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**400 SERIES  
FLUIDBED UNIT (H)**  
*INSTRUCTION MANUAL*



<b>DOCUMENT:</b>	<b>Fluidbed Unit 400 Series - Manual</b>
<b>DATE ISSUED:</b>	
<b>ISSUE NUMBER:</b>	<b>1</b>



# **CAUTION**

**This equipment can be dangerous unless it is used in accordance with the rules laid down in this manual.**

**Read this manual completely before installing and operating the equipment, and keep on file.**

**Ensure all safety instructions and procedures are correctly followed and that all operators are fully trained.**

**This equipment must be installed and used in accordance with all relevant local and national safety codes and standards.**

**In countries of the EEC, refer also to EN1953:1999 and the ATEX Directive 94/9/EEC. For Manual Powder Spray Installations refer also to EN50053: Part 2:1989 and for Automatic Powder Spray Installations refer also to EN50177:1997.**

**DO NOT permit untrained or unauthorized personnel to maintain or adjust this equipment.**

**All other manuals relevant to components and equipment of the installation must be followed.**

- 1. Ensure that the equipment is properly earthed/grounded. Refer to assembly instructions.**
- 2. The electrical supply to the gun's electrostatic generator and the control unit must be interlocked with the spray booth extraction system such that spraying cannot be carried out unless the exhaust ventilation system is in operation. The efficiency of the exhaust ventilation system should be checked regularly.**
- 3. All conductive structures within the vicinity of the spray area shall be bonded together with the earth terminal of the high voltage generator to the protective earth of the system electrical supply.**
- 4. The equipment operates by electrostatically charging the powder by means of a high voltage corona discharge at the nozzle of the spray gun. This electrostatic discharge can seriously damage other electronic equipment if it is sited in close proximity and not suitably protected.**
- 5. It is essential that all jigs and work pieces are adequately earthed. The workpiece shall have a resistance to earth of no greater than 1 Mohm. This should be checked regularly. If the earthing is not adequate, this can result in:-**
  - a) Poor coating.**
  - b) Sparks between the product and jigs, which can constitute an ignition or explosion hazard.**
  - c) Radio and TV interference from sparks between the product and jigs. This interference may also affect computer systems and process controllers.**
- 6. Ensure the air supply is clean and dry.**

**NOTE:- Refer to pneumatic specifications.**

## **EC Declaration Of Conformity**

We, Exel Industrial UK Ltd. declare that the following product:

**Description:** Manual Fluid Bed Spray Unit

**Model:** 400 H

**Use:** Electrostatic Powder Coating Unit

was manufactured by ourselves and conforms with the following standard (s) and /  
or other normative document (s):

EC Machinery Directive 89/392/EEC

EC Low Voltage Directive 73/23/EEC

EC Directive of Electromagnetic Compatibility 89/336/EEC

Electrostatic Painting and Finishing Equipment Using Flammable Materials

EN50 050:2001 and EN50 053:Part 2:1989

Signed on behalf of Exel Industrial UK Ltd by



Mr. D.H. Campbell  
Technical Manager

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## **400H - MANUAL POWDER COATING UNIT FLUID BED TYPE**

Part No. 5008002, Single Operator

Part No. 5008005, Double Operator

1. Mobile chassis carries a 50 litre fluidized bed (approx. 25 kg (55 lbs) of powder).
2. Fluid bed incorporates lifting handles and an access flap for ease of filling.
3. Fluidization of the hopper is achieved using a large porous tile for maximum fluidization efficiency. The fluidization may be altered to suit the powder being used and to provide the most effective fluidity relative to powder level.
4. The venturi's are spring clip mounted for quick release allowing the suction tube and the venturi itself to be cleaned if a colour change is required.
5. The 400 H can be supplied as a single or double unit and a single unit can be upgraded to a double system at a later date if so required.
6. The construction is of a robust design with a low centre of gravity and is transported on large conductive castors.
7. Power transmission between the control unit and spray gun is by a highly flexible, sealed cable assembly.
8. For improved safety, efficiency of charging, minimum surface disruption and unrivalled re-coatability Exel utilize their TOTAL ENERGY CONTROL system. This has two operating modes:-
  - TEC 1** enables operator adjustment of discharge voltage up to 85 kV. with a fixed TEC current threshold of 50 uA. max.
  - TEC 2** enables operator adjustment of the TEC current threshold up to 100 uA. with a fixed discharge voltage of 85 kV. max.

## SPECIFICATION

### General

<b>Fluidbed 50L Manual Unit:-</b>	Single Operator Unit	<b>Model No.:- 400 H</b> <b>Part No.:- 5008002</b>
<b>Fluidbed 50L Manual Unit:-</b>	Double Operator Unit	<b>Model No.:- 400 H2</b> <b>Part No.:- 5008005</b>
<b>Gun Control Unit:-</b>	Controls all electronic & pneumatic functions to gun.	<b>Model No.:- GCU 400</b> <b>Part No.:- 2024002</b>
<b>Manual Powder Spray Gun:-</b>	Complete with slotted cap & medium deflector.	<b>Model No.:- MG 400</b> <b>Part No.:- 3019002</b>
<b>5 Metre Hose &amp; Cable Set</b>	Powder delivery hose, airline & interconnecting cable.	<b>Part No.:- 3019036</b>
<b>Fluidised Bed Capacity:-</b>	25kg. (55lb.) Powder Max.	
<b>Fluidised Bed Mounting:-</b>	Lift On, Lift Off.	
<b>Powder Delivery Rate:-</b>	Variable up to 500 gms. / min.	
<b>Venturi Mounting:-</b>	Push on	
<b>Operating Temperature:-</b>	0 °C. to 40 °C. (32 °F. to 104 °F.)	
<b>Powder Charging:-</b>	Single Point Corona Discharge Needle (std).	
<b>Hose and Cable Length to Gun:-</b>	5 metres, (16 ft). (std).	

### Electrical Data

<b>Input Voltage</b>	100-240 Volts 50 / 60 Hz single phase	
<b>Power Consumption (full load)</b>	45 VA	
<b>Input Current (max.)</b>	400 mA at 115 V 200 mA at 230 V	
<b>Electrostatic output voltage (max.)</b>	10 - 85 kV negative.	
<b>Electrostatic output current</b>	Mode 1; 0 - 50 uA	Mode 2; 0 – 100 uA.

### Electrical Controls

<b>Mains Switch- Front Panel</b>	Rotary 3 position-	OFF/ON/REMOTE (AUTO) OFF/ON/E'STATICS OFF(MANUAL)
<b>Mode Selection Front Panel</b>	Push Button LED's display mode selected	TEC 1 (mode 1)/ TEC 2 (mode 2)
<b>Charge Control- Front Panel</b>	Push Buttons +/- to increase or decrease	Sets the maximum level of kV(Mode1). Sets the maximum level of uA(Mode2).
<b>Set Value Display Front Panel</b>	Numerical LED Indicator	Displays set max. kV. (Mode1) TEC1 Displays set max. uA. (Mode2) TEC2
<b>Electrostatic Charge Indicators Front Panel</b>	LED Bar Graphs	0 to 100 µA / 0 to 100 kV

**Auto-Manual Selection -- Unit automatically detects which type of gun is connected**

<p><i>Auto gun connected</i> LED displays "A" Auto selected LED Indicator at "A"</p>	<p>Unit triggers automatically when main switch is turned to <b>On</b> position. (1) Unit triggers via remote 24V dc. supply when main switch is turned to <b>Remote</b> position.</p>
<p><i>Manual gun connected</i>  LED Indicator at "T" when triggered</p>	<p>Unit is triggered by micro-switch in Hand Gun or other remote triggering device when main switch is turned to <b>On</b> position.(1) Unit is triggered by micro-switch in Hand Gun or other remote triggering device without electrostatics when main switch is turned to <b>E'statics Off</b> position.</p>

<b>Mains Input</b>	Via connector on rear panel.	
<b>Mains Output Socket</b>	Non switched 6A max.-	may be used to connect additional control units.
<b>Trigger Switch - Hand Gun</b>	Microswitch in hand gun-	connected through plug and socket on rear of control unit.
<b>Remote Trigger -</b>	24 V dc. Supply from Remote PLC.	connected through plug and socket on rear of control unit.

**Circuit Protection**

Miniature circuit breakers:-	<i>Mains input</i>	- 0.6A
	<i>Mains output</i>	- 6A
<b>Input air pressure</b>	7.0 bar (100 p.s.i.) max.	
<b>Input air conditioning</b>	Oil free to 0.1 p.p.m. and dry to 1.3 g/cubic Nm.	
<b>Air consumption (Nominal)</b>	400H 15.0 cubic m/h. ( 9.0 c.f.m. ) Fluidbed Unit	
<b>Input Connection</b>	¼" bsp male air fitting.	

**Pneumatic Controls**

**Pressure regulators and gauges**

These control the air supply pressure to the following :-

- i) Powder delivery    *4 bar (60 psi)*    **venturi jet**; controls delivery of powder from the venturi to the gun.
- ii) Dilution ratio      *2 bar (30 psi)*    **venturi dilution**; controls mixture ratio of powder to air from venturi to gun.
- iii) Gun-Forward air    *2 bar (30 psi)*    **air supply to gun**, prevents powder build up on face of deflectors and inside nozzle.

**Auxiliary output**

Maintained unregulated output for connection of ancillary equipment, eg. Second control unit or an air clean down gun. Connection 6mm. push in fitting. Supplied fitted with blanking plug.

**Weights & Dimensions**

<b>Complete Unit 400 H</b> weight/dims.	33 kg.	62cm x 45 cm x 108 cm
Packed Unit weight/dims.	40 kg.	72cm x 51 cm x 106 cm
Packed Unit volume	0.389m <sup>3</sup>	
<b>Manual Gun MG 400</b> weight/dims	0.495kg	33 cm x 20 cm x 4.5 cm
<b>Gun Control Unit GCU400</b> weight/dims	8.0 kg	28 cm x 28 cm x 12 cm

## ASSEMBLY INSTRUCTIONS

### **WARNING: THIS EQUIPMENT MUST BE EARTHED**

1. Carefully remove units and components from packaging, and check contents against packing list. (Placed in the box)
2. Secure the Gun Control Unit to the vertical column with the 2-off M6 x 10 socket cap head screws and lock washers as shown on page 23 (parts 14,15,16), using the long 5mm hex. key provided.
3. Connect the four un-connected airlines to the air fittings on the rear of the Gun Control Unit as follows:-  
**NOTE:-** Diagrams at the rear of this manual indicate the relevant connectors and fittings.
  - a) RED airline from the Venturi Jet to the bottom left hand air fitting.
  - b) BLUE airline from the Venturi Dilution Port to the centre left hand air fitting
  - c) CLEAR airline from Fluid Bed to the F. BED bottom right hand air fitting.
  - d) BLACK airline from the gun services assembly to the top left hand air fitting.
4. Connect the large BLACK airline (8mm.od.) to the centre right hand air fitting on the rear of the gun control unit.
5. Insert the suction tube through the spigot on the fluid bed lid until it latches into position,
6. Fit the venturi to the top of the suction tube and connect the airlines as follows:-
  - a) RED airline to POWDER DELIVERY air fitting at the top rear of the venturi (The sealing washer of this fitting is red).
  - b) BLUE airline to POWDER DILUTION air fitting at the top centre of the venturi. (The sealing washer of this fitting is blue).
7. Secure the Gun Hook to the side of the Gun Control Unit using the M6 x 50 socket cap head screw as shown.
8. Remove the hand gun from the carton. The gun is supplied fitted with a five meter hose and cable set comprising of :-
  - a) 1-off supply / trigger cable.
  - b) 1-off powder hose.
  - c) 1-off 6 mm air line.
9. Connect the round supply / trigger cable connector to the plug on the base of the gun handle, connect the black airline to the airline tail on the base of the gun handle and finally push the powder hose fully onto the spigot on the base of the handle.
10. The other end of the gun service assembly should be connected as follows:-  
The square 5 way electrical connector to the lower right connector on the rear of the control panel and secure using the metal latch. The 12mm. bore powder hose to the powder spigot on the venturi. The black air line to the top left hand air fitting on the rear of the gun control unit.
11. Connect a suitable airline to the 1/4" BSPMP air connection of the ball valve mounted on the side of the chassis.
12. If not already fitted, fit the spray nozzle to the gun by removing the large front retaining nut, inserting the electrode assembly into the nut, point first, and replacing on the barrel.  
Fit either the slotted cap over the front end of the nozzle, or the medium size deflector onto the stem of the electrode.
13. With the mains switch in the off position, connect the 4-way mains connector to the top left connector on the rear panel of the gun control unit and secure using the metal latch..
14. **IMPORTANT:-** When fitting a plug to the mains lead, it is essential that it contains an earthing/grounding contact that this is connected. Under no circumstances should this equipment be connected to a mains supply which does

not include an earthing/grounding wire and contacts. e.g. 2 wire extension leads as used for some domestic equipment **MUST NOT BE USED.**

**NOTE:-** The cable colour coding and connector pins used for the Gun Control Unit and its supplied cable are as follows:-

<u>Pole</u>		<u>U.S.A.</u>	<u>U.K.</u>	<u>Pin Connection</u>
Live	L	Black	Brown	1
Neutral	N	White	Blue	3
Earth / Ground	E	Green	Green/Yellow	E

**NOTE:-** The terminal connections used on the mains connectors on the rear panel of the unit coincide with the terminal connections used on the cable connectors.

**NOTE:-** For United Kingdom Installations see below:-

As the colours of the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:-  
The wire which is coloured GREEN and YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol , or coloured green or green and yellow. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured black. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured red.

**NOTE:-** The method of disconnection from the mains electrical supply is by removal of the plug on the mains lead from its respective supply socket.

**NOTE:-** If the system is to be permanently connected to mains wiring then the switch used to disconnect the unit from the supply voltage must disconnect all poles and have a contact separation of at least 3 mm.

***The unit is now ready for use.***

## SET UP PROCEDURE

1. Ensure that all switches are in the OFF position and that all pressure regulators are closed, (the knobs should be turned fully anti-clockwise). The knobs of the pressure regulators are released by pulling outwards and locked by pressing in.
2. Place powder in the fluidised bed, but do not overfill as the non-fluidised powder may rise by as much as 100 % in some instances.
3. Open the ball valve on the left hand of the chassis and adjust the pressure regulator on the left hand side of the chassis until approximately 5-10 psi. is indicated on the pressure gauge. When air bubbles are evenly distributed over the surface of the powder, turn the pressure down to the minimum level which will maintain a gentle 'simmering' with small evenly distributed bubbles over the surface of the powder.
4. Turn on the 'MAINS ELECTRICAL' switch of the control unit to the second position marked :- . The numerical display of set value and the mode indicator will illuminate. ● The electrostatic output will be disabled.  
*NOTE:-* Diagrams in the appendix indicate the various switches, regulators, etc.
5. With the spray gun pointing into an extracted spray booth, operate the trigger of the gun. A red LED will illuminate next to the `T` symbol on the display. With the trigger still pressed, open the left hand pressure regulator on the control panel (GUN AIR) to approximately 0.35 bar (5 psi.) This helps to prevent any powder build up at the front of the nozzle.
6. With the trigger still pressed, open the centre pressure regulator on the control panel (DILUTION AIR) to approximately 0.5 bar (7 psi.) and then open the right hand pressure regulator (POWDER DELIVERY AIR) to give the required powder output. A good starting point is 1 bar (15 psi.)  
*NOTE:-* It is good practice to always operate the powder control regulator last to avoid possible powder contaminating air lines.  
Check that all regulators are operating when the trigger is pulled and adjust pressures as necessary to ensure an even flow of the desired quantity of powder from the gun.
7. Having set the volume of powder required from the gun, if there is a tendency for the powder flow to surge unduly, this can normally be eliminated by adjusting the POWDER DILUTION AIR pressure.  
If, however, the fluidization of the powder is too violent, difficulty may be experienced in eliminating surging and erratic powder delivery.  
*NOTE:-* If the powder is damp, it may not be possible to achieve a smooth, even powder flow from the gun.
8. Turn the main switch on the front panel to the first position, This will enable the electrostatics when the trigger is operated. Press the `MODE` push button switch to set the operating mode in TEC1 with the green light illuminated. This will enable the setting of **Maximum** discharge voltage (kV) using the + and – pushbuttons between 10 to 85kV. The setting in kV. is displayed on the numerical display above the +/- buttons.
9. With the gun pointing into an extracted spray booth, operate the trigger and to see the actual discharge voltage and current displayed on the bar graphs. Voltage is displayed in green and current is displayed in amber. The maximum discharge current in TEC1 mode is 50 uA.  
*NOTE:-* The discharge current and voltage is dependent on the proximity of the spray gun needle to earth. When setting the maximum discharge potential the spray gun discharge needle should be placed approximately 100cm from earth.
10. With the trigger still pressed, press the `MODE` push button switch to set the operating mode in TEC2 with the amber light illuminated. This will enable the setting of **Maximum** discharge current (uA) using the + and – pushbuttons

between 5 to 100uA. The setting in uA. is displayed on the numerical display above the +/- buttons.

