vale tech
Dispensing Solutions Worldwide

Automated Drum Dispenser

User Manual

VALE-TECH LIMITED
Unit 12, Depot Road, Newmarket, Suffolk CB8 0AL, UK
Tel: +44 (0) 1638 668583/668593
Fax: +44 (0) 1638 676720
E-mail: sales@vale-tech.co.uk

Introduction

This Manual provides the user with a comprehensive guide to the machine.

The Manual identifies the requirements for the initial installation of the machine and provides information for the effective operation of the machine on a day-to-day basis, including maintenance, to ensure a high standard of ink dispensing can be consistently achieved.

The Service section of this manual enables the user to identify any spare parts that may need to be ordered for the machine. This product has been manufactured to the highest standards; however, should any difficulties arise, before requesting technical support, a speedier resolution can usually be reached by referring to the trouble-shooting guide.

The Service Log at the back of this manual serves to provide contact information. Should assistance be required please refer to the contact details supplied within this section. Forms available in this section allow the service history of the machine to be recorded for future reference.

Vale Tech Automated Drum Dispenser

Vale Tech Automated Drum Dispenser

Declaration of Conformity & Quality

Vale-Tech Limited Hereby Declares That

Machine:

Project:

Is in conformity with the provisions of the machinery directives as listed below: -

The Machinery Directive, 98/37/EC – "Machinery is described in the Directive as "an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, etc., joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material". The manufacturer is responsible for verifying whether a particular product falls within the scope of the Machinery Directive."

The Pressure Equipment Directive, 97/23/EC – " The directive provides control over equipment subject to pressure" Pressure equipment being vessels, piping, safety accessories and pressure accessories. A pressure assembly being several pieces of pressure equipment assembled to form an integrated functional whole.

The EMC Directive, 89/336/EEC – "The Directive applies to most electrical and electronic apparatus, that is, finished products and systems that include electrical and electronic equipment."

The Low Voltage Directive, 73/23/EEC – "Broadly the Regulations apply to most consumer, commercial and industrial electrical equipment designed for use within the voltage ranges 50 V ac to 1,000 V ac and 75 V dc to 1,500 V dc."

Remarks & restrictions for this declaration

This declaration is no longer valid if any changes are made to the machine, which is not corresponding to the abovementioned standards.

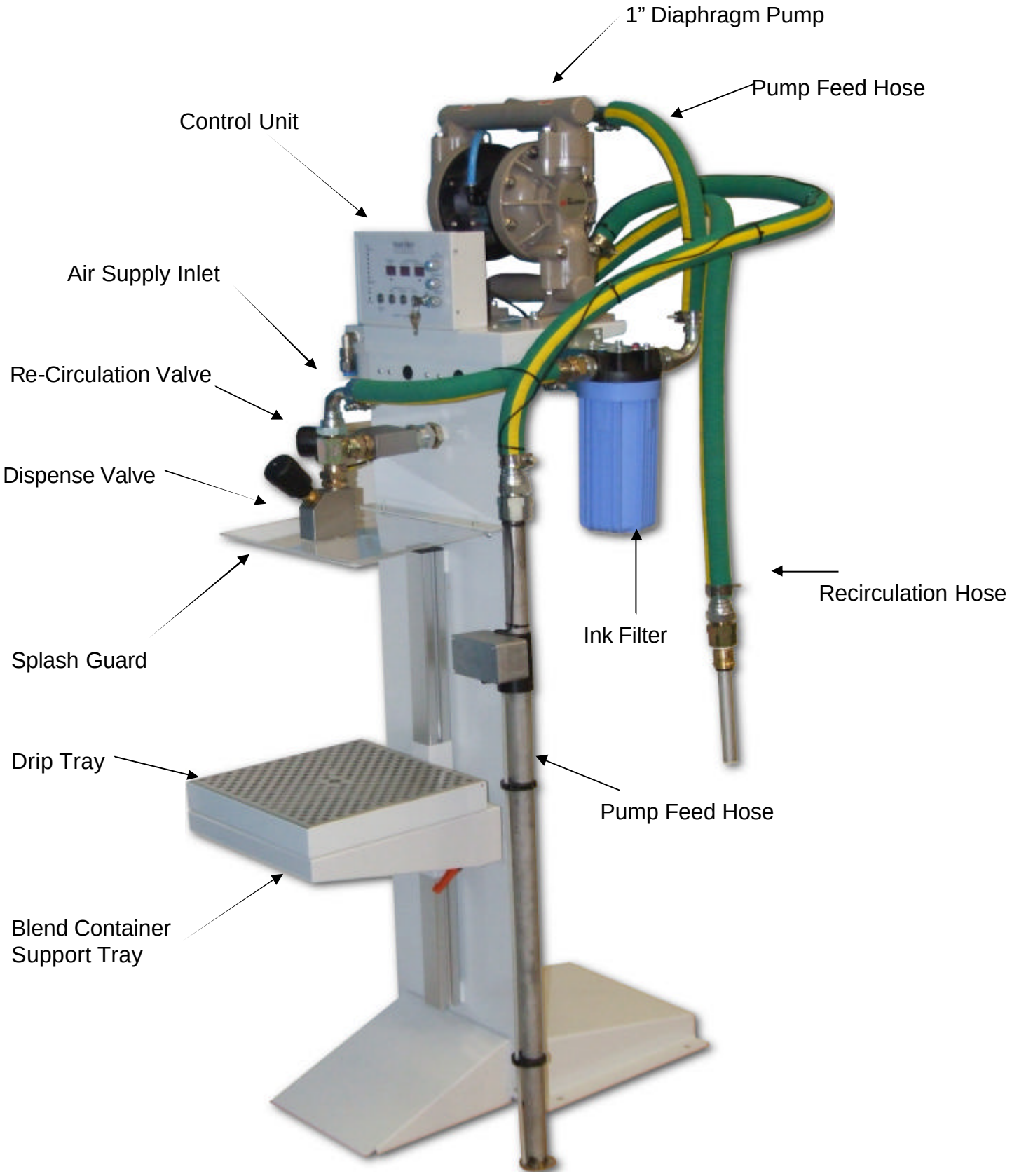
Place and date:	Newmarket
G Adlem:	Mechanical Engineering
C Stapleton:	Electrical Engineering
M Hughes:	Director
N Scott:	Director

Representing:

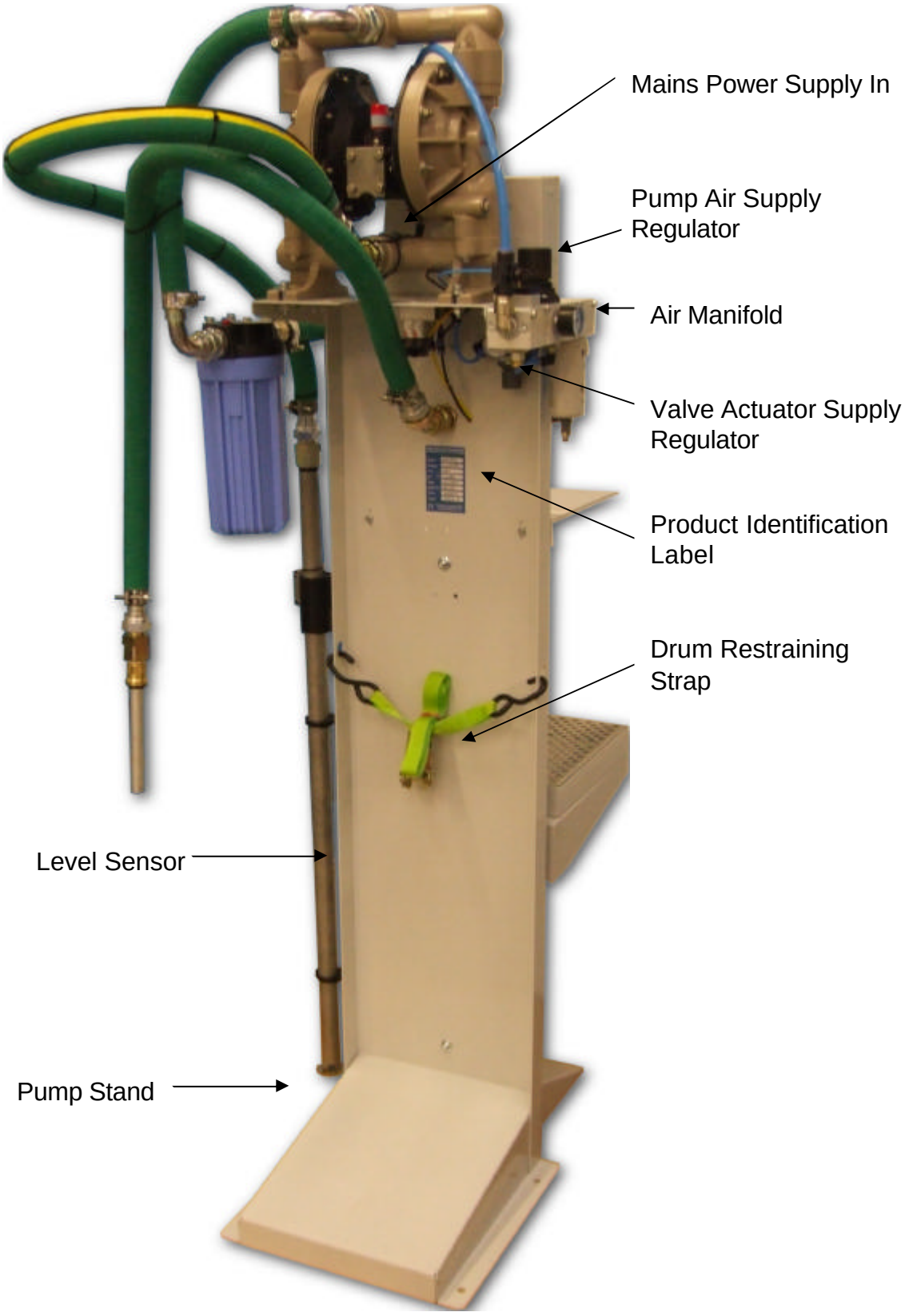
Vale-Tech Ltd
12 Depot Road
Newmarket
Suffolk CB8 0AL
United Kingdom

CE

1 Automated drum dispenser overview

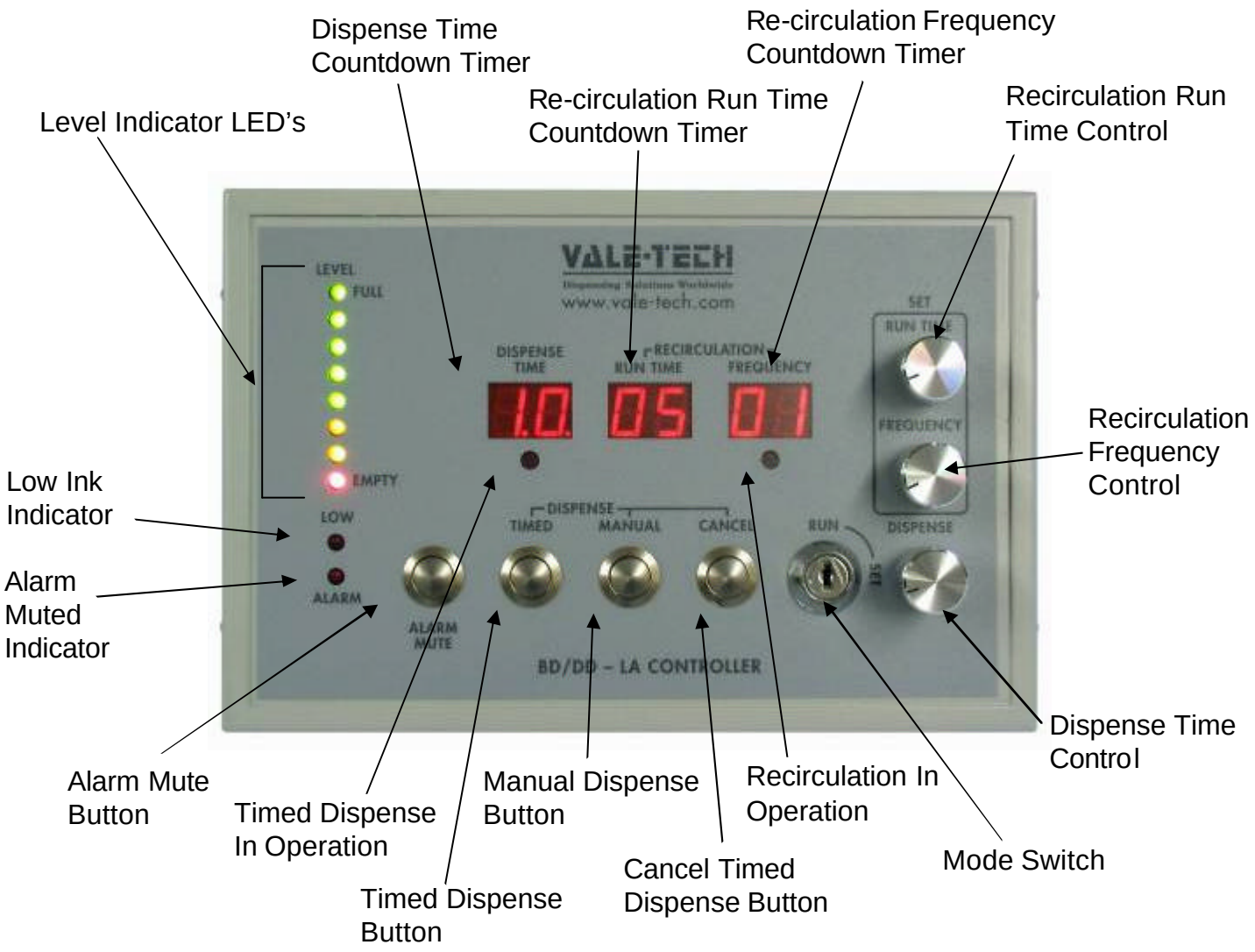


Automated drum dispenser overview (cont)

