pots together, replaces the existing handles.

3.16 Hydraulic Kit (optional)

The burner is provided with the option to fit a hydraulically activated main valve, which consists of a remote hydraulic handle with reservoir and an actuator block, both connected using a hydraulic tube. The function of the valve is similar to that of the standard valve.

The actuator block is inserted in a valve block slot (replacing a filler block), allowing its piston to move the main valve mechanism when the remote hand lever is squeezed. When this occurs, hydraulic fluid is pumped into a chamber inside the actuator block. This forces the piston to move, with the result that the main valve stem is pulled down, the valve is opened and the fuel flow to the coil is enabled. When the lever is released, the valve closes under spring action.

The main valve may be operated anytime in two ways: using the remote hand lever or the standard "squeeze" action handle.

3.17 Crossflow Kit (optional)

The burner is provided with the option to fit a set of additional valves and connections allowing the simultaneous use of two burner vaporisation coils. This feature allows the pilot to use all the power of a triple or a quadruple burner with just one hand.

The system consists of an interconnection tube between the two burner pot's vaporisation coil inlet. The interconnection tube is provided with a manual shutoff valve allowing the pilot to enable or disable the flow of fuel from one coil to the other. When the valve is closed the coils are completely independent from each other and the burner behaves as if it was a standard burner. On the other side, when the valve is opened the two vaporisation coils become connected and when one of the two main valves is activated the fuel flows along the two vaporisation coils.

SECTION 4. Preventative Checks

4.1 General

Further to the mandatory pre-flight checks described in the Flight Manual, Ultramagic recommends the burner to be subjected to certain additional preventative checks and actions from time to time. In-service experience on each particular operations scenario should be the basis for the owner/operator to determine how often these checks are worth (in absence of experience, an interval of 25 flight hours is suggested). Experience may also reveal certain checks to be more frequently convenient than others. Factors such as the roughness of the road transportation or the fuel quality may have a relevant influence on the final criteria.

NOTE: This section eventually becomes mandatory as part of the B-Type inspection (Section 6)

As far as Ultramagic is concerned, simplicity of the checks permit a ballon pilot holding a valid license to undergo them all. Checks do not require dismantling of parts and therefore, a specific release to service is not necessary, although it is recommended to log them when performed.

Since these are recommended only, such checks by themselves are not deemed to constitute a mandatory scheduled inspection.

Checks are detailed below. Beware that certain checks will require the burner to be connected to a fuel supply.

4.2 General Cleaning

Check for the excessive build up of sooty deposits on the vaporisation coil and can. Some accumulation of soot is inevitable and is not detrimental to the burner function. However, excessive deposits may be indicative of inefficient fuel combustion or poor fuel quality. If this is considered to be the case, contact ULTRAMAGIC for further advice.

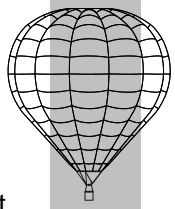
Soot deposits may be removed from the burner can and coil using a cleaning agent suitable for metals and nitrile rubbers. Such cleaning products must be applied in small quantities by means of a cloth: do never apply the product directly onto the burner. Especial care must be taken not to damage delicate parts inside the can such as the water slurper or the ceramic electrode.

Avoid the use of high-pressure water cleaners, as well as any products not compatible with brass, anodised aluminium, steel or nitrile rubbers. When using a solvent, follow the manufacturers' safety instructions, particularly with regard to the use of breathing protection and ventilation.

4.3 Valve Block Fixings

Check that the 6 M6 screws on the underside of the valve block perimeter are in place and secured.

The same check applies to the M5 hex socket cap fixings around the pilot light handle, the valve block cover and the liquid handle.



4.4 Main and Liquid Blasts

4.4.1 Jet Ring

Check the coil jet ring for large soot deposits. Check for the presence of obstructed jet holes. This is better achieved by connecting the burner to a suitable fuel supply and opening the main blast while observing the unburnt liquid fuel coming out. For obvious reasons, this must be done outdoors and in total absence of any ignition sources.
A small number of blocked jets (≤10%) does not have significant effects, but if a larger amount is detected, these must be cleaned as specified in Section 5.13.

4.4.2 Coil

Check the coil central fitting to the burner column to be secure. To do so, use a 24mm spanner or socket to check the blind nut to be tight.

Check the tube used in the construction of the coil for damage including signs of cracking, serious indentation and deterioration of welded joints. Serious indentation cannot be repaired and the coil must be replaced as described in Section 5.12.

Check also the colouration of the coil. Dull orange or wine tones might be indicative of a possible coil overheat, which can be caused by poor fuel quality, coil distortion, incorrect cylinder position at initial inflation, etc. Contact Ultramagic for further advice.

4.4.3 Water Slurper Tube Assembly

Check that the water slurper tube is firmly secured to its correct position. If some adjustment is required loosen the screw that holds the tube, make the adjustment and tight the screw again. For the removable version of the slurper assembly check also that the screw holding the boss to the coil jet ring is firmly secured.

Check if the slurper tube is blocked and clean or replace it accordingly.

4.4.4 Valves

With the pilot light lit, open and close the main and liquid valve handles firing both the main and liquid blasts individually, checking for a positive response, a normal flame profile and a quick extinguishing after releasing the handles. Check the system for any visible leaks.

4.5 Pilot Light

4.5.1 Pilot Light Strength

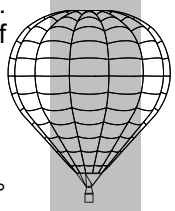
Check the strength and height of the pilot light flame. A weak or short flame is indicative of a blockage or partial blockage of the pilot light jet or a fault with the pilot regulator (if applicable) or pilot light valve. An irregular noise might be indicative of a pilot light malfunction too.

In the event that the pilot light flame is considered to be unacceptable, the assembly must be withdrawn for a thorough inspection and cleaning as per 5.20.

4.5.2 Pilot Light Shut-off

Check that the pilot light flame extinguishes correctly:

- Turn on and ignite the pilot light. Let it stabilize for some seconds.
- Switch off the pilot light valve.



- Await a few seconds (< 5 sec) and reopen the valve handle (without operating the piezo). Check that the gas exhausts the jet unburnt. If a flame is detected, repeat the check a couple of times. If the flame persists, the pilot light must be cleaned or fixed as appropriate.

4.5.3 Pilot Light Handle Movement

The pilot light handle is designed to enable its setup and adjustment. Its rotary action of 180° must allow sufficient margin to ensure the complete closing / opening of the valve. Therefore connect the burner to a suitable fuel supply and check that a flow of gas can be heard exiting the pilot light jet at approx. half of the handle run (90°). If a significant deviation is found, adjust the handle as described in Section 5.20.6.

4.5.4 Vapour Pilot Light (if applicable)

Check Vapour Pilot Light(s) as per 4.5.1, 4.5.2 and 4.5.3 above. To do so, beware that a suitable vapour supply will be required.
In addition, check the dedicated vapour hose as per 4.7.

4.5.5 Oxygen Pilot Light (if applicable)

Check Oxygen Pilot Light(s) as per 4.5.1, 4.5.2 and 4.5.3 above. To do so, beware that suitable vapour and oxygen supplies will be required.
In addition, check the dedicated vapour & oxygen hoses as per 4.7.

4.6 Igniter Spark

Check the strength of the igniter spark. If it is considered that the igniter spark is weak, adjust the spark gap as described in section 5.16. If this fails to improve the spark, it is possible that there is poor electrical continuity between the igniter and the pilot light. Check that the grub screw used to secure the igniter assembly and fitted in the side of the valve block is tight (take care not to damage the aluminium thread in the valve block). Check that the pilot light assembly is secure. If it appears to be loose, make sure all fixings are tight.

If the above actions fail to improve the spark, the igniter will need to removed and disassembled to determine the cause of the problem (see Section 5.16). Note that Small cracks or damage to the Igniter Ceramic as well as sooty deposits on the electrode or spark surfaces may cause ignition problems. Replace the electrode if necessary.

4.7 Fuel Hoses

Check the condition of the fuel hoses in its entirety. Look for any signs of abrasion, kinking, cracks or other forms of damage. If any of the above are detected, the hose must be replaced in accordance with the instructions in section 5.6.

Fuel hoses must be obtained from ULTRAMAGIC. For safety reasons, fuel hoses are supplied assembled with the connector and pressure tested.

4.8 Pressure Gauge

Check the function of the pressure gauge as follows:

- Check the readout transparent cover to be secure and to permit the reading
- Make sure that the burner is fully vented. Visually inspect the position of the gauge pointer and check that it is indicating between 0 and 1 bar.
- Connect the burner to a fuel cylinder at normal operational pressure (5 to 10 bar). Turn on the liquid supply and visually inspect the position of the gauge pointer to be sound. Shut

off the valve and repeat the process with the other burner units using the same cylinder. All manometers must provide the same reading ± 1 bar.

Upon completion of the test, ensure that the burner is safely vented again.

If either of the above tests indicate that the gauge is faulty, the gauge must be replaced in accordance with the instructions in section 5.15.

4.9 Burner Mounting

Visually inspect the can attachment and the hanger bracket not to show distortion or cracks. Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight.

4.10 Hydraulic Kit (if applicable)

Fit the actuator in the slot (section 5.22) and make sure that it stays in position: pull gently the hose and confirm that risk of inadvertent removal of the actuator is not possible. Check for the correct function of the hydraulic assembly and that there are no hydraulic fluid leaks.

4.11 Crossflow Assembly (if applicable)

Check the condition of the interconnection tube and valve. Look for any sign of damage or abuse loads. Check there are no leaks on any of the interconnection joints and that the valve works as intended, both in open and closed positions. On double crossflow assemblies (quad burners), check that the anti-rotation plate placed on the central gimbal assembly is in good condition.

4.12 Rotation - gimballing

Check that the burner rotation stops in the centre gimbal system are fully functional and that they prevent burner inversion in ***both*** axes (refer to MM supplement 8). Check friction setup.

4.13 Main valve locking button (if applicable)

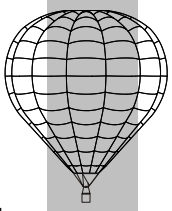
With the burner connected to a fuel supply and the pilot light lit, open the main blast, push the locking button and release the main blast handle. Main flame should held open. Keep the flame for a few seconds to grant a good stability. Slightly squeeze the main blast handle and release it. This should disable the locking button (a 'click' may be noticed) and the main blast should extinguish.

Failures or anomalies to the above process require the assembly to be checked as described in 5.25. Process must be carried out on all units assembled with main valve locking button.

4.14 Double action valve (if applicable)

With the burner connected to a fuel supply and the pilot light lit, test of the system consists in firing the first and seconds stages of the main handle in sequence, observing the main blast and the later subsequent addition of the liquid jet. After that, the separate liquid handle must be operated and the liquid jet found to perform correctly. Both main and liquid jets must shut off completely after the test.

Additionally, check that the pushbutton adjustment is such that locking mechanism triggers only the main blast, while the liquid (2nd stage) is closed.



SECTION 5. Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies, sub-assemblies and components used within the burner. Maintenance other than that detailed in the Section 4, (Preventative Maintenance) and Section 6, (Annual / 100 Hour Inspection) should not be carried out unless it is clear that there is a fault or there is a noticeable deterioration in the performance of any part of the burner functions. Remember, “If it ain’t broke, don’t fix it”.

Whenever a part or assembly whose removal breaks the pressure integrity of the burner is removed and replaced, the re-assembled joint(s) must be subjected to a pressure test. Connect the burner to a compressed air supply (7 Bar/100 psi recommended) and test the joint using leak detector fluid. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

Prior to carrying out any maintenance work, ensure that the burner is completely vented of fuel and disconnected from the fuel supply.

5.2 Gimbal Block Removal

The gimbal assembly is identical to that used on the MK21 burners. For maintenance instructions, refer to ULTRAMAGIC Maintenance Manual Supplement Number 8.

5.3 Gimbal Mounting Bracket Removal

- Remove the Handle Bar Assembly (Section 5.5)
- Remove the Gimbal Block (Section 5.2)
- Bracket and Can Withdrawal

5.4 Can Removal

If it is considered that the can must be replaced, refer to Figures 2 and 3 and proceed as follows:

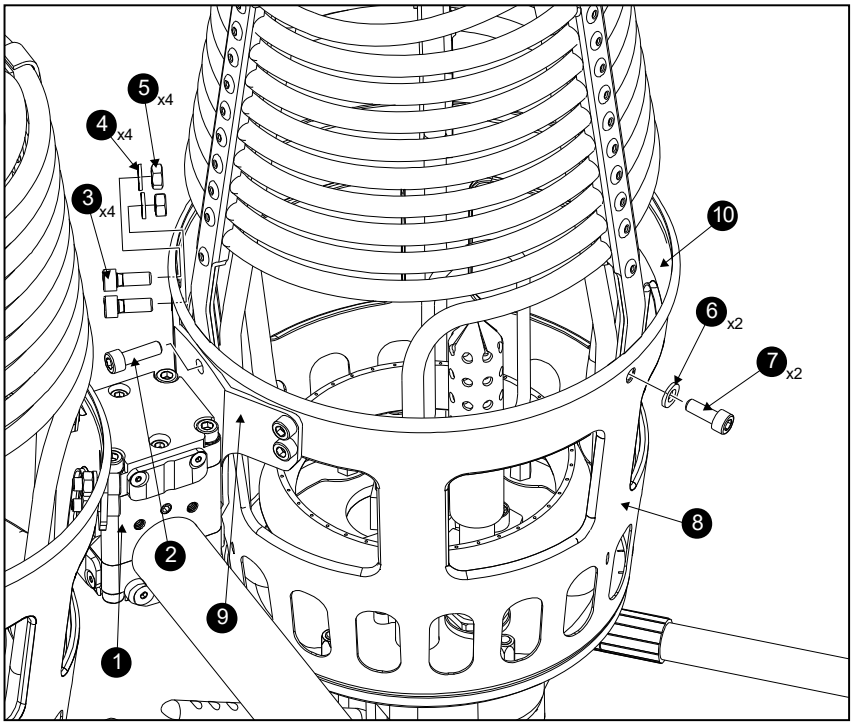


Figure 2 - Can & Coil Fixings

ID	P/N	DESCRIPTION
1	CR-22-2500	Centre Gimbal Block Assembly
2	CR-C-0260	Bracket-Can-Coil Securing Screw
3	CR-09-0080	Bracket-Can Securing Screw
4	MA-FE-0090	Washer
5	CR-03-0170	Locking Nut
6	MA-FE-0090	Washer

ID	P/N	DESCRIPTION
7	CR-C-0250	Coil-Can Securing Screw
8	3D-06-00XX	Burner Can
9	3D-15-00XX	Double Burner Centre Bracket
10	3D-06-12XX	Doubler Plate
N/A	3T-15-00XX	Triple Burner Centre Bracket
N/A	3Q-15-00XX	Quad Burner Centre Bracket

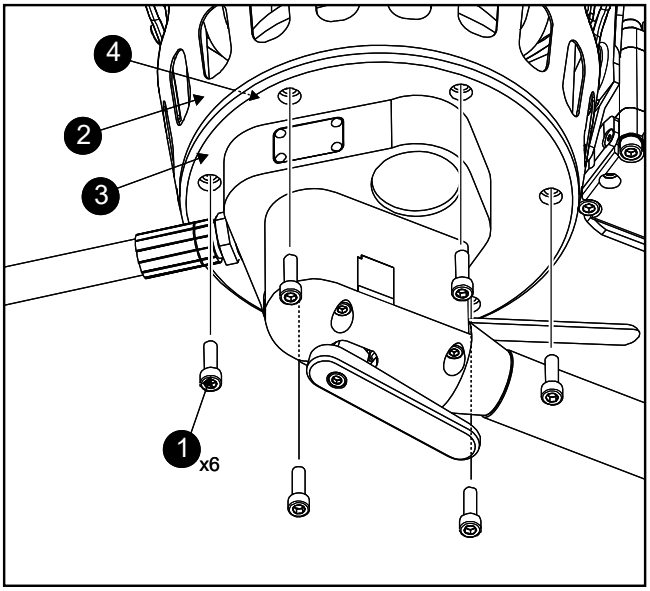


Figure 3 - Can Bottom Fixings

ID	P/N	DESCRIPTION
1	CR-C-0250	Can-Block Securing Screw
2	3D-06-00XX	Burner Can Assembly
3	3D-03-00XX	Main Burner Block
4	3D-06-1302	Can Rubber Gasket (not shown)

- Remove the Coil (Section 5.13).
- Remove the Handle Bar Assembly (Section 5.5).