#### **11. Operating in TEC 1 mode:-**

The maximum discharge potential (kV) required will depend largely on the object to be coated, although such parameters as environmental conditions may affect the required settings. Generally, intricate objects or components with difficult return edges, internal corners or deep recesses, or welded tubular structures may benefit from low discharge potentials of 40-60 kV whereas large simple panels may benefit from higher potentials of 60-70 kV. It will be found that aluminum parts require lower settings than steel parts and that re-coating of items which have already been powder coated may require very low settings such as 30-40 kV. in order to prevent back ionization. Thicker coatings may often be applied with lower output voltages, whereas higher discharge potentials give more of a self limiting effect for thinner coatings, but care must be taken to avoid surface disruptions and back ionization.

#### **12. Operating in TEC 2 mode:-**

The discharge current (uA) required will depend largely on the powder being used and the quality of finish required.

Metallic powders can cause problems for electrostatic spray guns due to free metallic particles creating conduction paths within the gun or the external powder clouds causing loss of charge. Although the majority of metallic powders have encapsulated metallic particles and cause no problems, higher discharge currents may be required in order to overcome the leakage current where un-bonded metallic powders are used. The discharge current in TEC2 mode may be adjusted from 5 up to 100 uA. in order to overcome the leakage current and still generate a corona discharge to charge the powder

If lower discharge currents are used, 30uA, the operational distance of the TEC fold back characteristic will be extended to 600 mm. This may be of more use in automatic installations than for manual spray guns.

#### ***GENERAL NOTE:-***

An approved mask should always be worn when spraying.

#### ***GENERAL OBSERVATIONS:-***

It is essential that all substrates and jigs are clean and that there is a good earth / ground to the workpiece to ensure maximum powder attraction.

Powder spraying is best performed by slow motions of the spray gun as opposed to the faster gun movements often associated with liquid paint spraying. Higher powder emissions do not necessarily mean faster coating or better penetration into corners and recesses. In practice it can often cause the opposite effect and produces products with a poor finish.

Similarly, high electrostatic discharge currents or voltages do not necessarily mean faster or more efficient coating. Again, in practice, they can cause the opposite effect and produce products with a poor finish.

#### ***RECOATING:-***

The "Total Energy Control" charging system permits exceptional ease of recoating product which has previously been coated and cured. To take advantage of this ability it is necessary for the operator to use a different technique to that usually employed for recoating.

#### ***FOR BEST RESULTS:-***

Instead of turning down the voltage control to very low levels and pulling the gun away from the product, the charge control may be left at maximum and the gun may be taken close to the product surface, this also helps when penetrating recesses and corners. In some instances it may be necessary to reduce the charge control for better results.

## CHANGING COLOUR AND END OF SHIFT CLEANING

In order to prevent contamination of the product from a previous colour, it is essential to remove all traces of the previously sprayed powder from the application equipment. i.e. Powder container, suction tubes, Venturies, Powder hoses and Spray guns. Also any other surfaces where powder may become dislodged and cause contamination of the product or new powder. If the powder is to be reclaimed, then the spray booth, ductwork and recovery equipment must also be thoroughly cleaned.

**IMPORTANT: WHENEVER COMPRESSED AIR IS USED FOR CLEANING EQUIPMENT. THIS OPERATION MUST BE CARRIED OUT IN AN EXTRACTED SPRAYBOOTH. AN APPROVED MASK AND EYE PROTECTION SHOULD ALWAYS BE WORN WHEN USING A COMPRESSED AIR BLOW DOWN GUN.**

### End of Shift

1. Turn the mains switch to the OFF (0) position, discharge the gun by touching the corona needle to a good earth.
2. Turn the ball valve on the side of the chassis to the OFF position.  
*NOTE:-* This should always be turned off when the spray booth is not running to prevent powder fines from contaminating the atmosphere and surrounding area.
3. Remove the powder hose from the venturi and gun and with one end of the hose pointing into an extracted spraybooth, purge the inside of the hose with clean dry compressed air from both ends if possible.  
*NOTE:-* Always ensure that the open end of the hose is pointing into an extracted spray booth..
4. Remove the nozzle from the spray gun and clean internally and externally with compressed air. Clean the gun in the same way.
5. Refit the nozzle and powder hose to the gun and place the gun in a safe position then refit the powder hose to the venturi.
6. If the unit is to remain idle for long periods then it should be thoroughly cleaned as if for colour changing.

## **Colour Changing**

In order to prevent contamination of the new colour with the previous colour it is essential to remove all traces of the previously sprayed powder from the equipment. Also any surfaces where the powder may become dislodged and cause contamination of the product or new powder must be cleaned. If recovering the powder, then the spray booth and reclaim system must also be thoroughly cleaned.

1. Follow shut down procedures 1 to 5 but do not refit powder hose to the venturi.
2. Remove the venturi from the top of the suction tube and detach the airlines.
3. Using clean dry compressed air blow through the air fittings first.
4. Remove the powder tail complete with the PTFE insert and blow them clean.

**ALWAYS CHECK THE CONDITION OF THE PTFE INSERT FOR SIGNS OF EXCESSIVE WEAR AND REPLACE AS NECESSARY.**

5. Blow through the induction hole to fully purge the inside of the venturi.
6. Clean the outside of the venturi and refit the hose tail and insert.
7. Squeeze the oval plastic clip and withdraw the suction tube from the fluid bed lid and clean internally and externally.
8. Disconnect the clear fluidising airline before removing the fluid bed from the unit and empty the unused powder from the fluid bed.
9. Unclip and remove the band clamp from the base. Detach the base plenum, complete with the fluidising tile and clean all the fluid bed parts thoroughly using either
  - a) a vacuum cleaner or
  - b) a compressed air blow gun into an extracted spray booth

**NOTE:-** Care should be taken not to damage or scrape the fluidising tile

10. Re-assemble and refit the clear airline.
11. Remove the vent hose from the lid of the fluid bed and blow clean.  
**NOTE:-** Spare vent hoses can be carried and dedicated to specific colours.
12. Refit the lid and replace the vent hose. Re-insert the powder suction tube, clip the venturi back into place, replace the powder hose and reconnect the airlines i.e. red airline to fitting with the red sealing washer and blue airline to fitting with the blue sealing washer.

## **DO's and DON'TS**

### **DO's**

1. Ensure that the equipment is operated by trained personnel only.
2. Ensure that the equipment is serviced regularly by qualified personnel. All repairs and maintenance shall be carried out by qualified personnel only, in accordance with the manufacturers instructions. Repairs must be carried out at the instigation of the operator when faults or defects are detected. Repairs must not be performed in hazardous areas and must not compromise safety standards. (Any repairs or maintenance carried out by unqualified personnel will invalidate any warranty on the equipment).
3. Ensure that the operator is correctly earthed. If overalls are worn, they should be anti-static or non-insulating. If gloves are worn, they should be anti-static or non-insulating. If this is not possible, gloves with the palms removed may be used. Footwear intended for use by operators shall be anti-static or non-insulating and shall comply with the requirements of ISO 2251 / BS 5451 or equivalent. Shoes with leather soles are usually adequate.
4. Ensure that the operator wears suitable respiratory equipment and or protective clothing. All personnel working in a powder-laden atmosphere should wear similar equipment.
5. Ensure that the operator wears suitable eye protection e.g. goggles or a visor (in addition to a respiratory mask) when using a compressed air clean down gun as particles in the airstream can damage eyes.
6. Avoid skin contact with powders where possible as some powders may cause skin irritation.
7. Wash hands and face after work and prior to eating or drinking.
8. Keep floors and equipment within 5 metres of the spray area clean using a suitable industrial vacuum cleaner.
9. Keep light fittings and all other electrical equipment clean.
10. Regularly check the effectiveness of dust/powder collectors and extraction filters and that recycled air is clean.
11. Regularly check the earthing of electrical equipment and manually operated spray guns.
12. Regularly check the earth bonding of all conductive electrical enclosures and all conductive structures such as floors, walls, ceilings, fences, conveyors, powder containers etc. within the vicinity of the spray area. These shall be bonded together with the earth terminal of the high voltage generator to the protective earth system of the electrical supply. Electrostatic grounding should comply with EN 50053.
13. Ensure that all jigs and work pieces are adequately earthed. Each workpiece shall have a resistance to earth of not greater than 1 Mohm. This resistance shall be checked regularly.
14. Ensure that correct cleaning procedures are followed. See "Changing Colour and End of Shift Cleaning Procedures"
15. Ensure that powders are processed in compliance with the powder manufacturers instructions. Special care should be taken with powders containing metallic pigments.
16. Regularly check the compressed air supply to ensure that it is clean and dry.

## **DON'TS**

1. The operator must not wear insulating gloves, clothing or footwear.
2. Do not smoke in areas where powder coating is being carried out or in areas where powder is stored.
3. Do not eat or drink in areas where powder coating is being carried out or in dust-laden atmospheres.
4. Do not spray into areas which are not properly extracted. The direction of airflow should always be from behind the operator. It is recommended that airflow velocities over the face area of a booth opening should be in excess of 0.5 metres/sec.
5. Do not use compressed air for cleaning skin and clothing as it can penetrate the skin causing embolisms. Use a suitable industrial vacuum cleaner for clothing and wash skin with water.
6. Do not point compressed air clean down guns towards body orifices such as mouth, ears etc.
7. Do not enter spray booths when in operation.
8. Do not operate fluidised beds without connecting a suitable vent hose from its lid to an extracted area such as a spray booth.

**NOTE:-** The workplace must be kept tidy and well organised to reduce the risk ofidents. Good illumination, protection from any damp environment and correct storage of materials will assist the operator to maintain concentration and an awareness of potential hazards.

**NOTE:-** Before starting to clean the spray gun or carrying out any other work in the spraying area, the high voltage supply shall be switched off in such a manner that it cannot be re-energised by operating the trigger of the spray gun.

## FAULT FINDING

<b>-UNIT WILL NOT OPERATE (No LED's will illuminate)</b>	Check that mains connector is fitted to rear panel of control unit.
	Check that unit is connected to a suitable mains electrical supply and is switched on.
	Check that miniature circuit breaker (automatic fuses) on the rear panel of the control unit have not tripped. If one or more has, then press to reset. If it trips again, switch off unit and refer to an authorized distributor or service agent.
<b>UNIT WILL NOT OPERATE (LED's will illuminate)</b>	Check the trigger connections at the gun and on the bottom panel of the control unit.
	Check that the trigger switch in the gun is operating. Depress the trigger and an audible click should be heard if the trigger switch is operating and a red light should illuminate next to the letter `T` on the control panel.
<b>NO POWDER DELIVERY</b>	Check air supply to unit, and that the ball valve is turned on.
	Check that fluid bed is not empty, or the powder level too low.
	Check that the internal solenoid valve is operating by depressing gun trigger when an audible click should be heard and a red light should illuminate next to the letter `T` on the control panel. If it is not, check the trigger connections at the gun and on the rear panel of the control unit.
	Check for kinked or blocked powder hose.
	Check for blockage in suction tube, venturi body and gun.
	Check that the level of fluidization air is adequate to fully fluidise the powder.
<b>POWDER DELIVERY INTERMIT-TENT OR SURGING</b>	Check that there is sufficient powder in the fluid bed.
	Check ratio of dilution air to powder air and adjust if necessary.
	Check for any kinks or partial blockages in the powder hose, venturi suction tube and body, or gun. Blockages in powder paths may be caused by damp powder if the air supply contains more than the permitted level of moisture.
	Check that the venturi body is located securely and sealing at the top of the suction tube.
	Check condition of PTFE insert in venturi for signs of wear - replace as necessary.
	Check that the powder is not damp. If it is, it may be difficult to fluidise evenly and lumps may form in the powder causing partial blockages and 'spitting' from the nozzle of the gun. Powder may become damp if left for long periods in an open fluid bed or if the air supply contains more than the permitted level of moisture. Refer to the Pneumatic Data in the specifications.
	Check that the level of fluidization air is adequate to fully fluidise the powder.
<b>POWDER DOES NOT ADHERE TO WORKPIECE</b>	Check that main switch is set to the first position marked 1. The green and yellow LED bar graphs should be illuminated to show the level of electrostatic discharge from the spray gun
	Check the setting of the charge control is at a sufficient level to charge the powder effectively and that an electrostatic charge is present at the discharge electrode needle of the gun.
	Check that the workpiece is properly earthed/grounded.
	Check that the compressed air supply is clean and dry. Dirt and moisture trapped inside the gun may cause a loss of electrostatic charge to earth, if this is occurring the units warranty may be invalidated.

## DEFECTS ON FINISHED PRODUCT

<b>CONTAMINATION OF SURFACE WITH SPECKS OF OTHER COLOURS</b>	Application equipment inadequately cleaned after using previous powder.
	Airborne powder of different type within a contaminated spraybooth, or sucked in from dirty surroundings.
	Reclaimed powder contaminated with other powders from within the reclaim system e.g. ductwork, cyclone, booth etc.
	Airborne contamination within the oven.
	Dust or dirt dislodged from jigs or conveyor.
	Dusty environment before or after coating.
<b>LUMPS OR PROTRUSIONS ON SURFACE</b>	Dirty or contaminated powder.
	Dirty or contaminated substrate (workpiece)
	Rusty substrate
	Dusty environment before or after coating.
	Dust or dirt in oven.
	Dust or dirt dislodged from jigs or conveyor.
<b>HEAVY "ORANGE PEEL"</b>	Applied coating is too thick.
	Incorrect cure cycle and/or temperature.
	Inferior quality or powder.
<b>FISH EYES</b>	Contamination of substrate.
	Contamination of powder.
	Contamination of compressed air supply.
<b>CRATERS AND VOIDS</b>	Poor cleaning of substrate e.g.. trapped oils or solvents.
	Wet components e.g.. water trapped in corners or joints.
	Contamination of powder.
	Contamination of substrate.
<b>PIN-HOLING AND BUBBLES</b>	Porous substrate e.g. expansion or air or solvents from porosity or cavities in castings during curing cycle. Pre-heating of the workpiece may help to overcome this.
	Excessive electrostatic charge applied to the powder. To overcome, reduce the discharge current and / or increase the spraying distance.
	Rusty substrate.
	Contamination of substrate, powder, air supply or from dirty surroundings.
	Excessive moisture in compressed air supply. Refer to pneumatic data in specifications.

**NOTE:-** Contamination may be caused by airborne vapour such as wet paint, airline or conveyor oil or stripping facilities.  
Silicones and acrylic paints are the worst offenders and can contaminate the powder and/or substrate.

## TOTAL ENERGY CONTROL

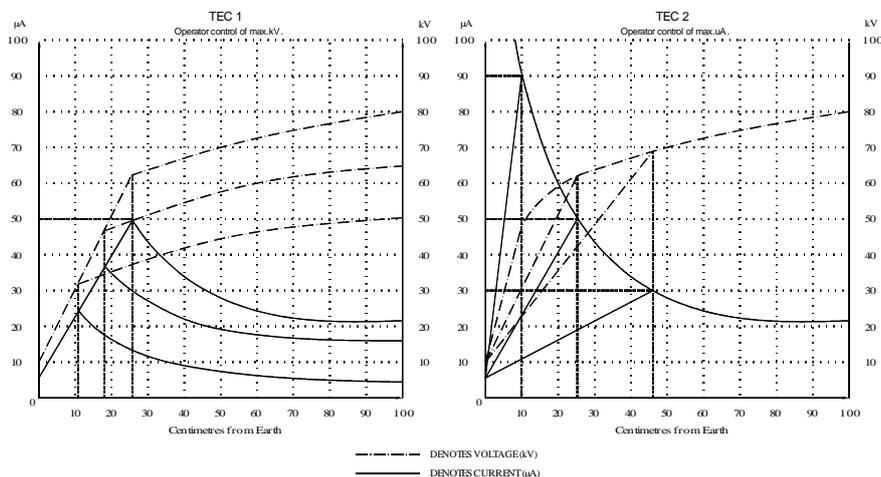
“Total Energy Control” is a patented system developed by EXEL INDUSTRIAL UK LTD. to automatically control the electrostatic charging energy of a spray gun to optimum levels of both current and voltage subject to the distance between the spray gun and the workpiece to be coated.

