

## Platon M-Valve

### SPECIFICATION

The 1/4" & 1/2" M-Valve is a miniature air operated proportional control valve for use in Liquid, Gas & Steam applications with a control range as much as 40:1. With its interchangeable Trim sets it is ideal for pilot plant control, with control performance similar to larger control valves.

The standard air actuator requires a 3-15 psig control input with the valve operation either 'Air to Open' or 'Air to Close'.

The Air to Open (ATO) valve is arranged to 'Open' with increasing air signal and with the spring action to 'Close' the valve on air failure. The Air to Close (ATC) valve is the opposite to ATO and is arranged to 'Close' with increasing air signal and with the spring action to 'Open' the valve on air failure.



<b>Valve Body:</b>	316 Stainless Steel (forged)
<b>Trim:</b>	A to F (1/2" Model): 316 Stainless Steel F to N (1/4" Model): 316 Stainless Steel P0 to P13 (1/4" Model): 316 Stainless Steel Stem, 416 Stainless Steel Seat c/w Stellite Plug With Linear (all) or Equal Percentage (A to J) operation
<b>Housing:</b>	Aluminium Alloy polyester powder coated
<b>Valve Packing:</b>	Braided PTFE
<b>Bellofram:</b>	Nitrile
<b>Seals:</b>	Nitrile (ATO Models only)
<b>Connections:</b>	1/4" or 1/2" NPT Female
<b>Pressure:</b>	150 bar g max @ 20°C Dependent on Valve Packing.
<b>Temperature:</b>	-75 - 190°C (Bottom works) -20 - 50°C (Top works)
<b>Operation:</b>	Air to Open (ATO) or Air to Close (ATC)
<b>Signal:</b>	3 - 15 psig (0.2 - 1 bar g) Using clean & dry instrument Air
<b>Control Range:</b>	Trims A - N: 40:1 Trims P0 - P13: 12:1
<b>Cv/Kv Values:</b>	Refer to Table 1
<b>Stem Travel:</b>	1/4" Model: 11mm (7/16") 1/2" Model: 14mm (9/16")
<b>Leak Rate:</b>	Less than 1% of the max Cv/Kv when closed. The M-Valve is not an isolating valve

**NOTE:** All specifications listed above are for Standard Pneumatic (w/o Positioner) instrument configurations only.

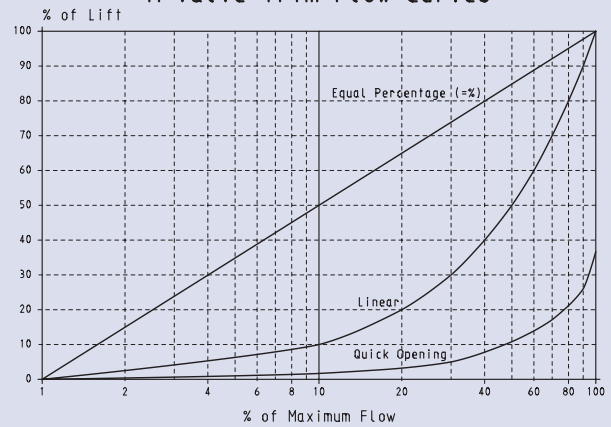
## OPTIONS

- Pneumatically operated top mounted Positioner (refer to OMM SD73B (ATO) or SD73(ATC))
- Extended Bonnet for Cryogenic applications
- Extended Bonnet with Cooling Fins for High Temperature applications
- Flanged connections
- Solid PTFE or Chevron valve packing

Table 1

Cv = 1.167 Kv		Kv = 0.86 Cv	
Trim	Cv Max	Kv Max	Model
A	3.0	2.6	1/2"
B	2.0	1.7	
C	1.25	1.1	
D	0.8	0.7	
E	0.5	0.43	
F	0.32	0.27	1/4" & 1/2"
G	0.2	0.17	1/4"
H	0.13	0.11	
I	0.08	0.07	
J	0.05	0.04	
K	0.03	0.026	
L	0.02	0.017	
M	0.01	0.0086	
N	0.006	0.0052	
P0	0.003	0.0026	
P1	0.002	0.0017	
P2	0.0013	0.0011	
P3	0.001	0.00086	
P4	0.0006	0.00052	
P5	0.0004	0.00034	
P6	0.00027	0.00023	
P7	0.00018	0.00015	
P8	0.00012	0.0001	
P9	0.00008	0.00007	
P10	0.00005	0.000043	
P11	0.000036	0.000031	
P12	0.000024	0.000021	
P13	0.000016	0.000014	