- Using a 5mm Allen key, undo and remove the four fixings (Figure 2, item 3) securing the can to the supporting bracket. Note that the screws are fitted with nuts (Figure 2, item 5) and washers (item 4). When reassembling the can later, fit new copper nuts.
- Using a 5mm Allen key, undo and remove the six M6 fixings (Figure 3, item 1) securing the base of the can (Figure 3, Item 2) to the valve block (Figure 3, Item 3).
- Check the condition of the gasket (Figure 3, Item 4) and replace if damaged.
- Re-assembly is the reverse process of dismantling. Note that the vaporisation coil must be reassembled in accordance with the instructions contained in section 5.13.
- Beware that the can is fitted with an internal steel doubler on the top collar which adds mechanical strength to the can. It is hold by the screws which secure the coil strips and the centre support bracket. Beware that the doubler can be assembled only in one position, thus check for the correct alignment of the holes. If a riveted nut in the can bottom is seized or damaged, check out 5.13.3.

5.5 Handle Bar Assembly Removal and Disassembly

The procedure is common to all burner assemblies (Double/Triple/Quad). Refer to figure 4a and proceed as follows:

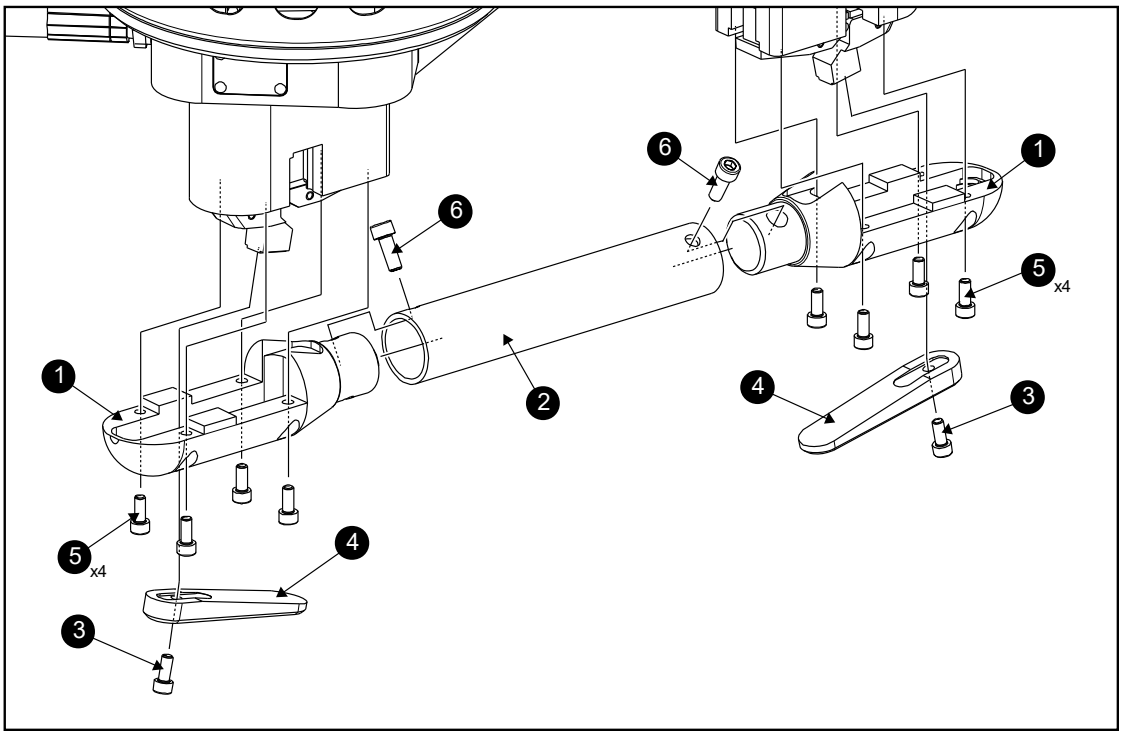


Figure 4a - Handle Bar and Liquid Fire Handle Assemblies

ID	P/N	DESCRIPTION
1	3D-03-12XX	Valve Block Handle Connection
2	3D-01-10XX	Double Burner Handle Tube
3	CR-PP-0011	Liquid Handle Securing Screw

ID	P/N	DESCRIPTION
4	3D-11-22XX	Liquid Handle (Red)
5	CR-PP-0011	Handle Connection Securing Screw
6	CR-09-0080	Handle Tube Securing Screw

- Remove all Filler Blocks and/or the Hydraulic Actuators (Section 5.22)
- Using a 4mm Allen key, undo and remove the screws (Figure 4a, item 3) securing the liquid handles (Figure 4a, item 4). Release the handles.
- Using a 4mm Allen key, undo and remove the four screws (Figure 4a, item 5) holding each handle bar end (Figure 4a, item 1).

Once removed from the burner, the Handle Bar Assembly can be disassembled loosening the screws (Figure 4a, item 6) which hold the tube(s) (Figure 4a, item 2) with the ends (Figure 4a, item 1). These screws can be accessed from the holes in the handle bar. On the triple and quadruple burner assemblies, the tube arrangement may be dismantled as shown in Figure 4b:

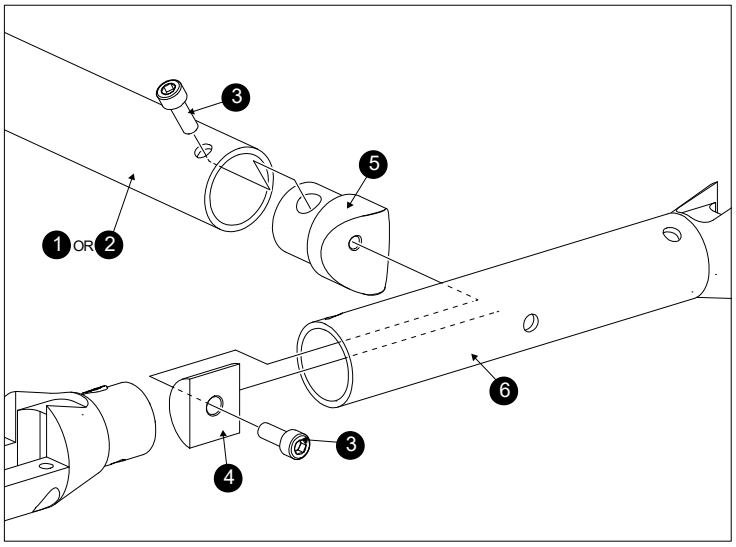


Figure 4b - Triple/Quad Handle Bar Subassembly

ID	P/N	DESCRIPTION
1	3T-01-1101	Triple Burner Handle Tube (Long)
2	3Q-01-1101	Quad Burner Central Handle Tube
3	CR-09-0080	Handle Tube Securing Screw

ID	P/N	DESCRIPTION
4	3T-01-1302	Handle Tube T-connection Inner Saddle
5	3T-01-1201	Handle Tube T-connection Outer Saddle
6	3T-01-1001	Triple/Quad Burner Handle Tube (Short)

Re-assembly is generally the reverse procedure to disassembly. Insert the ends to the bar(s) but do not tighten the screws (item 6) until the Handle Bar Assembly is connected to the burners (by doing this, the correct alignment of the ends is warranted).

5.6 Fuel Hose (Liquid) Removal and Replacement

To replace a fuel hose, refer to Figures 1 and 5 and proceed as follows:

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Using an adequate open-ended spanner, undo the hose from the valve block.
- Inspect the condition of the thread in the Fuel Intake socket. Replace if necessary (Section 5.8).
- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to the ULTRAMAGIC Parts Catalog and specify the length and end fitting required.
- In parallel (cylindrical, BSP) threaded fittings, inspect the condition of the Bonded washer, looking for signs of corrosion or damages to the rubber lip. Replace if damaged or if in doubt about its condition.
- In conical (NPT, BSPT) threaded fittings, remove all PTFE tape from the female screw thread. Cover the new male thread with a minimum of three turns of PTFE tape (it can be combined with the use of Loctite 572). Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the valve block.
- Refit the connector to the hose end. Ensure that the joint is tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. Check the joint between the fuel connector and the hose and the joint between the hose and the fuel inlet post. The joints may be checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

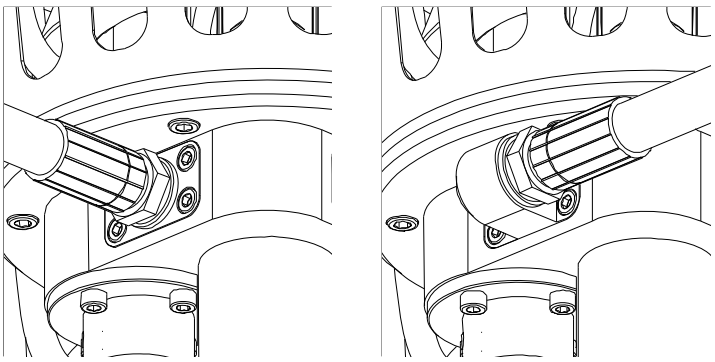
5.7 Fuel Hose End Connector Removal

The following instructions describe the removal and replacement process of all approved connector types (Rego, Tema, FastFlat):

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Hold the hose end fitting securely, preferably in soft vice jaws.
- Using a suitable open-ended spanner, undo and remove the connector from the hose.
- Replace the hose or the connector, as required. When ordering a replacement part, refer to the ULTRAMAGIC Parts Catalog.
- In parallel (cylindrical, BSP) threaded fittings, inspect the condition of the Bonded washer, looking for signs of corrosion or damages to the rubber lip. Replace if damaged or if in doubt about its condition.
- In conical (NPT, BSPT) threaded fittings, remove all PTFE tape from the female screw thread. Cover the male thread with a minimum of three turns of PTFE tape (it can be combined with the use of Loctite 572). Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the connector.
- Inspect the condition of the threaded bore in the connector.
- Ensure that the hose to valve block joint is tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. Check the joint between the fuel connector and the hose and the joint between the hose and the fuel inlet post. The joints may be checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

5.8 Fuel Intake Post Removal

The Fuel Intake Posts allow the burner to accommodate various types of hose and prevent the damage of the aluminium block in the event of a hose replacement. These also offer a proper orientation of the hoses, as posts can be of two types: straight and in 90° elbow. Note that the recess in the block which accommodates the posts is common, enabling the replacement of the post for another of a different type. To remove the post, refer to Figure 5 and proceed as follows:

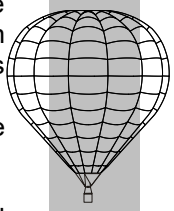


Straight Fuel Inlet Post Elbow Fuel Inlet Post

Figure 5 - Fuel Inlet Posts

5.8.1 Straight connection

- The straight fuel inlet post may be removed with the hose connected. However, the hose may be removed first if required as detailed in section 5.6.
- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Using a 4mm Allen key, undo and remove the four cap head screws securing the post to the valve block recess. Ensure that the post is held in position when the last screw is removed.
- Withdraw the fuel inlet post.
- Carefully remove the o-ring from the underside of the inlet post. When removing the seal, take care not to damage the groove surface.



- It is recommended to always replace the o-ring before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Reassembly is the reverse procedure of removal. A drop of Loctite 222 can optionally be applied to the four cap head screws.
- Ensure that the coil post fixings are tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. Check the joint between the fuel inlet post and the burner block. The joints may be checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

5.8.2 Elbow connection

The 90° elbow fuel intake post can be removed following the same steps of the straight post (Section 5.8.1). Note, however, that the previous removal of the fuel hose (Section 5.6) is mandatory in this case.

NOTE: The elbow type fuel inlet post is symmetrical and can be assembled in two different directions. Prior to refitting it, make sure that the alignment of the hose is the appropriate.