The spray material is not charged directly by the spray gun, but by the “charged air through which it passes between the spray gun and the workpiece. The charge density of the ionised air is a function of the discharge current from the gun. The smaller the distance between the gun and the workpiece, the smaller will be the volume of the air through which the powder travels, and the lower will be the discharge current required for the same charge density and vice versa. A reduction of discharge current is accompanied by a reduction in discharge voltage, resulting in a significantly lower discharge energy.

By automatically adjusting the total discharge energy in this way, the output is controlled from full discharge when away from the workpiece to minimal output when very close, but with the same high charging efficiency regardless of distance. A significant advantage of this technique is the ability to take the gun close in to a product to “place” the powder into hard to coat and Faraday Cage areas without the normal problems of overcharging the surface creating back ionization pinholes and orange peel, or blowing the powder off.

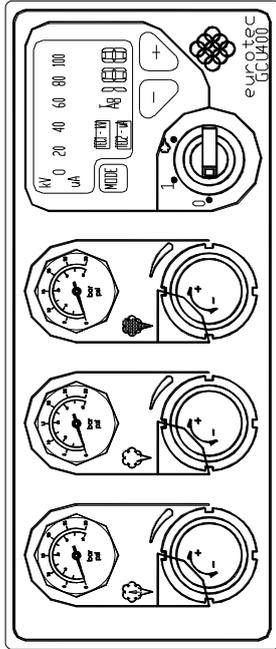
Total Energy Control is not new to Exel and is well proven and accepted for its coating benefits and ease of use. The original mode (TEC 1) with a 50 uA. threshold and operator adjustment of max kV is suitable for the majority of standard powders and applications is now enhanced by a second operating mode (TEC 2). This gives the operator adjustment over the max. output current up to a 100 uA. threshold. This will help with the spraying of some of the more difficult metallic powders. Alternatively, if the discharge current threshold is turned down to say 30 uA. the active operating range of TEC may be increased to say 500mm. which may be very useful for automatic applications where products have large variations in their profiles.

When powering up a control unit, the last operating mode and settings will automatically be recalled. When switching between operating modes, the last settings of the alternative mode will automatically be recalled. Adjustment to max. kV. (TEC 1) or max. uA. (TEC 2) is made using the + and – buttons and the set value is indicated on the numerical display. The discharge voltage and current are indicated on the LED bar graphs.



## GCU-400 Gun Control Unit Front Panel Symbols Explanation

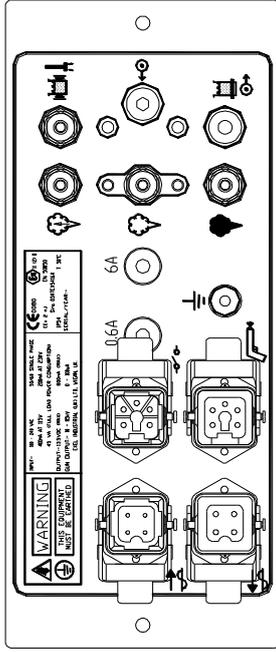
Illustration No. 6000197



- GUN AIR SUPPLY
- POWDER DILUTION AIR SUPPLY
- POWDER DELIVERY AIR SUPPLY
- UNIT OFF
- UNIT ON - POWDER & ELECTROSTATICS ON (AUTO GUN)  
- POWDER & ELECTROSTATICS ON WHEN GUN TRIGGER SWITCH OPERATED (MANUAL GUN)
- UNIT ON STANDBY FOR REMOTE OPERATION (AUTO GUN)  
UNIT ON WITHOUT ELECTROSTATICS WHEN GUN TRIGGER SWITCH OPERATED (MANUAL GUN)
- kV BAR GRAPH DISPLAY OF DISCHARGE KILO VOLTS
- uA BAR GRAPH DISPLAY OF DISCHARGE MICRO AMPS
- SET VALUE OF ELECTROSTATIC DISCHARGE - kV (TEC1) OR uA (TEC2)  
ILLUMINATED WHEN TOTAL ENERGY CONTROL MODE 1 SELECTED
- OPERATOR CONTROL OF kV  
ILLUMINATED WHEN TOTAL ENERGY CONTROL MODE 2 SELECTED
- OPERATOR CONTROL OF uA  
ILLUMINATED WHEN UNIT TRIGGERED BY MANUAL GUN OR REMOTE PLC
- ILLUMINATED WHEN AUTO GUN CONNECTED
- MODE PUSH BUTTON SELECTOR SWITCH FOR TEC 1 OR TEC 2
- PUSH BUTTON SWITCH TO REDUCE ELECTROSTATIC OUTPUT
- PUSH BUTTON SWITCH TO INCREASE ELECTROSTATIC OUTPUT

## GCU-400 Gun Control Unit Rear Panel Symbols Explanation

Illustration No. 6000198



- GUN AIR SUPPLY OUTLET
- POWDER DILUTION AIR SUPPLY OUTLET
- POWDER DELIVERY AIR SUPPLY OUTLET
- MAINS ELECTRICAL INPUT (ARROW POINTS TOWARDS CONNECTOR)
- MAINS ELECTRICAL OUTPUT (ARROW POINTS AWAY FROM CONNECTOR)
- ELECTRICAL OUTPUT TO GUN
- ELECTRICAL INPUT FROM REMOTE TRIGGER
- EARTH CONNECTION POINT
- 0.6A CIRCUIT BREAKER - GENERATOR SUPPLY
- 6A CIRCUIT BREAKER - SLAVE OUTPUT
- MAIN AIR SUPPLY IN (ARROW POINTS TOWARDS CONNECTION)
- FLUID BED / AUX AIR SUPPLY OUT  
(ARROW POINTS AWAY FROM CONNECTION)
- VIBRATOR / FLUIDISING PAD AIR SUPPLY OUT  
(ARROW POINTS AWAY FROM CONNECTION)



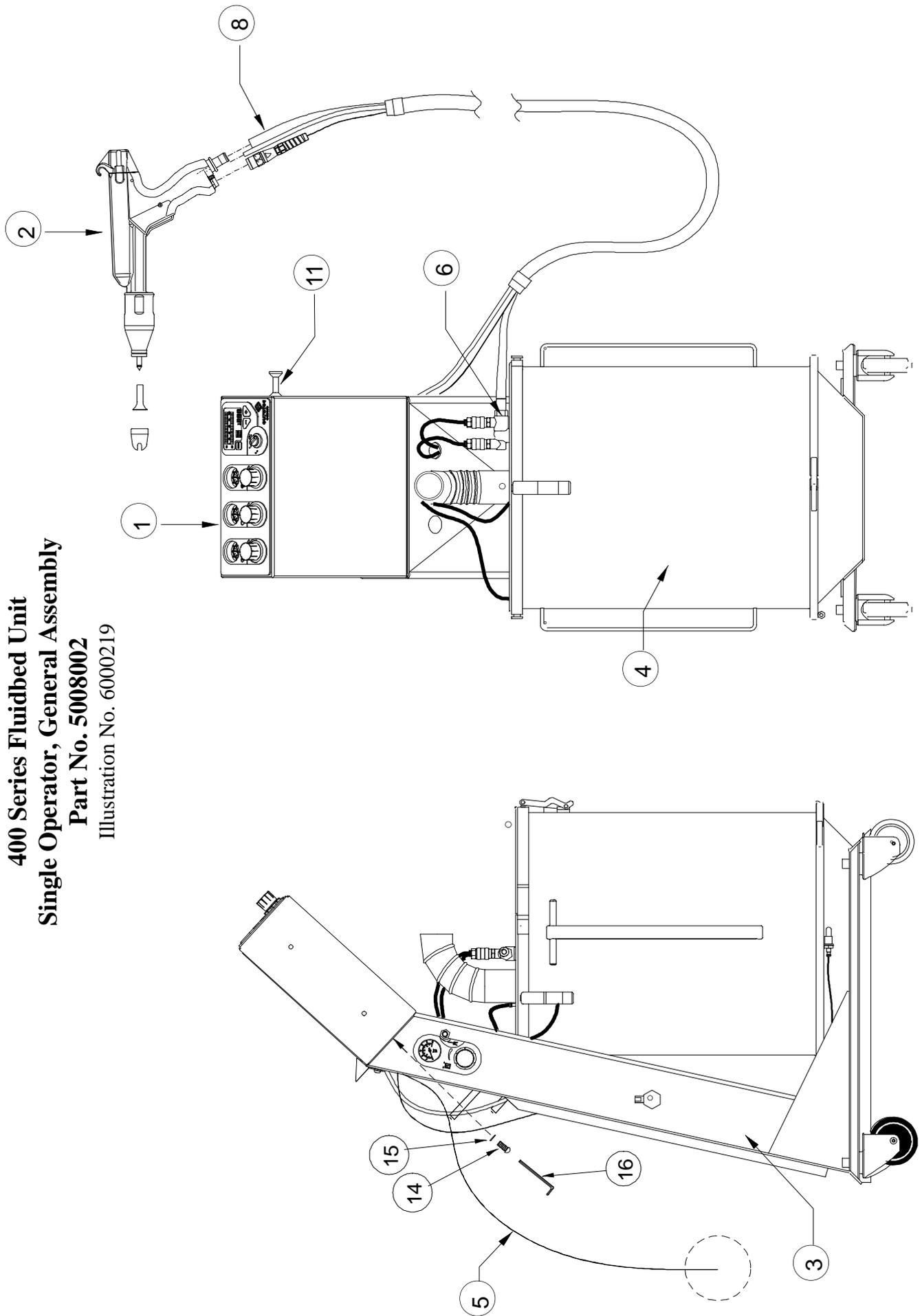
*APPENDIX (i)*

**ASSEMBLY DRAWINGS  
AND PARTS LISTS**



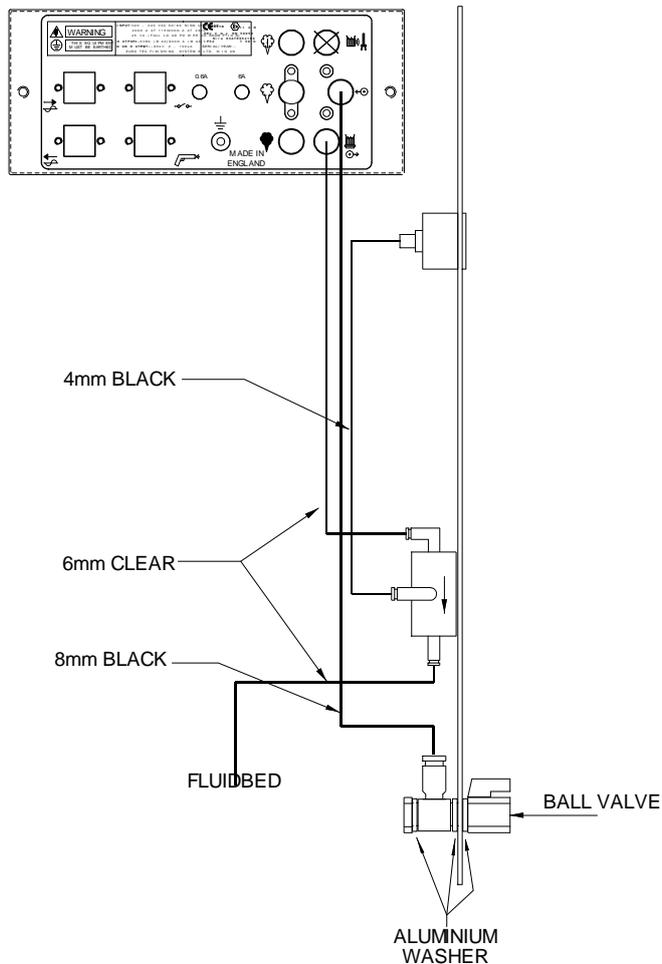
**400 Series Fluidbed Unit  
Single Operator, General Assembly  
Part No. 5008002**

Illustration No. 6000219



# Single Fluidbed, Piping Diagram

Illustration No. 6000220

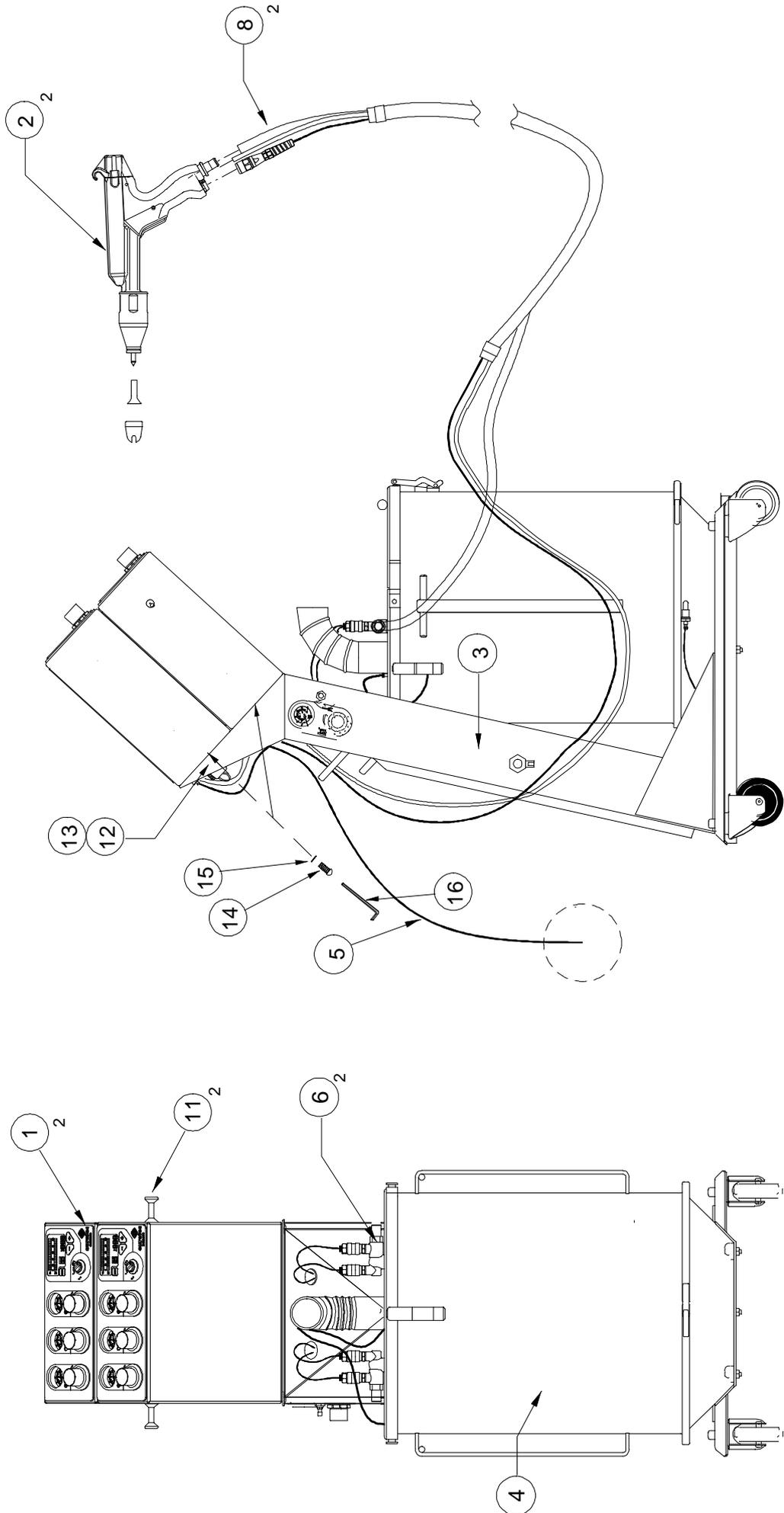


## 400 Series Fluidbed Unit, Single Operator, General Assembly. PARTS LIST

Item	Part No.	Description	Qty.
1	2024002	Gun Control Unit – GCU 400	1
2	3019002	Manual Powder Gun – MG 400	1
3	5008004	Chassis Assy, 400 Boxfeed	1
4	5008003	Fluidbed Body 50L	1
5	5000038	Mains Lead Assy	1
6	2095002	Venturi Assy, 400 Series	1
7	5008006	Suction Tube Assembly (NS)	1
8	3019036	Hose & Cable Set, 5M	1
9	5008030	Warning Label (NS)	1
10			
11	5009024	Gun Mounting Pillar	1
12	9000657	Screw, M6 x 10 Skt, Cap Head	2
13	9000840	Washer, M6, Crinkle	2
14	9001914	M5 Long Handle Allen Key	1
15	7000001	M4 Allen Key (NS)	1
16	7000000	M3 Allen Key (NS)	1

