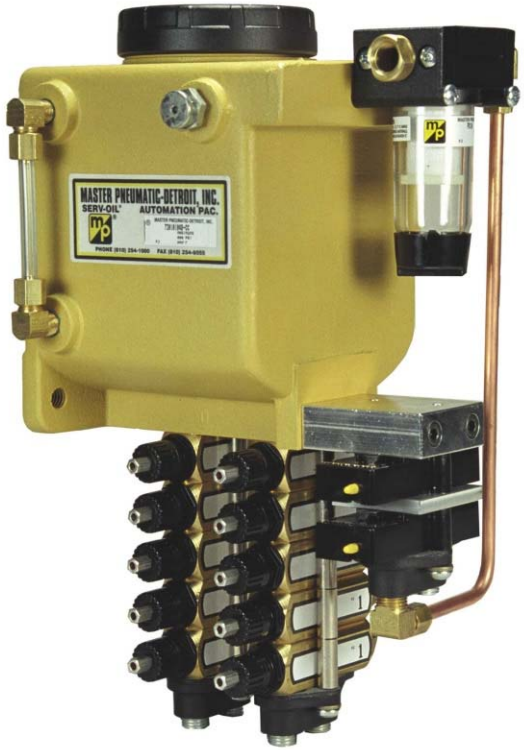
Master Pneumatic Inc.
Introduction to SERV-OIL®

Multi Point Lubricators (MPL)



History

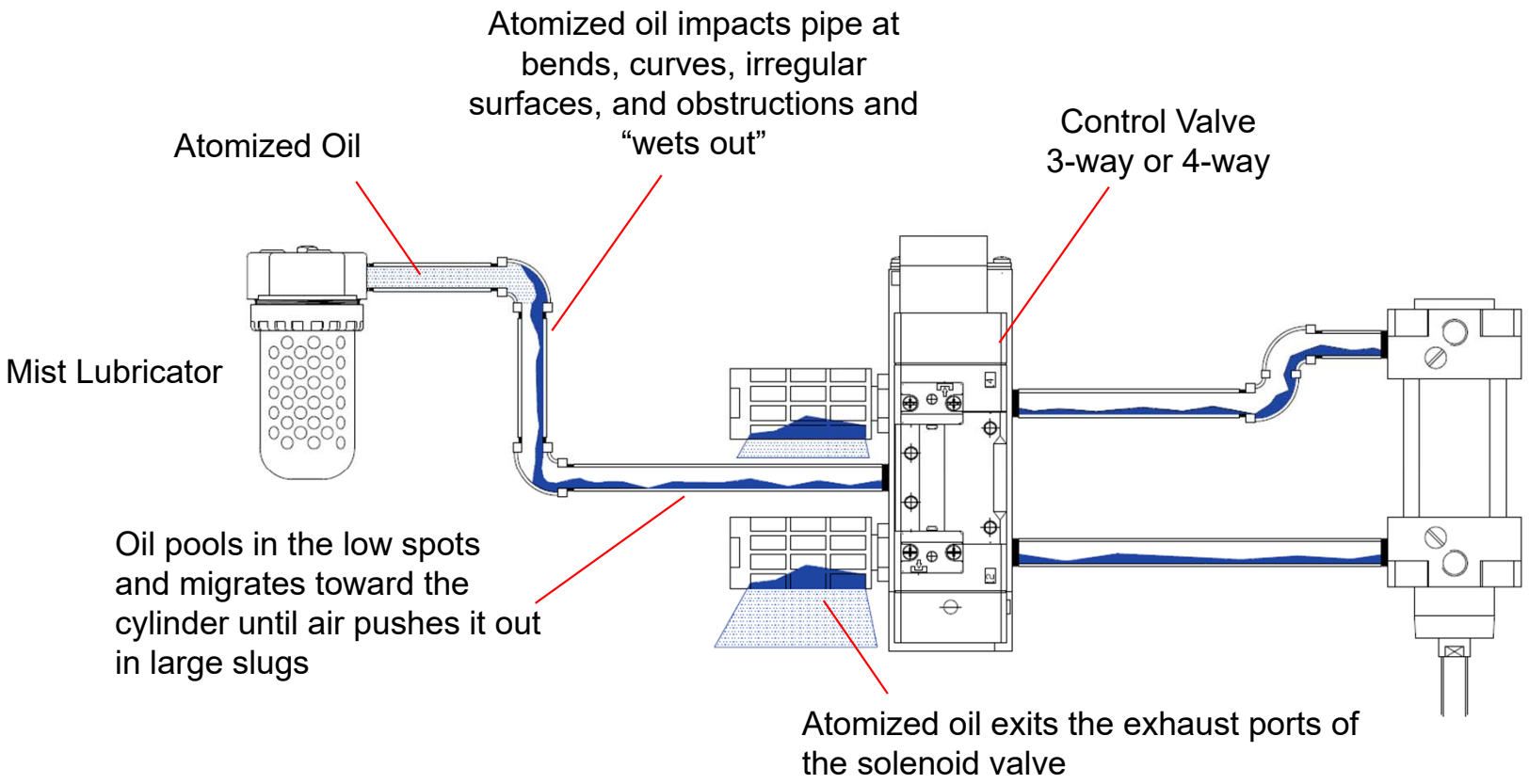
- Automotive Industry 1960's
- Multiple Spindle Nutrunners
- Inconsistent lubrication-Inconsistent torque
- Master Pneumatic to design positive displacement pump
  - Precise, low volume output
  - Point of use
- 10,000,000 cycles