5.9 Valve Block Assembly Removal

To remove the valve block assembly, refer to figure 6 and proceed as follows:

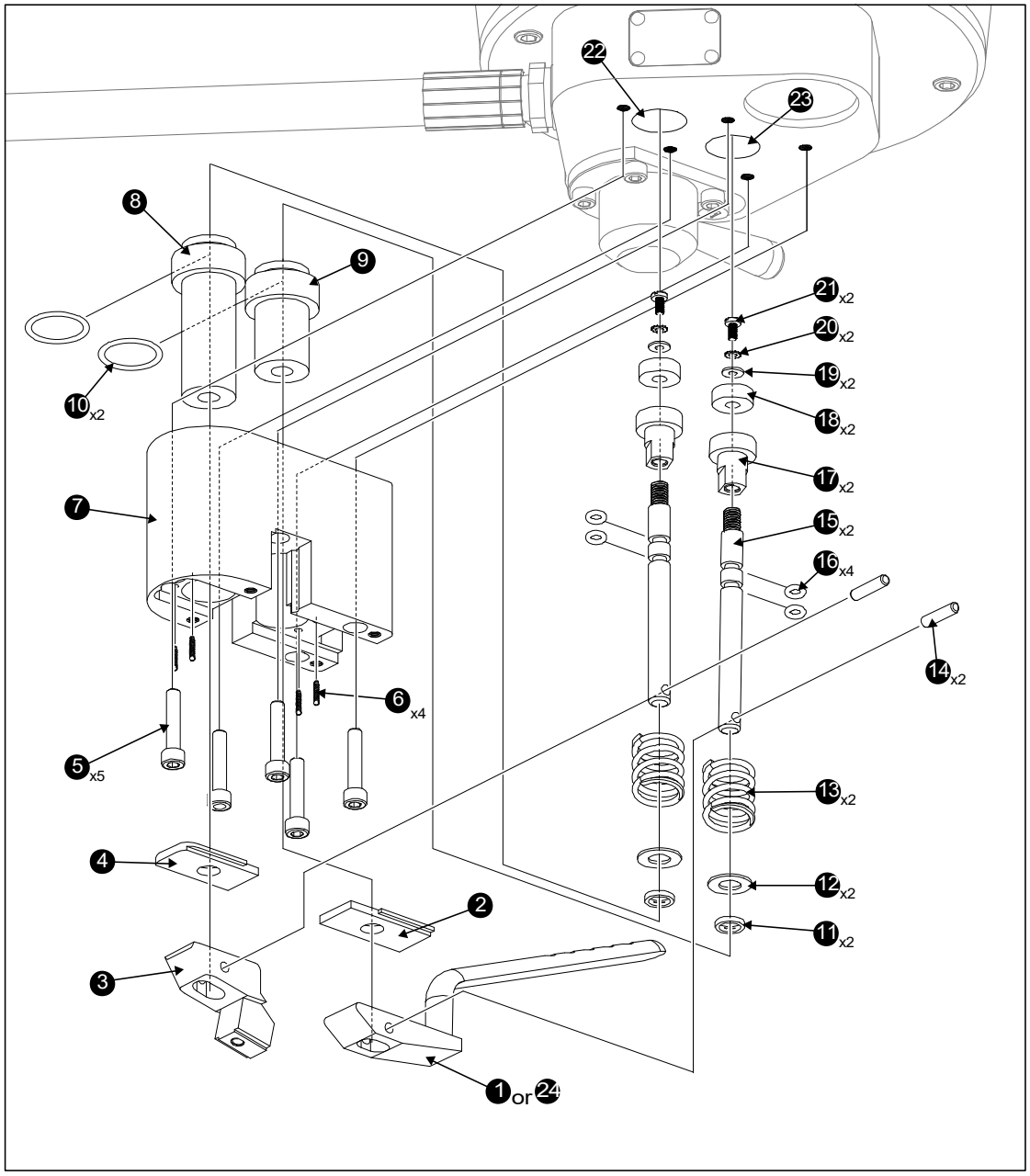
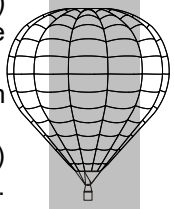


Figure 6 - Main and Liquid Valve Assemblies

ID	P/N	DESCRIPTION
1	3D-12-03XX	Main Valve Handle (Slotted)
2	3D-12-20XX	Main Valve Antifriction Spacer
3	3D-11-21XX	Liquid Valve Lever
4	3D-11-20XX	Liquid Valve Antifriction Spacer
5	MA-FE-0840	Valve Body Securing Screw
6	3D-11-14XX	Main/Liquid Handle Play Spring
7	3D-03-11XX	Valve Block Cover
8	3D-11-30XX	Liquid Valve Body
9	3D-12-30XX	Main Valve Body
10	3D-99-0135	Valve Body O-Ring
11	CR-PP-0301	Energized PTFE Stem Guidance Ring
12	3D-11-13XX	Guidance Ring Retention Washer

ID	P/N	DESCRIPTION
13	3D-08-28XX	Valve Spring
14	3D-11-23XX	Stem-Handle Connection Pin
15	3D-11-10XX	Valve Stem
16	3D-99-0085	Valve Stem O-Ring
17	3D-11-11XX	Valve Seat
18	3D-11-15XX	Valve Seat Shutter Rubber
19	CR-22-1118	Valve Seat Shutter Retention Flat Washer
20	MA-FE-0520	Valve Seat Shutter Serrated Washer
21	MA-FE-0517	Valve Seat Shutter Retention Screw
22	N/A	Liquid Valve Bore (Main Block)
23	N/A	Main Valve Bore (Main Block)
24	3D-12-02XX	Main Valve Handle (Smooth)

- Remove the Handle Bar Assembly (refer to Section 5.5). This enables the access to the liquid lever and main valve handle.
- Remove the pin (item 14) which connects the main valve handle (item 1 or 24) to its stem (item 15).



- Remove the main valve handle (item 1 or 24) and the white antifriction spacer (item 2) underneath. Beware that the two handle dumping springs (item 6) are now free. Remove them also.
- Remove the pin (item 14) which connects the liquid valve lever (item 3) to its stem (item 15).
- Remove the liquid valve lever (item 3) and the white antifriction spacer (item 4) underneath. Beware that the two handle dumping springs (item 6) are now free. Remove them also.
- The five M5 Hex Drive screws (item 5) can now be accessed. Using a 4mm Allen key, undo and remove them following the sequence in Figure 7 below. The removal of screws nr.4 and 5 will result in a decompression of the valves and the final release of the entire valve block.

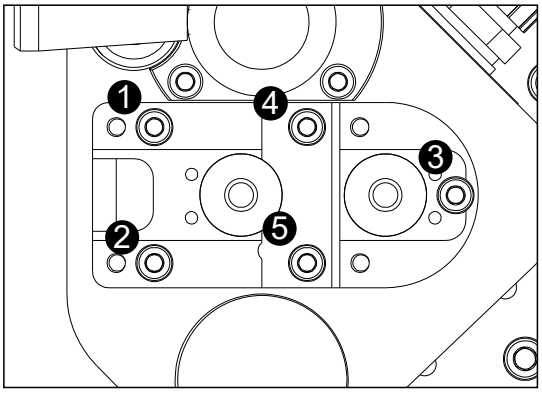


Figure 7 - Valve Body Removal Sequence

- Re-assembly is the reverse procedure of disassembly. Note that the screwing sequence to be applied to the five fixings above is also reverse (from 5 to 1).

5.10 Main / Liquid Valve Removal

The main blast valve and liquid valve assemblies share a unique design of stem, spring, washers and sealing components. Furthermore, both valves are assembled into the same valve block, thus their disassembly and removal instructions are common. Refer to Figure 6 and proceed as follows:

- Remove the Valve Block Assembly as described in section 5.9.
- Withdraw the applicable valve assembly (liquid or main) from the top of the Valve block.
- Carefully remove the NBR O-Ring (item 10) from the groove around the brass valve body (item 8 or 9, as required). When removing the seal, take care not to damage the groove surface.
- It is recommended to replace the O-Ring before refitting the valve. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Ensure that the seal to be used is lubricated with Krytox grease.
- Pull out the stem assembly from the top of the valve. The spring (item 13), brass washer (item 12) and energized PTFE Ring (item 11) are now accessible for inspection or replacement, if required.
- Check the internal surface of the hole in the brass valve body. Look for significant scratches and cleanliness. If the bore is scratched or damaged, it must be replaced.
- Check the rubber seal (item 18) in the valve seat (item 17) for signs of damage or shrinkage. A small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve block. If the seal is damaged or shows signs of hardening or shrinkage, it must be replaced. When only the rubber seal is replaced instead of using a complete shutter assembly, make sure that the socket head screw (item 21) retaining the assembly is fitted using Loctite 222 screwlock liquid, together with the appropriate serrated (item 20) and flat (item 19) washers.

- To withdraw the shutter assembly from the stem (item 16), hold the stem preventing its rotation (use the pin hole in combination with a small screwdriver or an equivalent rod) and undo the shutter assembly with a 8mm open ended spanner. The reassembly of a shutter onto the stem requires the use of Loctite 222 over the thread.
- Check the valve stem for signs of scratches or damage. Check also its alignment. If the stem is scratched, bent or damaged, it must be replaced.
- Check the condition of the two O-Rings (item 16) in the stem grooves. No damage is allowed to the O-Rings and if in doubt, these must be replaced. Whenever the O-Rings are removed, clean the grooves from grease and particles and refill with new Krytox grease.
- Re-assembly is the reverse procedure of disassembly. Check the correct greasing of the stem, and carefully insert it into the body through the energised PTFE washer (making sure not to damage or bend its lip). The recommended orientation of the PTFE washer is with the spring side looking up to the valve shutter.
- Note that the liquid valve body (item 8) is significantly longer than the main blast valve body (item 9). Check that each valve is inserted in the correct bore of the valve block (items 22 for the liquid, item 23 for the main).

5.11 Centre Column Removal

5.11.1 Standard column assembly

Refer to Figure 8 and proceed as follows:

- Remove the coil as described in Section 5.12.
- Using a 4mm Allen key, undo and remove the three fixings (item 3) which secure the column to the block. Pull out the column.
- Carefully remove the o-ring from the underside of the column. When removing the seal, take care not to damage the groove surface.
- It is recommended to always replace the o-ring (P/N 3D-99-0110) before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Check the condition of the hole edge mating with the valve seat at the underside of the jet. It must be clean and free of scratches/damage.

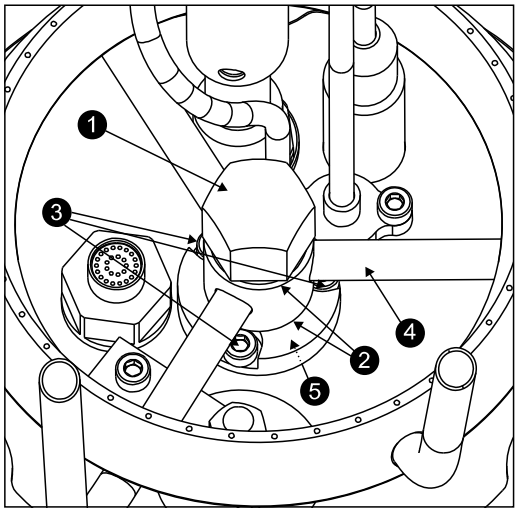


Figure 8 - Centre Column Assembly

ID	P/N	DESCRIPTION
1	CR-22-0319	CENTRE COLUMN BLIND NUT
2	MA-FE-0624	3/8" BONDED WASHER FOR COIL POST
3	CR-PP-0011	CENTRE COLUMN SECURING SCREW

ID	P/N	DESCRIPTION
4	3D-05-00XX	COIL ASSEMBLY
5	3D-99-0110	COLUMN BOTTOM O-RING (HIDDEN)

NOTE: Later MK-32 units are added with a plug (P/N 3D-03-19XX) on the top bore of the center column, sealed with an o-ring (P/N CR-09-0150), just below the blind nut – not shown in Figure 8. Its function is performance-oriented, requiring no maintenance.

5.11.2 Double Outlet Column assembly

Should the burner be fitted with the optional crossflow assembly (Section 5.24) or the auxiliar outlet assembly (Section 5.27), the standard centre column (P/N 3D-03-18XX) where coil is mounted is replaced by an extended-length column version (P/N 3D-21-10XX). Such column allows a sandwich-type mount of the two sleeves: the cylindrical inlet post of the coil below and the accessory cylindrical sleeve on top of it, both secured with the same blind nut from top. Beware that a bonded washer P/N MA-FE-0624 must be fitted both on top and bottom of each sleeve to grant a good seal (See 5.12 for coil removal). The Double Outlet column is sealed and secured to the block using the same screws and o-ring to the assembly described in 5.11.1.

5.12 Coil Removal

Since serious indentation in the coil tube cannot be repaired and any welding faults must be returned to ULTRAMAGIC for inspection, coil maintenance is limited to the areas detailed below. To remove the coil and jet assembly, refer to figures 2 & 8 and proceed as follows:

- Ensure that the burner is safely vented before commencing.
- Using a socket and extension bar, undo and remove the coil post nut (Fig 8, item 1).
- Remove the upper bonded washer (Fig 8, item 2).
- Undo and remove the three coil support fixings (Fig 2, items 2, 6 & 7).
- Withdraw the coil (Fig 8, item 4).
- Remove the lower bonded washer.
- Replacement of the coil is the reverse procedure to removal. When replacing the coil, fit new bonded washers (Fig 8, item 2). Observe the recommended torque from section 1.9 (do never exceed 55 N·m). It is also strongly recommended to install a new set of the screws securing the coil strips to the can (Fig 2, items 2 & 7), using also aluminium or copper-based anti-seize paste.
- In the event of seizing or damage to any of the riveted nuts at the end of the coil strips, refer to 5.13.3.
- The joints between the coil and the coil post must be tested to ensure that there are no leaks. Attach a 7 Bar (100 psi) air line to the burner. Open the main valve and check for leaks using soapy water. If any leaks are detected, they must be corrected before further burner use.

NOTE: Whenever the coil is re-fitted into the can, make sure the slurping tube assembly (section 5.27) does not get damaged and the tube is correctly adjusted.

5.13 Coil Cleaning and Servicing

To disassemble, clean and adjust the jet, firstly identify the type of assembly applicable to the burner and proceed to sections 5.13.1 or 5.13.2, as required:

5.13.1 Fixed Jet Assembly

The fixed jet and coil assembly is fully constructed in selected Stainless Steel alloys. Its assembly is mostly welded and riveted, thus the possible operations on it are limited. Any major damage or deterioration will probably lead to the replacement of the entire coil. For works involving riveting or welding, contact ULTRAMAGIC. Refer to 5.13.3 for issues on the riveted nuts of the vertical strips.

To clean the coil and jet assembly, remove all sealing elements and apply soapy water or a solvent adequate for stainless steel alloys. If necessary, insert a suitable metal pin into any

blocked jet holes. Rinse the assembly with clean water at the end of the process, blowing compressed air through the openings afterwards.

5.13.2 Detachable Jet Assembly

The MK-32 coil can alternatively be offered with a detachable jet. This enables the withdrawal of the jet from the coil, enhancing its cleaning and making its partial replacement possible. To remove the jet from the coil (coming from section 5.13), proceed as follows:

- Use a 4mm Allen key to undo and remove the three pairs of M5 screws securing the three coil tube end fittings to the jet perimeter.
- Check the condition of the three O-Rings sealing the jet intakes, and replace if damaged or if in doubt. Apply a smear of Krytox grease on the O-Rings before reassembling.
- Check also the condition of the grooves for the O-Rings and its mating surfaces, looking for scratches or particles. Clean carefully.
- Replacement of the jet is the reverse procedure to removal. Check that the jet ring is installed facing the correct direction (with the holes pointing to the coil). Always install new o-rings between the coil and jet ring.

5.13.2.1 Standard Jet Assembly

The standard jet assembly is constructed in one piece, and is made of Stainless Steel. There are no operations possible on it other than cleaning, following the process described in section 4.2.

5.13.2.2 Coanda Jet Assembly

The Coanda jet assembly is constructed in Aluminium, and is composed of a lower ring, an upper ring and the bimetal strips for temperature control. Inspection of the jet ring may reveal an accumulation of oily deposits on the outer surface. These deposits are not detrimental to burner performance provided that the deposit does not cause jet blockage. To prevent unnecessary work at this stage, check the condition of the jets for blockages etc. This may be done visually and by inserting a suitable piece of stiff wire in to each jet hole. Only proceed with further dismantling if it is considered that the jets require thorough cleaning or if the bi-metal strips require inspection or maintenance.

