FAPC 3000 Process Conveyor Part: 500-503
&
FAPC 5000 Process Conveyor Part: 500-505

It is important that this manual is read prior to installation.
Incorrect installation and maintenance of machine may invalidate your Warranty

INSTALLATION AND OPERATION USER GUIDE

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Version 11/2012

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1. INTRODUCTION

The 'Fanjet Adjustable Process Conveyor' or FAPC Processors Unit is free standing and has been designed to work with the latest, developing, etching or stripping chemistry for the manufacture of prototypes, small batch work, Printed Circuits and Metal Components.

We have designed our Processors with modern technology making them very easy machines to dismantle for routine cleaning and servicing.

All controls and filters are easily accessible from front and sides, therefore eliminating the requirement to access the rear of the machine, and the necessity to move the machines once sited. The machines can be positioned with the back against a wall thus saving space.

PLEASE NOTE: **These machines are heavy.**
FAPC 3000 = 90 kilos
FAPC 5000 = 150 kilos

PLEASE READ THIS VERY IMPORTANT NOTICE

The FAPC's are constructed in PVC Plastic with welded seams and joints. This practice has been widely used throughout the Chemical Processing Industry for many years. It is physically very strong and extremely resistant to many corrosive chemicals. The only disadvantage with this technique is that it makes the construction hard and brittle.
Therefore extreme care should be taken when placing the units on any surface.

When removing from packaging, ensure the unit is lifted evenly and gently by the four lifting points, and placed very carefully on to a flat surface. Please avoid any heavy landings on corners, as this will induce a shear action which can cause cracking in the carcass.

The unit has been designed for easy handling, manoeuvring and sighting.
It incorporates 4 lifting points, which are clearly marked at each corner.
This allows the machine to be lifted with either two people, by taking strong wooden or metal fixing struts and inserting them through the lifting points to allow easy lifting. Or alternatively by four people – one at each corner using the lifting handles.

Fan Jet Nozzles are mounted in a rigid manifold system which can be adjusted to vary the impact angle of the sprays. Both top and bottom manifolds are identical, and can be easily removed as complete units for cleaning and maintenance.

The pump is magnetically coupled which can handle liquids of 1.6 specific gravity (SG). Liquids of greater than 1.6 SG could damage the pump and invalidate the warranty.

The unit incorporates 2 x 500W heaters which are located in the heater section of the specially developed baffled sump. This ensures even heating of liquid as it passes through this section.

The baffled sump controls sediments and particles that may form and stops them from entering the flow systems and blocking filters and jets.

The Process Lid incorporates a unique interlock system which shuts down the pump before the lid can be removed.

The temperature is controlled by a digital controller that has a maximum limit of 50°C. There is also an over-temperature thermostat which cuts off power if the temperature of the liquids reaches 55°C, which could indicate a fault condition.
The over-temperature device then has to be manually reset after investigation
(see page 11)
NB: Under no circumstances must the over-temperature device be tampered or modified, as this will invalidate the warranty.

The Conveyor main-shaft is connected directly to a worm-drive gearbox and motor, which is controlled by a precision drive inverter. This ensures consistent and accurate feed speeds with sufficient torque, even down to speeds as low as 45mm per minute. This in turn eliminates the requirements for multi-passes of the board which can damage the dry film resist.

2. VISUAL INSPECTION FOR TRANSPORT DAMAGE

1) All our machines are built in-house in Mega and are fully tested before despatch. It is essential that upon delivery, the unit is thoroughly checked for damage that could occur in transit. Should any damage be found, please contact us immediately.
Please keep all packaging – just in case the unit has to be returned for any reason.
Replacement packaging would be chargeable.

2) Remove lids and ensure all the conveyor rollers are in place, especially the top pinch rollers.
Also make sure that the orange floating shields are resting in the small slots at the top of the roller holders, so that they rest just above the top pinch rollers on the entrance and exit points of the process chamber and the spray wash chamber.

3) Remove the Filter Tray (*see page 12 – figs: 19 & 20)* and check that the two piece PVC base covering the liquid chamber has not moved. **N.B**. You will need a torch to check this. If by any chance they have moved, you will have to remove the top spray manifold (*see page 13 – fig: 24*) and then remove the centre transport rollers. You should now have access to the two base plates. After fixing in correct position, replace rollers and top spray manifold.

WARNING:

As with all electrically powered equipment, always isolate the electrical supply before removing any panels on these machines.