History

- Successful on TORQUE issue !
- Other benefits
  - Longer tool life
  - Significant reduction in repair costs
  - Better for environment
    - Less oil in exhaust air
    - Reduction in oil on people and product

Mist v Injection Lubrication

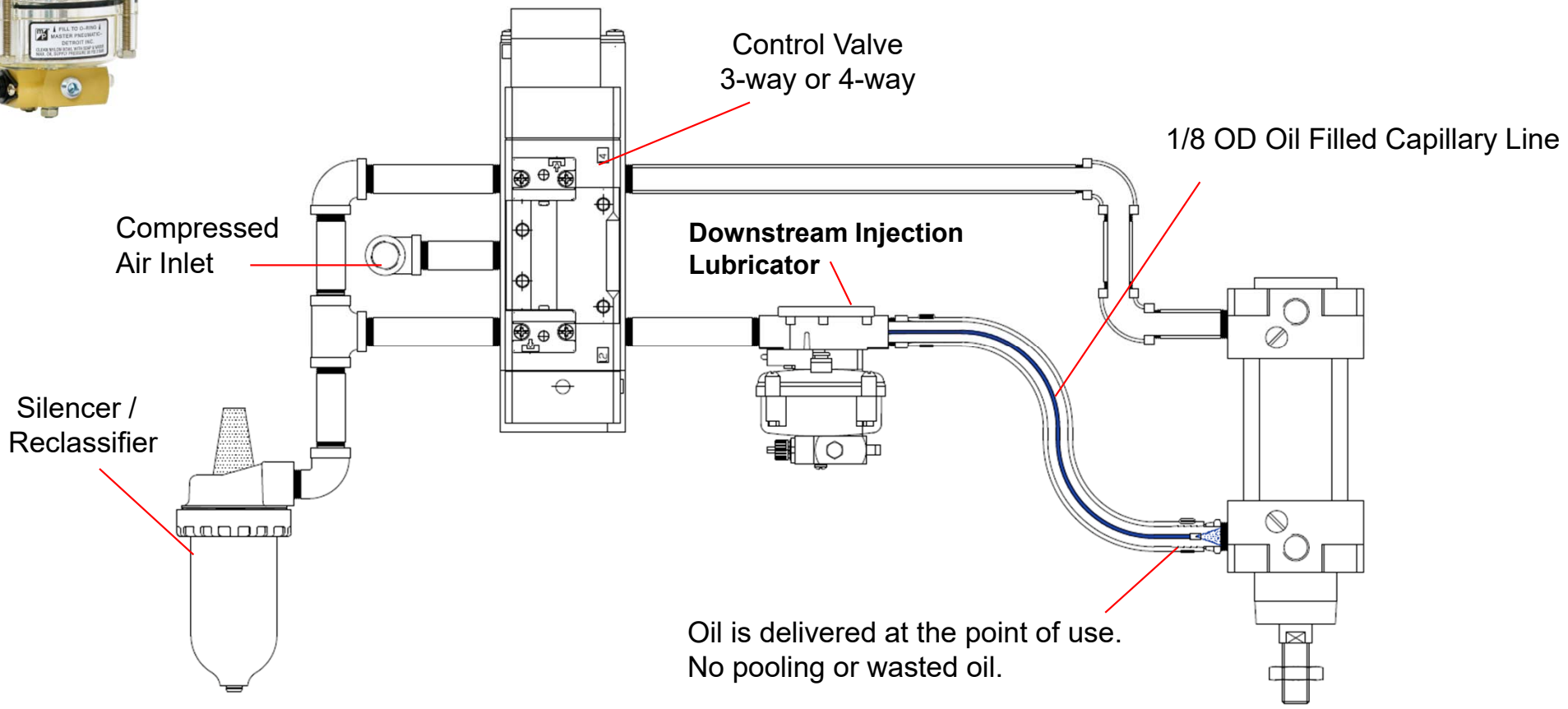
CONVENTIONAL "MIST" METHOD



When the atomized oil exits the lubricator, it **"WETS OUT"** at bends in the piping, low spots, and in any device between it and the cylinder to be lubricated. Many applications are low flow. Small bore and short stroke cylinders will rarely receive the lubrication required. Most of the oil will end up exiting the system through the valve silencers to atmosphere and end up on the products being made, the people making them and/or the plant floor.

EVERYWHERE BUT WHERE YOU WANTED IT!

“DOWNSTREAM INJECTION” METHOD