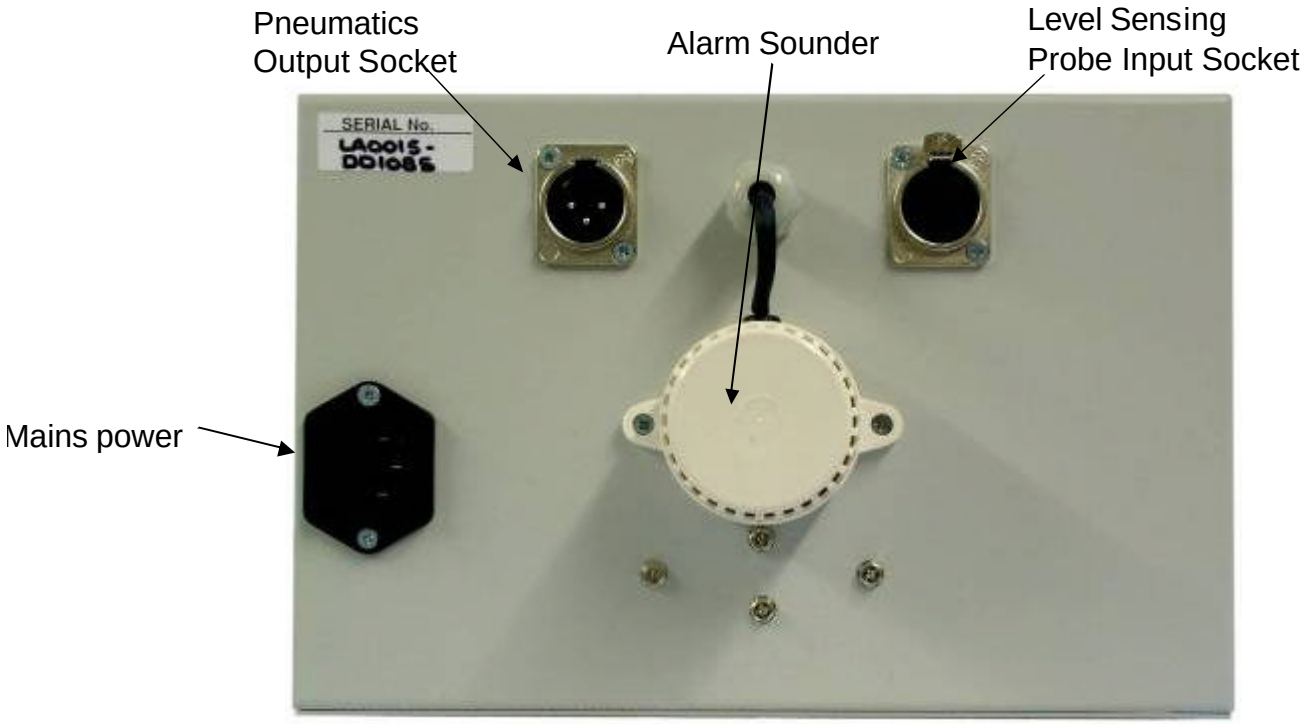


2 LA Controller

2.1 Control unit features



2.1 Control unit features (cont)



2.2 Product Operation Overview

- Set-up

  Accessing the Setting Controls
  Setting Empty and Full Levels
  Setting Alarm Activation Point

- Operation. - Set Mode

  Setting 'Dispense Time'
  Setting Re-circulation 'Run Time'
  Setting Re-circulation 'Frequency'

- Operation. - Run Mode

  Timed Dispense
  Timed Dispense Cancel
  Manual Dispense
  Re-circulation Operation
  Level Sensor Display
  Low Ink Alarm and Alarm Mute

Product Operation Overview (cont)

The LA Controller has two modes of operation; set and run.
In set mode recirculation period and time can be set along with timed dispense duration using the three rotary controls.

In run mode the timer is activated to provide automatic recirculation, timed dispensed are performed based on the duration set in set mode, and manual dispenses can be made using the manual button.

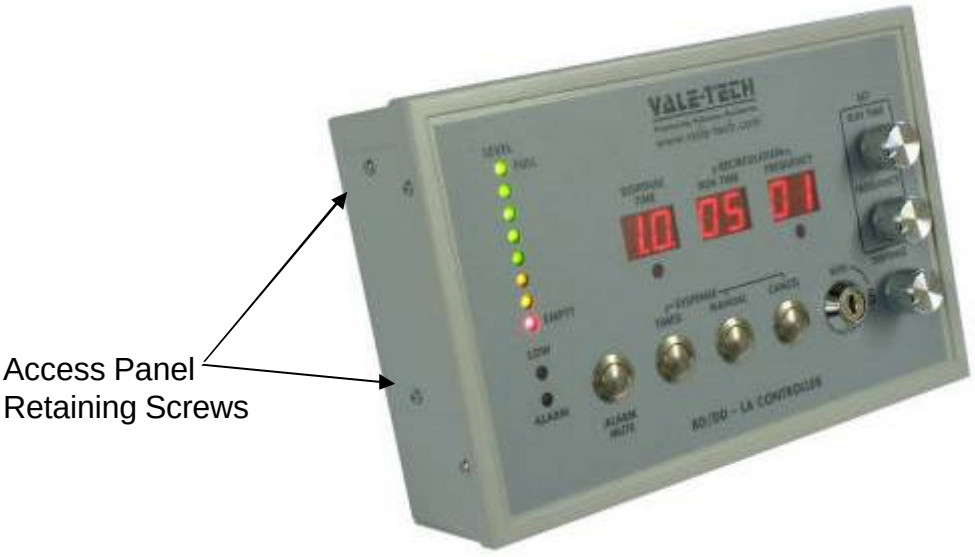
The three numerical LED's provide information on the time functions set, and the eight LED's of the level display indicates the amount of product remaining in the drum. A further two LED's compliment the level display with muted alarm and low ink level indication.

2.3 Set-up

Before using the Drum Dispenser, calibration of the Level indicator to display the correct product level in the drum, will be required. If this is not set, the wrong level will be shown and could prevent the product from being dispensed with a premature an alarm condition.

2.3.1 Accessing the Setting Controls

Access to the empty and full level setting controls can be gained by the removal of the access panel found on the left hand side of the controller.

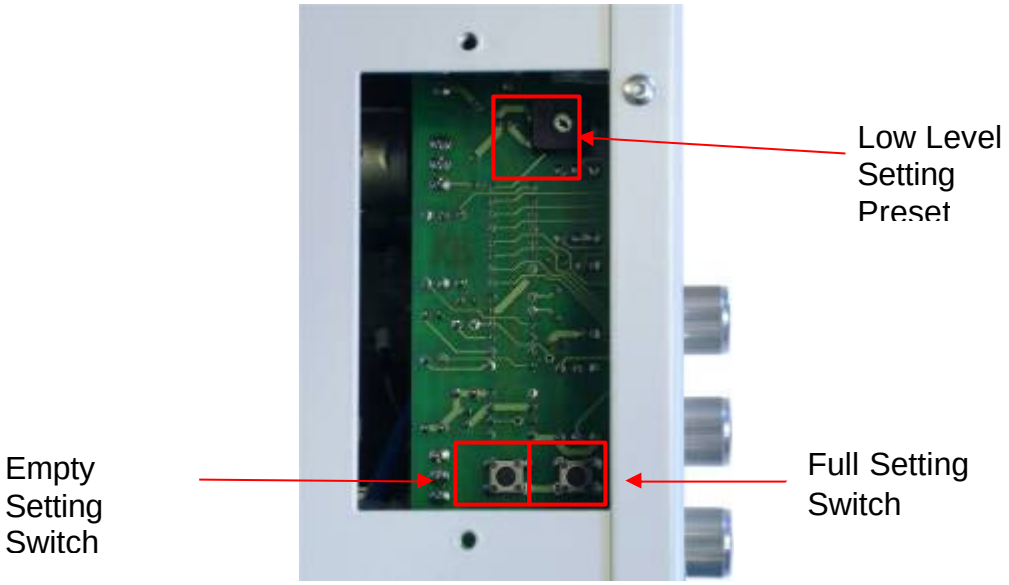


Remove the two retaining screws and the panel to reveal the setting controls mounted on the PCB within.

Apply power to the controller; there is no power switch on the Controller and it will power up as soon as the supply is applied. The alarm may sound when power is applied, and this is normal.

2.3.2 Setting Empty and Full Levels

Locate and identify the two switches on the smaller PCB shown below.



Remove the lid from a full drum of product to be dispensed through the drum dispenser. Insert the level sensing probe (mounted on the ink supply hose) into the product to a depth of 20mm and press the empty setting switch shown above which will set the empty point.
Replace the lid, place the full drum on the drum stand and secure with the retaining strap. See section 4.2 of this manual for safe placement of drum onto drum dispenser. With the drum inclined away from the drum stand, position the larger screw cap on the lid farthest from the drum stand. Remove this cap and fully insert the ink supply hose into the drum. Press the full setting switch shown above to set the full point.

All eight LED's of the level display on the front panel should now be lit and the alarm sounder will be silenced.

During operation of the system, the level of the ink in the drum will drop and the LED's will go out from green to amber to red.
When the red LED goes out the empty alarm indicator will come on, this is when the ink level has dropped to a point below which a reliable dispense can be achieved. This indicator is also red and will be accompanied by the sounder. The empty condition will shut off the dispense valve and recirculation valve, so no further dispenses can take place. Any remaining ink will not be recirculated.

2.3.3 Setting Alarm Activation Point

To set the alarm activation point, turn the low level setting pot (shown above) until just the red empty LED is lit on the level display. At this point the alarm will sound and further timed dispenses will be inhibited.

Re-fit the access panel and secure with the two screws.

2.4 Operation

In set mode the LA Controller can be configured for the required timed dispense period, recirculation run time and recirculation period. Turning the mode key switch to the set position enters this mode.

2.4.1 Setting Dispense Time

Turn the dispense time control to set the time required to dispense an appropriate quantity of product for the container being used.

The dispense time is indicated by the first numerical LED marked dispense time, (shown below). Initially, the dispense time is displayed in seconds (one to fifty-nine), indicated by the use of two decimal points, then in minutes (one to thirty-six) with no decimal points.

This is the time period the dispense valve will be kept open automatically for un-attended dispensing. It is important that this time is not so large as to over-fill the container.

2.4.2 Setting Recirculation Run Time

Turn the recirculation run time control to set duration of recirculation.

The second pair of numerical LED's display the run time, (shown below). The recirculation time can be set from one minute to fifty nine minutes in one minute steps. During this time the re-circulation valve will open allowing the product to be drawn from the bottom of the drum re-circulated back into the top of the drum.

Starting a timed dispense during or immediately before the recirculation run time will abort the current or pending re-circulation.

2.4.3 Setting Recirculation Frequency

Turn the recirculation frequency control to set the frequency of recirculation, in hours; from every hour to every thirty six hours in one hour steps. This is displayed by the third pair of numerical LED's marked frequency. The display will count down in hours until the recirculation takes place and will then reset to the set value. If the minimum frequency of one hour is set, the display will show 00 almost all of the time indicating less than one hour before the next recirculation.

Setting Recirculation Frequency (cont)

Note. The timer is reset each time Set Mode is entered.

To store the values and start the recirculation timer turn the mode key back to the run position. The key can be removed when in the run position to prevent changes to the stored data. This is preferable to avoid the timer from being reset and incorrect values being set for the three controls. Store the key in a safe place so that the timings can be changed if required.

2.4.4 Timed Dispense

Place a suitable container beneath the dispense head, press the timed button on the LA Controller, the timed dispense LED will light red (shown below) and the dispense time counter will count down from the pre-set time to zero.

Timed Dispense showing 53 Seconds

During the count down the dispense valve will open and deliver the product to the container beneath it. At the end of the dispense time the counter will return to the pre-set value and the red LED will extinguish.

Timed Dispense (cont)

If the dispense time is greater than fifty-nine seconds, the counter display will alternate between minutes and seconds; the seconds being indicated by the use of the decimal points (Fifty-three seconds is shown above).

If the controller enters an alarm condition during a timed dispense, the counter will continue to count down, however the dispense valve will close stopping the product from flowing.