The sump capacity for the FAPC 3000 is 35 litres of fluid and 50 litres for the FAPC 5000. The level of which is easily viewed through 'Site-Glass' at the front of the machine.

3. INSTALLATION & POSITIONING

Careful consideration for all necessary services should be reviewed before sighting this machine.
For example: Size of Panels to be processed, Ample space must be available for loading and unloading panels.
(Please bear in mind that as there are no controls at the back of the machine. It can be positioned against a wall).

Ensure all water services are connected in accordance with local water bylaws. For effective washing of panels, we recommend a head pressure of 2 bar minimum closed valve with a supply flow 12 litres / minute.

This equipment is Fluid Category 5 – Industrial and Chemical Plant

4. ELECTRICAL SUPPLY & SAFETY NOTICE

A mains Lead is supplied to connect the FAPC Unit to suitable electrical supply. The lead has a moulded into an IEC RFI Filter Socket (*see figure 1*) which plugs into the unit at the front, on the underside of the control module.
The input socket is fused with a 13A 1" Ceramic fuse

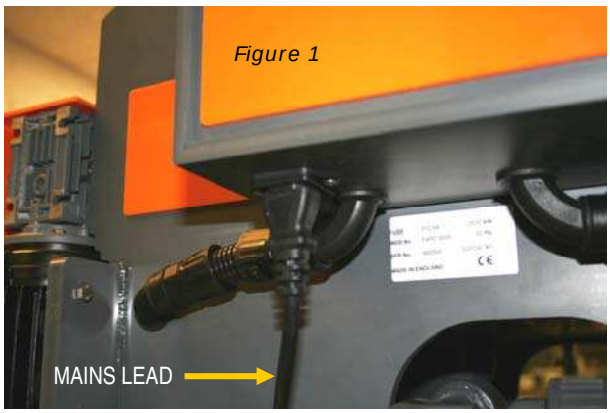


Figure 1

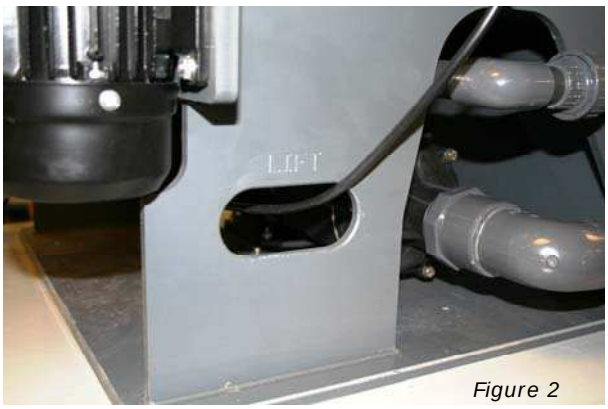


Figure 2

To keep the lead tidy and in place, route through the Lifting Aperture at the front on the left side (*see figure 2*).

20 x 5mm Cartridge fuses are used throughout the unit for each process and are available as spares. Please refer to Page 15.

The Mains Lead has a fused UK plug – fitted with 13A 1" Ceramic fuse.
Replacement Fuses must be of the same value.

DESCRIPTION	FUSE	FAPC3000	FAPC5000
MAINS IN	13A 1" Ceramic	167321	167321
HEATERS	5A 20 min F	167303	167303
SPRAY PROCESS	5A 20 min T (FAPC3000) 8A 20 min T (FAPC5000)	167304	 167305
SPRAY WASH	50 m A Slow Blow 20mm	167313	167313
CONVEYOR	3.15A Slow Blow 20mm	167302	167302

Please note that the mains fuse is located in the mains input IEC Socket.
All other fuses are din rail mounted in the front panel control box and can be accessed by removing the two screws holding the control box cover on either side of the front of the box.

This equipment is designed to safety class 1
Before connecting this equipment to the mains electricity supply, examine the information on the apparatus rating label.
Ensure that the mains supply is single phase alternating current (a.c.) of the stated frequency (Hz), with neutral nominally at earth potential.
Check the supply voltage is within the stated range.
The equipment rating label states the value of the fuse fitted to the apparatus itself. Ensure that the plug or supply circuit is fitted with an appropriate fuse of higher value.

WARNING THIS APPARATUS MUST BE EARTHED.