## M-Valve Trim Flow Curves



## SIZING

Trim sizes are tabulated in Cv and Kv values for easy reference, but the selection of the size needed requires expert skill for all, but the simplest of applications. The values included in table 1, have been derived from the following formulae:

US Units	SI Units
<b>Liquids*</b>	
$C_v = Q = G / \Delta P$	$K_v = Q = G / \Delta P$
Q = Flow, US GPM	Q = Flow, m <sup>3</sup> /h
G = Specific Gravity (H <sub>2</sub> O = 1)	G = Relative Gravity (H <sub>2</sub> O = 1)
$\Delta P$ = Pressure Drop, psi	$\Delta P$ = Pressure Drop, bar
<b>Gases</b>	
$C_v = Q / 60 = 293 P_1 \Delta P / GT$	$K_v = Q / 29 = 293 P_1 \Delta P / GT$
Q = Flow, SCFH	Q = Flow, Nm <sup>3</sup> /h
G = Specific Gravity (Air = 1)	G = Relative Gravity (Air = 1)
T = Temperature, K	T = Temperature, K
P <sub>1</sub> = Inlet Pressure, psia	P <sub>1</sub> = Inlet Pressure, bar abs
$\Delta P$ = Pressure Drop, psi	$\Delta P$ = Pressure Drop, bar

\* The Liquid formula applies only to clean, bubble free liquids, with no cavitation or flashing and with a Reynolds number >= 100,000



## INSTALLATION

- 1) The instrument should be examined for any transit damage prior to installation.
- 2) Re-check that the instrument is suitable for the chosen application.  
i.e. Corrosion Resistance
- 3) Ensure the instrument is installed with the direction of flow as per the 'Arrow' on the Valve body. For models fitted with Cooling fins ensure Horizontal installation.
- 4) Install other equipment to provide process &/or instrument isolation, as necessary.
- 5) Provide additional support for positioner equipped valves.
- 6) Connect instrument Air supplies, as necessary.
- 7) Ensure that the packing gland nut is sufficiently tight. Firstly tighten with a spanner and then back off until finger tight.
- 8) Leak check all connections.

## MAINTENANCE

Listed below are the spanner sizes required for use with this instrument:

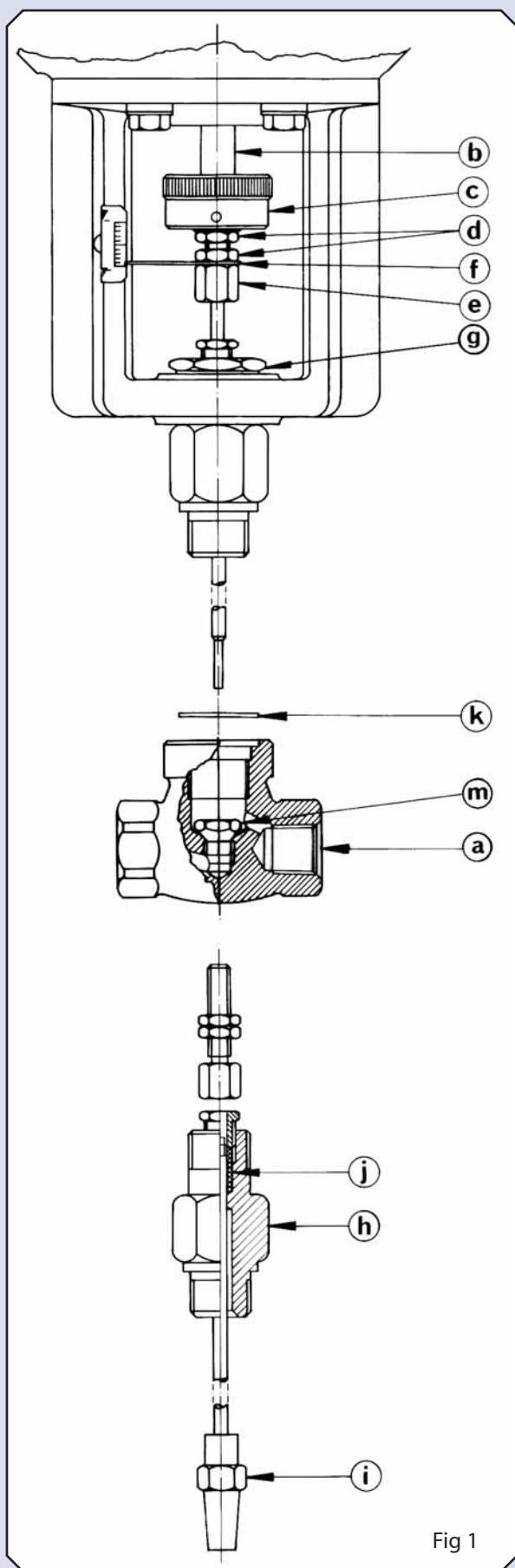
Description	1/4" Model	1/2" Model
Lock Nuts	3/8"	
Stem Connector		
Housing Screws		
Bonnet Lock Nut	7/8"	1 1/8"
Piston Lock Nut	3/8"	
Trim Seat	3/8"	5/8"
Packing Gland Nut	3/8"	7/16"
Valve Body	1"	1 3/8"