2.4.5 Timed Dispense Cancel

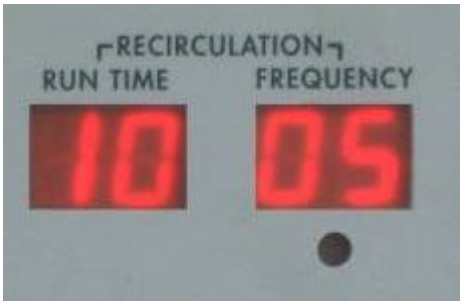
In the event that a timed dispense needs to be cancelled pressing the cancel button will stop the dispense and reset the dispense time timer.

2.4.6 Manual Dispense

To perform a manual dispense, press and hold the manual dispense button. The dispense valve will open and ink will be delivered into the container. Release the button when the required amount of ink has been dispensed. Manual dispense can be used to top-up a timed dispense.

2.4.7 Re-circulation Operation

Re-circulation takes place at a frequency determined by the frequency timer. This determines how often the recirculation valve will open and is set in hours. i.e. every hour, every two hours, every five hours etc. (A recirculation frequency of five hours is shown below).



The timer is started when run mode is entered (from set mode). The next recirculation will start at the same time every hour, two hours, etc. at the time value which was entered. The timer will reset if set entered and then run mode is re-entered.

Re-circulation Operation (cont)

The frequency display will count down to 00 when automatic recirculation is triggered, and will then reset to the programmed time. During the recirculation run time, the red LED below the frequency display will light, at the end of the recirculation run time the LED will go out.

The recirculation run time determines how long the recirculation valve will remain open and therefore how much of the product is recirculated from the bottom of the drum to the top. This is set in minutes and is shown by the run time display. (This has been set to ten minutes in the illustration above).

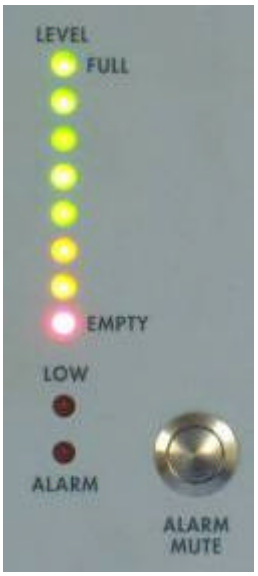
During a recirculation operation the run time display will count down 00 while the recirculation LED is lit, after the set run time has elapsed the display will return to the set time and the LED will go out.

If a timed dispense is in operation at the same time as a recirculation is scheduled to start, the re-circulation will be aborted. If a timed dispense is started during a recirculation run time, the re-circulation will be aborted.

Note. Avoid turning the controller off unnecessarily as this will reset the recirculation start time. Automatic recirculation will not take place while the controller is switched off.

2.4.8 Level Sensor Display

The level sensor display provides an easy to read representation of the level of product remaining in the drum. As the product is used, the level on the display will drop, and will be indicated by the upper LED's extinguishing from full to empty. When the red empty LED is the only remaining LED lit, the alarm will sound and the low LED will light. Timed dispenses and recirculations will be inhibited.



2.4.9 Low Ink Alarm and Alarm Mute

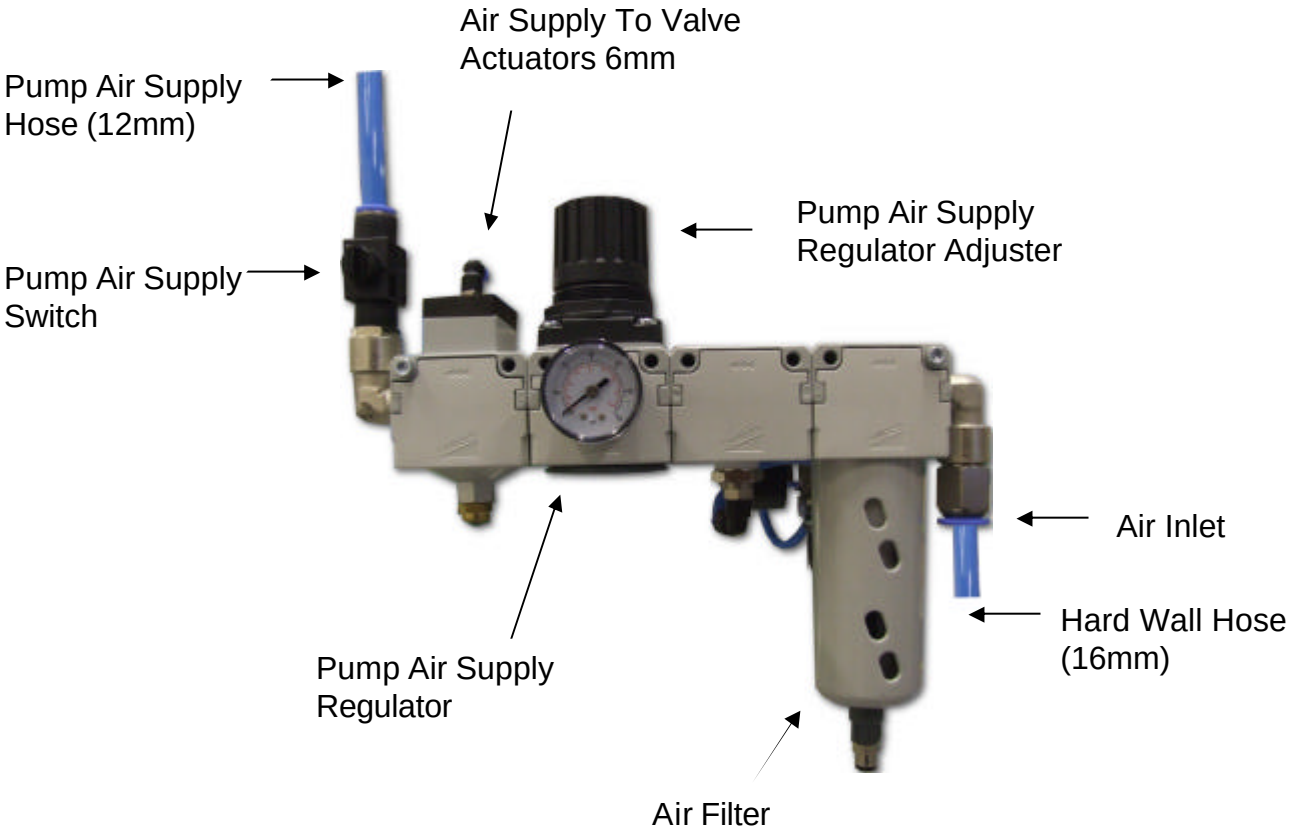
When the product level is at a minimum, the red empty LED of the level display will light; the low LED will also light and the alarm will sound. This indicates that the drum must be changed before any further dispenses can be achieved. If it is not convenient to change the drum at this time, but the sounder is becoming an annoyance, it can be muted by pressing the alarm mute button. The alarm LED will light whilst the alarm is muted. Do not turn the controller off. This will reset the recirculation start time.

INSTALLATION

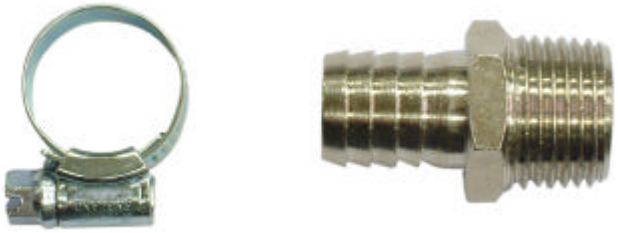
3 Connection Of Services

3.1 Connecting Air Supply

Connect a clean dry air supply of 6-bar minimum to the 16mm air inlet.



If 16mm Hard Wall Hose is not available a soft wall hose can be used with the provided adaptor.



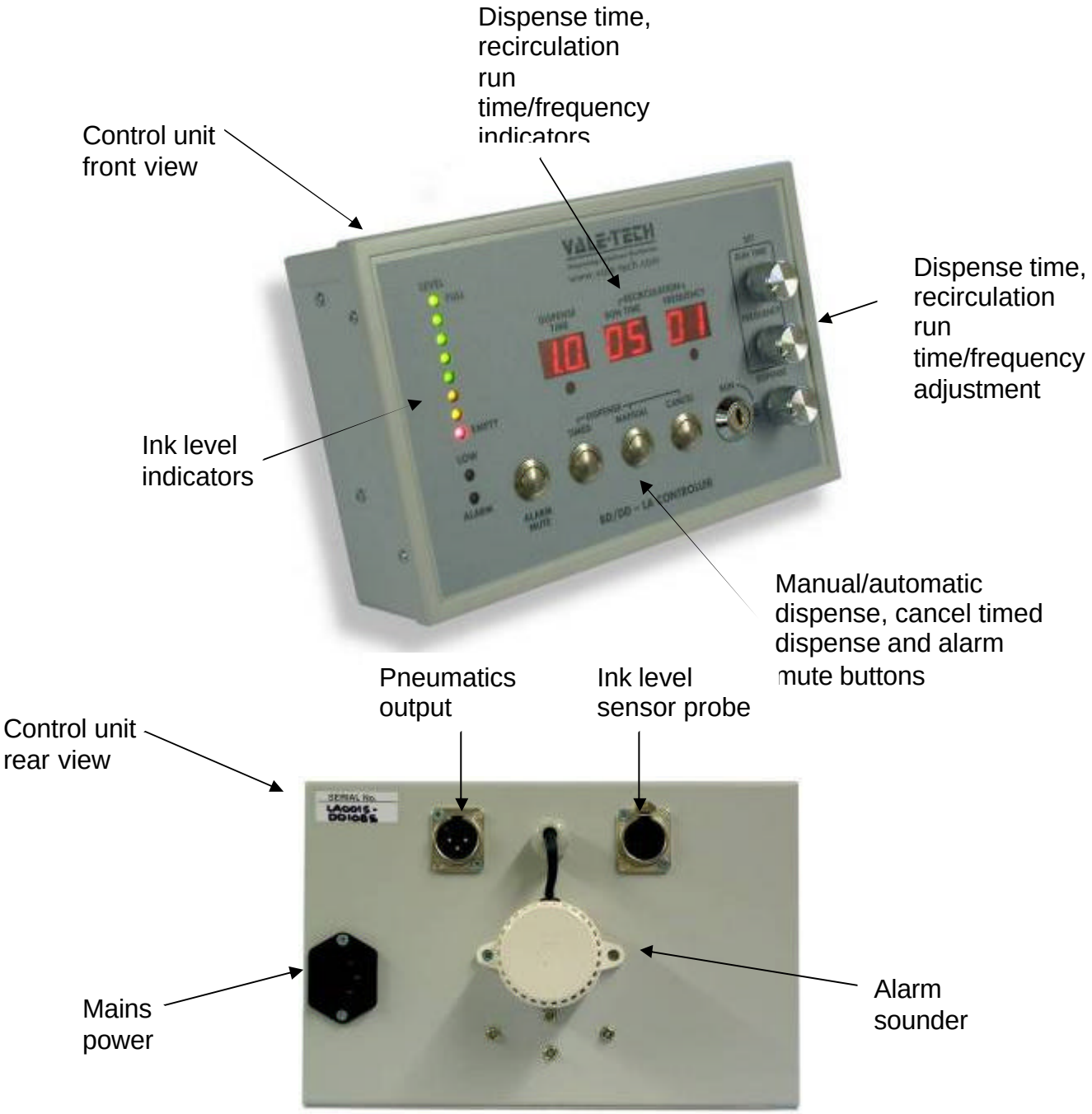
3.2 Connecting Electrical Supply

Connect mains 100-240V ac supply to the mains socket, on the back of the control unit.

4 Setting Up

4.1 Control unit

Drum dispenser dispensing operations are controlled by parameters set within the control unit. The control unit functions are to control the dispense, level sensing, automatic batch switching and automatic re-circulation of ink. The control unit will become active when the mains power is switched on. Full instructions of it's operation are detailed in section 2 of this manual.