The mains electrical supply should be connected via a 'Residual Current Device' (RCD) Available from Mega (part 161053) if required.
Supply: - 220-240Vac 13 amps single phase / 50 Hz

The wires in the mains lead are coloured in accordance with the following code:

Green/Yellow - Earth (E)
Blue - Neutral (N)
Brown - Live (L)

If a moulded fused plug is not fitted connect the wires to a non-reversible 3 pin plug as follows:-

Green/Yellow wire to terminal marked:
E (earth) or G (ground) or coloured Green or coloured Green/Yellow.

Blue wire to terminal marked:
N (neutral) or Common or coloured blue.

Brown wire to terminal marked:
L (live) or Phase or coloured Brown.

NO SERVICING OR MAINTENANCE SHOULD BE CARRIED OUT UNTIL THE UNIT HAS BEEN SWITCHED OFF AND ISOLATED FROM THE MAINS ELECTRICITY SUPPLY.

Any spare parts which may be required, are supplied on the understanding that the replacement of these requiring the exposure of live electrical connections will be undertaken by an electrically qualified person.

5. SPRAY WASH WATER SUPPLY

Water is required for the Spray Wash Section. It may also be required if the unit is fitted with a cooling system (optional). Please refer to this section of the manual.

Wash Water requirement: 12 Litres / Minute.
Minimum Pressure: 2 Bar (closed valve).

Connection to the Water Supply is with the 'Wash Machine' type hose supplied ¾" BSP thread both ends. We recommend that the supply is terminated with a suitable isolator valve, which can be 'closed' when the machine is not in use.

Connection of the Supply Hose is on the left hand side (*see figure 3*).

Ensure all water services are connected in accordance with local Water Bylaws.

This equipment is fluid category 5 – Industrial and Chemicals Plant.

Figure 3

6. SPRAY WASH DRAINAGE

The drain outlet is located on the left hand side of the unit next to the inlet (*see figure 4*).

The Outlet pipe is 1¼" PVC. A 40mm compression bend is supplied for easy connection to waste or suitable effluent treatment plant.

Figure 4

7. PROCESS CHEMICAL DRAIN

To drain the Process Chamber, remove the threaded plug and fit the drain hose assembly (*see figure 5*) with the other end of the hose placed in a suitable container.

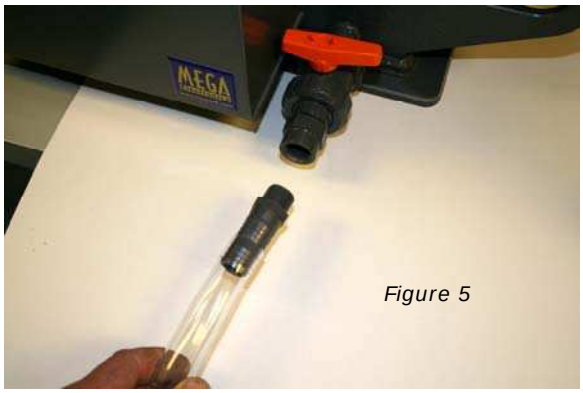


Figure 5

Turn the drain valve clockwise 90 degrees to allow the chemistry to flow into the container.
Careful consideration should be given to the capacity of the container and capacity of the sump to avoid over-filling and possible spillage.

When the bulk of the liquid has been drained in this way, it is necessary to leave the unit to drain further as liquid is controlled by a sediment baffle system, which will drain via a controlled bleeding system.
Please allow for a further 7 litres for this process.
This could take up to 30 minutes.

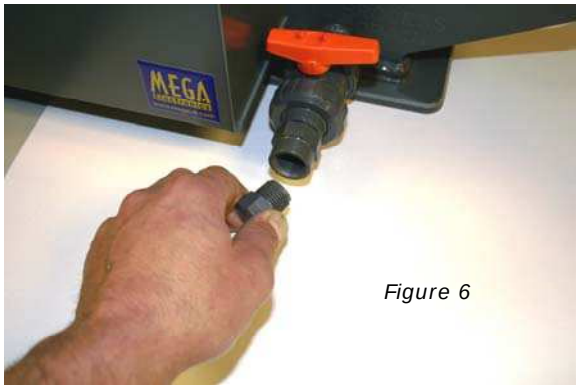


Figure 6

As an added safety feature the valve is fitted with a threaded plug, should it be opened unintentionally (*see figure 6*).

This plug needs to be removed to fit the Drain Hose and replaced finger-tight before filling the unit.
Do not over-tighten !

IMPORTANT !
Ensure this plug is in place before filling the Process Sump. Due to space required, this unit is shipped without the plug fitted.

8. NEGATIVE PRESSURE PORT

At the rear of the unit there is a provision for a hose connection, (*see figure 7*) whereby a Negative Pressure can be applied.