### Trim Set Replacement (see Fig 1)

This is best carried out at a work bench rather than in situ.

#### Removal

- 1) For ATO models apply 4 psig (0.3 bar g) to the actuator housing. This is not necessary for ATC.
- 2) Remove the valve body (a) from the bonnet (h), initially using a spanner to break the joint. Do not loose bonnet washer (k).
- 3) Apply vice grip pliers to the drive shaft (b) inside the yoke and above the adjustable limit stop (c).
- 4) Loosen the lock nuts (d) and stem connector (e) to release the travel indicator (f).
- 5) Unscrew the bonnet to yoke nut (g).
- 6) Remove the bonnet assembly (bottom works) from the yoke.
- 7) Loosen the packing Gland nut.
- 8) Unscrew the trim stem from the stem connector.
- 9) The design of the trim (i) varies as the Cv value changes. For lower Cv values the trim & stem are all one piece, whilst as the Cv value increases the trim & stem become separate components. With either design withdraw the trim downwards, using a rotating motion.
- 10) The trim seat (m) can be removed from the valve body using a socket wrench.
- 11) If the gland packing (j) needs to be replaced refer to the 'Packing Replacement' section.



### Replacement

- 1) Screw trim seat back into the valve body.
- 2) Replace the trim into the bonnet from the bottom, through the loosened packing, using a rotating motion.
- 3) Screw the valve body onto the bonnet, remembering the bonnet washer.
- 4) Reassemble the bonnet/valve body (bottom works) to the yoke, slipping the bonnet nut over the trim stem. Ensure the bonnet nut is tightened.
- 5) Screw the trim stem back together with the stem connector and replace the travel indicator, ensuring all threaded joints are tight.
- 6) Reset the Trim movement by referring to the 'Stem Travel' section.
- 7) Leak check the assembly.

### Packing Replacement

- 1) Unassemble the bonnet assembly, etc... as described for 'Trim Set Replacement', up to point 6).
- 2) Unscrew & remove the packing gland nut.
- 3) Remove & discard the old gland packing & replace with that supplied.
- 4) Press the new gland packing firmly home (a piece of straight copper or bundy tubing works well).
- 5) Tighten the packing gland nut with a spanner and then back off until finger tight.
- 6) Stroke the valve through its full range by hand, to check for any bind or drag. This will indicate some form of misalignment with the assembly.
- 7) Clearances are small between the trim & trim seat and non-uniform packing will cause varying degrees of drag.
- 8) Reassemble the bonnet assembly, etc... as described for 'Trim Set Replacement', from point 4).