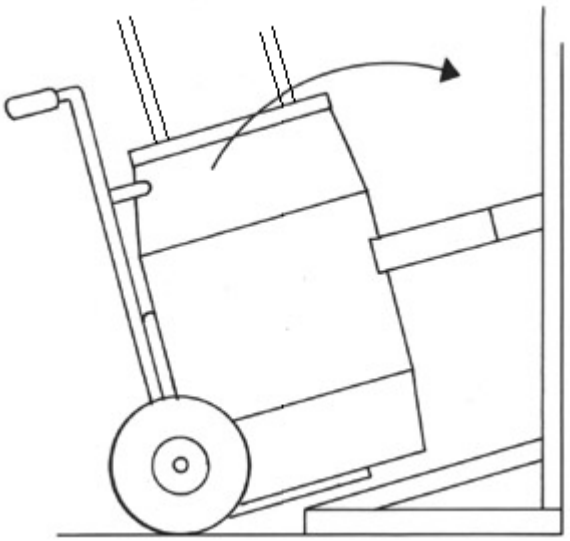


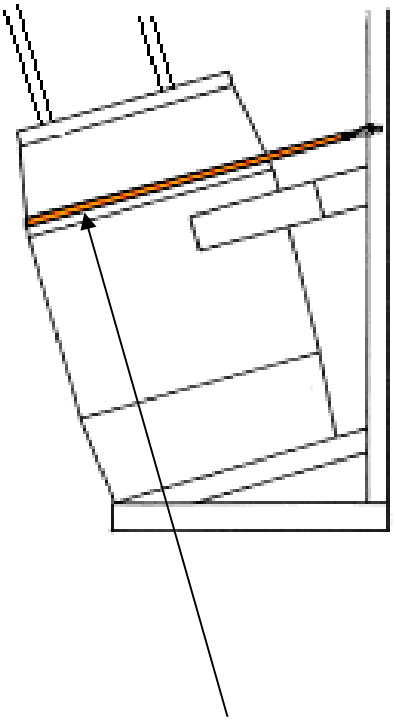
4.2 Loading Drum Onto Dispenser

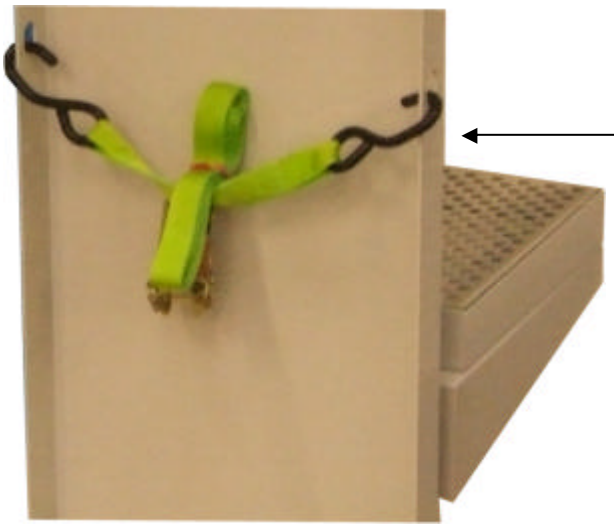
Using a drum trolley, move the drum of ink close to the rear of the drum dispenser. With it flat on the floor, remove the screw in caps from the drum lid and insert the pump feed and recirculation hoses.

Set the full and empty ink level sensors as detailed in section 2 of this manual.

Carefully locate the drum onto the rear of the drum dispenser and secure it in place using the ratchet strap provided.



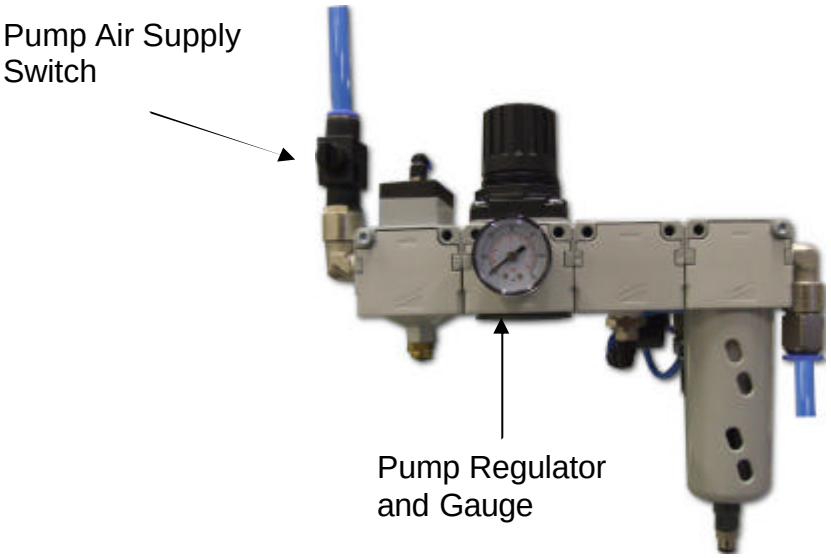




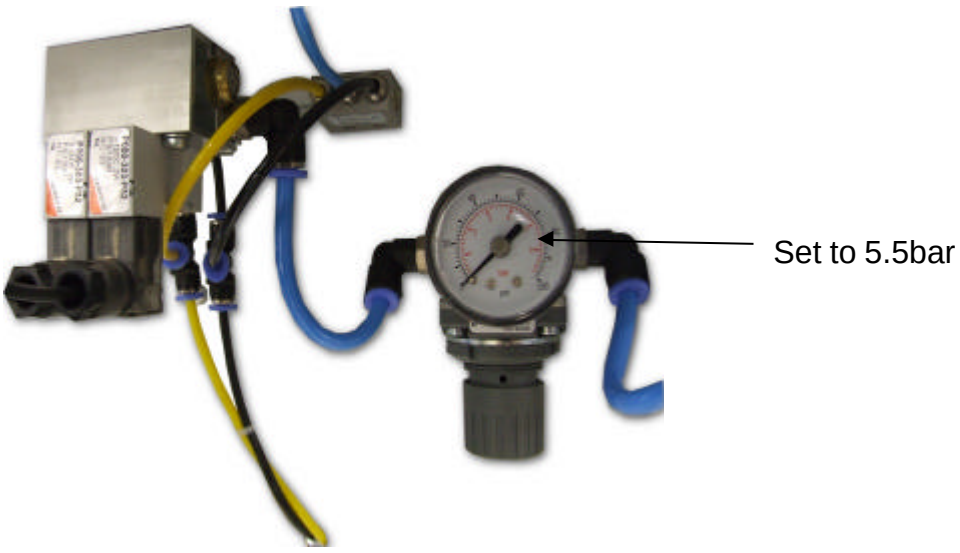
4.3 Priming Pump

Having connected the mains power and the air supply to the drum dispenser, the following must be undertaken:

Set the pump pressure regulator to 2.5bar. This is the recommended starting pressure. Turn on the air supply to the pump using the pump air supply switch.

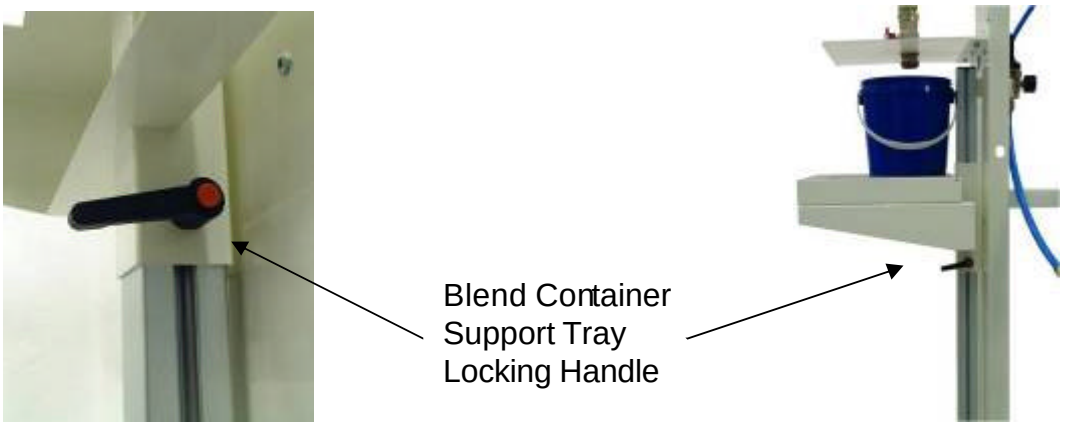


Set the ink valve pressure regulator to 5.5bar.

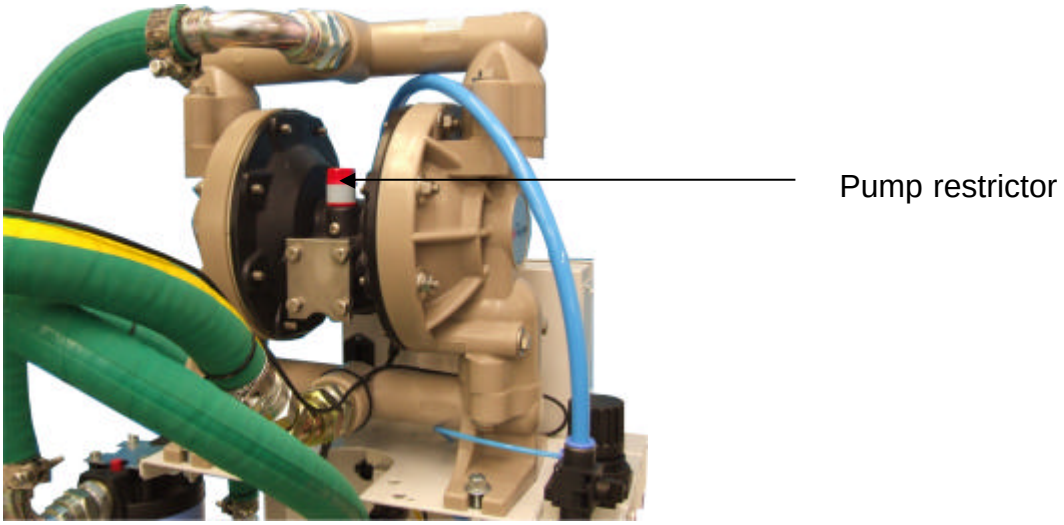


4.3 Priming Pump (cont)

Place an empty container onto the dispense drip tray, unlock the handle and adjust the height of the blend container support tray so that there is approximately 30mm clearance between the top of the container and the underside of the splash guard as shown below. Ensure support tray is locked in position before proceeding.



Locate the restrictor on the top of the pump.



In the centre of the restrictor is a socket head bolt or slotted adjuster. Turn this bolt anti-clockwise (upwards) to de-restrict the pump, stop when the bolt comes into contact with limiter pin. This will allow free flow of ink through the pump, and can be adjusted if necessary when the pump has been primed with ink.

4.3 Priming Pump (cont)

Press the manual dispense button on the control unit until any residual water, (from the factory testing of the dispenser), and ink from the drum is being dispensed into the container. The pump may slow as ink enters the system and starts to dispense.

Adjust the restrictor by turning the socket head bolt clockwise. This will result in the cycle time of the pump slowing. Adjust this until a one-second-pump cycle is achieved. If required the air pressure can be increased to stop the pump from stalling. It is advisable to increase the air pressure slowly until just enough pressure is applied for reliable operation.

The pump should now operate to its optimum flow rate.

If the pump stalls for any reason, turn the pump air supply switch to the off position for at least 10 seconds. This will allow the pump to clear itself. Turn the pump air supply switch back to the on position. With a container in place below the dispense valve, press manual dispense to allow the pump to operate. This should allow the pump to automatically re-start itself.
If the pump does not restart itself immediately or pumps intermittently, follow setting up procedure in the Service Section.

4.4 General operation

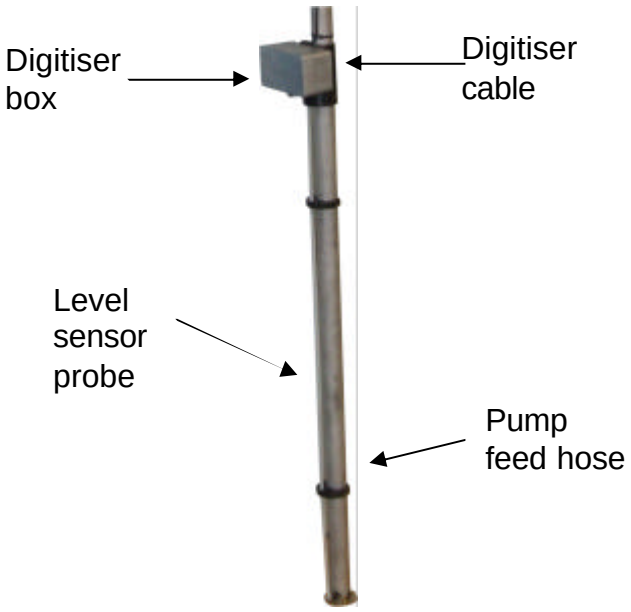
Having primed the pump, the ink contained within the drum can be dispensed either by a timed dispense, as described in section 2.4.4 or manually as described in section 2.4.5.
Before dispensing ink, ensure the height of the blend container support tray with the drip tray are set correctly for the height for the container to be used, and not too low that splashing of the ink may occur due to the gap between the top of the container and the underside of the splash guard being too great. The splash guard has a hole in the centre which is lined up with the dispense valve outlet nozzle. Ensure the time allocated to the timed dispense is adequate to fill the container to the desired level, and not too long so it can be overfilled.

4.4.1 Recirculation mode

In recirculation mode, the ink is pumped from the bottom of the drum, through the recirculation ink valve and back through the recirculating hose to the top of the drum. If the recirculation mode is required to be in operation due to setting up or separation of ingredients used in the ink, this can be configured as described in section 2.4.3. The frequency and time for recirculation will be specific to the type of ink being dispensed.