To rip down the jet completely (coming from section 5.13), proceed as follows:

- Using a 4 mm Allen key, undo and remove the six screws from the upper side of the top jet ring. Carefully withdraw the bottom jet ring from the upper jet ring.
- Check the condition of the internal jet ring faces. Carefully clean away any oil deposits or other contaminants. Make sure not to scratch the surfaces, and use always products compatible for anodised aluminium.
- Check the condition of the bi-metal strips. These are secured to the underside of the upper jet ring. When the coil is cold, the strips should be in the “closed” position i.e. covering the inlet to the jet hole. Only remove the strips if it is considered necessary.
- Prior to removing the bi-metal strips, use a soft marker pen to mark the position of the strip to indicate which jet holes are covered by the strip.
- To remove the bi-metal strips, use a crosshead Philips screwdriver and remove each screw securing the strip to the upper jet ring. Beware that the bimetal strip has two different faces; once assembled, the face shown must have lettering on it.
- Replacement is generally the reverse procedure to removal. Ensure that the bi-metal strips are positioned correctly. Note that the seal between the upper and lower jet rings is formed by the conical fit of the two components. It is very important therefore to ensure that the lower ring is fitted square to the upper ring and that the six fixings are tightened correctly. Fit all six fixings finger-tight. Select any fixing and tighten a quarter turn. Select the diagonally opposite fixing and tighten a quarter turn. Continue to tighten all fixings, always as diagonally opposite pairs, a quarter turn each time, until all fixings are tight. Use just an Allen screwdriver to tighten the screws. Over-tightening may result in permanent deformation of the multihole jet ring.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the

jet. Check the joint between the rings, and make sure that gas exhausts only from the jet holes. Check also that no holes are blocked.

5.13.3 Riveted nut replair

The MK-32 uses M6 riveted nuts on various positions. Should any of these become seized, standard metal workshop techniques to remove the thread stuck inside can be applied. Whenever the female thread is slightly damaged, attempt repairing the fillet with a suitable M6x0.75 tap for stainless steel.

In failure of the above, the riveted nut should be carefully removed using a small grinder readied for metal cut. Riveted nut may be replaced with a conventional assembly using a CR-03-0171 Nut and a MA-FE-0090 washer. No attempt should be made to install a brand new riveted nut (P/N 3D-99-0170) unless a specific threaded rivet tool for M6 is available, ensuring the final nut protrusion to be between 9 and 10mm.

5.14 Liquid Jet Removal

5.14.1 Standard Liquid Jet

To remove and strip down the liquid fire jet assembly, proceed as follows:

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of the Liquid Jet breaks the pressure integrity of the burner.
- Locate the liquid fire jet. Using a long 24mm AF socket tube, undo and remove the entire assembly from the valve block. For ease of access, it is optional to remove the coil (following Section 5.12).
- Carefully remove the o-ring (P/N 3D-99-0110) from the underside of the liquid jet assembly. When removing the seal, take care not to damage the groove surface.
- It is recommended to always replace the o-ring before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Check the condition of the hole edge mating with the valve seat at the underside of the jet. It must be clean and free of scratches/damage.
- No attempt must be made to withdraw the brass diffuser from the exhaust of the jet. It is permanently locked and the whole assembly must be treated as a single item.
- Re-assembly is generally the reverse procedure of removal.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the liquid jet. Check the joint between the jet and the burner block. The joints may be checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use. Make an operational test of the liquid valve.

5.14.2 Silent Liquid Jet (Optional, alternative to 5.14.1)

Where burner is equipped with a Silent Liquid Jet (P/N 3D-26-00XX), proceed as with the standard jet above but using a long 29mm socket to rotate the jet body using its hexagonal neck. Same o-ring (P/N 3D-99-0110) is used for sealing with the main block underneath.

Any malfunction on the Silent Jet requires its replacement. However, it can be cleaned using cleaners/solvents suitable for stainless steel, requiring such product to be applied separately, after removal of the jet from the block. A proper rinsing with clean water and a visual inspection are mandatory before the reassembly.

5.15 Pressure Gauge Removal and Disassembly

Refer to figure 9 and proceed as follows:

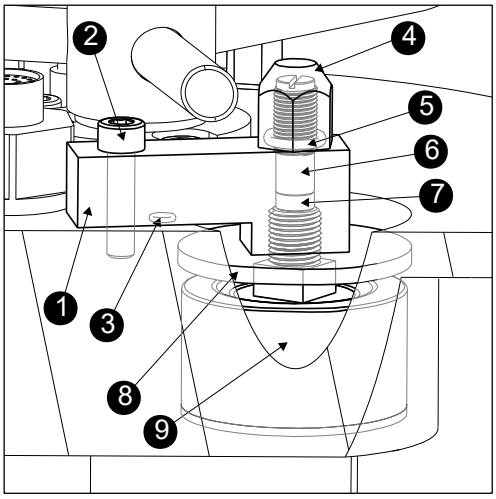


Figure 9 - Pressure Gauge Assembly

ID	P/N	DESCRIPTION
1	3D-13-01XX	Connector
2	MA-FE-0170	Block-Connector Securing Screw
3	CR-09-0156	Block-Connector O-ring
4	3D-13-12XX	Compressor Cap
5	3D-99-0115	Cap O-ring

ID	P/N	DESCRIPTION
6	3D-13-11XX	Compressor
7	3D-13-13XX	Dumper
8	3D-13-21XX	Water Gasket
9	3D-13-20XX	Pressure Gauge

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of the Pressure Gauge Assembly breaks the pressure integrity of the burner.
- The assembly is mechanically connected to the block by means of a screw (item 2). Using a 4mm Allen Key, undo and remove the screw.
- Turn the assembly nearly 90° so that the steel connector (item 1) does not interfere with the coil tube.
- Check the condition of the O-ring (item 3) between the connector and the block. Replace if necessary. Check that the small hole in the centre of its bore is clean.
- Pull up the pressure gauge assembly. The black rubber seal for water (item 8) will interfere with the coil tube before the complete withdrawal of the assembly. Bend the rubber seal above the coil tube to enable the release of the gauge. The Pressure Gauge Assembly is now free for access.
- Hold the connector securely, preferably in soft vice jaws.
- Using a 13mm open ended spanner, undo and remove the cap (item 4) of the compressor.
- Check the condition of the sealing O-ring (item 5) under the cap. Replace if necessary.
- Use a flat blade screwdriver to undo and release the compressor (item 6) from the connector.
- Take out the flow felt dumper (item 7). Replace if damaged or obstructed.
- Using an 14mm open ended spanner on its square neck, unscrew the pressure gauge (item 9) from the gauge connection. Clean off all traces of PTFE tape from the gauge thread.
- Check the condition of the O-Ring groove and the seal bore in the gauge connection. If there is any damage to the seal mating surfaces, the gauge connector must be replaced.
- Using a compressed air supply, make sure the internal holes of the connector remain unobstructed.
- Check the condition of the gauge body seal (item 8). The seal is designed to prevent the passage of water from inside the burner through the valve block. Minor deterioration of the seal is therefore not detrimental to burner performance or safety. However, it is recommended that the seal be replaced if damage or deterioration is found.

Note: The pressure gauge is a sealed item with no serviceable parts. No attempt must be made to repair a faulty gauge. Gauge repair is by replacement only.

CAUTION: The sole replacement of the pressure gauge without proper adjustment of the pressure damper grub screw (as explained below) may lead to subsequent premature failure of new gauges.

- Re-assembly is generally the reverse procedure of removal: Start applying 5 to 10 turns of PTFE tape onto the gauge male fitting, optionally adding some drops of Loctite 542 or 572. Make sure not to block the inlet pinhole.
- Screw the gauge by hand into the connector, making sure it completes 3 turns at least. Tighten then with a suitable spanner (when a torque wrench is used, apply 12 N·m).
- Check the correct position of the gauge with regard to the connector. When both elements are screwed together, the final position is such that the gauge needle at 0 bar approximately points in the same direction than the connector bar.
- Apply a thin smear of Krytox grease to all O-rings.
- Prior to fitting the felt damper (item 7), the grub screw (item 2) and the compressor (item 6) it is recommended to apply a drop of Loctite 222 onto their threads. Tighten firmly the grub screw so that the felt underneath is squeezed (4 to 5 N·m recommended). Add the cap on the grub screw head and tighten gently.
- Check the presence of the o-ring (item 3) and secure the assembly into the main block bore. Secure tight the bolt (item 2).
- Once the assembly is finished, check for the correct orientation of the gauge inside the valve block.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the Pressure Gauge Assembly. Check the joints using leak detection fluid and watching for bubbles. If any bubbles are observed, rectify the problem before further burner use.
- Check the reading to be sound before and after pressurizing. If the damper is properly adjusted, needle indicator should move smoothly on pressure changes.

5.16 Piezo Ignitor Removal and Disassembly

To remove the Piezo Igniter Assemblies, refer to Figure 10 and proceed as follows:

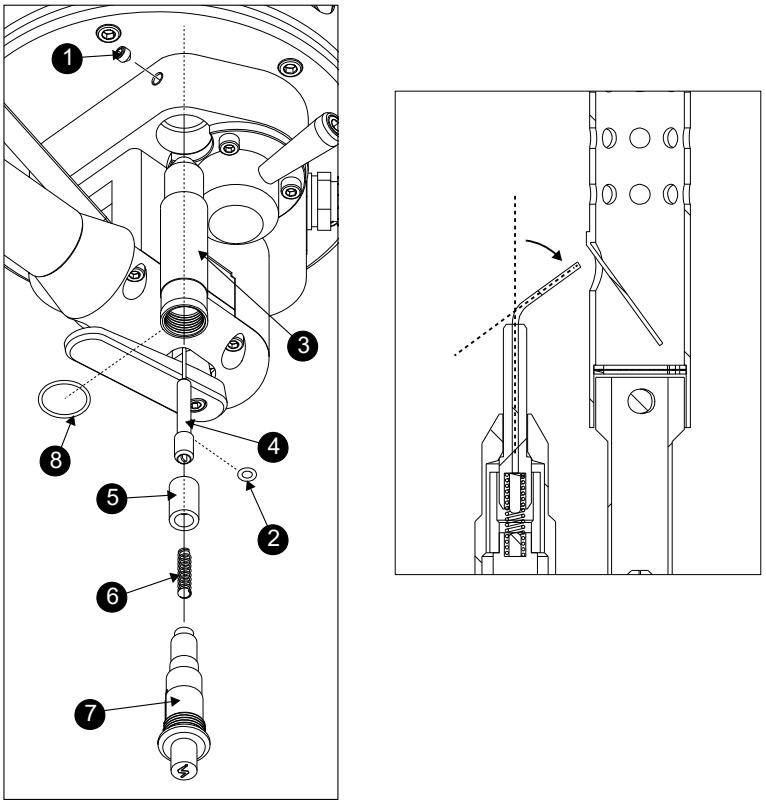
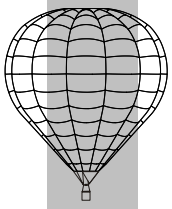


Figure 10 - Igniter Assembly and Electrode Adjustment

ID	P/N	DESCRIPTION
1	CR-N-0040	Piezo Retention Grub Screw
2	MA-FE-0606	Friction O-ring
3	3D-09-10XX	Piezo Cover Body
4	3D-09-12XX	Ceramic Electrode
5	3D-09-13XX	Electrode Spacer

ID	P/N	DESCRIPTION
6	3D-09-14XX	Spring
7	3D-09-11XX	Piezoelectric Ignitor
8	CR-PP-0325	Water O-ring



- Ensure that the burner is completely vented of fuel.
- Using a 3mm Allen key, loosen but do not remove the grub screw (item 1).
- Turn the pilot light valve handle enough to allow the withdrawal of the igniter assembly from the underside of the valve block.
- Unscrew and remove the piezo igniter (item 7) from the body (item 3).
- Check the condition of the “O” seal (item 8) fitted on the exterior surface of the igniter body and underneath the piezo flange. Replace the seal if damaged. Note that the seal is fitted to prevent water formed inside the burner from dripping down past the igniter assembly and a damaged seal will not cause deterioration in burner performance.
- Withdraw the insulator, spring and electrode (items 5, 6 and 4 respectively) from the body. Note that the electrode rod is bent; straighten it as required in order to remove it from the body.
- Check for any signs of corrosion or damage on the spring, the pin at the underside of the electrode and contact on top of the igniter. Check also for cracks on the ceramic of the electrode, and the condition of the friction o-ring around its neck (item 2).
- Replacement is generally the reverse procedure of removal. Prior to fitting the “O” seal, apply a thin smear of Krytox or Molycote grease to the seal. Take care not to over-tighten the grub screw (item 1) as this might cause damage to the aluminium thread in the valve block.
- Having re-fitted the igniter, carefully bend the electrode rod as shown in Figure 10, making sure not to damage the ceramic. The end of the rod must be oriented to the large hole of the pilot light torch. Pivot the electrode over the vertical axis as required, and re-tighten the igniter.
- Operate the igniter and check for a good spark between the electrode tip and the tag on the pilot light assembly. Adjust the gap if necessary to improve the spark strength. The spark should be “strong” and blue in colour.

5.17 Preheater Assembly Removal

The preheater assembly is mounted onto the burner block surface, on those units installed with a liquid pilot light.
To disassemble the preheater, refer to figure 11 and proceed as follows:

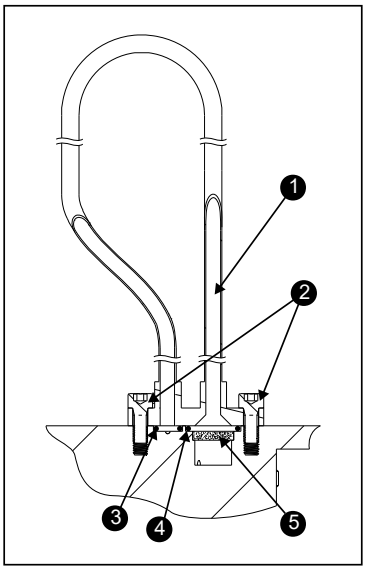
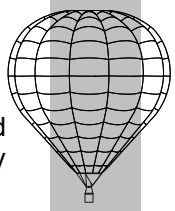


Figure 11 - Preheater Assembly

ID	P/N	DESCRIPTION
1	3D-08-02XX	Preheater Tube
2	CR-PP-0011	Preheater Securing Screw
3	3D-99-0100	Preheater Inlet O-Ring

ID	P/N	DESCRIPTION
4	3D-99-0105	Preheater Outlet O-ring
5	3D-08-32XX	Preheater Filter



- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of this assembly breaks the pressure integrity of the burner.
- Using a 4mm Allen Key, undo and remove the two screws (item 2) fixing the preheater base to the main block. Release the preheater.
- The sealing o-rings (items 3 and 4) and the filter (item 5) can now be accessed and removed from their bores. To do so, carefully use an adequate sharp tool not to damage the aluminium surfaces.
- Replace the o-rings if damaged or if in doubt. Filter can continue to be used subject to the absence of particles, oil or any substance or body obstructing it (some decolouration to the sintered bronze is normal and acceptable).
- Blow compressed air through the preheater tube from the holes at the bottom plate. Repeat the process in the opposite direction. Beware that particles can exit the tube at high speed; therefore take caution measures. If the flow is obstructed or significantly restricted, the tube must be replaced.
- Some deposits can accumulate at the cavity below the filter. Clean it with a soft cloth or absorbing paper making sure not to block the hole at the bottom.
- Re-assembly is generally the reverse procedure of removal. Clean the bores with a soft cloth and apply a thin smear of Krytox grease over the o-rings prior to assembling.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals under the preheater using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.