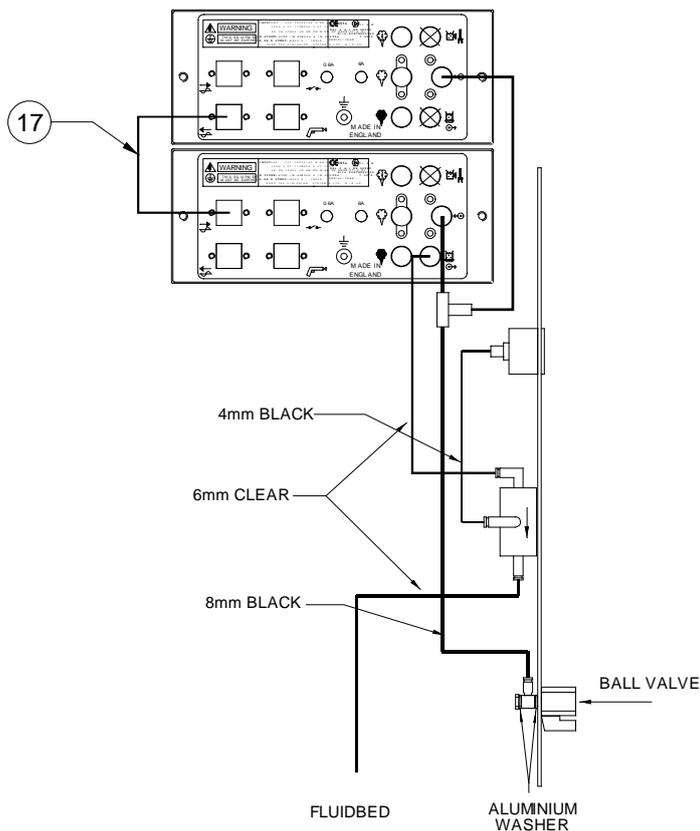
(NS) - Not Shown on this Illustration

**400 Series Fluidbed Unit**  
**Double Operator, General Assembly**  
**Part No. 5008005**  
 Illustration No. 6000221



# Double Fluidbed, Piping Diagram

Illustration No. 6000222



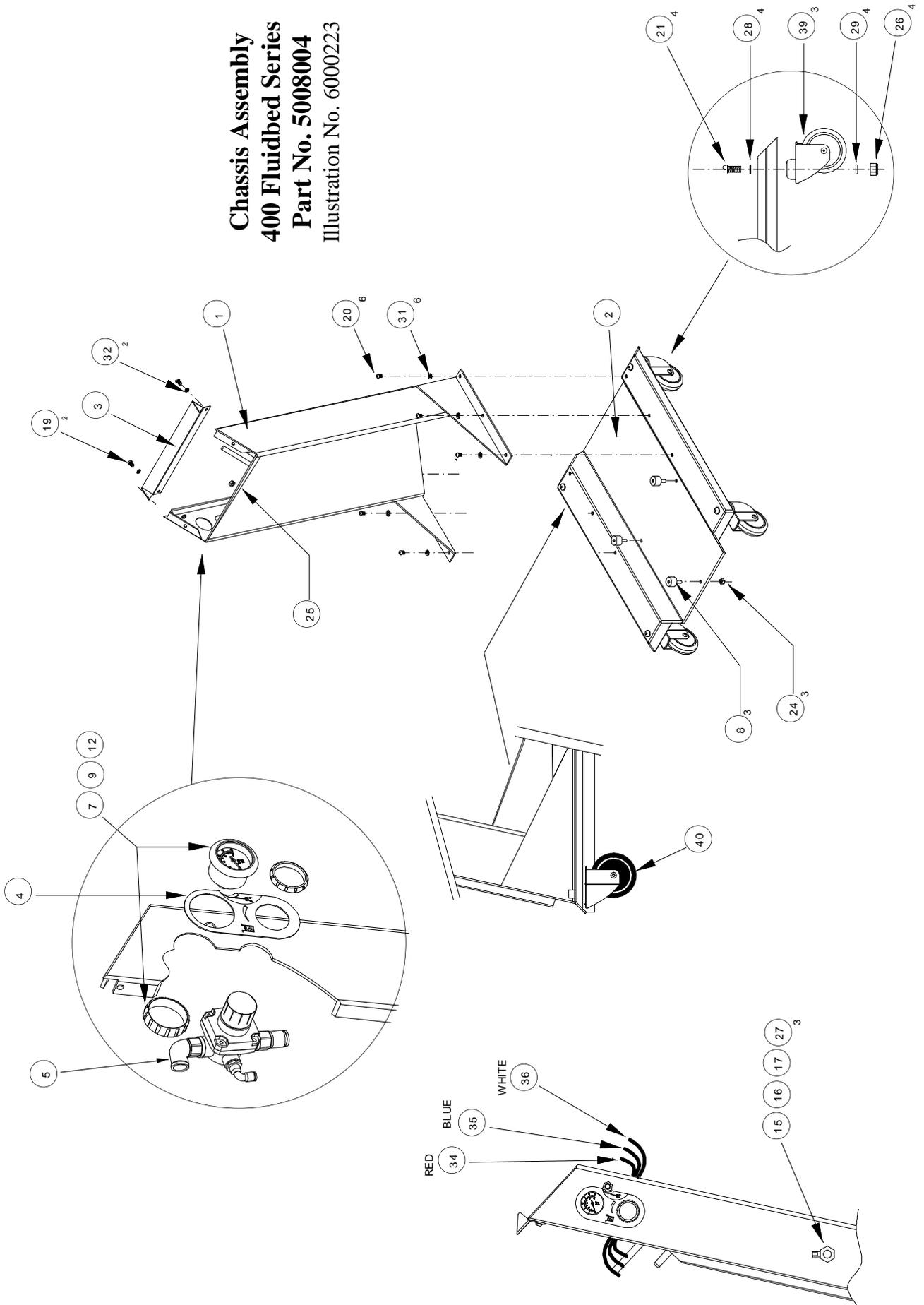
## 400 Series Boxfeed Unit, Double Operator, General Assembly.

### PARTS LIST

(NS) - Not Shown on this Illustration

Item	Part No.	Description	Qty.
1	2024002	Gun Control Unit – GCU 400	2
2	3019002	Manual Powder Gun – MG 400	2
3	5008004	Chassis Assy, 400 Boxfeed	1
4	5008003	Fluidbed Body 50L	1
5	5000038	Mains Lead Assy	1
6	2095002	Venturi Assy, 400 Series	2
7	5008006	Suction Tube Assembly (NS)	2
8	3019036	Hose & Cable Set, 5M	2
9			
10	5009020	Lift Tube Mounting Spigot (NS)	2
11	5009024	Gun Mounting Pillar	2
12	5009026	Mounting Bracket Left	1
13	5009027	Mounting Bracket Right (NS)	1
14	9000657	Screw, M6 x 10 Skt, Cap Head	2
15	9000840	Washer, M6, Crinkle	2
16	9001914	M5 Long Handle Allen Key	1
17	2001040	Mains Interconnection Cable	1
18	7000001	M4 Allen Key (NS)	1
19	7000000	M3 Allen Key (NS)	1
20	3019026	Latch Ring (NS)	2
21	9000821	Lock Nut, ¾ BSP (NS)	2

**Chassis Assembly  
400 Fluidbed Series  
Part No. 5008004  
Illustration No. 6000223**



**Chassis Assembly, 400 Series Boxfeed.***PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	5009017	Box Column Support	1
2	5009023	Box Base	1
3	5009022	Shelf	1
4	5009030	Regulator Overlay	1
5	5009007	Regulator Assembly,	1
6			
7	9001879	Pressure Gauge,4 bar Panel Mtg,Screw Body	1
8	9001915	Rubber Feet	3
9	5000040	Disc, Porous Plastic	1
10			
11			
12	9000052	Straight 1/8 BSPFP 4mm OD Tube, PI (NS)	1
13	9001672	Elbow, M5 – 6mm OD Tube, PI (NS)	1
14	9000366	Tee, 6mm.Equal PI (NS)	1
15	9001892	Ball Valve ¼ Mini	1
16	9001886	Banjo Bolt	1
17	9001888	Banjo Ring Piece	1
18			
19	9000603	Screw, M5 x 10 Skt. Btn. Hd. Blk. Zinc	2
20	9000650	Screw, M6 x 12 Skt. Btn. Hd. Blk. Zinc	7
21	9000760	Screw, M10 x 30 Skt. Btn. Hd. Blk.	4
22			
23			
24	9000809	Nut, M5 Nyloc	3
25	9000803	Nut, M6 Nyloc	1
26	9000808	Nut, M10 Nyloc	4
27	9001887	Washer, Aluminum	3
28	9000837	Washer M10. S/P	4
29	9000836	Washer M10 Plain	4
30			
31	9000835	Washer M6 S/P	7
32	9000849	Washer M6 Plain Full	2
33			
34	9000168	Tubing, 6x 4 PU, Red	1 Mtr
35	9000169	Tubing, 6x 4 PU, Blue	1 Mtr
36	9000170	Tubing, 6x 4 PU, Clear	1 Mtr

***Continued:-***

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
37	9000203	Tubing, 4x 2.5 PU, Black	0.1 Mtr
38			
39	9000065	Castor, 75mm Dia. Rubber	3
40	9000064	Castor, 75mm Dia. Elec. Conductive Rubber	1
41			
42			
43			
44			
45			

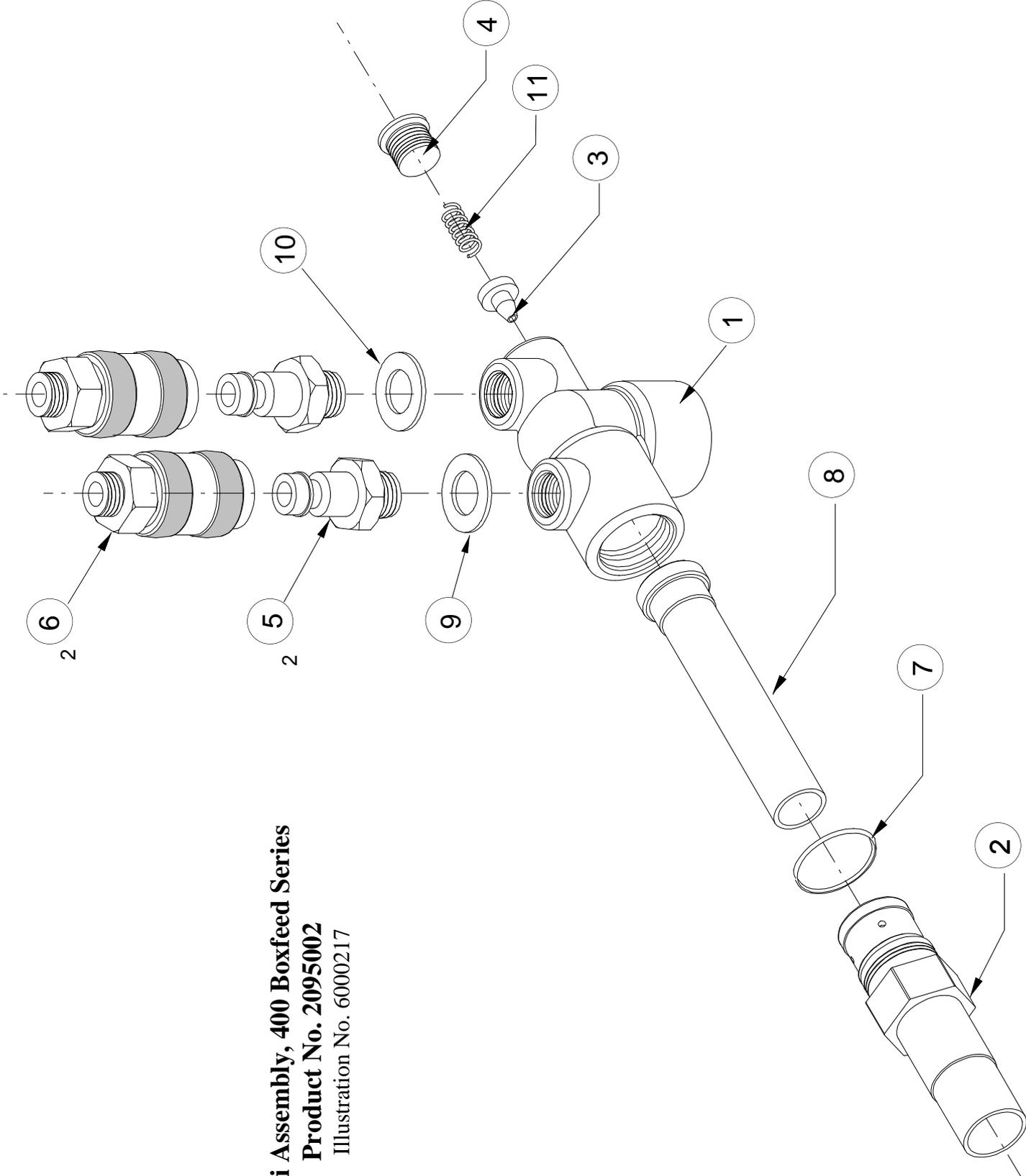
**(NS) - Not Shown on this Illustration**



**Fluidbed Body Assembly, 400 Boxfeed Series**  
*PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	5008021	Body, Fluidbed 50L	1
2	5008022A	Lid, F/B 50L Venturi Section	1
3	5008022B	Lid, F/B 50L Access Section	1
4	5008020	Plenum, 50L	1
5	5008023	Band Clamp	1
6	5000006	Tile, F/B 50L	1
7	5000033	Seal Fluid Tile, 50L	1
8			
9	9000068	Latch, Toggle, Rubber	3
10	9000852	Washer, 1/8 BSP, White Nylon	1
11	9001108	Straight M5FP-1/8BSP MP BNP	1
12	9001083	1/8 BSP Male Plug	1
13	9000347	Ball, Knob, Flat Lid	1
14	9001838	Seal Strip Self Adhesive, 15mmx5mm	2.4
15	9000552	Screw, M4x6 Pan Head	6
16	9000650	Screw, M6x12 Skt, Btn. HD, Black	3
17	9000849	Washer, M6 Plain	3
18	9000189	Elbow 1/8 BSP	1
19	9000113	Terminal, Earth, G/Y, Panel MNT.	1
20	9000302	Grommet, Blank, F/B	1
21	9000272	Quick Release Fitting	1
22	5009020	Lift Tube Mounting Spigot	1
23	3019026	Latch Ring	1
24	9000821	Lock Nut, 3/4 BSP	1