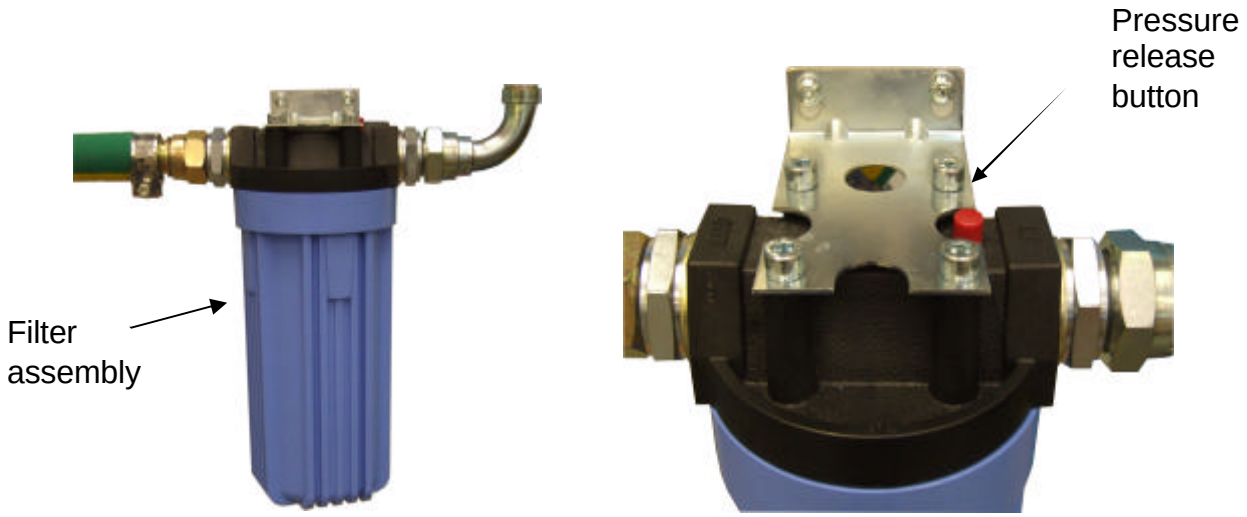
4.4.2 Ink level sensor

The ink level sensor probe is mounted on the pump feed hose and detects the amount of ink remaining in the drum. The probe terminates in the digitiser box and a cable runs from here to the LA Controller which displays the level by means of the level indicator LEDs on the front panel. Set up of this function is described in section 2.3.2 of this manual.



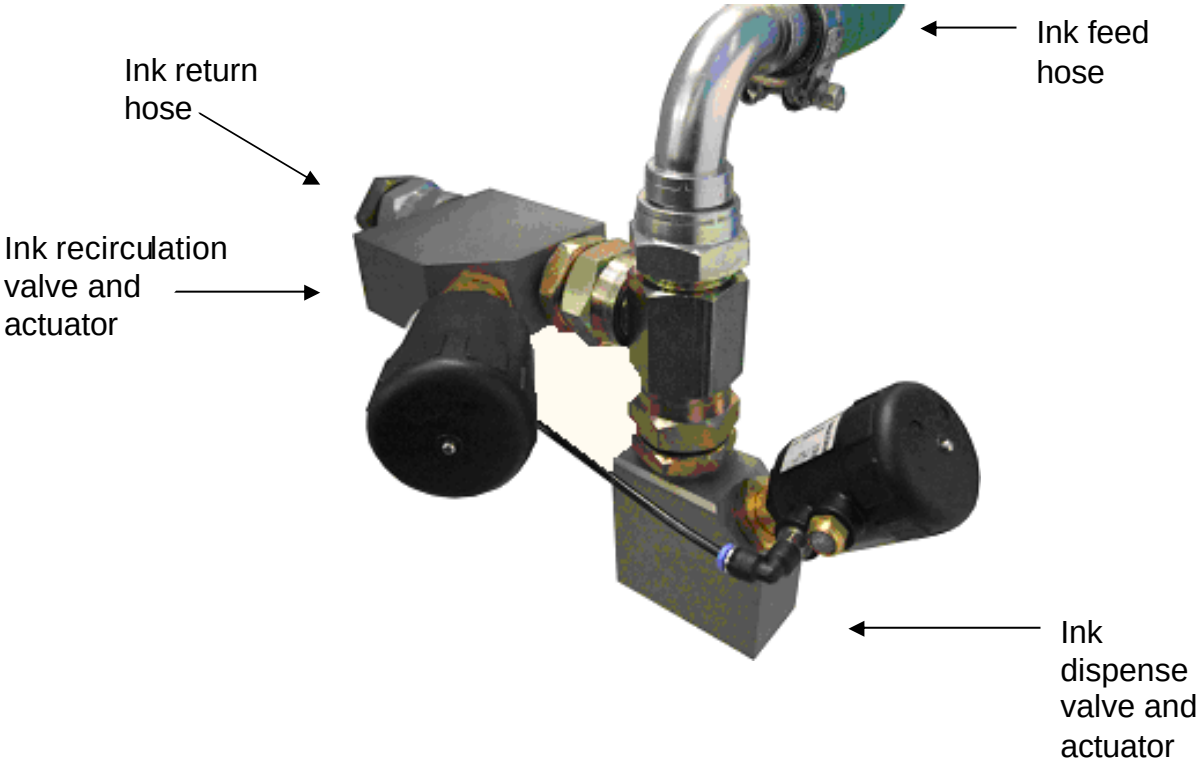
5 Ink Filter

The ink filter is positioned on the right side of the machine and is part of the pump feed hose line. It comprises an outer casing, with an enclosed mesh filter. Its purpose is to filter debris from the ink before it reaches the ink container. To remove the filter for cleaning, first switch off the air supply to the pump, and with a suitable container on the drip tray, press the manual dispense button to release the pressure in the ink feed hose. When the flow subsides, press the red button on top of the filter to release and residual pressure in the ink filter. Wearing suitable protective gloves, overalls and safety glasses, hold the blue outer casing of the filter with both hands and unscrew it. The filter and casing must be kept in a vertical position to avoid spilling and of the contents. Empty the contents of the filter and casing into a waste container and place the casing and filter in a suitable location for cleaning. Once cleaned, replace the filter and casing, and switch on the air supply to the pump.



6 Ink valve and recirculation valve

Ink is dispensed into the container via the ink valve. This comprises a valve body and an actuator which is controlled by the LA Control Unit to dispense as required. As the actuator is activated, the dispense nozzle in the valve body is opened and the ink is pumped either to complete a timed dispense or for the duration of the manual dispense button being pressed. The ink dispense valve incorporates an anti drip fitting to the outlet of the nozzle.



The recirculation valve comprises a valve body and an actuator which is also controlled by the LA Control Unit. It will open as determined by the setting of the control unit. As the actuator is activated, the restrictor in the valve body is opened and the ink is pumped through the return hose and back into the drum.

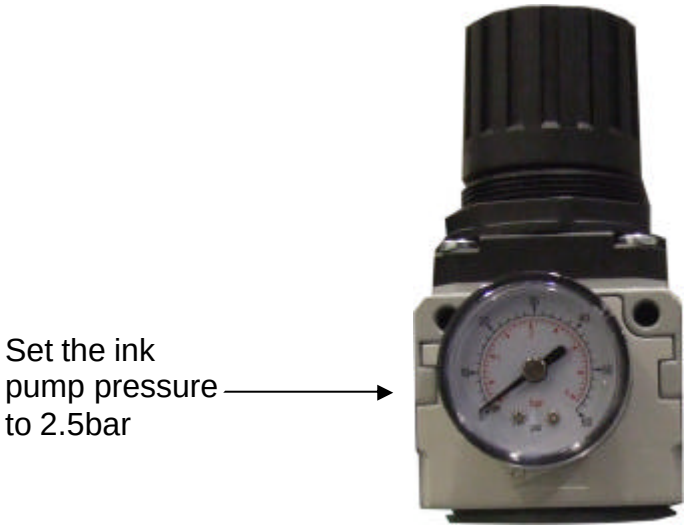
7 Troubleshooting

If the drum dispenser should fail to operate, check the following:

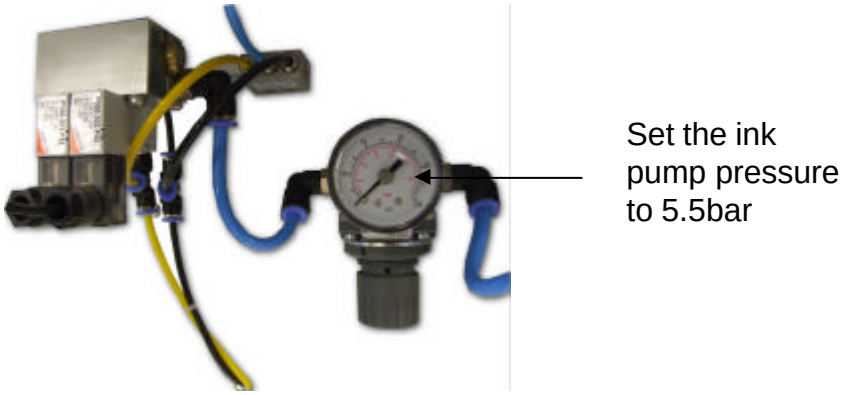
Power to LA controller unit. Check the level sensor indicators and the numerical indicators are lit. If not, check the mains power supply to the dispenser.

Compressed air to the air supply manifold is good. A clean dry air supply of 6bar minimum is required for correct operation.

Compressed air supply to the pump is set to required pressure and is switched on. Set to default pressure of 2.5bar at the factory, but this may differ slightly dependent on ink viscosity. Adjust the regulator to obtain pressure to the required value.



Check the air to the dispense and re-circulate valves is set correctly. This is set by means of the regulator mounted on the side of the control box. This is set to 5.5bar at the factory and is the recommended pressure.



Troubleshooting (cont)

The empty alarm LED is lit and the empty alarm sounder is sounding. In this mode the dispenser will not dispense. Replace the empty drum with a full drum to continue. If there is still a reasonable quantity of ink in the drum, adjust the level sensor thresholds. See section 2.3.2.

The pump has stalled. If this occurs, turn the air to pump switch off and then on again. This will usually restart the pump.

The dispense valve has stuck open. If this occurs, turn the air supply to the pump off and place a container under the dispense outlet to catch any residual ink. Call for a service engineer.

The recirculate valve is stuck open. If this occurs, the pump will operate even when the timer is off, and will continue to recirculate during a dispense. This will slow the dispense and should be rectified as soon as possible. Call for a service engineer.

The level sensing is inaccurate**.** Re-calibrate the level sensing circuit. See section 2.3.2.

8 Spare parts

8.1 General Parts List

Item		
1	Dispense valve including actuator	SP-9189
2	Recirculating valve including actuator	SP-9197
3	Actuator	SP-9178
4	Filter complete	SP-9530
5	Filter Mesh	SP-9531
6	Ink feed hose part 1	SP-9332
7	Ink feed hose part 2	SP-9332
8	Ink feed hose part 3	SP-9332
9	Recirculation hose	SP-9330
10	Hose clip	SP-9343
11	Air manifold complete	SP-
12	Main air regulator and gauge	SP-
13	Actuator air regulator and gauge	SP-
14	Ink valve actuator solenoid	SP-
15	Recirculation valve actuator solenoid	SP-
16	Ink pump air switch	SP-
17	LA controller complete	SP-
18	Dispenser pump assembly	SP-9341
19	Dispenser pump wet service kit	SP-9583
20	Dispenser pump air motor service kit	SP-9585
21	Ratchet strap	SP-9586
22	Alarm sounder	SP-9003
23	Level sensor probe	SP-
24	Splash guard	SP-
25	Drip tray complete	SP-
26	Blend container support locking handle	SP-
27	Anti drip nozzle	SP-9090

9 Diaphragm pump

9.1 Manual

OPERATOR'S MANUAL 6661AX-X-C

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

RELEASED: 9-11-89
REVISED: 1-10-03
(REV. S)

1" DIAPHRAGM PUMP
1:1 RATIO (NON-METALLIC)

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

SERVICE KITS

Refer to the Model Description Chart to match the pump material options.
637118-C for Air Section repair (see page 6).
637161-XX-C for Fluid Section repair (see page 4).

PUMP DATA

Models		See Model Description Chart for "-XXX".
Pump Type		Non-Metallic, Air Operated, Double Diaphragm
Material		See Model Description Chart.
Weight	6661A3-, 1AF-, 1AJ-, 1AL-	20.25 lbs (9.19 kgs)
	6661AP-, 1AR-, 1AS-, 1AT-	20.25 lbs (9.19 kgs)
	6661A4-, 1AG-, 1AK-, 1AN-	28.5 lbs (12.93 kgs)
	6661B3-, 1BF-, 1BJ-, 1BL-	28.8 lbs (13.06 kgs)
	6661BP-, 1BR-, 1BS-, 1BT-	28.8 lbs (13.06 kgs)
	6661B4-, 1BG-, 1BK-, 1BN-	37 lbs (16.78 kgs)
Maximum Air Inlet Pressure		120 p.s.i. (8.3 bar)
Maximum Material Inlet Pressure		10 p.s.i. (0.69 bar)
Maximum Outlet Pressure		120 p.s.i. (8.3 bar)
Maximum Flow Rate (flooded inlet)		47 g.p.m. (177.9 l.p.m.)
Displacement / Cycle @ 100 p.s.i.g.		0.17 gal. (0.64 lit.)
Maximum Particle Size (semi-solids)		1/8" dia. (3.2 mm)
Maximum Temperature Limits		
	Polypropylene	35° to 150° F (2° to 66° C)
	PVDF (Kynar)	10° to 200° F (-12° to 93° C)
Dimensional Data		see page 8
Noise Level @ 70 p.s.i. - 60 c.p.m.①		64.5 db (A)②

① Tested with 93110 muffler installed.
② The pump sound pressure levels published here have been updated to an Equivalent Continuous Sound Level (L_{Aeq}) to meet the intent of ANSI S1.13-1971, CAGI-PNEUROP S5.1 using four microphone locations.