## Bellofram Replacement

### ATO Models (see Fig.2)

- 1) Depressurise the actuator housing and the valve should return to the fully closed position.
- 2) Loosen lock nuts (a) and stem connector (b) to release the travel indicator (c).
- 3) Remove the 6x flange bolts (d) and unstick the flanged actuator joint with a sharp blow from a blunt object and remove the lid (e). ①
- 4) Lift out the spring (f). ②
- 5) Partially withdraw the piston/bellofram assembly (approx. 15mm) until the adjustable limit stop (g) touches the top of the yoke.
- 6) Unscrew the stem connector from the drive shaft (h) and then completely withdraw the piston assembly.
- 7) Unscrew and remove the piston lock nut (i) and then the spring collar (j), piston (k), bellofram (l) and piston retaining plate (m), taking note of the order of their removal.
- 8) Discard the old bellofram and replace with the new one onto the piston. ③
- 9) Reassemble the piston, etc... to the drive shaft in reverse order, ensuring the lock nut is tight.
- 10) If the o-ring seal (n) needs to be replaced refer to the 'O-ring Replacement' section.
- 11) Reinsert the piston assembly through the housing base, taking care not to damage the o-ring. Align any holes in the outside edge of the bellofram with those of the actuator housing.
- 12) Reverse steps 2) to 5) to reassemble the remaining components, ensuring all threaded joints are tight.
- 13) Reset the Trim movement by referring to the 'Stem Travel' section.
- 14) Leak check the assembly.