Figure 7

A Cap Is Fitted To This Part And Should Remain In Place If This Facility Is Not Used.

This Port draws air from the Neutral Chamber, which in turn keeps a Negative Pressure in the unit controlling the atomised chemistry when the panels enter the unit.

If this port is used, it is important to note that only a gentle negative pressure is required to contain the chemistry.

NOTE: It is estimated that 90m³ / Hour is sufficient.
A greater flow could risk drawing the chemistry out of the unit.
CONNECTION: 1¼" PVC Pipe
An Optional Kit is available.
Items from this kit can be supplied separately.

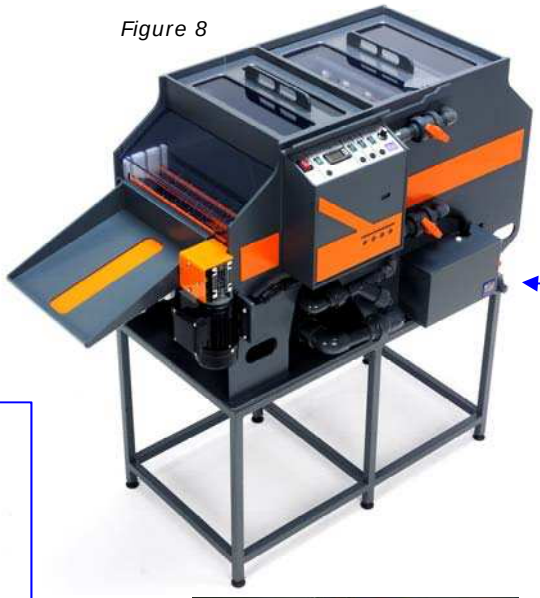
9. MOUNTING STAND (Optional)

This stand has been designed to provide a stable platform for the unit and provide an optimum working height.
It has six height adjustable feet, which should be used to find a level. This will help support the weight of the unit evenly.

More importantly, these feet can be adjusted to create a fall in the sump, so that when draining the chemistry it runs towards the Drain Valve on the Right Hand side of the front of the unit.
(*see figure 8 & 9*).

Use a Spirit Level and set at 'Hard Bubble' to the Drain Valve Corner.

Figure 8



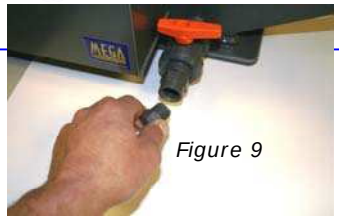


Figure 9

10. INITIAL START-UP

After installation, it is necessary to ensure the unit functions correctly and that no transit damage has occurred.

It is important that this procedure is followed carefully.

Figure 10

1) Ensure that all switches on the Front Panel are in the position 'OFF'
(*see figure 10*)
Also that the Wash Water Isolation valve is in the 'Closed' position.

2) Ensure that the Process Drain is in the 'Closed' position, and that the Drain Plug is in place. (*see page 7 - figs: 5 & 6*)

Figure 11

3) Unlock the lid by rotating the safety latch away from the top front body of the machine, thus activating the safety cut-out, which switches the pump off and enables the lid to be raised.
NB. Do not try to lift the lid vertically, as this will damage the rear locking pieces.
Just lift the lid 50 to 75mm (2"- 3") at the front, pull it towards you and then lift if off.
(*see figure 11*)

4) Fill the sump from the top with water to the uppermost mark on the 'Sight Glass' (*see figure 12*) Replace the lid and lock into place, by rotating the safety latch back into the locked position.

5) Open the Wash Water Isolation Valve and check for leaks.

Figure 12

6) Switch 'ON' the Mains Switch (IT WILL GLOW RED).

7) Switch on the Heater Section indicated by the Temperature Symbol (IT WILL GLOW GREEN).

The Digital display will flash '888' for a few seconds, the liquid temperature will then be displayed. The 'Red Dot' in the top left hand corner of the display indicates that the heaters are being energised. (refer to Page 11/ Section 12)

8) Ensure that both Spray Jet manifold Valves are fully open (*see figure 13*).

Figure 13

9) Switch on the spray Pump indicated with the 4 Spray Symbols. (Switch glows Green) The pump should be heard pumping.
Liquid should be spraying from both top and bottom Spray Jets. There may be a few seconds delay as air in the pipe system will have to be purged out by the pump. Check for any leaks.