This style of injection lubricator is piped into the air supply “downstream” of the directional valve that is controlling the actuator.

If you are retrofitting an existing system, our Silencer Reclassifier could be installed to clean up the excess oil left behind from the Mist Lubricator.

MPL

Multi Point Lubricator

The most popular Serv-Oil products used to lubricate pneumatic products and sliding surfaces are Master Pneumatic's MPL products.

These products are small, compact, fluid delivery pumps that have been used all over the world for decades. They are reliable and precise micro lubrication, positive displacement pumps…….***Servo-Meters***

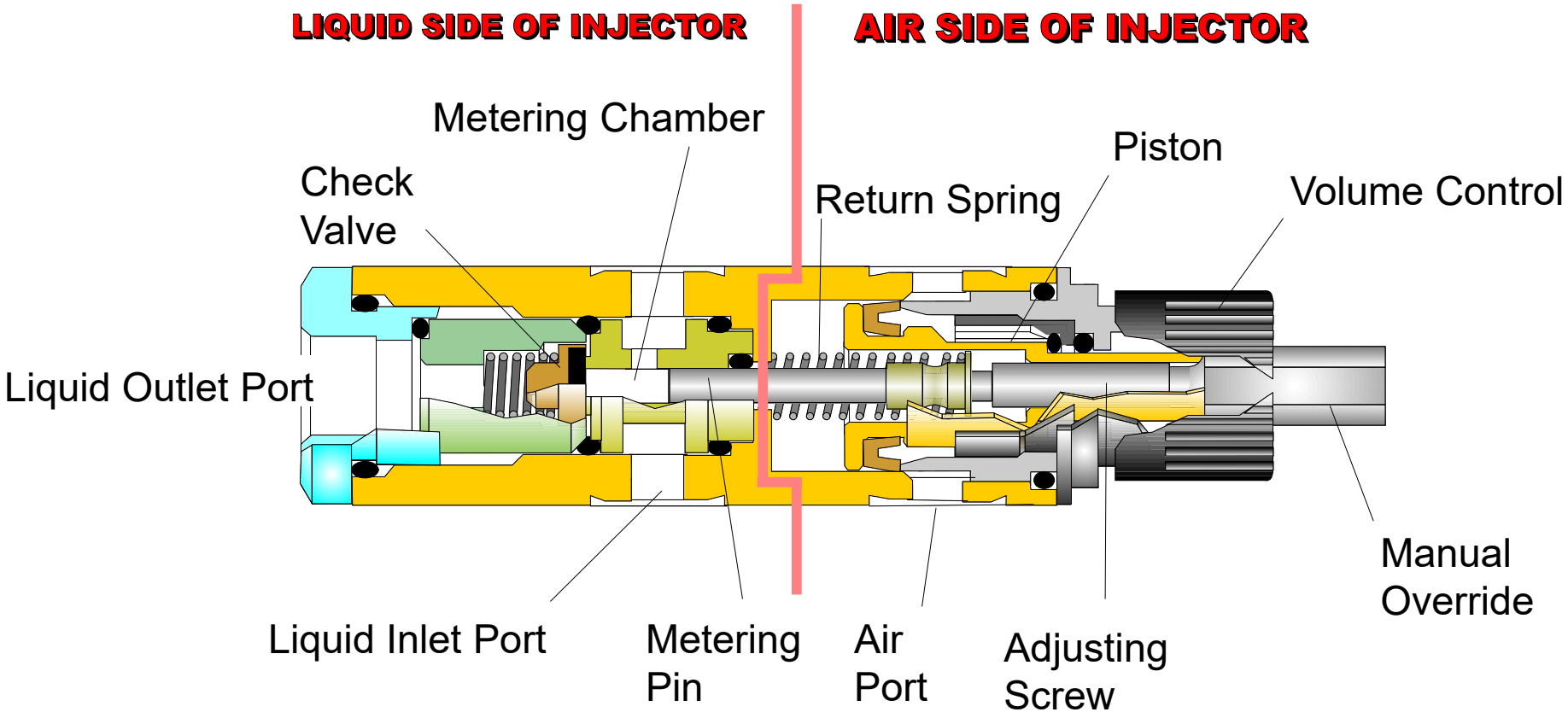
We refer to these fluid delivery systems as Multi Point Lubricators (MPL's) whether there is one Servo-Meter or more than one used in the stack.