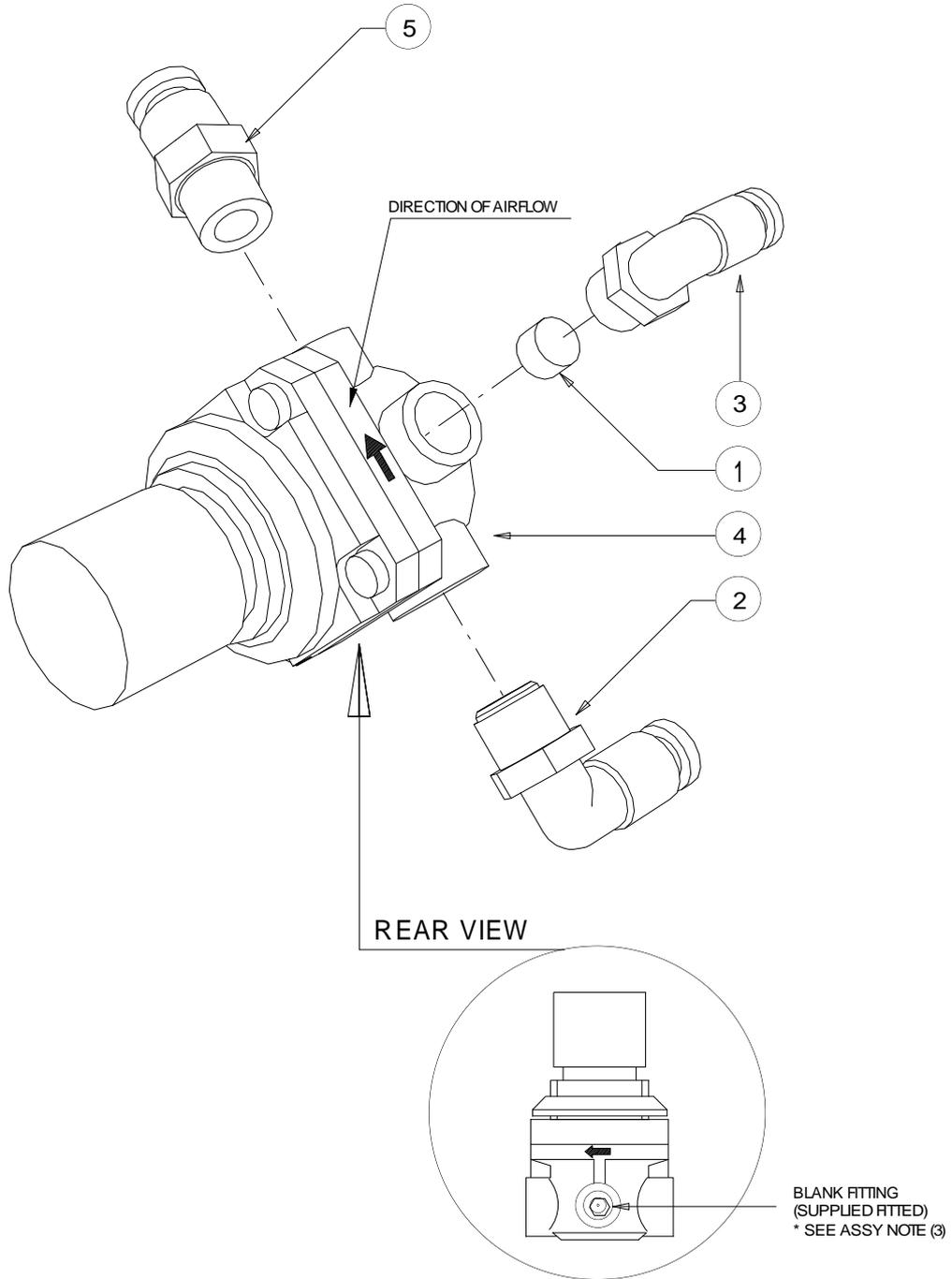
**Venturi Assembly, 400 Boxfeed Series**  
**Product No. 2095002**  
Illustration No. 6000217



**Venturi Assembly, 400 Boxfeed Series**  
*PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	2095010	Venturi Body	1
2	2090004	Venturi Tail, 12.5mm	1
3	2095013	Venturi Jet, Standard	1
4	9001874	Blank, 1/8 BSPMP, Hex, Skt	1
5	9001083	Plug, 1/8 BSP	2
6	9000272	Quick Release Air Fitting, Male	2
7	9001861	O-Ring, 15 x 1mm, Silicone	1
8	2090036	Insert, High Output	1
9	9000854	Washer, 1/8 BSP, Blue Nylon	1
10	9000853	Washer, 1/8 BSP, Red Nylon	1
11	9001855	Spring, Compression, Venturi Jet	1

**Pressure Regulator Assy 4 Bar  
400 Series  
Part No. 5009007  
Illustration No. 6000226**

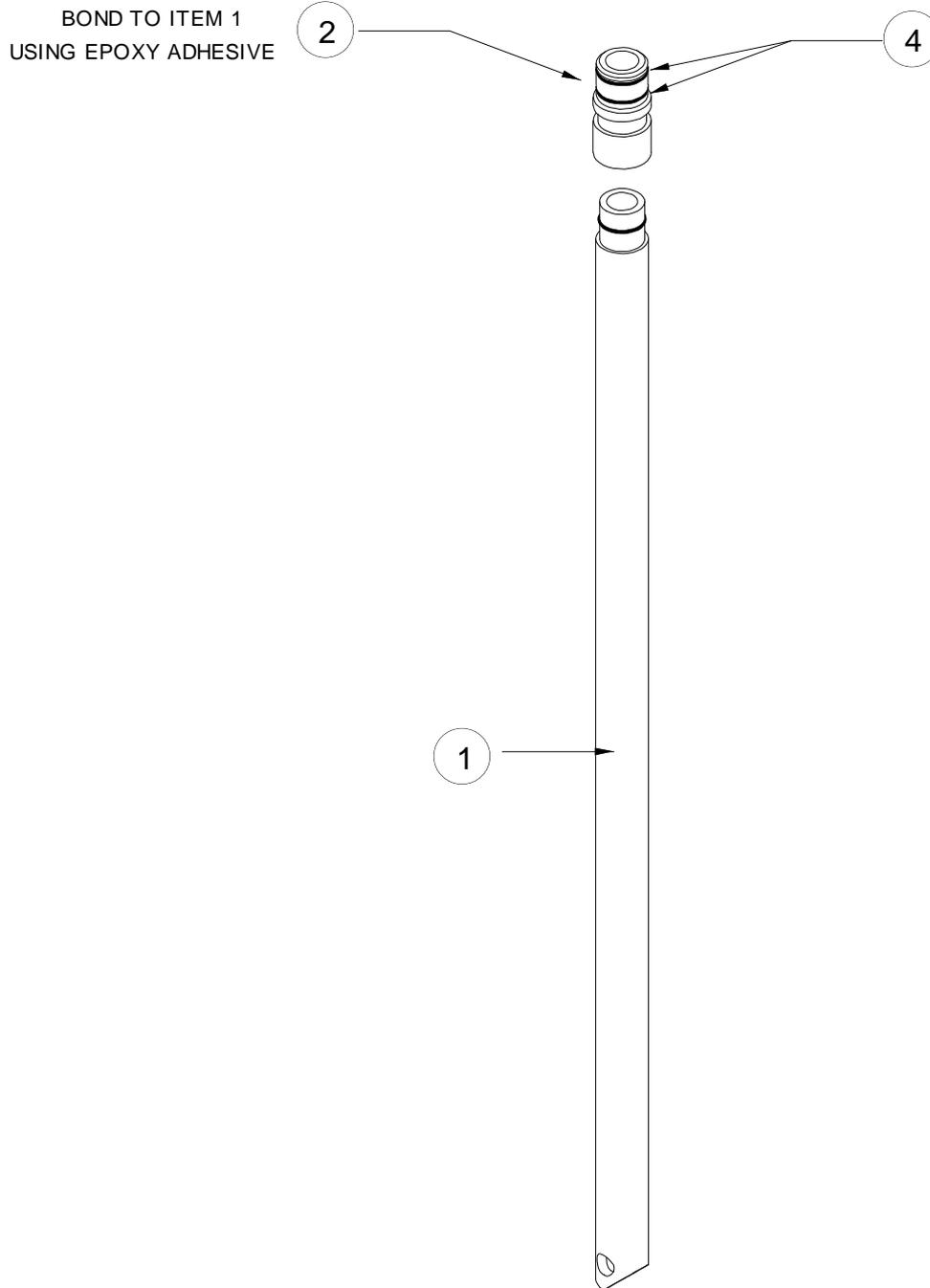


Item	Part No.	Description
1	5000050	Disc Porous Plastic 8 x 3.2Thk
2	9000033	Elbow, 1/4BSPMT 6mm OD Short PI
3	9000062	Elbow, 1/8BSPMT 4mm OD Short PI
4	9000112	Pressure Regulator, 4 Bar
5	9001889	Straight 1/8 BSP 6mm OD Tube PI

# Suction Tube Assembly

Product No. 5008006

Illustration No. 6000225



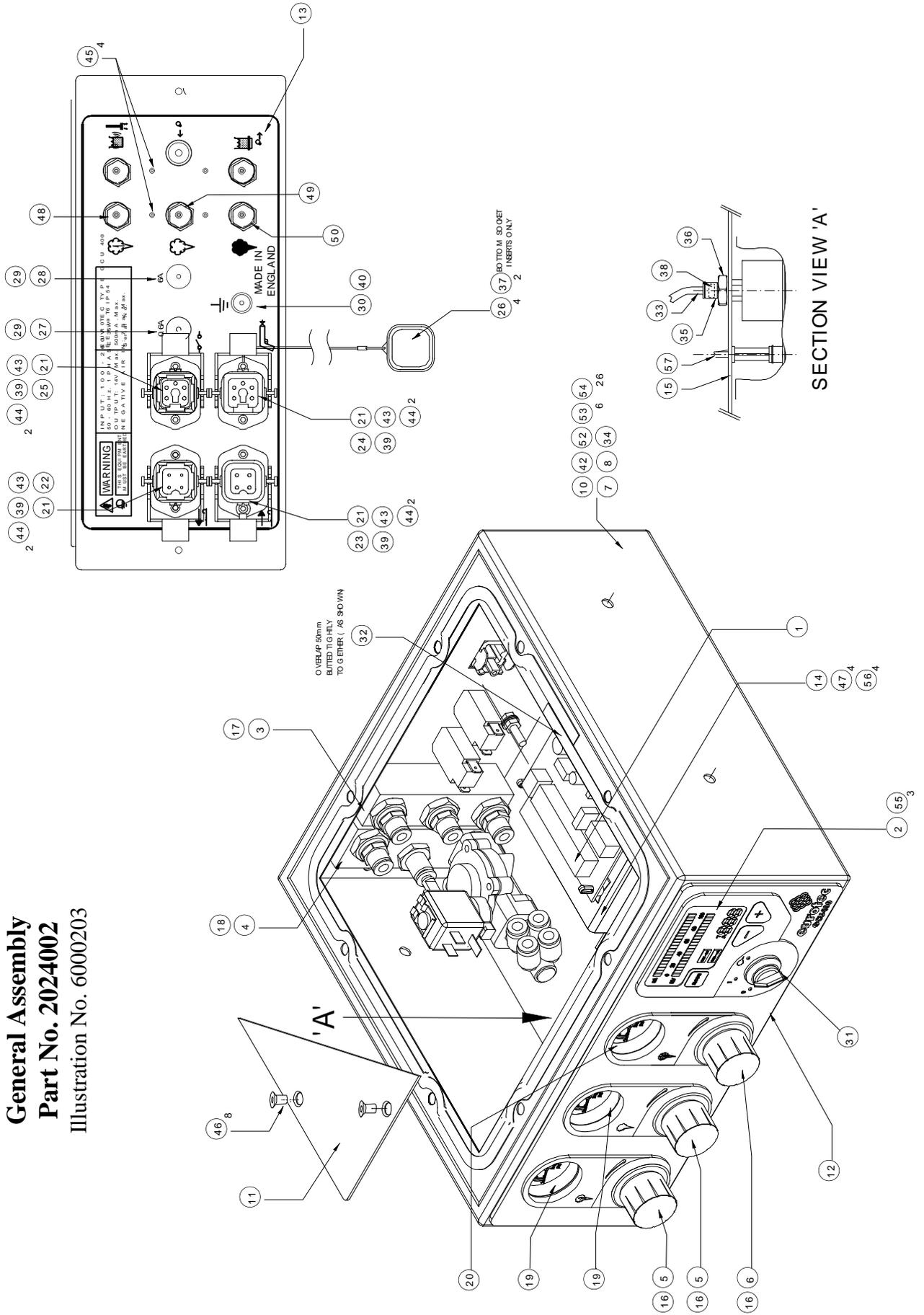
Item	Part No.	Description	Qty.
1	5008024	Lift Tube, Fluidbed 50L	1
2	5009019	Venturi Lift Top	1
3			
4	9001863	O-Ring 12 x 2, Silicone	2
5			

# 400 Series Gun Control Unit

## General Assembly

### Part No. 2024002

Illustration No. 6000203



**GCU 400 Series, General Assembly**  
*PARTS LIST*

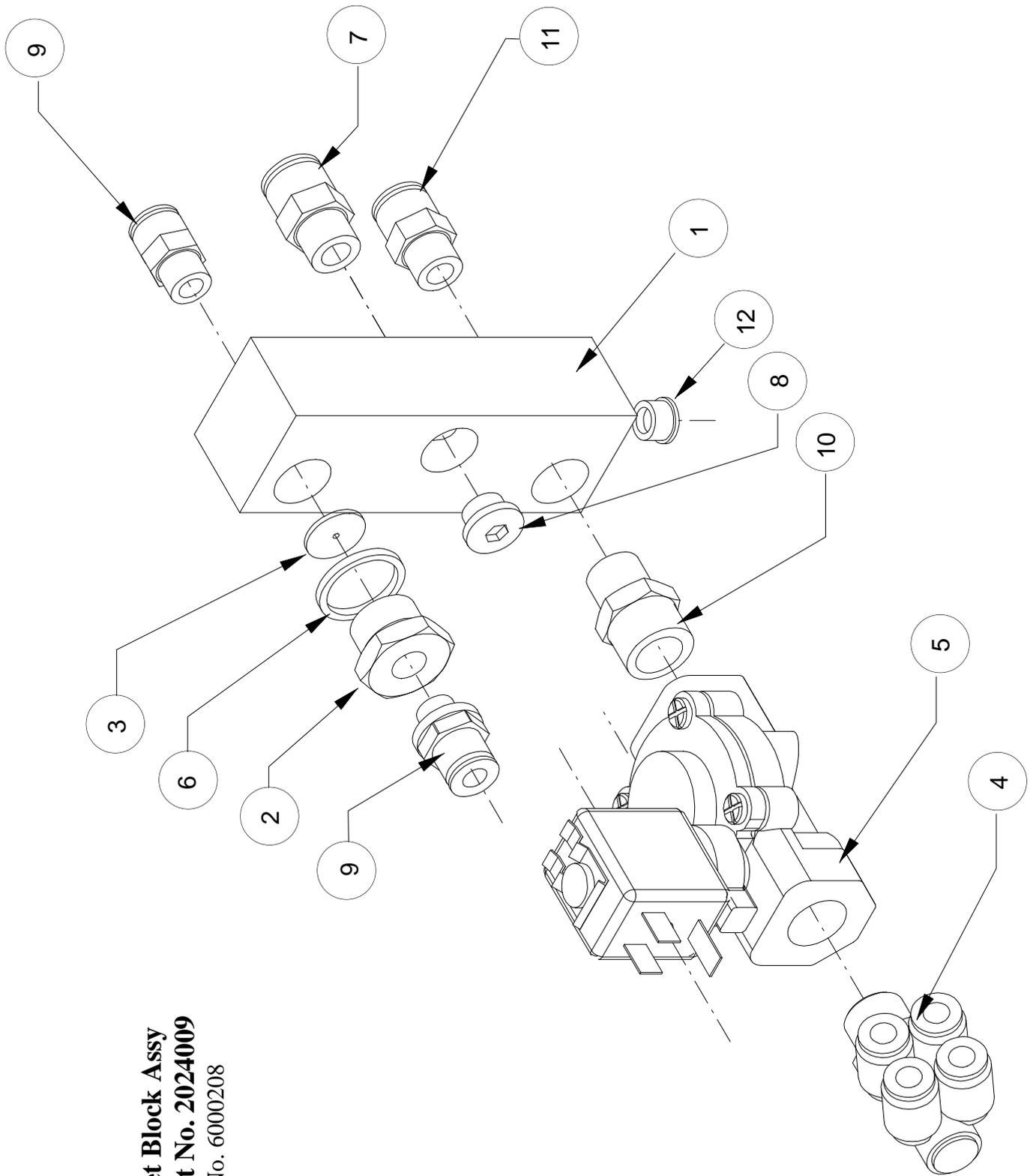
<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	2024006	Control PCB	1
2	2024005	Display PCB	1
3	2024021	Manifold, Outlet Block Assy	1
4	2024009	Manifold, Inlet Block Assy	1
5	2000026	Pressure Regulator Assy, 2 Bar	2
6	2010018	Pressure Regulator Assy, 4 Bar	1
7	2024007	Wiring Loom, Mains, GCU 400	1
8	2024008	Wiring Loom, Low Voltage	1
9			
10	2024010	Control Box Detail Type, GCU 400	1
11	2024011	Cover, GCU 400	1
12	2024012	Front Panel Overlay, GCU 400	1
13	2024013	Rear Panel Overlay, GCU 400	1
14	2024014	Chassis, 400 PSU/PCB	1
15	2024016	Gauge Support Plate	1
16	2024015	Spacer, Regulator	1
17	2020061	Gasket, Manifold Outlet	1
18	2020060	Gasket, Manifold Inlet	1
19	2024019	Pressure Gauge 30PSI / 2 Bar	2
20	2024020	Pressure Gauge 60PSI / 4 Bar	1
21	9000120	Connector Base, Panel Mounting	4
22	9000011	Connector Plug Insert, 3 pin + E	1
23	9000012	Connector Socket Insert, 3 pin + E	1
24	9000013	Connector Socket Insert, 4 pin + E	1
25	9000135	Connector Plug Insert, 4 pin + E	1
26	9000014	Connector, Protective Cover	4
27	9000016A	0.6A Circuit Breaker	1
28	9000018A	6A Circuit Breaker	1
29	9000019A	Circuit Breaker Boot	2
30	9000021	Terminal, Earth Post	1
31	9001322	Switch, Rotary, 2 Pole, 3 Position	1
32	9001785	Seal Strip, Foam, Self Adhesive, 15 x 3mm	1Mtr
33	9000203	Tubing, 4mm OD x 2.5mm ID PU, Black	0.4Mtr
34	9001843	Nylon Airline, 6mm	3Mtr
35	9000052	Straight, 1/8BSPFP – 4mm OD Tube PI	3
36	9000806	Lock Nut, 1/8 BSP Brass	3