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended, consult a representative or the factory if you have questions concerning availability.

GENERAL DESCRIPTION

The ARO Diaphragm Pump offers high volume delivery even at low air pressure and a broad range of material compatibility options available. Refer to the model and option chart. ARO pumps feature stall resistant design, modular air motor / fluid sections.
Air operated double diaphragm pumps utilize a pressure differential in the air chambers to alternately create suction and positive fluid pressure in the fluid chambers, ball checks insure a positive flow of fluid.
Pump cycling will begin as air pressure is applied and it will continue to pump and keep up with the demand. It will build and maintain line pressure and will stop cycling once maximum line pressure is reached (dispensing device closed) and will resume pumping as needed.

INGERSOLL-RAND COMPANY
P.O. BOX 151 • ONE ARO CENTER • BRYAN, OHIO 43506-0151
(419) 636-4242 • FAX (419) 633-1674

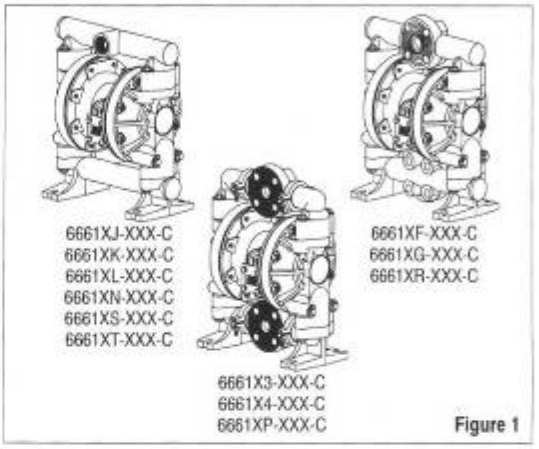


Figure 1

MODEL DESCRIPTION CHART

6661 X X - X X X - C

CENTER BODY MATERIAL
A - Aluminum B - Cast Iron

FLUID CAP / MANIFOLD MATERIAL
3 - Colorless Polypropylene flange (3-piece manifold)
4 - PVDF (Kynar®) flange (3-piece manifold)
F - Colorless Polypropylene flange (one piece manifold)
G - PVDF (Kynar) flange (one piece manifold)
J - Colorless Polypropylene, N.P.T. (one piece manifold)
K - PVDF (Kynar), N.P.T. (one piece manifold)
L - Colorless Polypropylene, B.S.P. (one piece manifold)
N - PVDF (Kynar), B.S.P. (one piece manifold)
P - Gray Polypropylene flange (3-piece manifold)
R - Gray Polypropylene flange (one piece manifold)
S - Gray Polypropylene, N.P.T. (one piece manifold)
T - Gray Polypropylene, B.S.P. (one piece manifold)

SEAT MATERIAL
2 - 316 Stainless Steel
3 - Polypropylene
4 - PVDF (Kynar)
8 - Hard 440 Stainless Steel

BALL MATERIAL
1 - Neoprene
2 - Nitrile
3 - Viton®
4 - T.F.E. (Teflon®)
5 - E.P.R.
8 - Polyurethane
A - 316 Stainless Steel
E - Santoprene®
M - Medical Grade Santoprene

DIAPHRAGM MATERIAL
1 - Neoprene
2 - Nitrile
3 - Viton
4 - T.F.E. (Teflon) / Santoprene
5 - E.P.R.
9 - Hytrel®
B - Santoprene
M - Medical Grade Santoprene

FLUID SECTION SERVICE KIT SELECTION 6661XX - X X X - C
EXAMPLE: MODEL # 6661A3-311-C
FLUID SECTION SERVICE KIT # 637161-11-C
637161 - X X - C
BALL DIAPHRAGM

ARO

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause pump damage, personal injury or property damage.

- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.
- Do not exceed the maximum inlet air pressure as stated on the pump model plate.

⚠ WARNING STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.

- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements.
- After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter should show 100 ohms or less.
- Submerse the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire.
- Use proper ventilation.
- Keep inflammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

⚠ WARNING Pump exhaust may contain contaminants. Can cause severe injury. Pipe exhaust away from work area and personnel.

- In the event of a diaphragm rupture, material can be forced out of the air exhaust muffler.
- Pipe the exhaust to a safe remote location when pumping hazardous or inflammable materials.
- Use a grounded 3/8" min. i.d. hose between the pump and the muffler.

⚠ WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump, hoses or dispensing valve while the system is pressurized.

- Disconnect air supply line and relieve pressure from the system by opening dispensing valve or device and / or carefully and slowly loosening and removing outlet hose or piping from pump.

⚠ WARNING EXPLOSION HAZARD. Models containing aluminum wetted parts cannot be used with III.-Trichloroethane, Methylene Chloride or other Halogenated Hydrocarbon solvents which may react and explode.

- Check pump motor section, fluid caps, manifolds and all wetted parts to assure compatibility before using with solvents of this type.

⚠ WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements.

- Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ CAUTION Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. For specific fluid compatibility, consult the chemical manufacturer.

⚠ CAUTION Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits. Refer to PUMP DATA on page 1 of this manual.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

- Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate when out of material for long periods of time.

- Disconnect air line from pump when system sits idle for long periods of time.

⚠ CAUTION Use only genuine ARO replacement parts to assure compatible pressure rating and longest service life.

NOTICE Replacement warning labels are available upon request: "Static Spark PN \ 93122 & Diaphragm Rupture PN \ 93616-1."

NOTICE RE-TORQUE ALL FASTENERS BEFORE OPERATION. Creep of housing and gasket materials may cause fasteners to loosen. Re-torque all fasteners to insure against fluid or air leakage.

⚠ WARNING	= Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.
⚠ CAUTION	= Hazards or unsafe practices which could result in minor personal injury, product or property damage.
NOTICE	= Important installation, operation or maintenance information.

AIR AND LUBE REQUIREMENTS

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause pump damage, personal injury or property damage.

- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. There is no lubrication required other than the "O" ring lubricant which is applied during assembly or repair.
- If lubricated air is present, make sure that is compatible with the Nitrile "O" rings in the air motor section of the pump.

OPERATING INSTRUCTIONS

- Always flush the pump with a solvent compatible with the material being pumped if the material being pumped is subject to "setting up" when not in use for a period of time.
- Disconnect the air supply from the pump if it is to be inactive for a few hours.
- The outlet material volume is governed not only by the air supply but also by the material supply available at the inlet. The material supply tubing should not be too small or restrictive. Be sure not to use hose which might collapse.
- When the diaphragm pump is used in a forced-feed (flooded inlet) situation it is recommended that a "Check Valve" be installed at the air inlet.
- Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration.

MAINTENANCE

Refer to the part views and descriptions as provided on page 4 through 7 for parts identification and Service Kit information.

- Certain ARO "Smart Parts" are indicated which should be available for fast repair and reduction of down time.
- Service kits are divided to service two separate diaphragm pump functions: 1. AIR SECTION, 2. FLUID SECTION. The FLUID SECTION is divided further to match typical part MATERIAL OPTIONS.
- Provide a clean work surface to protect sensitive internal moving parts from contamination from dirt and foreign matter during service disassembly and reassembly.

MAINTENANCE CONTINUED

- Keep good records of service activity and include pump in preventive maintenance program.
- Before disassembling empty captured material in the outlet manifold by turning the pump upside down to drain material from the pump.

FLUID SECTION DISASSEMBLY

1. Remove top manifold(s).
2. Remove (22) balls, (19 and 33) "O" rings and (21) seats.
3. Remove (15) fluid caps.

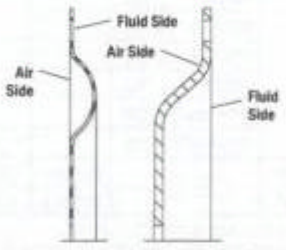
NOTE: Only Teflon diaphragm models use a (7) primary diaphragm and an (8) backup diaphragm. Refer to the auxiliary view in the Fluid Section illustration.

4. Remove the (6) nut, (7) or (7 / 8) diaphragms and (5) washers.
5. Remove (3 and 4) "O" rings.

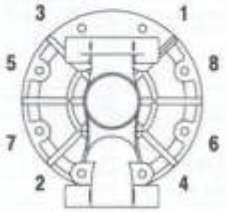
NOTE: Do not scratch or mar the surface of (1) diaphragm rod.

FLUID SECTION REASSEMBLY

- Reassemble in reverse order.
- Clean and inspect all parts. Replace worn or damaged parts with new parts as required.
- Lubricate (1) diaphragm rod and (2) "O" ring with Key-Lube® grease.
- Use ARO PN / 98930-T Bullet (installation tool) to aid in installation of (2) "O" ring on (1) diaphragm rod.
- Be certain (7) or (7 / 8) diaphragm(s) align properly with (15) fluid caps before making final torque adjustments on bolt and nuts to avoid twisting the diaphragm.
- For models with Teflon diaphragms: Item (8) Santoprene diaphragm is installed with the side marked "AIR SIDE" towards the pump center body. Install the Teflon Diaphragm with the side marked "FLUID SIDE" towards the fluid cap.
- Re-check torque settings after pump has been re-started and run a while.



CROSS SECTION VIEW OF DIAPHRAGMS
(Refer to figure 3, page 5)



Torque Sequence
(Refer to figure 3, page 5)

Figure 2

PARTS LIST / 6661AX-X-C FLUID SECTION

FLUID SECTION SERVICE KITS

☆ KITS INCLUDE: BALLS (See BALL Option, refer to -XX in chart below), DIAPHRAGMS (See DIAPHRAGM Option, refer to -XX in chart below), plus "O" ring items (2), (3), (4), (19) and (33) (listed below) plus a 93706-1 Key-Lube grease packet (see page 6).

SEAT OPTIONS 6661XX-XXX-C

"21"			
-XXX	Seat	Qty	[Mtl]
-2XX	95093	(4)	[SS]
-3XX	94707-1	(4)	[P]
-4XX	94707-2	(4)	[K]
-8XX	94706	(4)	[SH]

BALL OPTIONS 6661XX-XXX-C

☆ "22" (1-1/4" dia.)							
-XXX	Ball	Qty	[Mtl]	-XXX	Ball	Qty	[Mtl]
-X1X	93278-1	(4)	[N]	-X8X	93278-8	(4)	[U]
-X2X	93278-2	(4)	[B]	-XAX	92408	(4)	[SS]
-X3X	93278-3	(4)	[V]	-XEX	93278-A	(4)	[SP]
-X4X	93278-4	(4)	[T]	-XMX	93278-M	(4)	[SPM]
-X5X	93278-5	(4)	[E]				

MATERIAL CODE
[B] = Nitrile
[C] = Carbon Steel
[E] = E.P.R.
[H] = Hytrel
[K] = P.V.D.F. (Kynar)
[N] = Neoprene
[P] = Polypropylene
[SP] = Santoprene
[SPM] = Medical Grade Santoprene
[SH] = Hard Stainless Steel
[SS] = Stainless Steel
[T] = Teflon
[U] = Polyurethane
[V] = Viton

DIAPHRAGM OPTIONS 6661XX-XXX-C

-XXX	☆ SERVICE KIT -XX = (Ball) -XX = (Diaphragm)	☆ "7" / "8" Diaphragm (2)	[Mtl]	☆ "3" "O" Ring (2) 5/8" o.d.	[Mtl]	☆ "4" "O" Ring (2) 11/16" o.d.	[Mtl]	☆ "19" "O" Ring (4) 2-1/8" o.d.	[Mtl]	☆ "33" "O" Ring (▲) 1-5/8" o.d.	[Mtl]
-XX1	637161-X1-C	90533-1	[N]	Y325-14	[B]	Y325-112	[B]	Y325-225	[B]	Y325-220	[B]
-XX2	637161-X2-C	90533-2	[B]	Y325-14	[B]	Y325-112	[B]	Y325-225	[B]	Y325-220	[B]
-XX3	637161-X3-C	90533-3	[V]	Y328-14	[T]	Y328-112	[T]	Y327-225	[V]	Y327-220	[V]
-XX4	637161-X4-C	93459-4 / 92973-B	[T/SP]	Y328-14	[T]	Y328-112	[T]	93282	[T]	93281	[T]
-XX5	637161-X5-C	90533-5	[E]	Y328-14	[T]	Y328-112	[T]	93280	[E]	93279	[E]
-XX9	637161-X9-C	90533-9	[H]	Y328-14	[T]	Y328-112	[T]	Y327-225	[V]	Y327-220	[V]
-XXB	637161-XB-C	90533-B	[SP]	Y328-14	[T]	Y328-112	[T]	93280	[E]	93279	[E]
-XXM	637161-XM-C	90533-M	[SPM]	Y328-14	[T]	Y328-112	[T]	93282	[T]	93281	[T]

▲ Quantity of eight (8) required for models 6661X3-X, 6661X4-X and 6661XP-X.
Quantity of four (4) required for models 6661XF-X, 6661XG-X, 6661XJ-X, 6661XK-X, 6661XL-X, 6661XN-X, 6661XR-X, 6661XS-X and 6661XT-X.