10) Switch 'ON' the Spray Wash indicated by the single spray symbol. (SWITCH GLOWS GREEN).
Water should be spraying now from the top and bottom Spray Jets, allow for slight delay for the air in the pipe system. Check for leaks, including the Waste Water Drain.

11) Finally Switch 'ON' the Conveyor (SWITCH GLOWS GREEN). The motor should now be turning the main drive shaft at the front of the Unit, which then drives all the rollers and Conveyor system.
A high pitched noise may be heard from the motor, this is normal. Ensure the drive works across the entire range of 0 – 10 on the scale. With the knob set at **0** check the fast forward/reverse feature by pressing momentarily the square white button on the Control Panel. This should run the Conveyor at its maximum speed.

PLEASE NOTE:
The black rocker switch next to the square white button allows you to run the machine in forward or reverse mode, at pre-set speeds or maximum speed when white button is held down.

Run the machine at maximum speed for 5 minutes in both directions and then switch conveyor OFF.

Should any faults occur such as a leak for example, please contact your supplier immediately.

Leave machine running for a further 2 hours with all functions on except spray wash. Set the conveyor to run at position 4 on the control knob.

If at the end of this period if no leaks are visible and all functions are working satisfactorily switch off the unit, and drain water out as described on page 7. Your machine is now ready to be filled with the required process chemical.

11 CATCH TRAY

A catch tray is included (*see figure 14*). It is designed to collect panels as they exit the unit. Max. Panel length 12" (300mm).
Holding capacity 1 kg maximum.
The tray incorporates a claw feature which hooks over the exit just under the clear cover (*see figure 15*).

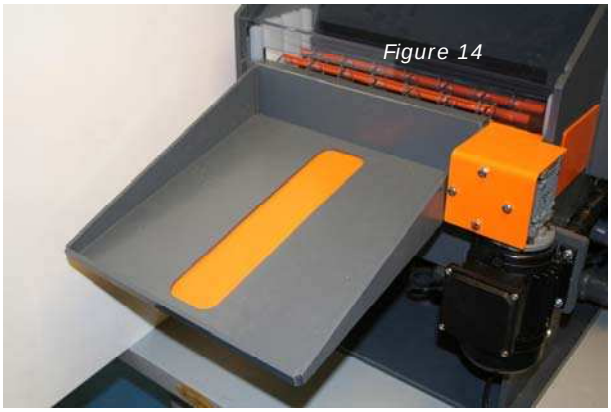


Figure 14

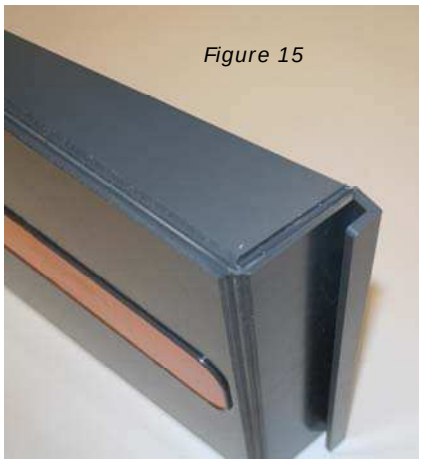


Figure 15

12. CONVEYOR SPEED CONTROLLER

The Speed of the Drive Motor is controlled with a precision inverter. This is adjusted by a Potentiometer on the Front Panel.
The Potentiometer has a '0-10' Scale '0' being the slowest speed.
There is also a Digital Display on the Inverter which can be viewed through a window in the front of the Control Box Casing (*see figure 16*).

The Digital display rangers from 10-200 and can be referred to as 10% of the drive speed to 200%.

This added feature will be invaluable for setting up accurate parameters in some Processes.


Figure 16

13. TEMPERATURE CONTROL

The temperature of the chemistry is controlled by the Digital Controller on the Control Panel. The temperature is set at the factory to be 45°C, normal working temperature. However the temperature can be changed as follows: Press the **P** button and display will show SP. Press the up and down arrows to set the new temperature and then press the **P** button.

PLEASE NOTE That the maximum temperature has been locked at 50°C to protect the unit from heat damage.

14. PROTECTION SYSTEM

OVER-TEMPERATURE CUT-OUT

An over-temperature cut out is incorporated in the system as a back-up should there be a failure with the temperature control. It is pre-set to activate at 55°C. In the event All Power to the functions will be terminated and only Mains Switch will glow red.

At this point the fault must be identified and rectified.

The over-temperature cut-out has a normal reset which is housed within the heater junction box (*see figure 12*).