5.18 Preheater Bypass Removal

On burner units fitted with Liquid Pilot Light, a bypass assembly may be installed instead of the preheater tube. Its assembly and disassembly instructions are equivalent to those applicable to the preheater assembly (see section 5.17).

5.19 Preheater Blanking Plate Removal

Burners mounting Vapour or Oxygen Pilot Lights do not require previous filtering or preheating of the fuel. Therefore a Blanking Plate can be mounted instead of the preheater or the bypass. Its assembly and disassembly instructions are equivalent to those applicable to the preheater assembly (see section 5.17), although the filter can be removed from the burner in this case.

5.20 Pilot Light Removal

To remove any of the Pilot Light Assembly variants from the burner, refer to Figure 12 and proceed as follows (Figure 12 corresponds to the Liquid Pilot Light assembly, although the removal/installation procedure is common to all variants):

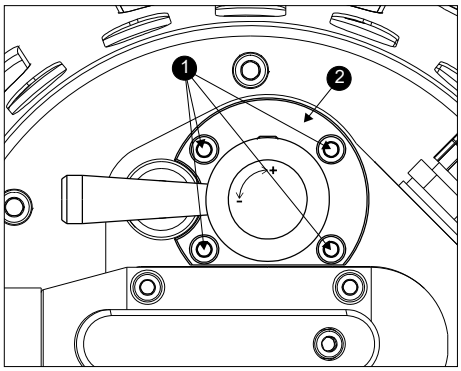


Figure 12 - Pilot Light Fixings

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that on Liquid Pilot Light assemblies, the removal of the Pilot Light breaks the pressure integrity of the burner.
- Use a 4mm Allen Key to undo and remove the four screws (item 1) securing the Assembly to the block.
- Gently pull out the Pilot Light assembly from the underside of the burner block. Beware that the assembly includes also the pilot light torch, thus make sure not to damage the piezo or the aluminium bore of the block during the operation.
- To disassemble the entire pilot light, proceed as per section 5.20.1, 5.20.2 or 5.20.3, as applicable.
- Re-assembly is the reverse procedure of disassembly. Pay attention to the correct alignment of the torch hole with the ignitor electrode.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.

5.20.1 Liquid Pilot Light Disassembly

To disassemble completely the Liquid Pilot Light, refer to Figure 13 and proceed as follows:

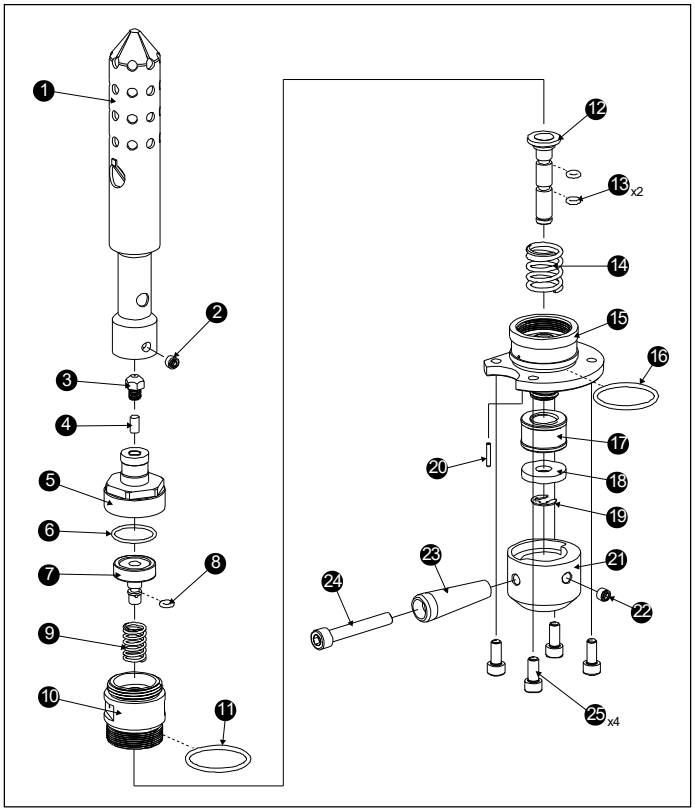


Figure 13 - Liquid Pilot Light Assembly

ID	P/N	DESCRIPTION
1	3D-08-03XX	Pilot Light Torch Assembly
2	CR-N-0040	Torch Assembly Grub Screw
3	CR-22-0713	Pilot Light Jet
4	3D-08-41XX	Pilot Light Jet Filter
5	3D-08-10XX	Pilot Light Regulator Upper Body
6	3D-99-0090	Regulator Piston Large O-Ring
7	3D-08-05XX	Regulator Piston
8	3D-99-0095	Regulator Piston Small O-Ring
9	3D-08-14XX	Regulator Piston Spring
10	3D-08-13XX	Pilot Light Regulator Lower Body
11	3D-99-0230	Regulator Body External Top O-Ring
12	3D-08-25XX	Liquid Pilot Light Valve Stem
13	3D-99-0085	Liquid Pilot Light Valve Stem O-Ring

ID	P/N	DESCRIPTION
14	3D-08-28XX	Liquid Pilot Light Valve Spring
15	3D-08-20XX	Liquid Pilot Light Valve Body
16	3D-99-0125	Regulator Body External Btm O-ring
17	3D-08-22XX	Pilot Light Valve Rotation Lever
18	3D-08-27XX	Pilot Light Valve Antifriction Washer
19	3D-99-0060	Pilot Light Valve Washer Circlip
20	3D-08-21XX	Pilot Light Valve Handle Rotation Pin
21	3D-08-23XX	Pilot Light Valve Knob
22	CR-N-0040	Pilot Light Valve Knob Grub Screw
23	3D-08-24XX	Pilot Light Valve Handle
24	MA-FE-0200	Pilot Light Valve Handle Screw
25	CR-PP-0011	Liquid Pilot Light Securing Screw

- Withdraw the torch assembly (item 1) from the regulator as per section 5.20.5.
- Check the condition of the two O-rings sealing the assembly (items 11 and 16). Replace if damaged or if in doubt.
- Loosen the grub screw (item 22) and release the handle assembly (items 21/23/24).
- Rotate counter clockwise the brass lever (item 17) with the hand until it contacts with the valve body (item 15).
- Using suitable circlip pliers, remove the circlip (item 19).
- Remove the nylon washer (item 18) and rotate clockwise the brass lever (item 17) to release it.
- Carefully hold the Valve body (item 15) and using a 26mm open ended spanner, undo and withdraw the regulator body (item 10) from the valve body (item 15).
- At this point, the valve can be accessed. Pull up the stem (item 12) and the spring (14).
- Check the condition of the O-rings on the stem (items 13) and replace if damaged or if in doubt.
- Check the condition of the rubber shutter on top of the stem (item 12). Replace the stem if the rubber shows abrasion, shrinkage, hardening, damage or significant distortion. A small circular witness on the seal surface is normal and indicates the position of contact between the seal and the regulator lower body.
- Unscrew and remove the pilot light exhaust jet (item 3) from the regulator upper body (item 5).
- Hold the jet up to the light and check that the hole appears clean and round.

- If the jet is blocked or partially blocked, replace it or carefully attempt to clean it blowing compressed air and/or soaking it in petrol or paraffin. Clean any oil deposits. Any damage of the jet implies its replacement. Avoid the use of sharp wires or tools as these can vary the diameter of the jet.
- Hold the regulator lower body (item 10) and using a 26mm open ended spanner, withdraw the regulator upper body (item 5).
- The regulator piston (item 7/8), its spring (item 9) and its main washer (item 6) are now accessible).
- Check the condition of the O-rings (items 6 and 8) and replace if damaged or if in doubt.
- Invert the upper body (item 5) and release the jet filter (item 4). If it does not fall, use a thin tool or rod (< 2mm Ø) to push it out from the regulator chamber.
- Check the condition of the filter, and replace it if blocked or if in doubt.
- Clean with a soft cloth any oil deposits and particles from the main bodies in the assembly (items 5, 7, 10 and 15) and clean all holes using an adequate compressed air supply.
- Re-assembly is the reverse procedure of disassembly. Apply a smear of Krytox grease on all O-rings.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.
- Adjust the position of the handle as per 5.20.6.

5.20.2 Vapour Pilot Light Disassembly

To disassemble completely the Vapour Pilot Light, refer to Figure 14 and proceed as follows:

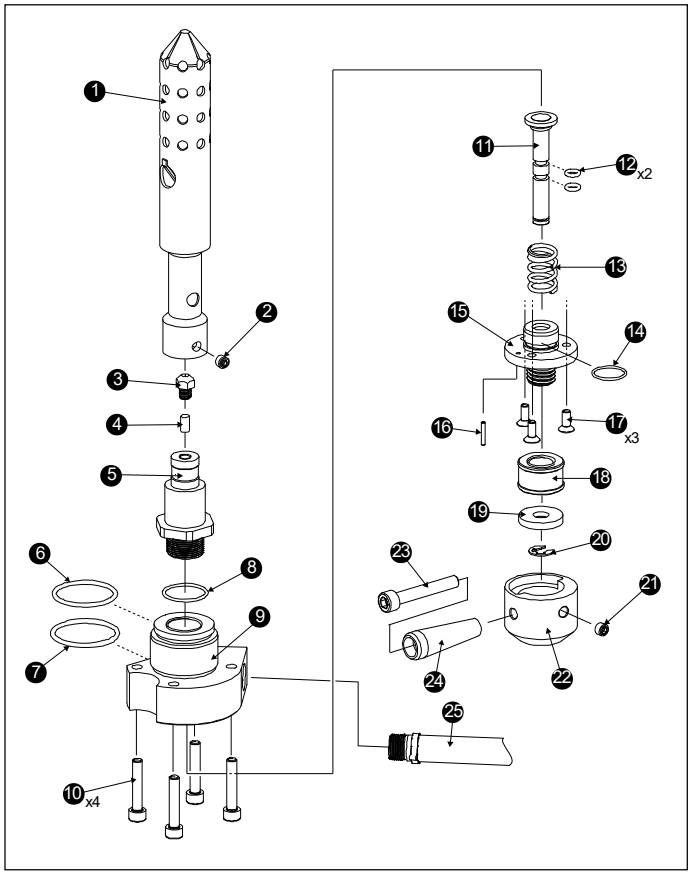


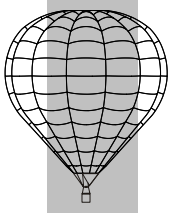
Figure 14 - Vapour Pilot Light Assembly

ID	P/N	DESCRIPTION
1	3D-08-03XX	Pilot Light Torch Assembly
2	CR-N-0040	Torch Assembly Grub Screw
3	CR-22-0713	Pilot Light Jet
4	3D-08-41XX	Pilot Light Jet Filter
5	3D-18-10XX	Vapour Pilot Light Valve Upper Body

ID	P/N	DESCRIPTION
14	CR-22-1120	Vapour Pilot Light Lower Body Seal
15	3D-18-12XX	Vapour Pilot Light Lower Body
16	3D-08-21XX	Pilot Light Valve Handle Rotation Pin
17	MA-FE-0012	Vapour Pilot Light Lower Body Screw
18	3D-08-22XX	Pilot Light Valve Rotation Lever

6	3D-99-0230	Pilot Light External Top O-Ring
7	3D-99-0125	Pilot Light External Bottom O-Ring
8	CR-PP-0325	Vapour Pilot Light Valve O-Ring
9	2022-1811	Vapour Pilot Light Valve Inlet Body
10	MA-FE-0170	Vapour Pilot Light Securing Screw
11	3D-18-13XX	Vapour Pilot Light Valve Stem
12	3D-99-0085	Vapour Pilot Light Valve Stem O-ring
13	3D-08-28XX	Vapour Pilot Light Valve Stem Spring

19	3D-08-27XX	Pilot Light Valve Antifriction Washer
20	3D-99-0060	Pilot Light Valve Washer Circlip
21	CR-N-0040	Pilot Light Valve Knob Grub Screw
22	3D-08-23XX	Pilot Light Valve Knob
23	MA-FE-0200	Pilot Light Valve Handle Screw
24	3D-08-24XX	Pilot Light Valve Handle
25	Ref. IPC	Vapour Hose Assembly



- Withdraw the torch assembly (item 1) from the valve upper body (item 5) as per section 5.21.5.
- Using a 14mm open-ended spanner, undo and remove the vapour hose (item 25) from the aluminium body (item 9). Clean off all traces of PTFE tape from the bore.
- Check the condition of the two O-rings sealing the assembly (items 6 and 7). Replace if damaged or if in doubt.
- Loosen the grub screw (item 21) and release the handle assembly (items 22/23/24).
- Rotate counter clockwise the brass lever (item 18) with the hand until it contacts with the valve lower body (item 15).
- Using suitable circlip pliers, remove the circlip (item 20).
- Remove the nylon washer (item 19) and rotate clockwise the brass lever (item 18) to release it.
- Using a suitable allen key, undo and remove the three c/sunk screws (item 17) securing the valve lower body (item 15).
- Check the condition of the O-Ring (item 14) and replace if damaged or if in doubt. Make sure the groove is not damaged, and remove any grease or particles on it. Refill with Krytox grease prior to reassembly.
- Pull out the stem (item 11) and the spring (item 13). Check the condition of the two stem O-Rings and replace if damaged or if in doubt. Clean any particles in the grooves for the O-Rings, check for scratches and apply new Krytox grease. Check the condition of the rubber pad on top of the stem; a small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve. If the seal is damaged or shows signs of hardening or shrinkage, it must be replaced.
- Check the bore underneath the valve body (item 9) for scratches, damage and cleanliness, particularly in the contact edge with the seal.
- Unscrew and remove the pilot light exhaust jet (item 3) from the valve body (item 9).
- Hold the jet up to the light and check that the hole appears clean and round.
- If the jet is blocked or partially blocked, replace it or carefully attempt to clean it blowing compressed air and/or soaking it in petrol or paraffin. Clean any oil deposits. Any damage of the jet implies its replacement. Avoid the use of sharp wires or tools as these can vary the diameter of the jet.
- Invert the valve body (item 9) and release the jet filter (item 4). If it does not fall, use a thin tool or rod (< 2mm Ø) to push it out from the valve chamber.
- Check the condition of the filter, and replace it if blocked or if in doubt.
- Re-assembly is the reverse procedure of disassembly. Apply a smear of Krytox grease on all O-rings.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.
- Adjust the position of the handle as per 5.20.6.