*Continued:-*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
37	2020059	Gasket, Connector Cover	2
38	5000040	Disc, Porous Plastic	6
39	9000832	Washer, M3, Crinkle	4
40	9000862	Washer, M5 Ext. S/P	1
41			
42	9000650	Screw, M6 x 8, Skt, Btn Hd, Black	4
43	9000501	Screw, M3 x 6, St. Stl, Pan Hd	4
44	9000500	Screw, M3 x 8, Skt, Cap, Black	8
45	9000551	Screw, M4 x 8, Skt, Btn Hd, Black	4
46	9000600	Screw, M5 x 6, Skt, Csk Hd, Black	8
47	9000801	Nut, M4 Nyloc	5
48	9000855	Washer, 1/8BSP, Nylon, Black	1
49	9000854	Washer, 1/8BSP, Nylon, Blue	1
50	9000853	Washer, 1/8BSP, Nylon, Red	1
51			
52	9000205	Label, Warning, Disconnect Mains	1
53	9000008	Cable Ties Base, Self Adhesive	6
54	9000022	Cable Ties, 2.5mm x 100mm	26
55	9001849	PCB Pillars, Display Board, 9.5mm	4
56	9001847	PCB Pillars, Control Unit, 6.4mm	4
57	9001848	PCB Pillars, Gauge Support Plate, 22.2mm	4



**Manifold Inlet Block Assy**  
**G-CU-400, Part No. 2024009**  
 Illustration No. 6000208

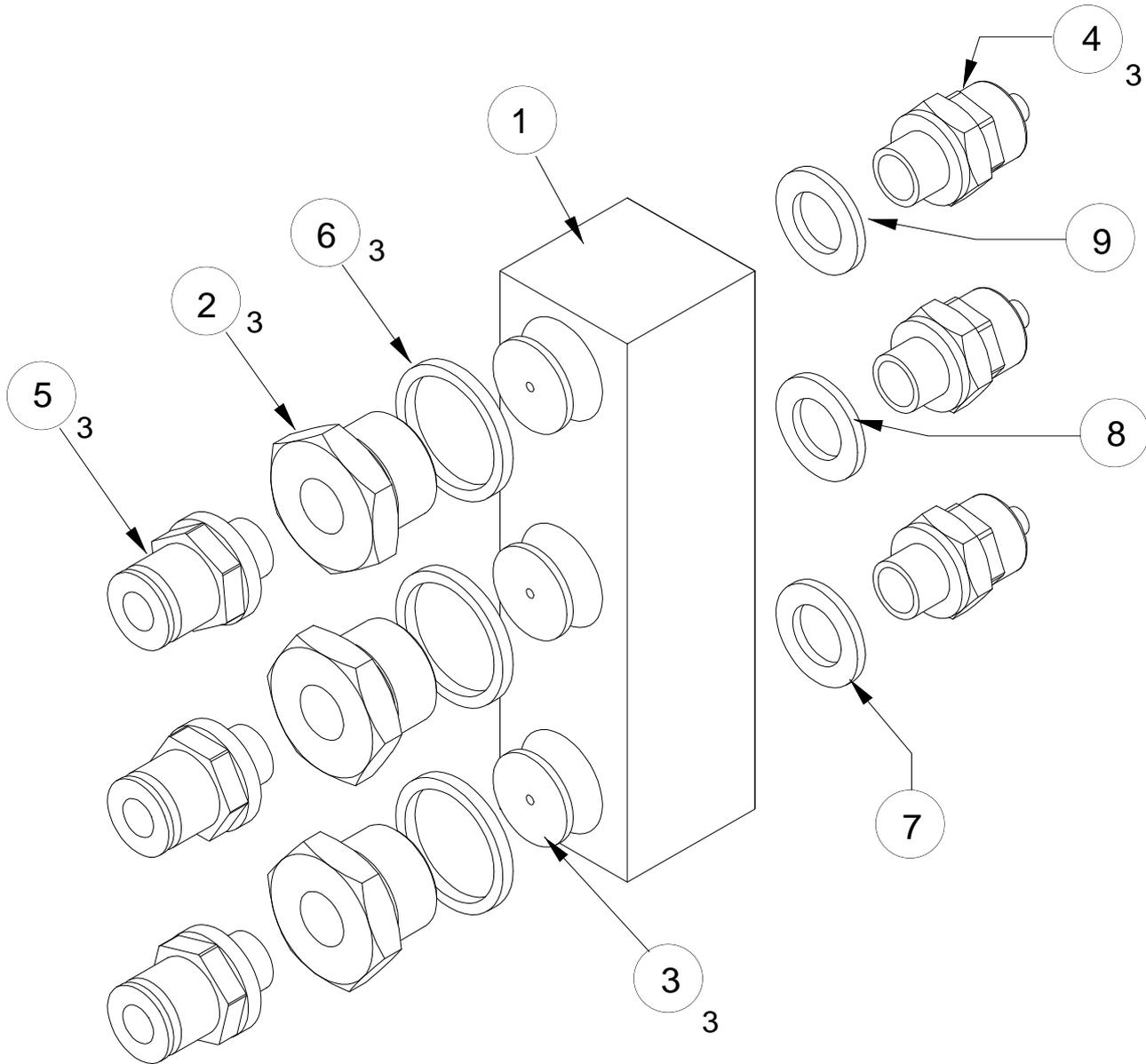


Manifold Inlet Block Assy

*PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	2000019	Manifold Inlet Block Detail
2	2000031	Valve, Non-Return
3	2000037	Seal, Non-Return
4	9001746	Banjo 3/8 – 6mm Quad
5	9000038	Valve, Solenoid, 2-2 3/8BSP 24V DC
6	9000042	Washer, Sealing, 3/8BSP, Nylon
7	9000030	Straight, 1/4BSPMT 8mm OD Tube, PI
8	9001880	Blank, 1/4 BSPMP
9	9000041	Straight, 1/8BSPMT 6mm OD Tube, PI
10	9000032	Straight 1/4BSPMT, 3/8BSPMT
11	9000105	Straight 1/4BSPMT 6mm OD Tube, PI
12	9001874	Blank, 1/8BSPMP, Hex, Skt

**Manifold Outlet Block Assy**  
**GCU-400, Part No. 2024021**  
 Illustration No. 6000211



**Manifold Outlet Block Assy**  
*PARTS LIST*

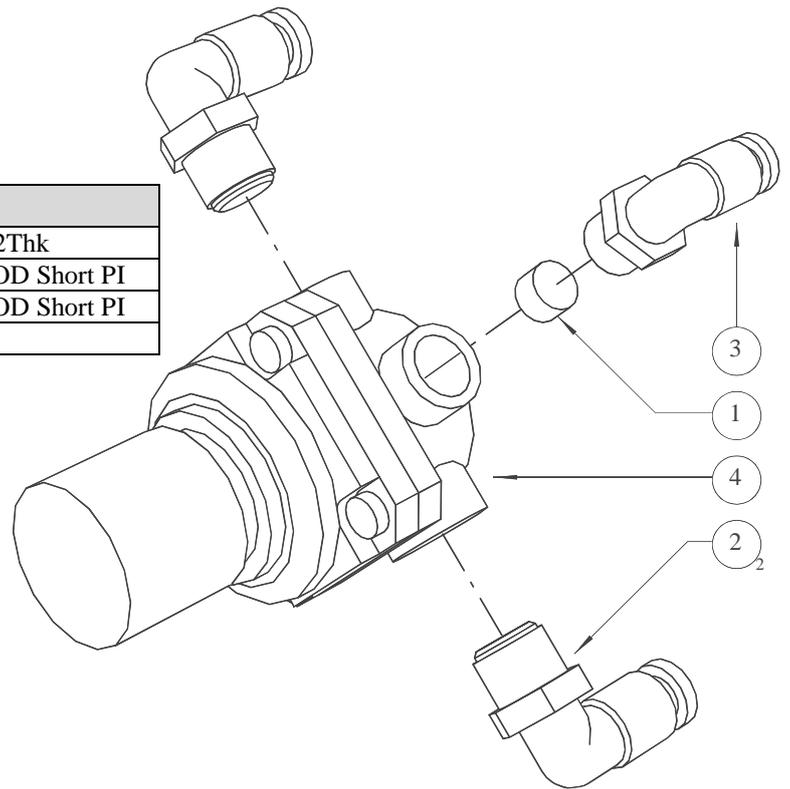
Item	Part No.	Description
1	2000018	Manifold Outlet Block
2	2000031	Valve, Non Return
3	2000037	Seal, Non Return Valve
4	9001045	Straight, 1/8BSP -6mm OD Tube Rapid, Metal I
5	9000041	Straight, 1/8BSPMP 6mm OD Tube PI
6	9000042	Washer, Sealing, 3/8BSP, Nylon
7	9000853	Washer, 1/8BSP Nylon, Red
8	9000854	Washer, 1/8BSP Nylon, Blue
9	9000855	Washer, 1/8BSP Nylon, Black

## Pressure Regulator Assy 4 Bar

Part No. 2010018

Illustration No. 6000091

Item	Part No.	Description
1	5000050	Disc Porous Plastic 8 x 3.2Thk
2	9000033	Elbow, 1/4BSPMT 6mm OD Short PI
3	9000062	Elbow, 1/8BSPMT 4mm OD Short PI
4	9000112	Pressure Regulator, 4 Bar

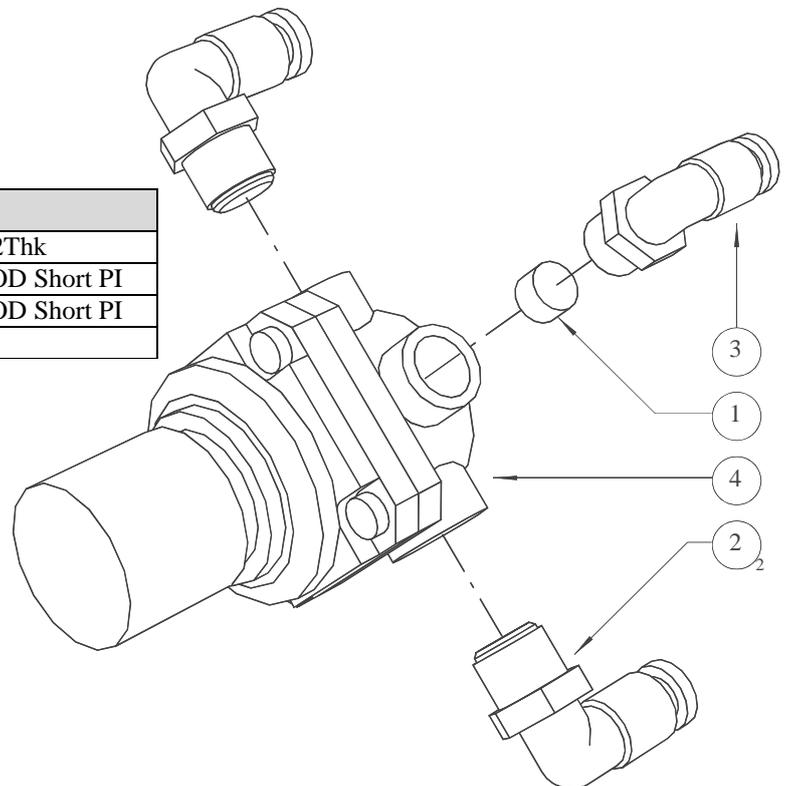


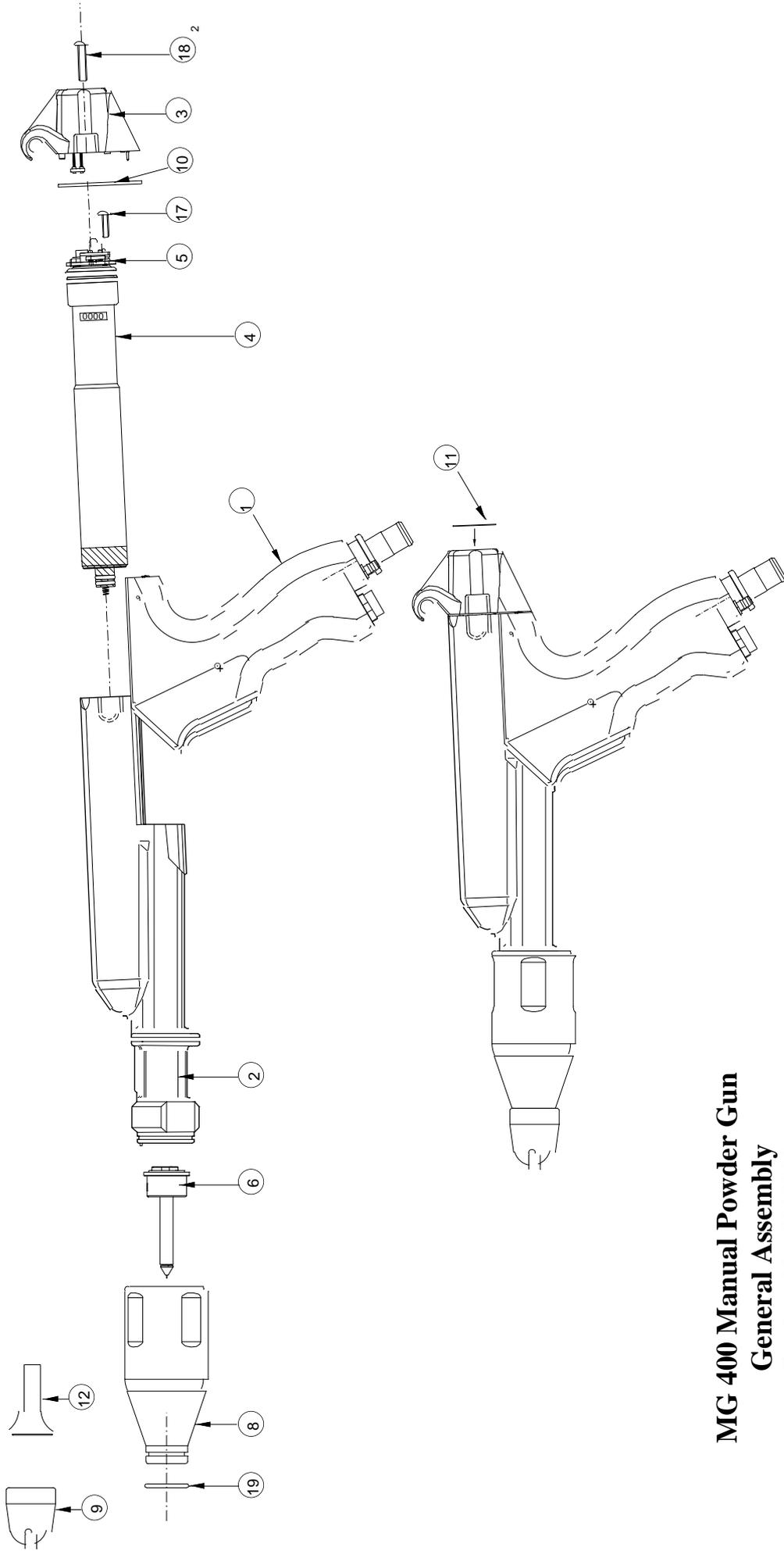
## Pressure Regulator Assy 2 Bar

Part No. 2000026

Illustration No. 6000090

Item	Part No.	Description
1	5000050	Disc Porous Plastic 8 x 3.2Thk
2	9000033	Elbow, 1/4BSPMT 6mm OD Short PI
3	9000062	Elbow, 1/8BSPMT 4mm OD Short PI
4	9000111	Pressure Regulator, 2 Bar