The Reset Procedure is as follows:-

1) Turn off the mains power (large red switch) and remove mains lead (*figure 1*).

2) Remove the white plastic screw at the top heater junction box cover and gently draw the cover away from the unit at the top allowing it to hinge at the bottom. When the top part of the cover is clear of the chassis, move the cover downwards to unhook the lower part of the cover from the unit and the cover will then be free to remove.

3) To the Left hand side of the cover chassis, there is a button (*see figure 17*) which can be depressed to reset – a Click should be heard and felt.
NB: Before the switch can be reset the liquid will have to cool down to about 15°C.

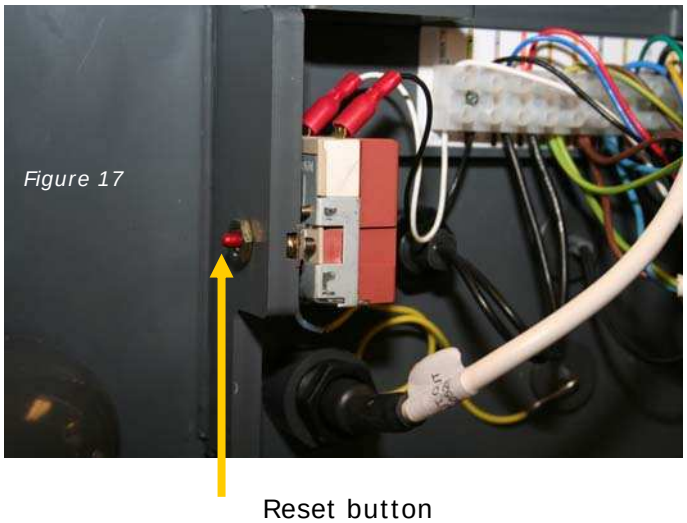


Figure 17

4) Gently replace the cover, engaging the lower hinge section first.

5) Replace the retaining screw and re-connect the electrical supply.

LOW LIQUID LEVEL CUT-OUTS

There are two liquid level sensors to protect the unit.

One is to protect the pump from running dry and causing permanent damage.

The second is to cut the power to the heaters and causing permanent damage. The display on the Temperature Controller will display '**E1**' flashing.

IMPORTANT
Any attempt to override, modify or tamper with in any way will invalidate the Warranty.

15. REMOVAL OF CONTROL PANEL COVER

At the top front of each side of the control panel box, you will find 2 x black self tapping screws.
When these are removed the front cover can be removed by tilting it slightly towards you and pulling upwards a few mm.

16. REMOVAL OF CLEAR SAFETY COVER

To remove the clear safety cover proceed as follows:

Unscrew the stainless steel bolt below the control box.


Figure 18

Remove it fully, making sure you do not lose the plastic spacer fitted behind the cover.

Holding the cover on the side left of the flow valves, carefully pull it towards you, so that it clears the orange handles of the flow control valves and then gently push the cover towards the right, so that it clicks off the two bends going into the top and bottom spray manifold

To replace the cover, reverse this procedure.

17. ROUTINE MAINTENANCE

Each time you empty the tank to replace the chemistry – Firstly remove the Orange Plate then the Filter tray. (*see figure 19 / 20*)


Figure 19

Ensure you have a tray or paper towels underneath to catch any drips.


Figure 20

Thoroughly wash the filter tray with water and replace, followed by the orange plate.

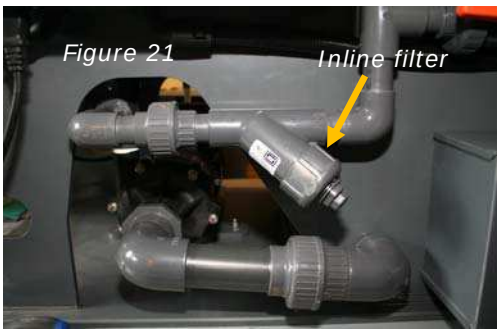


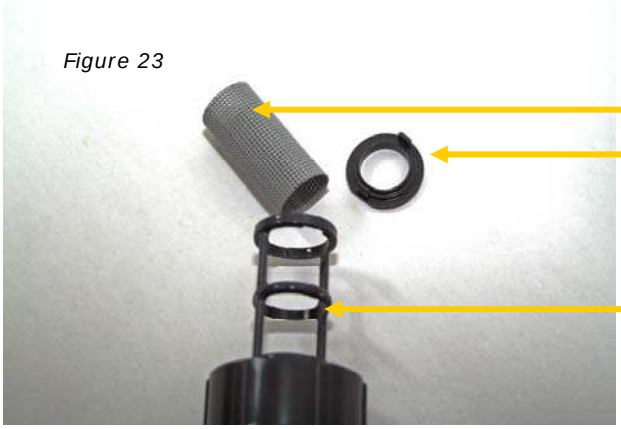
Figure 21

Remove the in-line filter (*figures 21 & 22*) ensuring you have some paper towels or a cloth underneath it to catch any drips.