5.20.3 Oxygen Pilot Light Disassembly

To disassemble completely the Oxygen Pilot Light, refer to Figure 15 and proceed as follows:

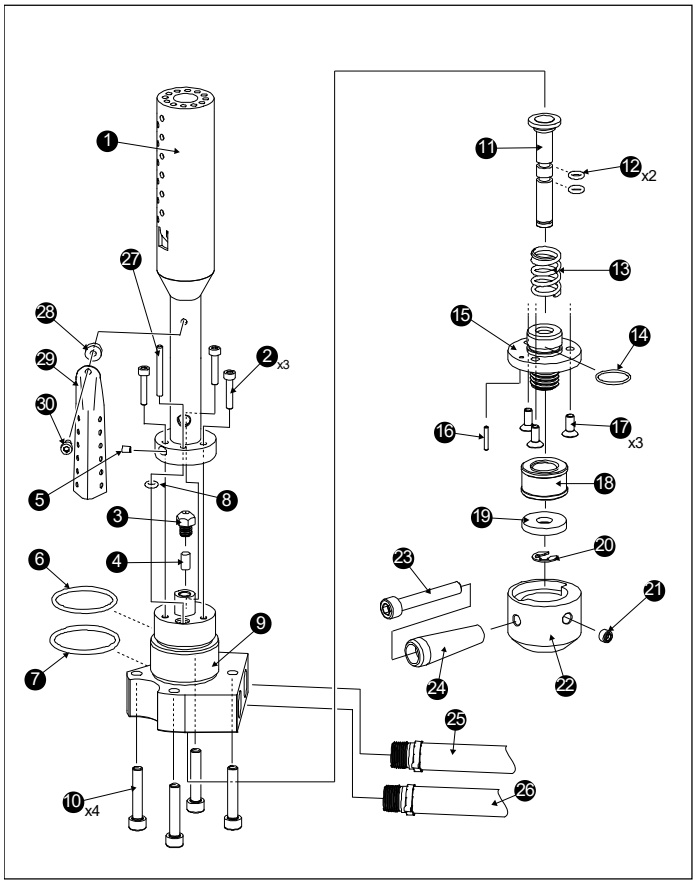


Figure 15 - Oxygen Pilot Light Assembly

ID	P/N	DESCRIPTION
1	3D-19-01XX	Oxygen Pilot Light Torch
2	3D-99-0160	Oxygen Pilot Light Torch Screw
3	CR-22-0713	Pilot Light Jet
4	3D-08-41XX	Pilot Light Jet Filter
5	3D-99-0150	Oxygen Needle Jet Grub Screw
6	3D-99-0230	Pilot Light External Top O-Ring
7	3D-99-0125	Pilot Light External Bottom O-Ring
8	3D-99-0145	Oxygen Needle Jet O-Ring
9	3D-19-11XX	Oxygen Pilot Light Valve Body
10	MA-FE-0170	Oxygen Pilot Light Securing Screw
11	3D-18-13XX	Oxygen Pilot Light Valve Stem
12	3D-99-0085	Oxygen Pilot Light Valve Stem O-ring
13	3D-08-28XX	Oxygen Pilot Light Valve Stem Spring
14	CR-22-1120	Oxygen Pilot Light Lower Body Seal
15	3D-18-12XX	Oxygen Pilot Light Lower Body

ID	P/N	DESCRIPTION
16	3D-08-21XX	Pilot Light Valve Handle Rotation Pin
17	MA-FE-0012	Oxygen Pilot Light Lower Body Screw
18	3D-08-22XX	Pilot Light Valve Rotation Lever
19	3D-08-27XX	Pilot Light Valve Antifriction Washer
20	3D-99-0060	Pilot Light Valve Washer Circlip
21	CR-N-0040	Pilot Light Valve Knob Grub Screw
22	3D-08-23XX	Pilot Light Valve Knob
23	MA-FE-0200	Pilot Light Valve Handle Screw
24	3D-08-24XX	Pilot Light Valve Handle
25	Ref. IPC	Vapour Hose Assembly
26	Ref. IPC	Oxygen Hose Assembly
27	3D-19-33XX	Oxygen Needle Jet
28	3D-19-32XX	Oxygen Diffuser Spacer
29	3D-19-31XX	Oxygen Diffuser
30	3D-99-0155	Oxygen Diffuser Screw

- Withdraw the torch assembly (item 1) from the valve body undoing and removing the three screws (item 2) on the base.
- Using a 14mm open-ended spanner, undo and remove the vapour hose from the aluminium body. Clean off all traces of PTFE tape from the bore.
- Repeat the previous step with the Oxygen hose.
- To release the Oxygen Diffuser Assembly from the torch, undo and remove the screw (item 30) with a suitable Allen key. The diffuser (item 29) and its spacer (item 28) can now be removed.
- To release the Oxygen Needle Jet (item 27), undo the grub screw (item 5) with a suitable Allen key. Pull the needle jet removing also the O-Ring (item 8) underneath the torch. Replace the O-Ring if damaged or if in doubt.

CAUTION: Parts in contact with oxygen must be particularly clean due to its high reactivity and the risks derived from it. Pay additional attention to clean all the bores, fittings and seals of the oxygen circuit to avoid presence of oils, greases, dust, cleaning agents or any other unknown fluids or particles. Observe only the possibility to use Krytox grease on the needle o-ring (item 8), if necessary.

5.20.4 Pilot Light Conversion

The MK-32 burner can be fitted with a series of different pilot light types, depending on the operation conditions and the needs of each customer. Note that the combined use of different pilot light types in a burner assembly is permitted.
The installation and removal of each type is described in section 5.20, but the following aspects must be accounted, depending on each case:

5.20.4.1 Liquid Pilot Light to Vapour or Oxygen Pilot Light

When a Vapour or Oxygen Pilot Light is to be installed instead of a Liquid Pilot Light, the preheater assembly (or the bypass plate) must also be replaced by a blanking plate (3D-08-33XX). Note that in this case, a master cylinder with a suitable vapour fuel supply is required on board.

5.20.4.2 Vapour or Oxygen Pilot Light to Liquid Pilot Light

When a Liquid Pilot Light is to be installed instead of a Vapour or Oxygen Pilot Light, the blanking plate must also be replaced by a preheater assembly (or a bypass plate 3D-08-35XX). Contact Utramagic for further details.

5.20.5 Pilot Light Torch Removal

The Pilot Light Torch assembly can be withdrawn from the burner either with the Pilot Light installed or removed from the burner block. Note that it is mechanically connected to the regulator upper body and consists of 3 main elements: Support tube, Torch and Internal Mesh. Its removal is necessary when the pilot light jet is to be accessed.
Beware that the vapour pilot light variant uses the same torch assembly, whilst the oxygen pilot light mounts a special torch arrangement, the disassembly of which is detailed in 5.20.3.

To remove and disassembly the pilot light torch, refer to figure 16 and proceed as follows:

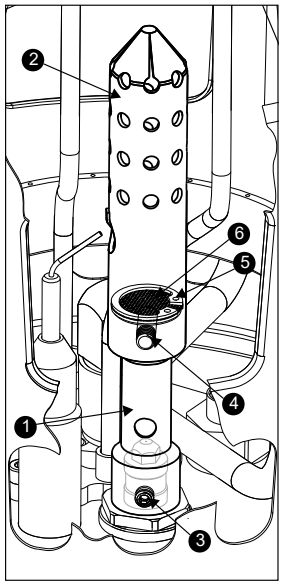


Figure 16 - Liquid/Vapour Pilot Light Torch Assembly

ID	P/N	DESCRIPTION
1	3D-08-42XX	Torch Support Tube
2	3D-08-43XX	Torch
3	CR-N-0040	Torch-Jet Securing Grub Screw

ID	P/N	DESCRIPTION
4	3D-99-0070	Torch Securing Long Grub Screw
5	3D-99-0020	Torch Mesh Circlip
6	3D-08-44XX	Torch Mesh

- Undo the lateral grub screw (item 3) securing the support tube (item 1) to the regulator upper body.

- Pull up the torch assembly to withdraw it from the regulator. At this point, the jet at the regulator output can be accessed.
- To continue with the complete disassembling of the torch, loosen the screw (item 4) holding the torch (item 2) to the support tube. This screw can be accessed from a lateral hole.
- A set of circlips (item 5) and a mesh (item 6) are now accessible from the underside of the torch. Using suitable circlip pliers, remove the bottom circlip and release the mesh.
- Check the condition of the mesh and the circlips. Replace if damaged, corroded or if in doubt.
- Re-assembly is the reverse procedure of disassembly. Pay attention to the correct alignment of the torch hole with the ignitor electrode.

5.20.6 Pilot Light Valve Handle Adjustment

To adjust the pilot light valve handle, refer to Figure 17 and proceed as follows:

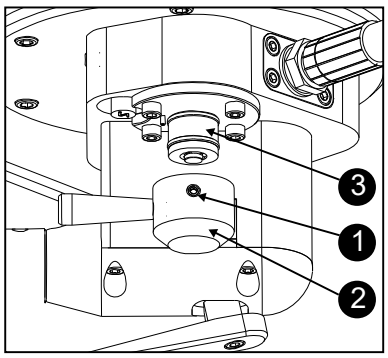


Figure 17 - Pilot Light Handle Knob Adjustment

- Loosen the grub screw (Item 1) at the side of the handle body
- Pull down and release the handle assembly (Item 2).
- The brass rotation lever can now be accessed. Rotate the lever counter clockwise with the hand until it stops.
- Rotate carefully the handle clockwise with the hand until an opposing force is noticed. At this point, the lever starts acting on the valve stem.
- Fit the handle assembly (Item 2) onto the brass lever. Lock it in the OFF position by firmly tightening the grub screw (Item 1).
- Connect the burner to a suitable fuel cylinder at normal operational pressure range (5 to 10 bar). Open slowly the pilot light valve by turning the handle. A gas flow noise should start to be noticed at nearly half of the handle run (90°). Fully open the valve and light the pilot light, and check for a strong flame. Close the valve and confirm that the pilot light extinguishes immediately. If any of these checks fail, repeat the whole adjustment process until the valve functions properly.

5.21 Filler Block / Hydraulic Actuator Removal

To remove the filler block or the hydraulic actuator from the burner block, refer to Figure 18 and proceed as follows:

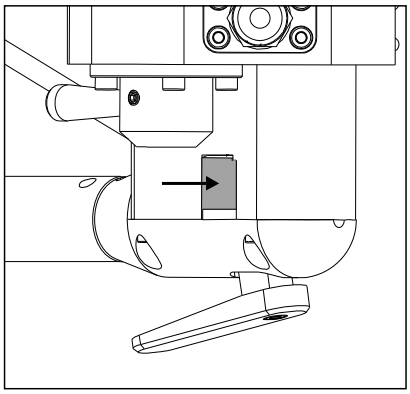


Figure 18 - Filler Block / Hydraulic Actuator Removal

- Disconnect the burner from the fuel cylinder and vent it completely.
- Squeeze and release the main valve handle once. Beware that fuel will be released if the circuit is connected or filled.
- Gently push the filler block (or the hydraulic actuator) from the pilot light valve side. This movement is marked with an arrow on the Figure. Prevent the fall of the insert with the hand at the opposite side.
- At this point, the internal stem mechanism is partially visible through the slot. Check that no strange bodies, sand or dust are present inside. Prevent the storage or transportation of the burner without the appropriate insert in the slot.

To refit/install a filler block or a hydraulic actuator, proceed as follows:

- Prior to the reassembly, lift the main valve handle (with an opposite movement to its normal squeeze action). This prepares the slot for the insert.
- Reassembly is generally the reverse procedure to dismantling. The filler block (or the hydraulic actuator) must be inserted from the manometer side. Note that the inserts can only be fitted in a single position due to a slot in one edge.
- When fitting the hydraulic actuator, check that the piston is in the fully retracted position before assembling.

NOTE: The burner must have either a filler block or a hydraulic actuator fitted into the slot for the proper function of the main blast valve.

5.22 Hydraulic Kit (Optional)

To disassemble completely the Hydraulic Kit, remove it from the burner as per 5.21, refer to Figure 19 and proceed as detailed in 5.22.1.
Alternatively, if the system is to be bled or adjusted only, proceed directly with sections 5.22.2 and 5.22.3.

5.22.1 Hydraulic Kit Disassembly

To disassemble a Hydraulic Kit, refer to figures 19 and 20 and proceed as follows:

- Put the handle over a flat surface with the reservoir upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Prepare a can to pour the remaining brake fluid of the circuit. Undo and remove the bleeder (item 2) from the actuator block (item 1). Beware that the brake fluid will escape from the bore: Take the necessary cautions as brake fluids may be irritant or corrosive. Squeeze the handle several times to empty the reservoir and to allow the circuit to drain completely, pouring the fluid in the can. Dispose the old fluid following the local regulations.
- Using a set of suitable circlip pliers or similar, undo and remove the retainer (item 5) from the block. Pull and release carefully the piston (item 3).

- Check the condition of the O-ring on the piston groove. Replace if damaged or if in doubt. Beware that this O-ring does not require greasing of any type.
- Using a set of open-ended spanners, disconnect the hose (item 7) from the connector (item 12) and the block. Note that straight and elbow versions are available and described in depth in Figure 20. Release also the hose from the handle assembly.
- Handle assembly can only be fixed by replacement. No attempt must be made to repair it, as special tooling and components are required. The only item that can be withdrawn is the handle grip tube (item 11), which can be removed by loosening the screw which secures it to the handle.
- Re-assembly is the reverse procedure of disassembly. Check carefully that all circuits and components are clean before re-assembly. If necessary, clean with a suitable brake cleaner.
- Bleed the system and adjust the handle as per sections 5.22.2 and 5.22.3.

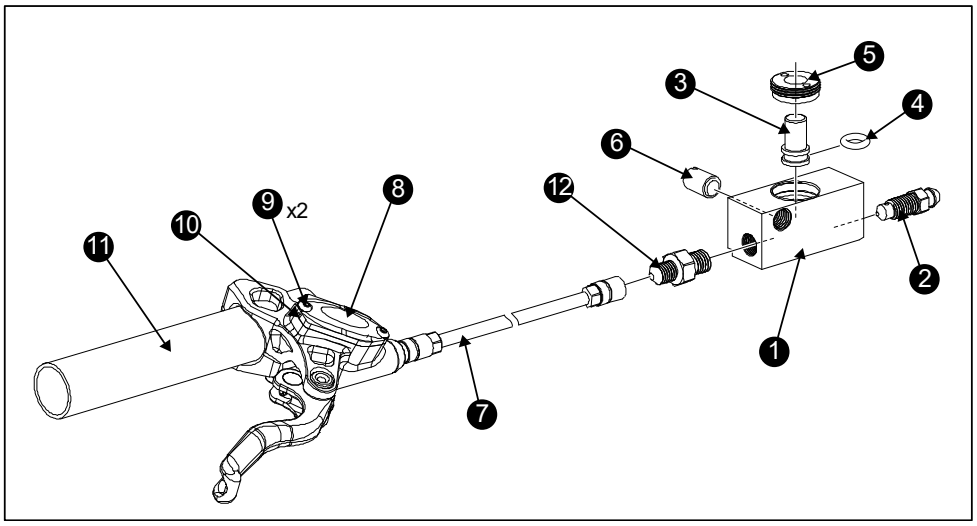


Figure 19 - Hydraulic Kit Assembly

ID	P/N	DESCRIPTION
1	3D-20-10XX	Hydraulic Actuator Body
2	3D-99-0030	Bleeder
3	3D-20-12XX	Actuator Piston
4	3D-99-0130	Actuator Piston O-Ring
5	3D-20-11XX	Piston Retainer
6	3D-99-0010	Flat Blade Head Positioning Grub Screw

ID	P/N	DESCRIPTION
7	(KIT)	Hydraulic Flexible Tube
8	(KIT)	Reservoir Cap
9	(KIT)	Cap Securing Screws
10	(KIT)	Cap Gasket
11	(KIT)	Handle Tube
12	(KIT)	Connector

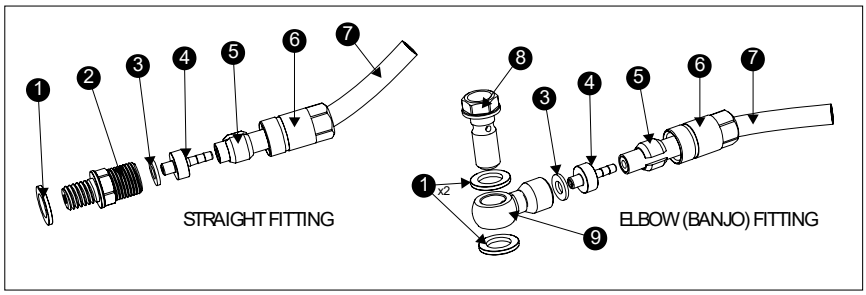


Figure 20 - Hydraulic Kit Assembly

ID	DESCRIPTION
1	M6 Sealing Washer
2	Straight Connector
3	Copper Washer
4	Hose Insert
5	Olive

ID	DESCRIPTION
6	Hose Shroud
7	Hose
8	90º Connector (Banjo) Bolt
9	90º Connector (Banjo)

NOTE: Whenever a seal is removed (particularly items 1 and 3 on Figure 20), it is strongly recommended to replace with a new one.