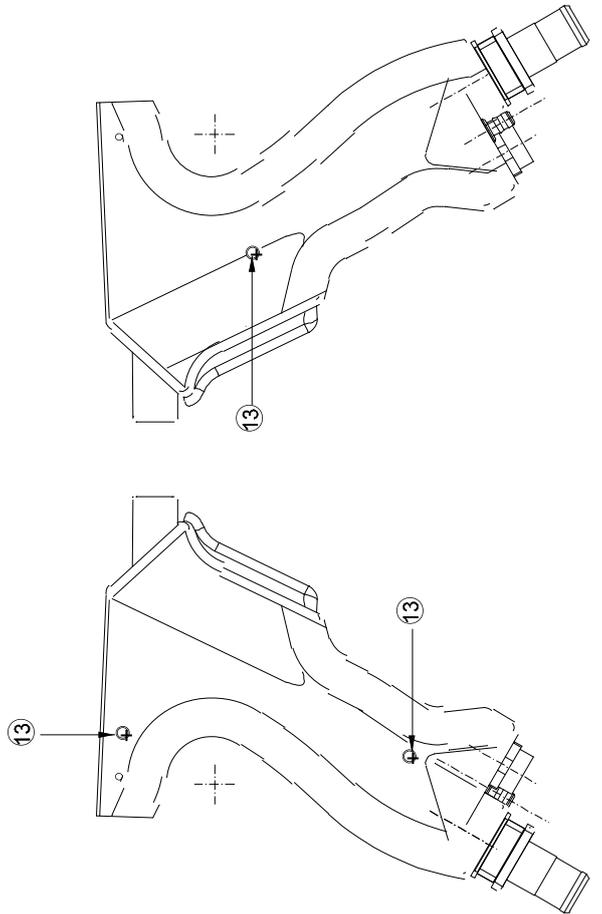
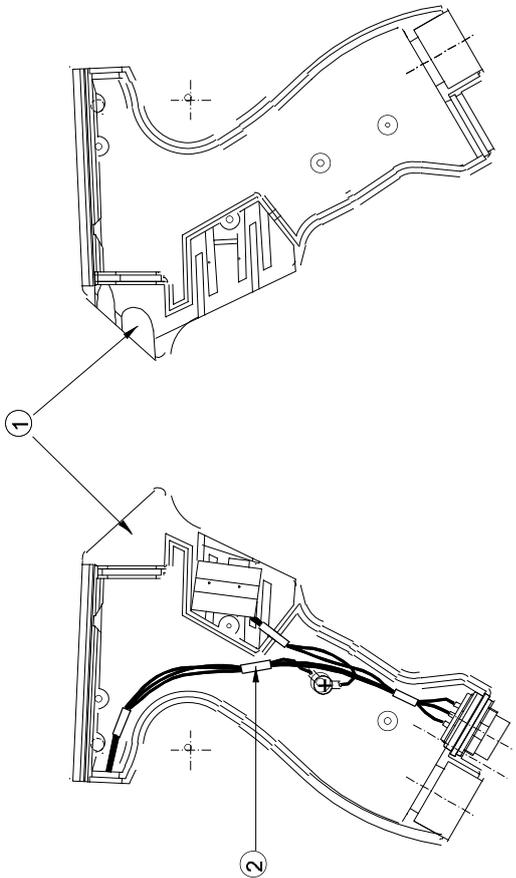
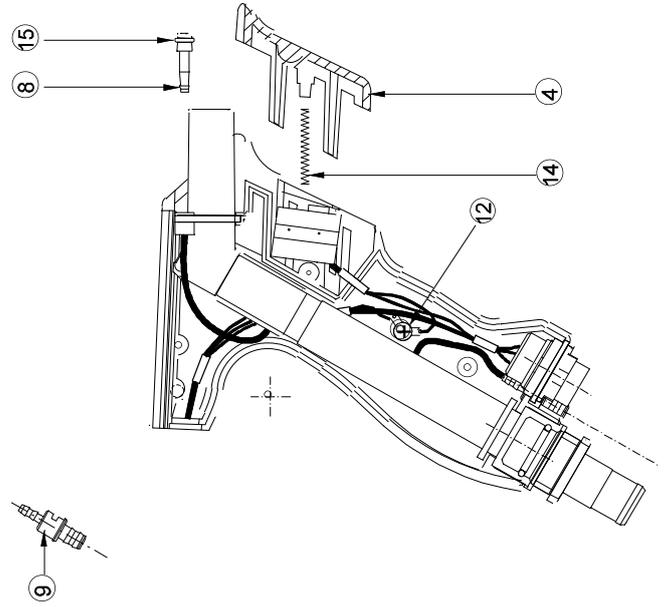
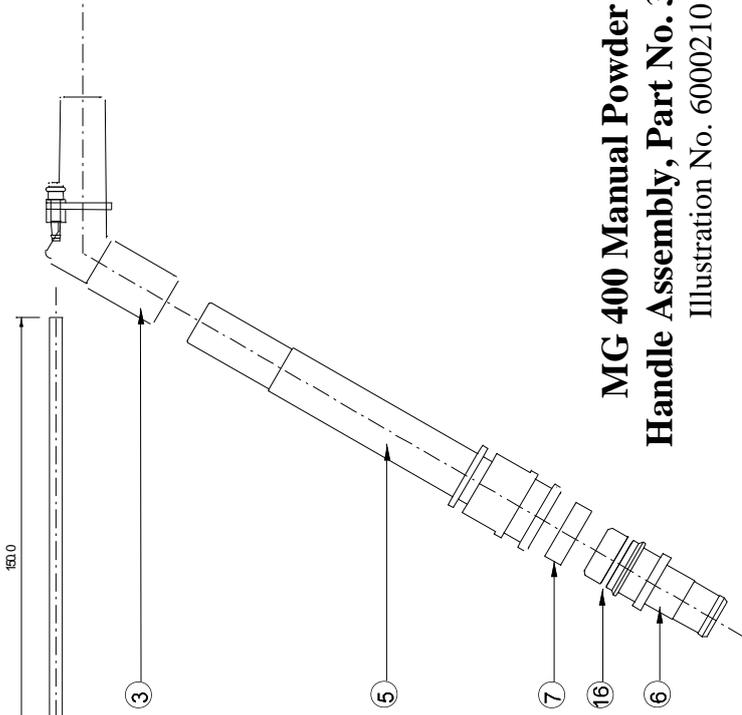


**MG 400 Manual Powder Gun**  
**General Assembly**  
**Product No: 3019002**  
**Illustration No: 6000209**

**MG 400 Manual Powder Gun General Assembly**  
*PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	3019004	Handle Assy, MG400	1
2	3019005	Barrel Assy, AG/MG 400	1
3	3019006	Rear Cap Assy, MG 400	1
4	3019007	HV Multiplier Assy, AG/MG 400	1
5	3019008	Oscillator Assy, AG/MG 400	1
6	3016185	Electrode Assembly	1
7			
8	3019013	Nozzle Nut, AG/MG 400	1
9	3019017	Slotted Cap, AG/MG 400	1
10	3019020	Gasket, MG400	1
11	3019040	Label Rating, MG 400	1
12	3016201	Medium Stem Spreader	1
13			
14			
15			
16			
17	9000511	Screw, M3 x 12, Button Head Sems	1
18	9000578	Screw, M4 x 20 Hex, Skt, T/Proof, Pan HD	2
19	9001856	O-Ring, BS018, Silicone	1

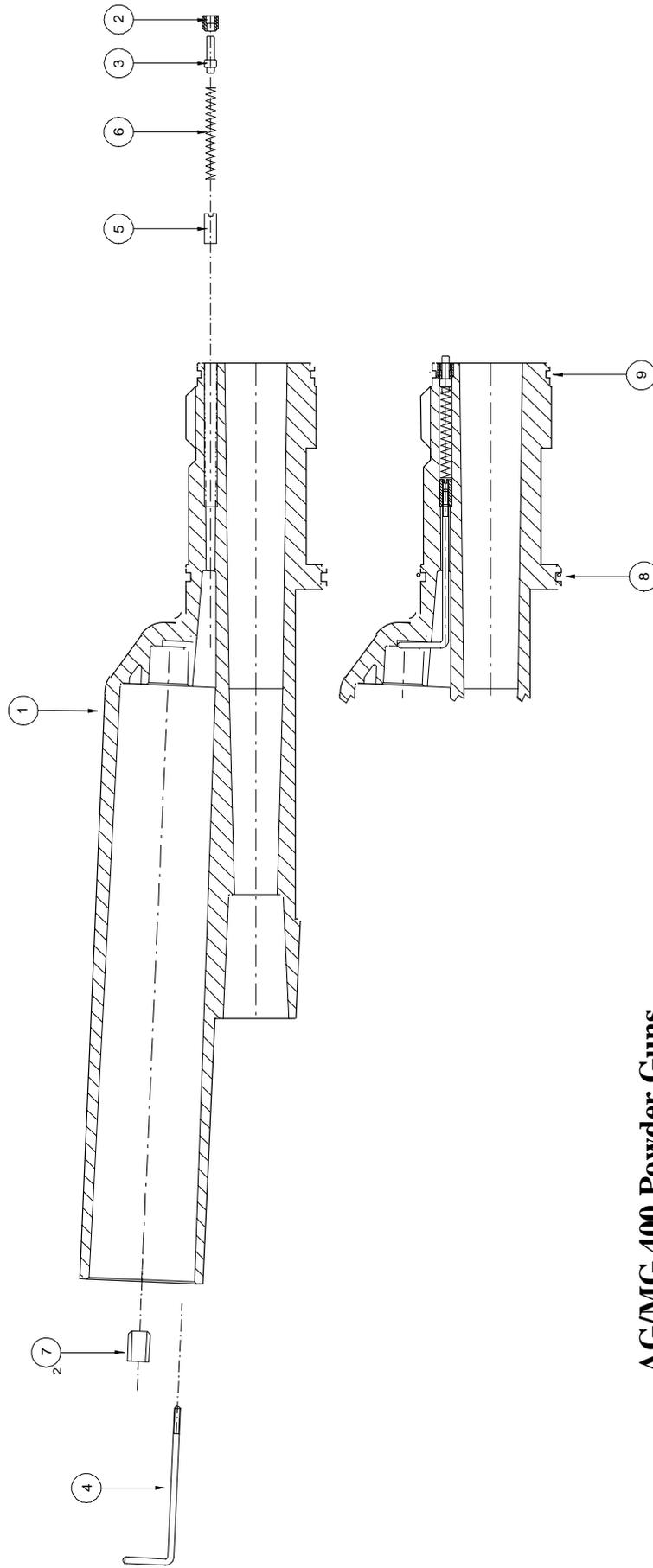
**MG 400 Manual Powder Gun  
Handle Assembly, Part No. 3019004**  
Illustration No. 6000210



**MG 400 Gun Handle Assembly**  
*PARTS LIST*

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1	3019033	Handle, Sub Assy, MG 400	1
2	3019009	Wiring Assy, MG 400	1
3	3019011	Elbow, MG 400	1
4	3019012	Trigger, MG 400	1
5	3019024	Powder Tube, MG 400	1
6	3019025	Powder Tail, MG 400	1
7	3019026	Latch Ring, AG/MG 400	1
8	3019027	Air Connector, Barrel, AG/MG 400	1
9	3019028	Air Connector, Handle, MG 400	1
10			
11			
12	9000501	Screw, M3 x 6 Pan HD	1
13	9000513	Screw, M3 x 20 Pozi, HD	3
14	9001853	Spring, Compression, Trigger	2
15	9001860	O-Ring, 3 x 1 Silicone	1
16	9001863	O-Ring, 14 x 2 Silicone	1
17	9000203	Tubing, 4mm OD x 2.5mm ID, PU	0.15M

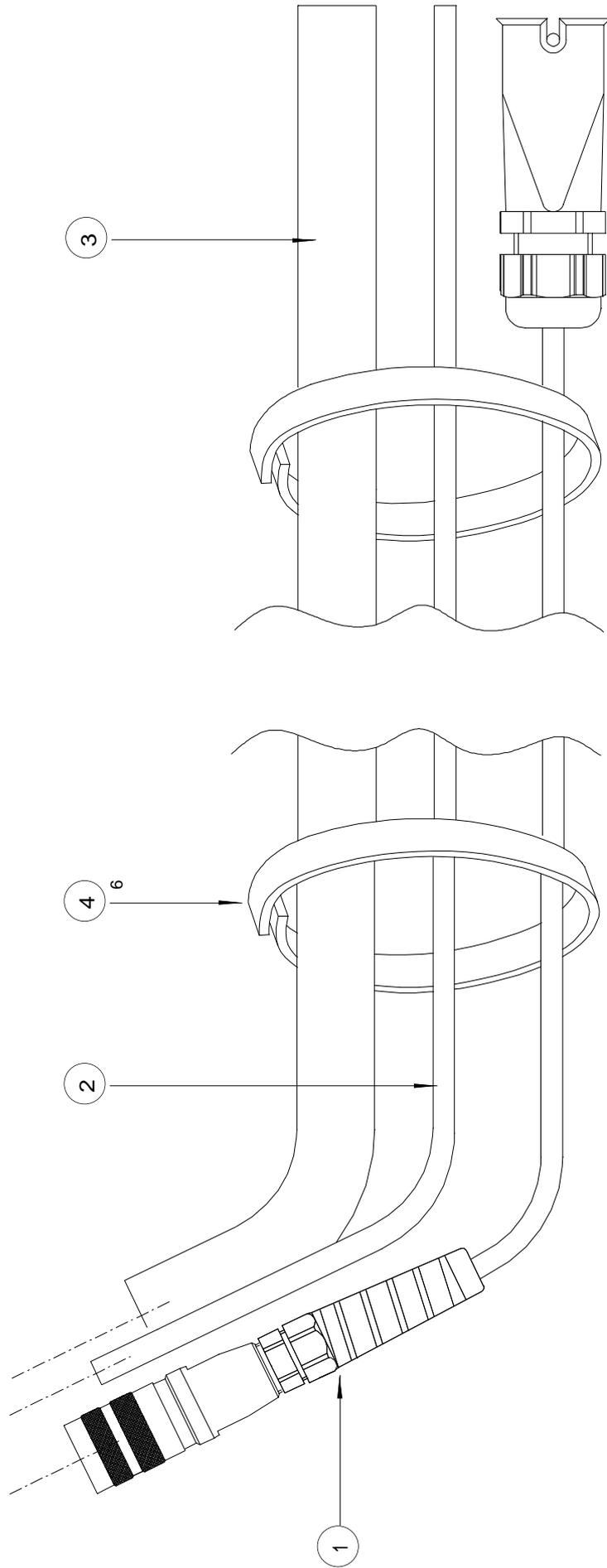




**AG/MG 400 Powder Guns**  
**Barrel Assembly, Part No. 3019005**  
 Illustration No. 6000199

Item	Part No.	Description	Qty
1.	3019010	Barrel, AG/MG 400	1
2.	3016013	HT Pin Retaining Screw	1
3.	3015024	HT Contact Pin	1
4.	3016038	HT Contact Rod	1
5.	3016039	HT Contact Nut	1
6.	9001852	Spring Compression,	1
7.	9001435	M4 Threaded Insert, Brass	2
8.	9001858	O-Ring, BS 022, Silicone	1
9.	9001856	O-Ring, 22 x 2.5mm, Silicone	1