Figure 22

Then remove the filter locking ring and pull the filter out (*see figure 23*) of the filter housing. Thoroughly clean the filter inside and out. Reassembly the unit and screw back into its housing by hand (no tools needed).

Figure 23

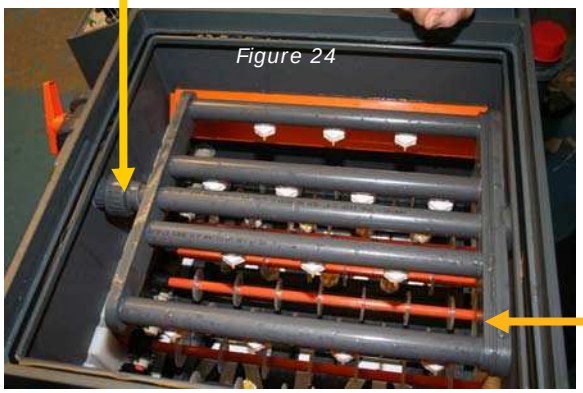


When you have finished working for the day, always wipe down all surfaces with a clean damp cloth to prevent staining of the equipment, especially when using Ferric Chloride.

Every six months, remove the spray bar manifolds. Then remove the spray nozzles and thoroughly clean from the front end with spray of water.
(*see figures 24,25 & 26*)

NB: If the machine is used on a daily basis for more than 3 to 4 hours, then change all the nozzles at this time. If only used intermittently, change the nozzles if you experience uneven etching after cleaning.

Figure 24



NB: to remove the bottom manifold, you need to lift out the transport rollers. (*see figure 24*).

Figure 25

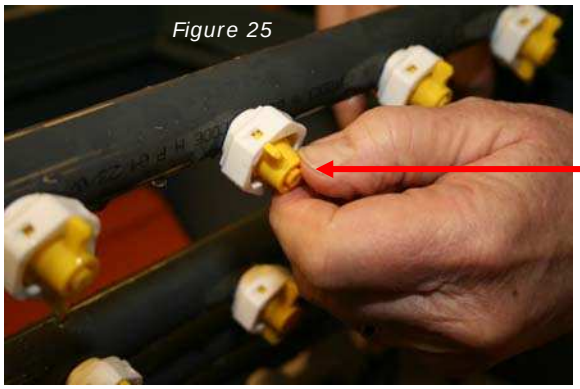
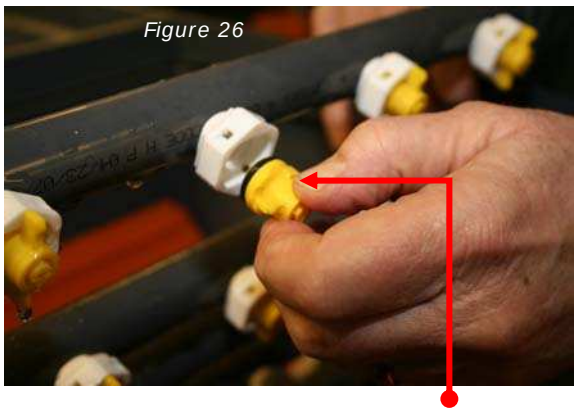


Figure 26



Turn the nozzle anti-clockwise 90° (*see figure 25*) and remove (*see figure 26*)
Replace nozzle using the reverse procedure, ensuring it is seated properly before twisting it into the locking position.
NB: If by any chance any of the white nozzle holders move during this operation, carefully realign them after the nozzle has been locked into position.