MANIFOLD / FLUID CAP MATERIAL OPTIONS 6661XX-XXX-C

			POLYPROPYLENE						P.V.D.F.					
			6661X3- 6661XP-		6661XF- 6661XR-		6661XJ-, XL- 6661XS-, XT-		6661X4-		6661XG-		6661XK-, XN-	
Item	Description (Size in inches)	Qty	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl
□ 6	Diaphragm Nut (1/2" - 20)	(2)	93239-1	[P]	93239-1	[P]	93239-1	[P]	93239-2	[K]	93239-2	[K]	93239-2	[K]
15	Fluid Cap	(2)	93235-[○]	[P]	93235-[○]	[P]	93235-[○]	[P]	93235-2	[K]	93235-2	[K]	93235-2	[K]
34	Manifold, Outlet (Top)	(2)	93236-[○]	[P]					93236-2	[K]				
35	Manifold, Foot (Bottom)	(2)	93237-[○]	[P]					93237-2	[K]				
36	Swivel	(2)	93238-[○]	[P]					93238-2	[K]				
□ 37	Clamp	(8)	93283	[SS]					93283	[SS]				
38	Bolt (1/4" - 20 x 1-1/2")	(8)	Y84-403-T	[SS]					Y84-403-T	[SS]				
39	Nut (1/4" - 20)	(8)	Y12-4-S	[SS]					Y12-4-S	[SS]				
60	Inlet Manifold (Bottom)	(1)			95746-[○]	[P]	95747-[▣]	[P]			95746-2	[K]	95747-[○]	[K]
61	Outlet Manifold (Top)	(1)			95744-[○]	[P]	95745-[▣]	[P]			95744-2	[K]	95745-[○]	[K]

▣ For N.P.T.F. thread colorless Polypropylene models (6661XJ-), use "-1". For BSP thread colorless Polypropylene models (6661XL-), use "-3".
For N.P.T.F. thread gray Polypropylene models (6661XS-), use "-5". For BSP thread gray Polypropylene models (6661XT-), use "-6".

◇ For N.P.T.F. thread models (6661XK-), use "-2". For BSP thread models (6661XN-), use "-4".

○ For colorless Polypropylene models (6661X3-, 6661XF-, 6661XJ-, 6661XL-), use "-1". For gray Polypropylene models (6661XP-, 6661XR-, 6661XS-, 6661XT-), use "-3".

COMMON PARTS

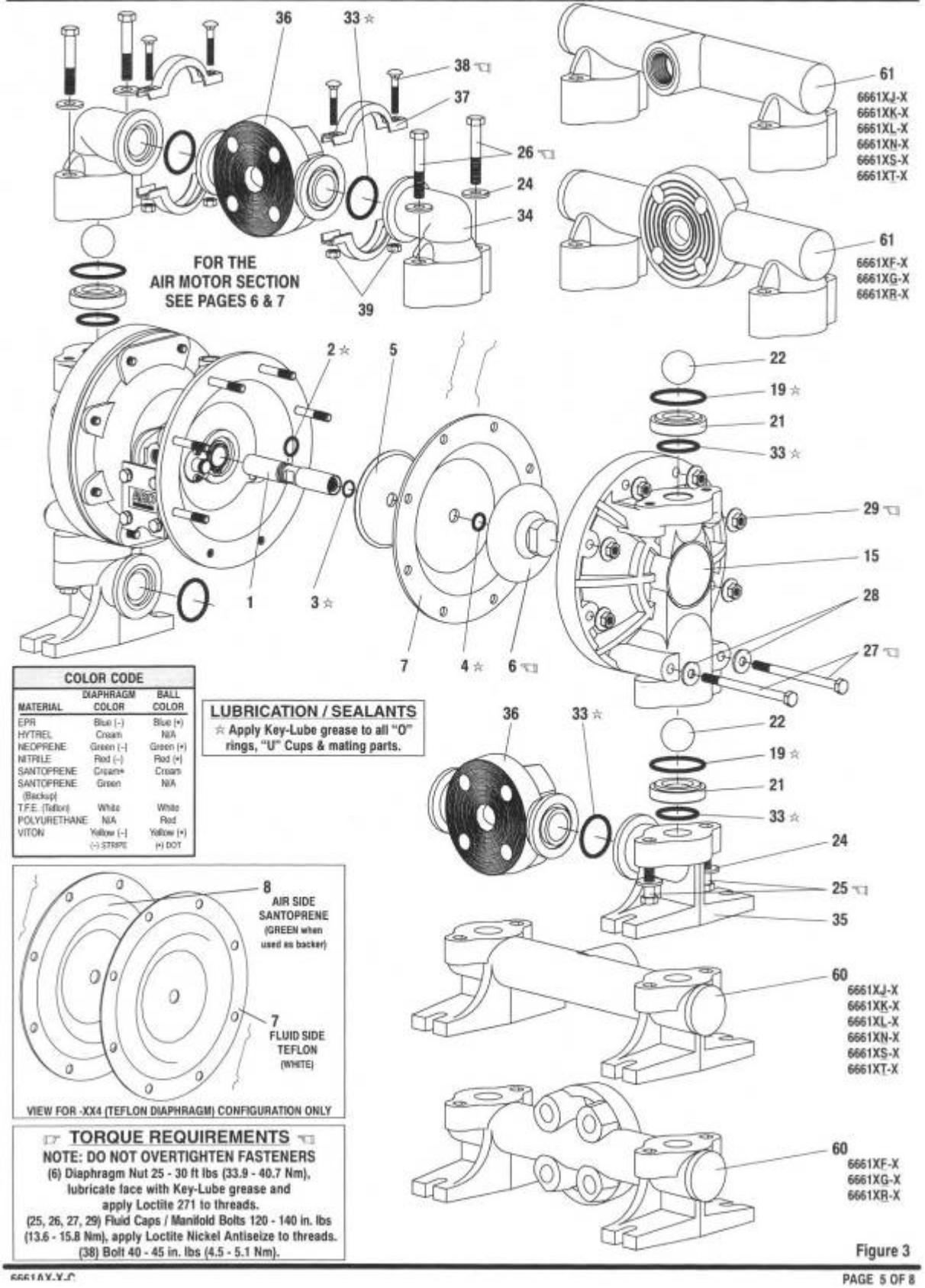
ITEM	DESCRIPTION (Size in inches)	Qty	Part No.	[Mtl]
□ 1	Rod	(1)	98724-1	[C]
☆ 2	"O" Ring (3/32" x 3/4" o.d.)	(1)	Y330-113	[B]
5	Plate	(2)	93441-2	[C]
24	Washer (13/32" i.d.)	(8)	93360-1	[SS]
25	Bolt (3/8" - 16 x 1-1/2")	(4)	Y6-67-T	[SS]

ITEM	DESCRIPTION (Size in inches)	Qty	Part No.	[Mtl]
26	Bolt (3/8" - 16 x 2-1/4")	(4)	Y6-610-T	[SS]
27	Bolt (5/16" - 18 x 4-1/2")	(4)	Y6-518-T	[SS]
28	Washer (5/16" i.d.)	(4)	93359-1	[SS]
29	Nut (5/16" - 18)	(12)	93886	[SS]

□ "Smart Parts" keep these items on hand in addition to the Service Kits for fast repair and reduction of down time.

Manual (cont)

PARTS LIST / 6661AX-X-C FLUID SECTION



COLOR CODE

MATERIAL	DIAPHRAGM COLOR	BALL COLOR
EPR	Blue (-)	Blue (•)
HYTREL	Cream	N/A
NEOPRENE	Green (-)	Green (•)
NITRILE	Red (-)	Red (•)
SANTOPRENE	Cream*	Cream
SANTOPRENE (Backup)	Green	N/A
T.F.E. (Teflon)	White	White
POLYURETHANE	N/A	Red
VITON	Yellow (-) (-) STRIPE	Yellow (•) (•) DOT

LUBRICATION / SEALANTS

☆ Apply Key-Lube grease to all "O" rings, "U" Cups & mating parts.

VIEW FOR -XX4 (TEFLON DIAPHRAGM) CONFIGURATION ONLY

TORQUE REQUIREMENTS

NOTE: DO NOT OVERTIGHTEN FASTENERS

(6) Diaphragm Nut 25 - 30 ft lbs (33.9 - 40.7 Nm), lubricate face with Key-Lube grease and apply Loctite 271 to threads.

(25, 26, 27, 29) Fluid Caps / Manifold Bolts 120 - 140 in. lbs (13.6 - 15.8 Nm), apply Loctite Nickel Antiseize to threads.

(38) Bolt 40 - 45 in. lbs (4.5 - 5.1 Nm).

Figure 3

6661AX-X-C

PAGE 5 OF 8

PARTS LIST / 6661AX-X-C AIR MOTOR SECTION

✓ Indicates parts included in 637118-C Air Section Service Kit.
SERVICE KIT NOTE: Service Kit 637118-C is a general repair kit for all 1" and larger ARO diaphragm pump air motors. It contains extra "O" Rings and extra parts that may not be needed to service this model.

ITEM	DESCRIPTION (Size in inches)	Qty	Part No.	[Mtl]
101	Motor Body (6661AX-XXX-C)	(1)	94743	[A]
	(6661BX-XXX-C)	(1)	94741	[CI]
✓102	"O" Ring (1/16" x 1" o.d.)	(2)	Y325-20	[B]
□103	Sleeve	(1)	94527	[D]
✓104	Retaining Ring, TruArc (.925" i.d.)	(2)	Y145-25	[C]
105	Screw (1/4" - 20 x 5/8")	(8)	Y6-42-T	[SS]
106	Lock Washer (1/4")	(8)	Y14-416-T	[SS]
107	Plate	(2)	93707-1	[SS]
✓108	Gasket (with notch)	(1)	92878	[B/Ny]
□109	Piston	(1)	92011	[D]
✓110	"U" Cup (3/16" x 1-3/8" o.d.)	(1)	Y186-51	[B]
□111	Spool (6661AX-XXX-C)	(1)	92005	[A]
	(6661BX-XXX-C)	(1)	93047	[C]
□112	Washer (1.557" o.d.)	(5)	92877	[Z]
✓113	"O" Ring (1/8" x 1-1/4" o.d.)	(5)	Y325-214	[B]
✓114	"O" Ring (3/32" x 1-9/16" o.d.)	(6)	Y325-126	[B]
□115	Spacer	(4)	92876	[Z]
□116	Spacer	(1)	92006	[Z]
✓117	Gasket	(1)	92004	[B/Ny]
118	Pilot Rod	(1)	93309-1	[C]
✓119	"O" Ring (1/8" x 3/4" o.d.)	(4)	93075	[U]
120	Spacer	(3)	115959	[Z]
121	Sleeve Bushing	(2)	98723-1	[Bz]
✓122	"O" Ring (3/32" x 9/16" o.d.)	(2)	94820	[U]
✓123	Screw (#8 - 32 x 3/8")	(4)	Y154-41	[C]
124	Screw (5/16" - 18 x 2-3/8")	(12)	93277	[SS]
128	Pipe Plug (1/8 - 27 N.P.T. x 1/4")	(1)	Y227-2-L	[C]
195	Button Head Screw (1/4" - 20 x 1/4")	(3)	94987	[SS]
201	Muffler	(1)	93110	[C]
✓	Key-Lube "O" Ring Lubricant	(1)	93706-1	
	Pak of 10 Key-Lube	(10)	637175	
✓	Service Kits include: Y212-101 (2) Screws (#10 - 32 x 1/4") used on units manufactured between 8/90 and 4/92 to retain the pilot bushing.			

AIR MOTOR SECTION SERVICE

Service is divided into two parts - 1. Pilot Valve, 2. Major Valve.

GENERAL REASSEMBLY NOTES:

- Air Motor Section Service is continued from Fluid Section repair.
- Inspect and replace old parts with new parts as necessary. Look for deep scratches on metallic surfaces, and nicks or cuts in "O" rings.
- Take precautions to prevent cutting "O" rings upon installation.
- Lubricate "O" rings with Key-Lube grease.
- Do not over-tighten fasteners, refer to torque specification block on view.
- Re-torque fasteners following restart.

PILOT VALVE DISASSEMBLY

1. Remove (104) retaining ring.
2. Remove (123) screws and (122) "O" rings.
3. Remove (118) piston rod, (121) sleeve bushing, (119) "O" rings and (120) spacers from the (101) motor body.
4. Remove (103) sleeve and (102) "O" rings.

PILOT VALVE REASSEMBLY

1. Replace two (102) "O" rings if worn or damaged and reinstall (103) sleeve.
2. Install one of the (121) sleeve bushings, (119) "O" rings, (120) spacers and the remaining (121) bushing.
3. Carefully push (118) pilot rod into bushings etc. and retain on each end with the two (122) "O" rings, retain with (123) screws.
4. Replace (104) retaining rings.

MATERIAL CODE

[A] = Aluminum	[CI] = Cast Iron	[P] = Polypropylene
[B] = Nitrile	[D] = Acetal	[U] = Polyurethane
[Bz] = Bronze	[N] = Neoprene	[SS] = Stainless Steel
[C] = Carbon Steel	[Ny] = Nylon	[Z] = Zinc

MAJOR VALVE DISASSEMBLY

1. Remove (107) plate (or leg depending on model), (108 and 117) gaskets.
2. On the side opposite the air inlet, push on the inner diameter (111) spool. This will force the (109) piston out. Continue pushing the (111) spool and remove. Check for scratches and gouges.
3. Reach into the air section (exhaust side) and remove (116) spacer, (115) spacers, (113) "O" rings, (114) "O" rings, (112) washers, etc. Check for damaged "O" rings.