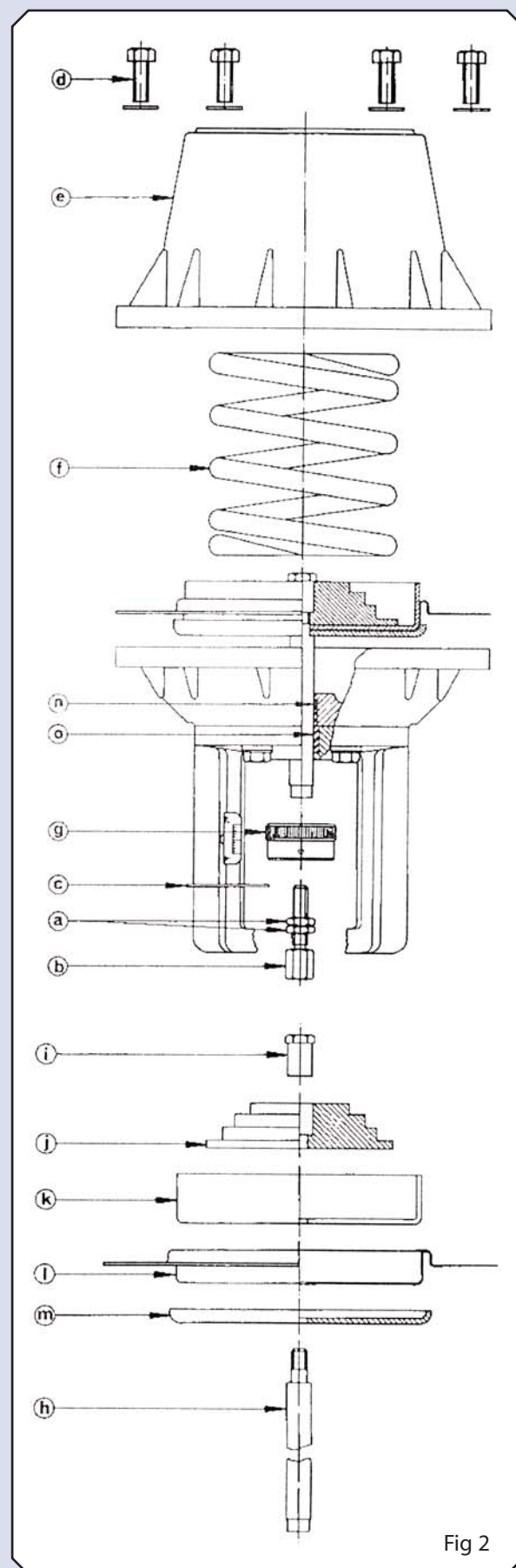


Fig 2



### ATC Models (see Fig 3 & 4)

- 1) Depressurise the actuator housing and the valve should return to the fully open position.
- 2) Loosen lock nuts (a) and stem connector (b) to release the travel indicator (c).
- 3) Remove the 6x flange bolts (f) and unstick the flanged actuator joint with a sharp blow from a blunt object and remove the lid (g). ②
- 4) Unscrew the stem connector from the drive shaft (h) and then completely withdraw the piston assembly.
- 5) Unscrew the piston lock nut (i) and remove the washer (j), piston retaining plate (k), bellofram (l) and piston (m) from the drive shaft (e), taking note of the order of their removal. ④
- 6) Discard the old bellofram and replace with the new one onto the piston. ③
- 7) Reassemble the piston, etc... to the drive shaft in reverse order, ensuring the lock nut is tight.
- 8) Reinsert the piston assembly through the housing base. Align any holes in the outside edge of the bellofram with those of the actuator housing.
- 9) Reverse steps 2) to 4) to reassemble the remaining components, ensuring all threaded joints are tight.
- 10) Reset the Trim movement by referring to the 'Stem Travel' section.
- 11) Leak check the assembly.

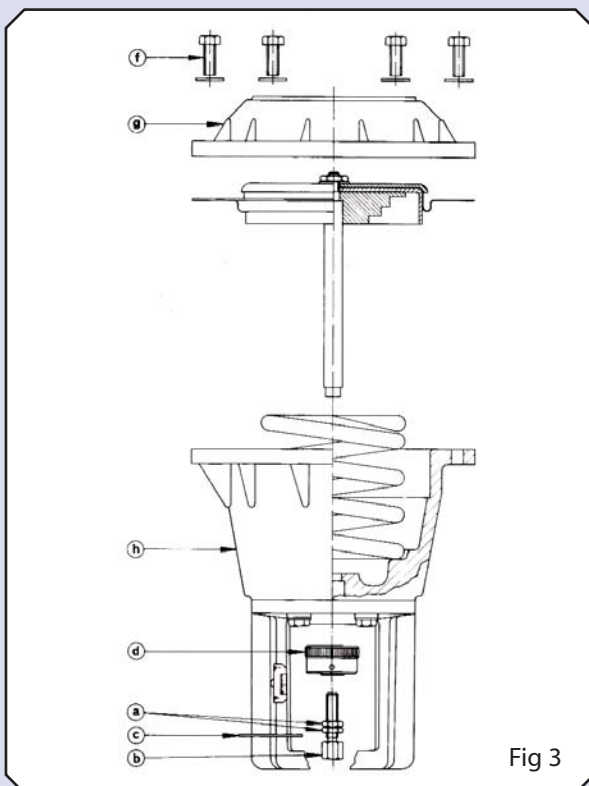


Fig 3

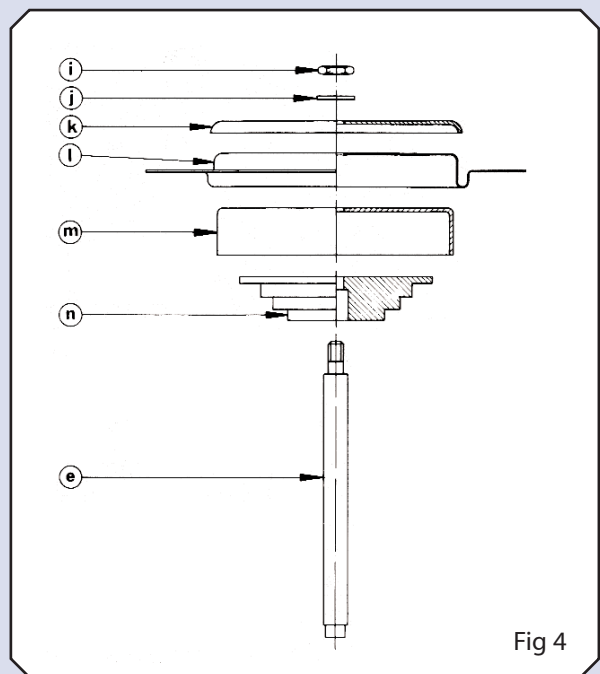


Fig 4

- ① M Valves (ATO) fitted with Top mounted Moores positioners have an o-ring located between the flange faces, so take care not to loose it.
- ② M Valves fitted with Top mounted Moores positioners will have a range spring fitted.
- ③ The side of the bellofram market 'Piston Side' must be placed against the piston.
- ④ M Valves (ATC) fitted with Top mounted Moores positioners have an additional spring collar (n) fitted.