5.22.2 Hydraulic Kit Bleeding

To bleed the hydraulic kit circuit, refer to figure 19 and proceed as follows:

NOTE: Whenever the hydraulic kit is to be bled, use only DOT5.1 or DOT4 brake fluid from a clean container.

- Put the handle over a flat surface with the reservoir cover flat upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Refill the reservoir to the maximum.
- If the bleeder (item 2) in the actuator has a protective cap, remove it. Clean the nipple from particles or dust.
- Fit a suitable ring spanner onto the bleeder, and connect a suitable transparent bleeding tube onto the nipple.
- Squeeze the handle several times and undo the bleeder approx. a quarter turn whilst the handle is squeezed. Fluid should come out through the bleeding tube. When fluid flow stops, close the bleeder.
- Alternate the action of the handle with the retraction of the piston (item 3), which should pop out on each squeezing of the handle.
- Repeat the two previous steps until the fluid exits the bleeder with no air bubbles at all. Make sure that the reservoir in the handle assembly does not get empty (refill if necessary).
- Check the condition of the reservoir gasket and the cap, looking for cleanliness and any possible distortion or damage. Clean with a soft cloth or replace if necessary.
- Fit the gasket onto the reservoir making sure not to push any air into it. Fit the cap and secure it with the two screws.
- Turn the handle so that the reservoir is right above the hose socket. Squeeze the handle at least ten times.
- Again, put the handle over a flat surface with the reservoir cover flat upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Make sure that the bleeder is closed and retract the piston (item 3).
- Clean the bleeder and cover it with the protective cap, if applicable.
- Refill the reservoir and close it with the gasket and the cap, securing the assembly with the two screws.
- Clean any remains of brake fluid with absorbent paper.
- Install the kit on the burner and check the actuator for a correct function.

5.22.3 Hydraulic Kit Handle Adjustment

If the unit is fitted with an adjustable handle, use an adequate Allen key to tighten or loosen the grub screw located under the handle, as shown in figure 21. By doing this, the handle position can be adjusted enabling a comfortable squeezing movement. Beware that some units may have a wheel instead of a grub screw; in this case, adjustment can be achieved with the fingers.

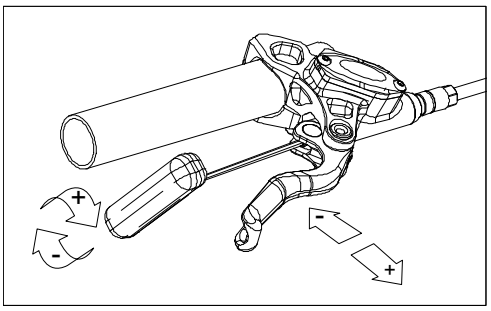


Figure 21 - Hydraulic Handle Lever Adjustment

5.23 Water Slurper Tube Assembly

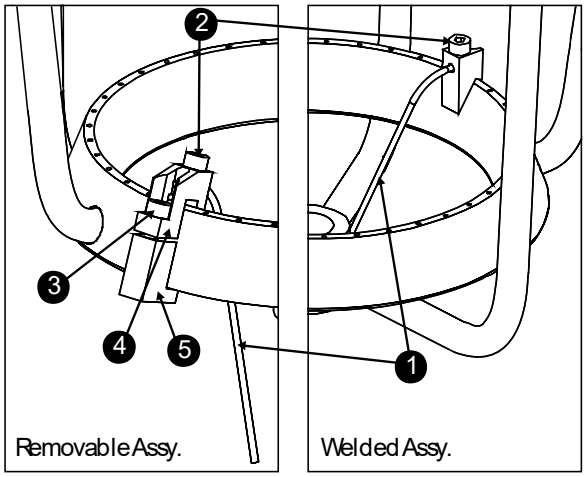


Figure 22 - Water Slurper Tube Assembly

ID	P/N	DESCRIPTION
1	3D-22-12XX	Water Slurper Tube
2	MA-FE-0175	Inox Allen Screw M4x6 DIN912
3	CR-09-0060	Inox Allen Screw M4x16 DIN912
4	3D-22-10XX	Water Slurper Top Body
5	3D-22-11XX	Water Slurper Bottom Body

MK-32 burners are fitted with a slurping tube system to expel the water accumulating on top of the main burner block. Such water is collected in the coil and can, and deposited in a dedicated machined recess. Assembly is such that the tube bottom end collects the water accumulated, while the top end is secured just above one of the jet holes of the main blast ring. When main blast is fired, the high-speed flow of fuel creates a venturi effect on the tube, suctioning the water and expelling it together with the blast flame.

Figure 22 shows both the removable tube assembly (P/N 3D-22-00XX - retrofittable) used on early MK-32 units, and the later-introduced welded assembly. Same tube is used on both versions. If the tube is found not to meet the description above, its position can be adjusted by loosening and securing the screw (Figure 22 Item 2) and moving it by hand. Tube is of thin section, allowing slight bending. However, forces in excess must be avoided as they can crush/obstruct the tube. If tube is correctly set but it is found not to evacuate the water, check for obstructions and replace it if necessary.

Be careful whenever the coil is removed and re-fitted so as not to damage this assembly.

5.24 Crossflow Assembly (Optional)

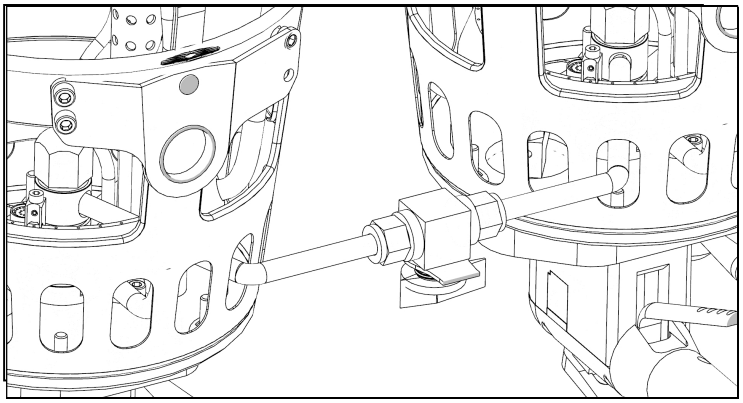


Figure 23 – Example of Crossflow Assembly

The optional Crossflow assembly is intended to simultaneously permit the flow of fuel on two adjacent coils whenever a single main handle is operated. This is achieved by means of an additional st steel tube connecting two centre column fittings, and its flow can be enabled or disabled with an in-line quarter-turn ball valve. It constitutes a customised setup, thus direct involvement from Ultramagic may be required whenever a malfunction is identified. Tubing is connected by means of stud couplings; should a leak be spotted, the nut should first be checked to be tight.

Valve itself is maintenance free; any malfunction requires replacement.

Beware that the use of a crossflow requires the introduction of a double outlet column (see section 5.11.2).

5.25 Main Valve Locking Button Assembly (Optional)

Refer to Figure 24 below and proceed as appropriate.

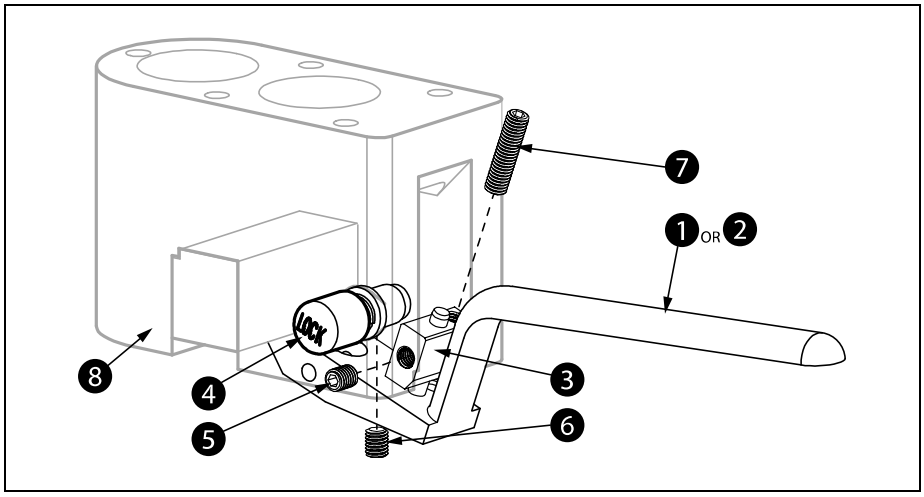


Figure 24 – Main valve locking system

ID	P/N	DESCRIPTION
1	3D-12-05XX	Smooth main handle
2	3D-12-06XX	Rough (slotted) main handle
3	3D-12-28XX	Main Handle Locking Adjuster
4	3D-12-05XX	Button assembly

ID	P/N	DESCRIPTION
5	CR-02-0090	Short grub screw
6	CR-02-0090	Short grub screw
7	CR-04-0010	Long grub screw
8	3D-03-11XX	Main valve block for locking button

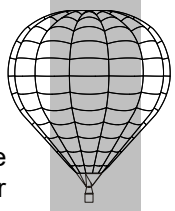
5.25.1 Assembly of the locking mechanism

The valve locking system consists of two main components: the locking pushbutton and the adjustable/lockable handle assembly.
Unless otherwise indicated by Ultramagic, the locking pushbutton (Item 4) is maintenance free. Should it show any malfunction or difficulties to be pushed or released, the whole pushbutton must be replaced. To do so, use 2.5mm hex key to access and undo the grub screw underneath (Item 6) to release the assembly in place.

NOTE: The grub screw shares the threaded hole with the screws securing the valve block handle connection. If grub screw is tight, enough thread length is available to secure the bolt.

Main valve handles (Items 1 or 2) are available on a smooth or rough (slotted) finish for ease of burner pot identification, as usual with other Ultramagic burners. Such handle is secured to the stem by means of the conventional pin.
Handle has been added with a welded guide pin upon which a locking adjuster (Item 3) is secured by means of grub screws (Items 5 and 7). See 5.25.2 for position adjustment.

5.25.2 Adjustment of the locking mechanism



Assembly permits the adjustment of the position at which the main valve handle is locked.

Refer to Figure 24 and proceed as follows:

- To adjust the position at which the main handle will be engaged, we need to access the Locking Adjuster. To do so, remove the Liquid valve handles and handle bar(s) as per Section 5.5.
- Check section 5.9 and remove the pin connecting the main blast stem to the st steel main blast handle.
- Undo the side grub screw (Figure 24, Item 5) using a 2.5mm hex key.
- Slide the Locking adjuster (Figure 24, Item 3) by spinning clockwise or counterclockwise the long grub screw (Figure 24, Item 7) as much as needed (as long as the locking adjuster can be safely secured to the guide pin). Same 2.5mm hex key can be used. The deeper the long grub screw is set, the wider the main blast will be opened.
  It is recommended to apply a drop of Loctite 222 to this grub screw before final setup.
  Once the desired setup is achieved, side grub screw (Figure 24, Item 5) is to be tightened. Again, it is recommended to apply a drop of Loctite 222 to this grub screw.
- Reassemble as reverse process to the dismantling.
- Once the work is completed, check the assembly to positively lock and unlock the main valve as expected.

5.25.3 Retrofit of the locking mechanism

Besides the additional items incorporated, observe 5.25.1 and consider that the retrofit of the locking mechanism entails the replacement of the earlier Valve block cover and the Main valve handle.

Retrofit requires the entire disassembly of the valve block assembly as per Section 5.9 with the subsequent re-assembly adhering to 5.25.1 and 5.25.2 as well.