**5m Hose & Cable Set General Assembly**  
**Product No. 3019036**

Illustration No. 6000201

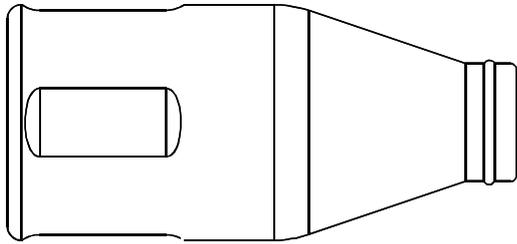
Item	Part No.	Description
1.	3016046	Cable Assembly
2.	9000084	Tubing, 6mm OD x 4mm ID, PU, Black
3.	9000081	Powder Hose Black
4.	9000256	Velcro, Double Sided



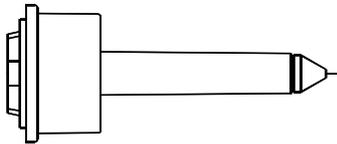
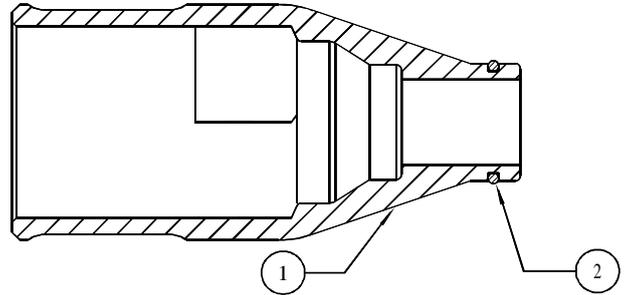
# Nozzle Components

## Automatic & Manual Powder Guns

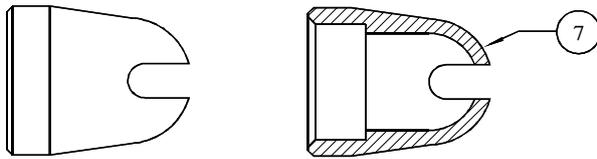
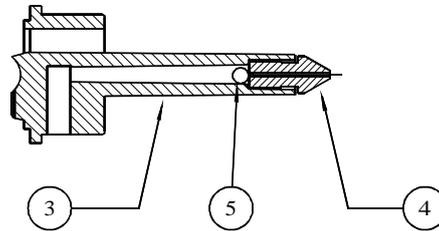
Illustration No. 6000202



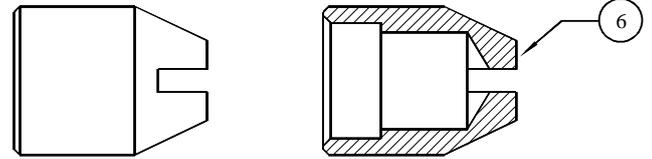
NOZZLE NUT, Pt. No. 3019013



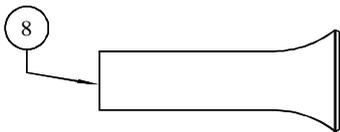
ELECTRODE ASSEMBLY Pt. No. 3016185



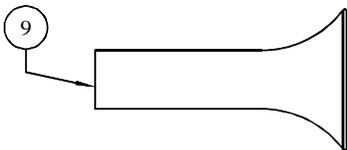
SLOTTED CAP - 6mm, Pt. No. 3019017



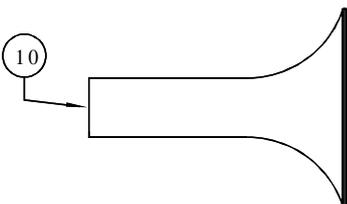
SLOTTED CAP - 4mm Pt. No. 3022019



STEM DEFLECTOR, SMALL Pt. No. 3016200



STEM DEFLECTOR, MEDIUM Pt. No. 3016201



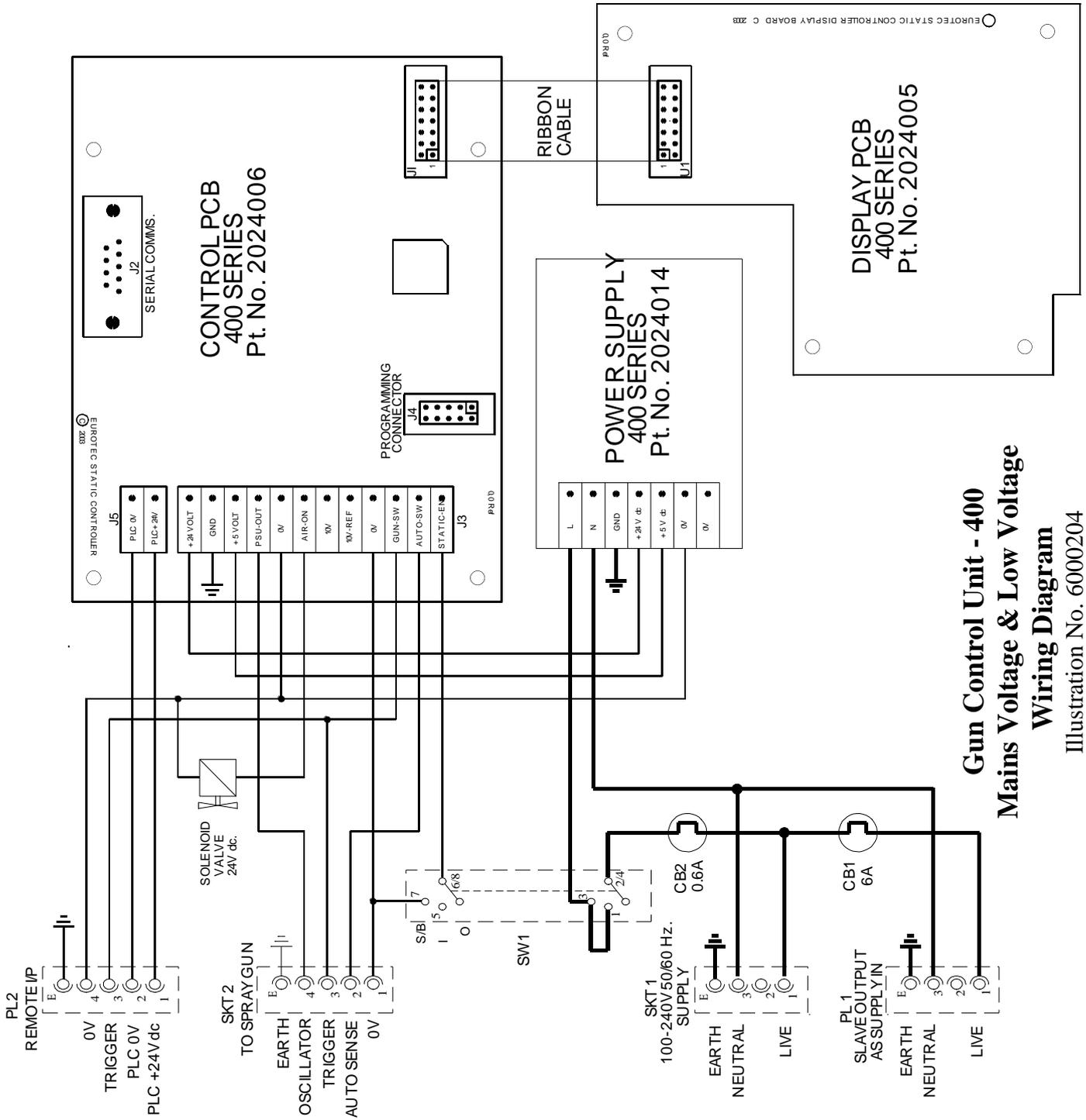
STEM DEFLECTOR, LARGE Pt. No. 3016202

Item	Part No.	Description
1	3019013	Nozzle Nut
2	9001856	O-Ring
3	3016158	Moulded Electrode
4	3016171	Electrode Support
5	3016172	Electrode
6	3022019	Slotted Cap - 4mm
7	3019017	Slotted Cap - 6mm
8	3016200	Deflector, Small
9	3016201	Deflector, Medium
10	3016202	Deflector, Large

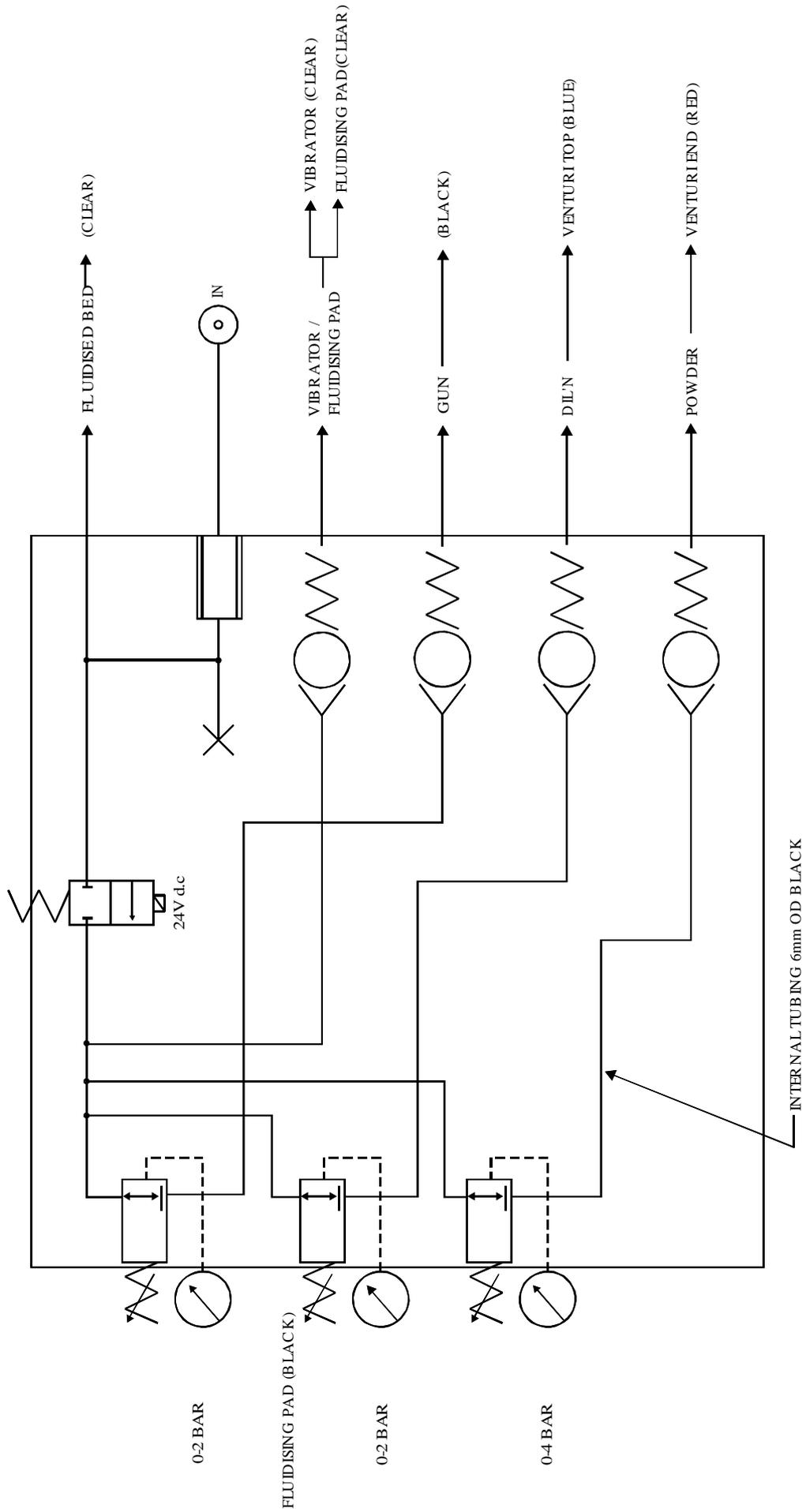


*APPENDIX (ii)*

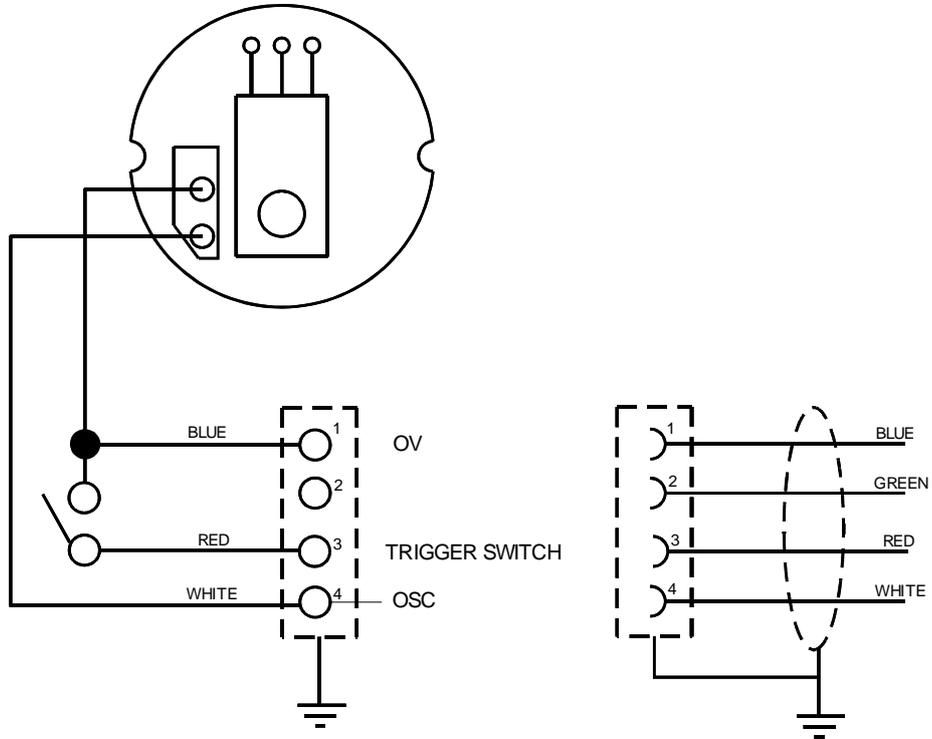
**SCHEMATIC DIAGRAMS**



**Gun Control Unit 400**  
**Pneumatic Diagram**  
 Illustration No. 6000205



**Manual Powder Gun**  
**Wiring Diagram, Oscillator PCB**  
Illustration No. 6000206



*APPENDIX (iii)*

## **WARNING LABELS**

**Fluidbed (H) 400  
Sira Warning Labels  
Illustration No. 6000228**

	<b>WARNING</b>	<b>INPUT:-</b> 100 - 240 VAC                      50/60 SINGLE PHASE 400mA AT 115V                              200mA AT 230V 45 VA (FULL LOAD POWER CONSUMPTION)	 <b>0518</b>  <b>II 2 D</b> <b>EEx 2 mJ</b> <b>EN 50050</b> <b>Sira 03ATEX5416X</b>
	THIS EQUIPMENT MUST BE EARTHED		

GCU 400 – Referred to  
Drawing No 2024002.  
Page No. 36

**FLUID BED UNIT**

 **0518**                       **II (2) D**  
**EEx 2 mJ**  
**EN 50050**  
**Sira 03ATEX5416X**

MODEL No. 400H  
PART No. 5008002  
SERIAL No. \_\_\_\_\_

**COMPRISING THE FOLLOWING:-**

GCU400 CONTROL UNIT	P/N 2024002
FLUID BED ASSEMBLY	P/N 5008003
CHASSIS ASSEMBLY	P/N 5008004

Boxfeed Assembly 400 – Referred to  
Drawing No 5008002  
Page No. 23

**MIG400**

Serial / Year \_\_\_\_\_  
Part No: 3019002

Sira 03ATEX5416X  
EEx 2 mJ EN 50050

 **0518**                       **II 2 D**

**IP54**                      **OUTPUT**                      **T 50°C**  
 85kV (-ve) Max  
 100 uA Max  
 Exel Industrial (UK) Ltd  
 Wigan, UK

Manual Powder Gun 400 – Referred to  
Drawing No 3019002  
Page No. 44

***NOTES:***