MAJOR VALVE REASSEMBLY

1. Replace (112) washer, (114) "O" ring and (113) "O" ring onto (115) spacer and insert etc.
   NOTE: Be careful to orient spacer legs away from blocking internal ports.
2. Lubricate and carefully insert (111) spool.
3. Install (117) gasket and (107).
4. Lubricate and install (110) packing cup and insert (109) piston into (air inlet side) cavity, the (110) packing cup lips should point outward.
5. Install (108) gasket and replace (107).

□ "Smart Parts" Keep these items on hand in addition to the Service Kits for fast repair and reduction of down time.

PARTS LIST / 6661AX-X-C AIR SECTION

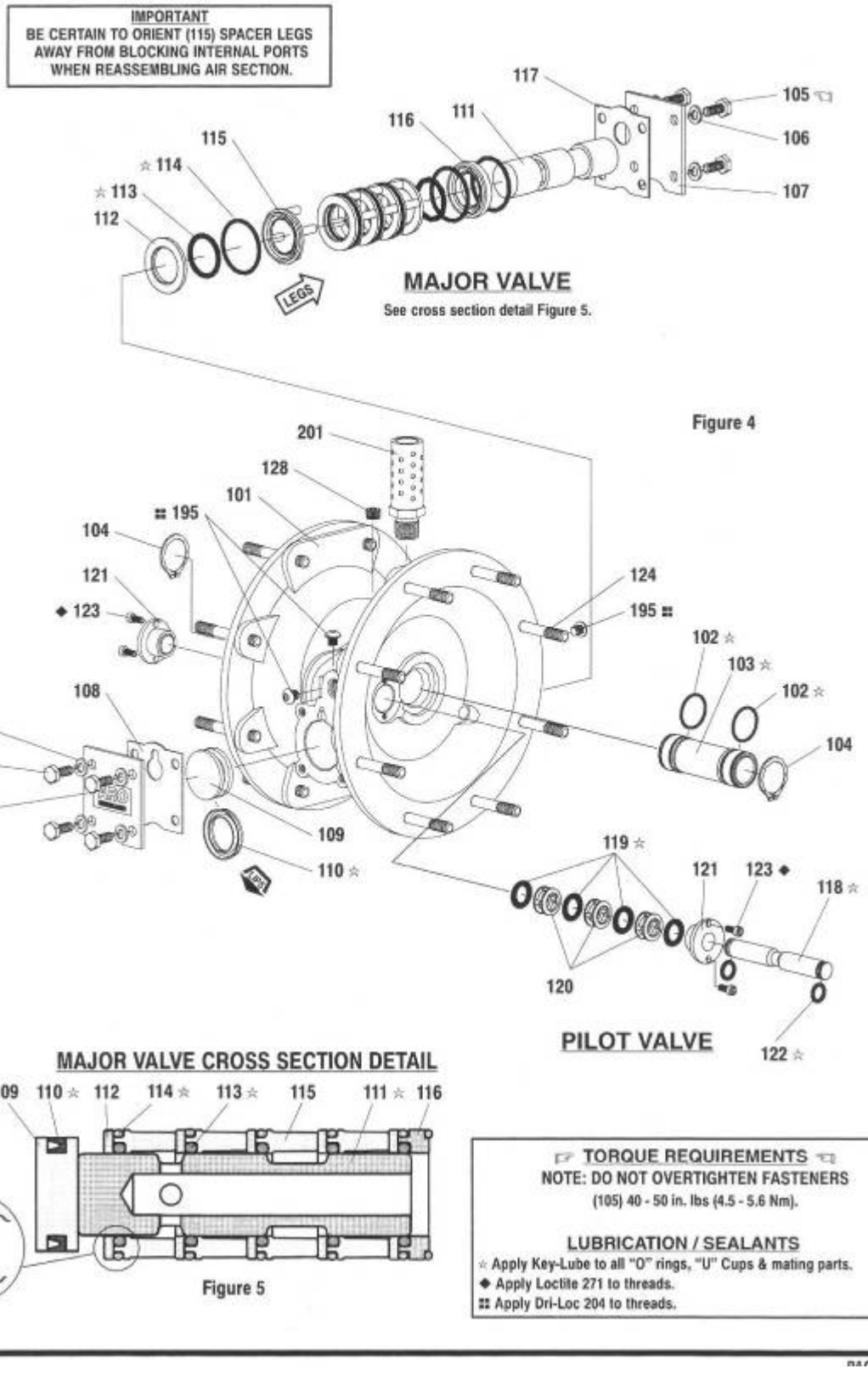


Figure 4

Figure 5

☞ TORQUE REQUIREMENTS ☜
NOTE: DO NOT OVERTIGHTEN FASTENERS
(105) 40 - 50 in. lbs (4.5 - 5.6 Nm).

LUBRICATION / SEALANTS
☆ Apply Key-Lube to all "O" rings, "U" Cups & mating parts.
◆ Apply Loctite 271 to threads.
:: Apply Dri-Loc 204 to threads.

PARTS LIST / 6661AX-X-C AIR SECTION

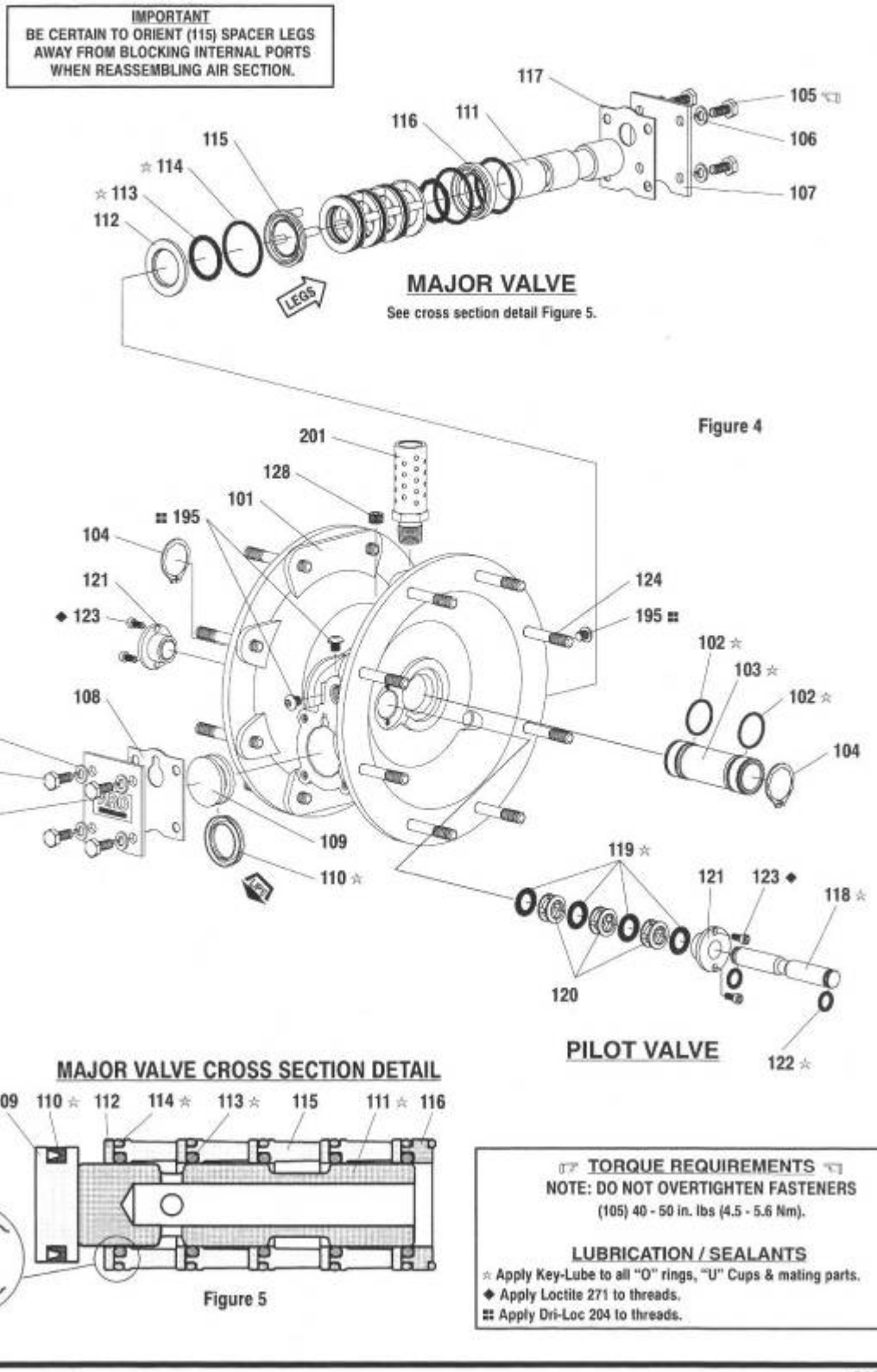


Figure 4

Figure 5

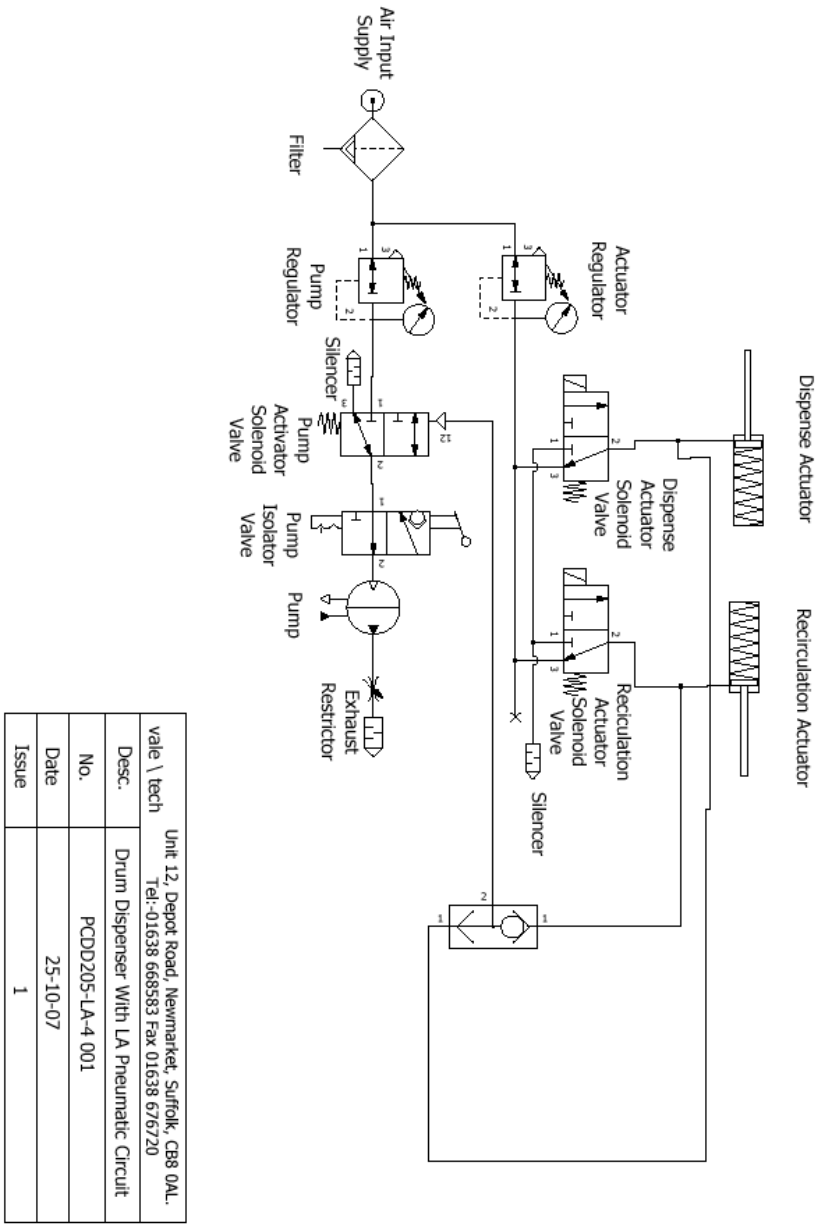
SERVICE LOG

10 Information

This Service Log serves to provide contact information; should additional assistance be required please refer to the contact details supplied below. Forms available at the end of this section allow space for the service history of the machine to be recorded for future reference.

11 Drawings supplied

Pneumatic circuit diagram



12 Contact Information

If you require any additional assistance or have any queries, please contact

Vale-Tech

Telephone: +44 (0) 1638 668593

Fax: +44 (0) 1638 676720

Email: technical.support@vale-tech.co.uk

Website: www.vale-tech.co.uk

Address:

VALE-TECH LIMITED
Unit 12
Depot Road
Newmarket
Suffolk
CB7 OAL
UK

13 Service History

13.1 Machine Fault/Maintenance Log

Date	Action Taken	Signed

Machine Fault/Maintenance Log (cont)

Date	Action Taken	Signed