5.25.4 Disabling the locking mechanism

Locking mechanism may be permanently disabled either:

- by removing the button assembly (Fig 24, Item 4) after undoing the grub screw (Fig 24, Item 6)
- by removing the adjuster (Fig 24, Item 3)

5.26 Double Action Valve Assembly (Optional)

Refer to Figure 25 below and proceed as appropriate:

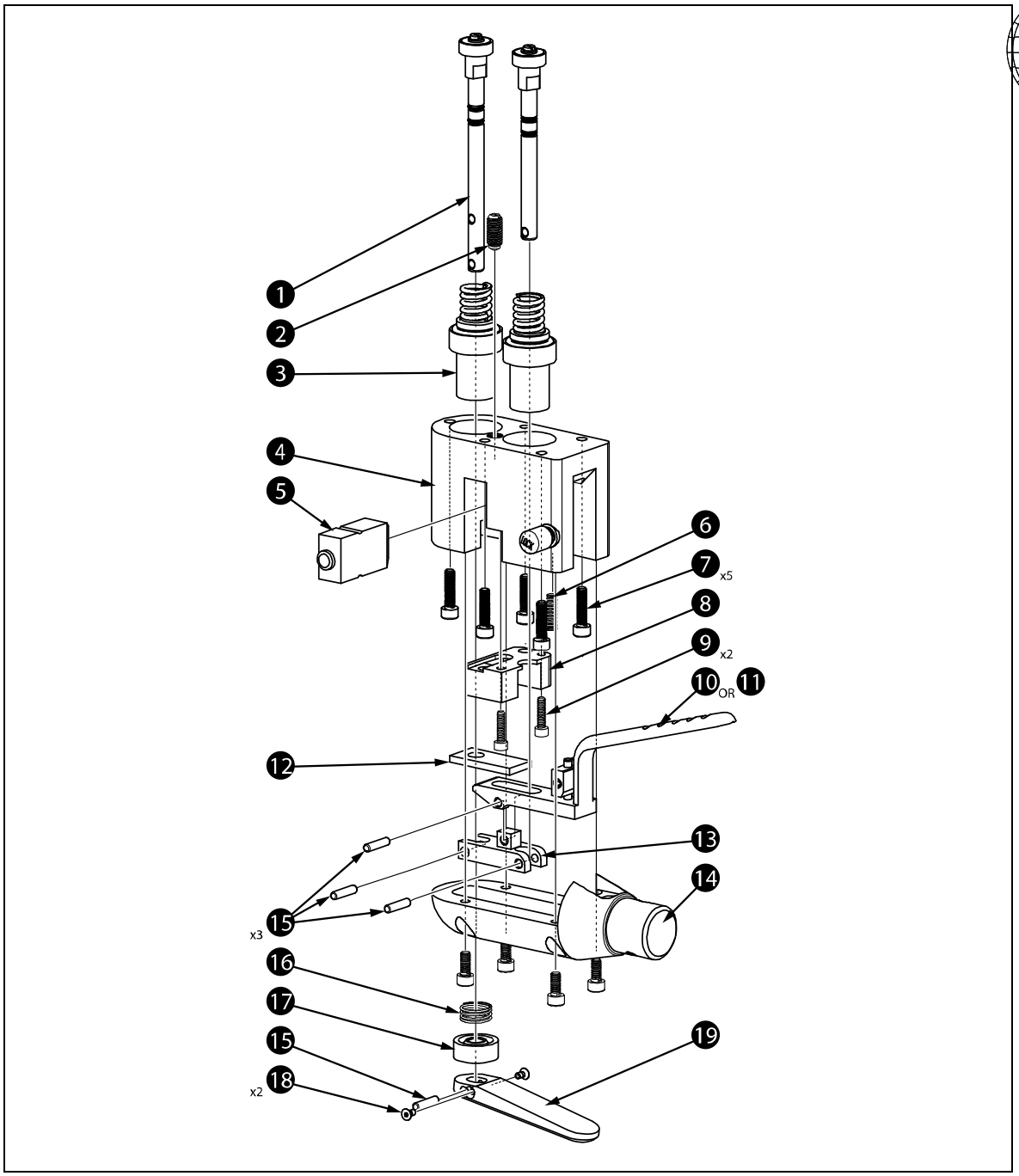


Figure 25 – Double Action Valve Assembly

ID	P/N	DESCRIPTION
1	3D-27-10XX	Double action Liquid stem (stem only)
2	3D-99-0010	Set grub screw
3	3D-27-17XX	Double action Liquid valve body
4	3D-27-11XX	Double action valve block cover
5	3D-27-19XX	Filler block for Double Action
6	3D-09-14XX	Main handle play control spring
7	MA-FE-0170	Double action valve block cover st steel bolts
8	3D-27-18XX	Cradle for Hydraulic actuator
9	CR-09-0060	St stl cradle securing bolt(s)
10	3D-27-02XX	Double action main valve handle (Smooth)

ID	P/N	DESCRIPTION
11	3D-27-03XX	Double action main valve handle (Slotted)
12	3D-27-14XX	Antifriction spacer
13	3D-27-13XX	Double action cam
14	3D-27-12XX	Double Action Valve block handle connection
15	3D-11-23XX	St Stl pin
16	PS-02-13XX	Double Action Liquid handle spring
17	3D-27-20XX	Liquid handle antifriction washer
18	MA-FE-0514	Liquid handle pin locking screw(s)
19	3D-27-16XX	Double Action Liquid valve handle

NOTE: Parts displayed on the Figures without ID number are standard and should be identified using the generic assembly from section 5.9.

NOTE: All burners fitted with double action valve include a locking mechanism (see 5.25 where needed).

NOTE: MK-32 installed with Double action valve can continue to be assembled with an optional Hydraulic Kit. However, although procedures in section 5.22 continue to apply, appearance of certain components is modified – contact Ultramagic for details on this variant.

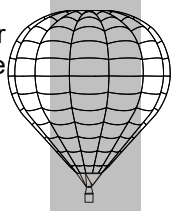
5.26.1 Assembly of double action valve system

To disassemble & access the valve system components, refer to figure 25 above and proceed as follows:

- Using a 2mm hex (Allen) key, undo and remove one of the two conical head screws (Item 18) at the side of the liquid handle (Item 19). This permits the release of the pin (Item 15).
- With the same key above, push out the steel pin (Item 15) connecting the handle with the stem. If shear is observed to impede a smooth release, squeeze fully the main handle (reaching the second stage) while pushing out the pin.
- Pull out the spring and antifriction washer (Items 16 and 17)
- Removed the four screws securing the handle bar assembly (Item 14) as per section 5.5, following with the removal of the handle bar assembly (observe the need to remove it from adjacent burner pots too)
- Cam (Item 13) is now accessible. Remove the three pins (Item 15) securing the cam to the stems and the main handle (Item 10 or 11). Where adjustment of the main valve locking mechanism is needed, refer to section 5.25.
- Remove the antifriction spacer (Item 12)
- Where necessary, remove the anti-play spring (Item 6). Observe the possible presence of grease inside the bore to impede the spring from falling when burner is disassembled upright.
- Note that the cradle (Item 8) for hydraulic actuator does not need removal to continue with the access to the valves.
- Pull out and remove the filler block (Item 5)
- Now the five bolts (Item 7) securing the valve block cover (Item 4) can be removed, following the principles described in section 5.9. Note that bolts in positions 4 & 5 on Figure 7 can be accessed through a hole in the cradle (Item 8). Beware that such five bolts (item 7) are shorter than the conventional bolts on the standard assembly (ref. Figure 6, Item 5).
- The whole valve block cover can now be removed. Cover block contains the two valve assemblies.
- Valve stems, bodies, springs, o-rings and washers can be accessed and/or replaced as needed following the standard procedures from section 5.9.
  Beware that the Stainless Steel stem (Item 1) and brass body (Item 3) from the Liquid valve used on the double action assembly are different from the standard parts (Figure 6, Items 8 & 15).
- Set grub screw (Item 2) can also be accessed from top with a flat blade screwdriver. Adjust its position if necessary, using Loctite 638 to keep it in place.
- Re-assembly is the reverse procedure of disassembly. No special tuning or adjustment is required other than the locking mechanism of the main handle (as seen in section 5.25.2). Although not mandatory, the use of PTFE or graphite powder (or a very thin smear of graphite or molybdenum grease if the operation conditions are not dusty) is possible in the pins connecting the cams with the stems.

5.26.2 Retrofit of the double action valve assembly

Existing MK-32 burner units can be retrofitted with the double action valve assembly. A specific kit is to be supplied by Ultramagic containing all necessary parts for conversion (contact Ultramagic or one of its dealers). The assembly resulting from the retrofit is not different from a burner originally manufactured with such optional. Beware that certain parts from the original assembly can continue to be used and therefore, will not be supplied with the kit.



Note also that the double action valve is an independent assembly that does not require all burner pots on a burner to be modified, meaning that i.e. a double burner can keep a conventional valve system on one side, and implement a double action valve on the other side.

5.27 Auxiliar Liquid Outlet for Main Flame (Optional)

MK-32 can be fitted with an auxiliar outlet to the main blast, meant to expel part of the fuel before it reaches the coil. Such outlet kit consists of a cylindrical sleeve with a series of outlet tubes pointing upward in direction to the flame. Such additional outlet is mounted onto a Double outlet column assembly (see section 5.11.2), right on top of the central coil sleeve and below the blind nut. Auxiliar outlet is available in double (3D-24-03XX), triple (3D-24-01XX) or quadruple (3D-24-02XX) tube configuration – all sharing the same assembly/disassembly procedure.

Parts involved are maintenance free; any defective part must be replaced, with the exception of a slight distortion of the tubes (which can be straightened) or their obstruction (which can be attempted to clear with the use of suitable cleaners and steel wire).

SECTION 6. Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or every 100 flight hours, whichever is the sooner. The inspection requirements are detailed in sections 6.3 and 6.4.

6.2 [Removed]

6.3 Functional Test

Carry out all preventative checks detailed in Section 4 (Preventative Maintenance).

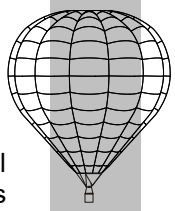
In addition, proceed with the following:

6.3.1 Liquid Pilot Regulator (if applicable)

During operation it is possible that an oily residue progressively accumulates inside the bore of the pilot regulator valve. This is quite normal depending on the fuel sourcing, and the design allows for a certain amount of it. However, if the residue is allowed to accumulate or to stay for long periods, it may cause problems in time as the residue changes consistency and begins to block the pilot light and pilot regulator jets and holes. This can cause a pilot light failure.

The regulator must therefore be checked to work properly and, in case of malfunction or if the presence of residues is suspected, regulator must be cleaned as follows:

- Remove and strip down the regulator as described in section 5.20.
- Using a soft cloth, wipe the inside of the regulator housing and the regulator piston and remove all traces of the residue.
- If the residue proves difficult to remove, a cloth soaked with a small amount of solvent should be used. Beware not to clog any of the bores when whipping dirt out.
- Check the condition of the fuel filter under the jet. Clean or replace if necessary.
- Check the pinhole in the jet and make sure it is clean. Gently remove any oil accumulation and any other dirt or contamination (do not use sharp tools or metal wire on the hole). Replace the jet if the obstruction persists.
- Lubreicate the seals and re-assemble the regulator as specified in section 5.20.



Having re-assembled the pilot regulator, its function must be tested as per section 4.5.

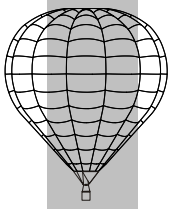
6.4 Leak Test

Connect the burner to a suitable fuel cylinder or compressed air supply at normal operational pressure range (5 to 10 bar). Using soapy water, check the following areas for leaks on every burner pot:

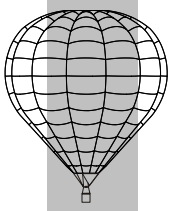
Main valve to valve block joints
Fuel hose inlet post (either straight or elbow type)
Coil post column assembly to valve block (while the main valve is open)
Liquid fire jet assembly to valve block (while the liquid valve is open)
Fuel hose joints, including both fuel hose end fittings and the 20 cm (minimum) of rubber hose next to each fitting.
Entire pressure gauge assembly, including its connection to the main block
Pilot light valve to valve block joint
Pilot light torch foot to valve block joint
Preheater tube (or bypass / blanking plate) to main block
Joints on the crossflow valve assembly (main valve open) [if applicable]

SECTION 7. Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Main burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Filler block or hydraulic actuator removed from the block slot.	Fill the slot.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Liquid burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Persistent smell of fuel	Fuel leak from burner or hose.	Air pressure test to determine location of leak. Repair as necessary.
Reduction in main burner power	Jets in jet ring blocked.	Clean and unblock jets.
Main and / or liquid valves fail to close.	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Valve rubber shutter hardened	Replace shutter.
	Damages/scratches on the shutter mating bore	Replace centre column or liquid jet (as required)
Pilot light fails to ignite	Fuel cylinder valve off.	Turn valve on.
	On vapour pilot light – Master cylinder pressurized with inert gases	Replace master cylinder with an adequate one
	Cylinder regulator incorrectly adjusted (Vapour / Oxygen pilot light variants only)	Adjust master cylinder regulator
	Pilot valve off.	Turn valve on.
	Fuel Filter Assembly blocked.	Clean/replace Fuel Filter Assembly
	Regulator jet filter blocked.	Clean/replace filter.
	Regulator jet blocked.	Clean jet.
	Preheater blocked (if installed)	Clean/replace preheater.
	Excessive oil deposits inside regulator.	Clean regulator.
	Failure of piezo igniter.	Repair igniter.
	Dirty or cracked igniter electrode.	Replace electrode.
	Incorrect gap between igniter electrode and torch.	Re-set gap.



	Burner placed in excessive crosswind.	Move burner away from crosswind.
	Pilot valve handle incorrectly adjusted.	Re-set valve knob position.
	Preheater tube clogging	Replace the pre-heater tube
	Detachment of the rubber shutter on pilot light stem.	Replace stem
Pilot light flame weak	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly
	Cylinder regulator incorrectly adjusted (Vapour / Oxygen pilot light variants only)	Adjust master cylinder regulator
	Regulator filter blocked.	Clean filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Preheater blocked (if installed).	Clean/replace preheater.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
	Piston lower seal detached from piston.	Replace piston assembly.
	Inlet and outlet hole in piston blocked.	Clean hole.
	Air inlet to pilot light blocked.	Clean mesh filter.
	Piston O-rings failure.	Replace piston seals.
Pilot light flame very large	Regulator jet not fitted.	Fit jet.
	Incorrect piston spring fitted.	Replace for a suitable spring.
	Regulator piston seals not fitted or failed.	Repair seals.
Pilot light fails to extinguish	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Pressure gauge fails to display correct pressure	Blockage of the manometer inlet.	Adjust compressor force and/or replace filter.
	Pressure gauge damaged.	Replace pressure gauge.
Burner gimbal action too tight or too loose	Friction setting on gimbal mechanism incorrectly set.	Adjust friction setting.
Burner excessively hot	Fuel pressure too low.	Run burner within recommended fuel pressure range.
	Fuel cylinder disposed incorrectly when horizontal, burner running on vapour only.	Orientate the cylinder to allow the draining of liquid fuel.
	Fuel cylinder empty, burner running on vapour only.	Connect burner to a full cylinder.
Hydraulic actuator fails to open the main valve	Air in the hydraulic circuit.	Bleed the circuit.
Hydraulic handle blocked	Incorrect hydraulic fluid.	Clean the hydraulic system. Replace gaskets and seals and refill with the appropriate fluid.
Hydraulic fluid leak	Damage of a seal	Identify the faulty seal and replace. Refill the circuit and bleed.
Excessive water accumulates in the can.	Water slurper tube assembly working unproperly.	Adjust / Clean / Replace Water Slurper Tube
Main valve locking mechanism fails to engage	Wrong adjustment or loose assembly	Rip off the handle and button assembly
Main valve locking mechanism stuck engaged	Damage or foreign bodies in the cam mechanism	Access the cam to identify and correct
	Wrong adjuster setup	Adjust the assembly



APPENDIX I. Annual/100 Hours Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Valve Block Fixings	4.3		
General Cleaning	4.2		
Jet Ring	4.4.1		
Coil	4.4.2		
Water Slurper	4.4.3		
Pilot Light Strength	4.5.1		
Pilot Light On/Off function	4.5.2, 4.5.3		
Igniter Spark	4.6		
Fuel Hoses	4.7		
Pressure Gauge	4.8		
Burner Mounting	4.9		
Main Burner Function	4.4		
Liquid Valve Function	4.4		
Liquid Pilot Light Regulator	6.3.1		
Burner mounting	4.9		
Rotation – Gimballing	4.12		
Leak test	6.4		
ACCESSORIES (Complete only if applicable)			
Hydraulic actuator test	4.10		
Vapour Pilot Light Test	4.5		
Oxygen Pilot Light Test	4.5		
Crossflow Valve Test	4.11		
Main Valve Locking Button Test	4.13		
Double action Test	4.14		