### O-Ring Replacement

#### (ATO Models only, see Fig.2)

If this is being carried out at the same time as the Bellofram replacement, then some of the steps detailed below have already been completed.

A 3/8" open ended spanner is required for these procedures.

- 1) Depressurise the actuator housing.
- 2) Loosen lock nuts (a) and stem connector (b) to release the travel indicator (c).
- 3) Remove the 6x flange bolts (f) and unstick the flanged actuator joint with a sharp blow from a blunt object and remove the lid (g).
- 4) Unscrew the stem connector from the drive shaft (h) and then completely withdraw the piston assembly.
- 5) Loosen and remove the 4x screws that connect the top and bottom works together through the yoke.
- 6) Remove and discard the old o-ring (n) from the actuator lower housing.
- 7) Apply a small amount of silicone lubricant to the new O-ring and replace.

- 8) Reassemble the Top & Bottom works together, ensuring all screws are tight.
- 9) Reinsert the piston assembly through the housing base, taking care not to damage the o-ring. Align any holes in the outside edge of the bellofram with those of the actuator housing.
- 10) Reverse steps 2) to 5) to reassemble the remaining components.
- 11) Reset the Trim movement by referring to the 'Stem Travel' section.
- 12) Leak check the assembly.

### Stem Travel

This adjustment has been made at the factory, with 3.5 bar g process pressure applied to the valve body, with a maximum seat leakage of 0.01% of the maximum trim capacity.

- 1) Apply 8.7 psig (0.6 bar g) signal pressure to the actuator housing.
- 2) Loosen the lock nuts (a) and adjust the stem connector (b) until the valve is in the half open position as shown by the travel indicator (c). Retighten the lock nuts and stroke the valve through its full range.
- 3) Any further adjustments should only be carried out to achieve better shut-off.
- 4) For instruments fitted with Positioners follow the relevant Positioner instructions.

### RECOMMENDED SPARES

Trim Sets - code = TRIM + Letter + Size + Profile  
 where - Letter = Trim letter as selected from Table 1  
 - Size is 0.25 or 0.5 for Trim 'F' only  
 - Profile = 'L' for Linear or 'P' for Equal Percentage

Seal Kits – including Bellofram, Trim Packing, O-Ring (ATO only) & Bonnet Sealing Washer

Size	ATC	ATO
1/4"	MVCK0.25	MVOK0.25
1/2"	MVCK0.5	MVOK0.5

### RETURNS & WARRANTY

Before returning any goods to RM&C, you must obtain a Returns form containing a unique returns (CA) authorisation number. Failure to do so will result in the goods being returned to you, without any inspection, etc. To obtain this form, contact the QA department of our Sheffield office and by return the form will be faxed to you.

On receipt of the Returns form, fill in any required fields and return it with the goods to the Sheffield office. It is advisable to keep a copy of this form (with authorisation no.) for reference purposes.

If the goods have come in to contact with any processes or environments that may be harmful to a user, then COSHH Regulations must also be observed. It is requested that a Material Safety Data Sheet (MSDS) is also supplied with returned goods, if this is likely to be the case. If not provided and the goods are suspected of being contaminated, they will be returned to you.

On receipt of the appropriate documentation, the goods will be examined and assessed in accordance with the terms of any Warranty agreement.

#### Repairs

Prior to any repair work being carried out, you will be informed of our findings and any charges that may be incurred.

#### Replacement

Prior to the supply of any replacements, you will be informed of our findings and any charges that may be incurred.

No replacements will be sent prior to receiving the goods back from you, unless an Order number is supplied to cover the cost of the new unit/s. After inspection, etc of the returned goods, a Credit may be issued, based on our findings.

#### Warranty (extract from Terms and Conditions)

The warranty period is normally 12 months from the date of shipment, except as agreed at the time of sale.

Any misuse of the goods will void any warranty.

For full Warranty and other Contract details, refer to our 'Terms & Conditions'.

Every effort has been made during the preparation of this document to ensure the accuracy of statements and specifications. However, we do not accept liability for damage, injury, loss or expense caused by errors or omissions made. We reserve the right to withdraw or amend products or documentation without notice.

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