**Do not try to mechanically clean the nozzle,
as this could affect the nozzle pattern.**

18. FAPC 3000/ FAPC 5000 PROCESSORS SPARE PARTS

PART NUMBER	DESCRIPTION	Price each FAPC3000	Price each FAPC5000
160005	SOLENOID VALVE SINGLE 230V	£8.90	£8.90
160034	HEATER 240V 500W WITH NO THERMAL FUSE	£37.95	£37.95
160044	FAPC3000 PUMP TE-7P-MD PP/VITON/CERAMIC 230V 50HZ	£442.00	--------
160048	FAPC5000 SERFILCO ST6H MAC DRIVE PUMP	------	£810.00
160142	MOTOR & WORM GEAR UNIT FOR PROCESS CONVEYOR	£184.00	£184.00
160052	OVER TEMPERATURE THERMOSTSAT RESETTABLE	£7.50	£7.50
191036	TEMPERATURE PROBE HOUSING IN PVC	£5.00	£5.00
163014	RELAY SPDT 10A 240V ac COIL	£3.75	£3.75
167160	SEE-SAW TYPE FLOAT SWITCH HORIZONTAL IN POLYPROP	£9.95	£9.95
164600	10K LIN COMMERCIAL POT	£0.44	£0.44
160088	ELMA KNOB BLACK 14.5mm WITH INDICATOR LINE	£5.95	£5.95
160089	ELMA KNOB CAP GREY	£0.33	£0.33
160086	NUMBER DIAL EMBOSSED	£1.35	£1.35
160080	STATOR FOR 14.5mm KNOB	£1.50	£1.50
160122	OMRON JX INVERTER DRIVE	£137.60	£137.60
160187	TEMPERATURE CONTROLLER	£31.95	£31.95
167129	SQUARE PUSH SWITCH WHITE	£0.35	-----
167130	LARGE RED ROCKER SWITCH	£5.10	£5.10
167150	MINI ROCKER SWITCH DPST GREEN ILLUM	£3.00	£3.00
167151	SPLASH PROOF COVER FOR 167150	£0.65	£0.65
167302	20mm 3.15AF CERAMIC FUSE (DRIVE MOTOR)	£0.21	£0.21
167303	20mm 5A F CERAMIC FUSE (HEATER)	£0.60	£0.60
167304	20mm 5AT CERAMIC FUSE (PUMP)	£0.29	-------
167305	20mm 8AF CERAMIC FUSE (PUMP) FAPC5000	-------	£0.31
167312	FUSE 1A SLOWBLOW 20mmx5mm (DRIVE MOTOR)	£0.15	£0.15
167313	50Ma SLOWBLOW FUSE 20mmx5mm (SPRAY WASH)	£0.15	£0.15
167321	1" 13A MAINS CERAMIC FUSE	£0.30	£0.30
191077	GEAR SHAFT LOCKING COLLAR	£2.24	£2.24
191165-1	FAPC3000 PLAIN PINCH ROLLER	£32.76	-------
191165-2	PINCH ROLLER WITH BLACK SPUR GEAR	£37.44	-------
191167-1	FAPC5000 PLAIN PINCH ROLLER	-------	£39.50
191167-2	FAPC5000 PINCHROLLER WITH BLACK SPUR-GEAR	-------	£48.00
250196	FAPC WORM GEARS BEIGE POLYPROP	£5.00	£5.00
250197	SPUR GEARS BLACK POLYETHYLENE	£9.48	£9.48
253100	FAPC BEARING DRIVE SHAFT BEARING	£5.00	£5.00
251301	SPRAY NOZZLE ADAPTOR PUSH FIT QUICK RELEASE	£0.89	£0.89
251300	SPRAY NOZZLE YELLOW FAN 902L 7DO QUICK RELEASE	£1.68	£1.68

MEGA ELECTRONICS LIMITED.
MEGA HOUSE, GRIP INDUSTRIAL ESTATE,
LINTON, CAMBRIDGE, CB21 4XN
TEL: 01223 893900 FAX: 01223 893894
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DECLARATION OF CONFORMITY

We : Mega Electronics Ltd.
Mega House
Grip Industrial Estate
Linton,
CAMBRIDGE
CB21 4XN

Declare that the products:

FAPC Process Conveyor Units.
500-503
500-505

To which this declaration relates are to the best of our knowledge, in conformity
with the following standards or other normative documents:

EN 61000-6-3:2007
EN 61000-6-1:2007
EN 61000-3-2:2006

Following the provisions of the EEC EMC Directive 2004/108/EC

EN 61000-6-1 :2001
EN 61000-6-3 :2001
EN 61000-3-2 :1998

Following provision of EEC LVD Directive 2006/95/EC

Place of issue : CAMBRIDGE
Date of issue : Thursday 22nd March 2010

M.A. Hall
Technical Director
Mega Electronics Limited.

FAPC WIRING DIAGRAM