These products are unique in the markets you serve and provide solutions to problems your customers did not know even existed.

Differentiate! This is not just another "oiler".

Servo-Meter

Positive Displacement Pump



Servo-Meter

- Positive Displacement Pump
  - Initially 1 drop (.030 mL, 1/30th cc)
  - ½ drop (.015 mL) & 2 drop (.060 mL)
  - Shut off and NON Shut Off
- Housings
  - Brass
  - Nickel plated brass
  - Aluminum
- Stackable – up to 10
- Various seals
  - Buna N
  - Viton
  - Other

Servo-Meter Output

½ Drop (0.015 ml)

	1/2 Drop		
Clicks	ml	Clicks	ml
Full Volume 46	0.0150	**23**	0.0083
45	0.0147	**22**	0.0080
44	0.0144	**21**	0.0077
43	0.0141	**20**	0.0074
42	0.0138	**19**	0.0071
41	0.0135	**18**	0.0068
40	0.0132	**17**	0.0065
39	0.0129	**16**	0.0062
38	0.0127	**15**	0.0059
37	0.0124	**14**	0.0056
36	0.0121	**13**	0.0053
35	0.0118	**12**	0.0050
34	0.0115	**11**	0.0047
33	0.0112	**10**	0.0045
32	0.0109	**9**	0.0042
31	0.0106	**8**	0.0039
30	0.0103	**7**	0.0036
29	0.0100	**6**	0.0033
28	0.0097	**5**	0.0030
27	0.0094	**4**	0.0027
26	0.0091	**3**	0.0024
25	0.0088	**2**	0.0021
24	0.0086	**1**	0.0018

Servo-Meter Output

1 Drop (0.030 ml)

Clicks		1 Drop ml		
Full Volume 46		0.0300	**23**	0.0165
	45	0.0294	**22**	0.0159
	44	0.0288	**21**	0.0154
	43	0.0282	**20**	0.0148
	42	0.0277	**19**	0.0142
	41	0.0271	**18**	0.0136
	40	0.0265	**17**	0.0130
	39	0.0259	**16**	0.0124
	38	0.0253	**15**	0.0118
	37	0.0247	**14**	0.0112
	36	0.0241	**13**	0.0107
	35	0.0236	**12**	0.0101
	34	0.0230	**11**	0.0095
	33	0.0224	**10**	0.0089
	32	0.0218	**9**	0.0083
	31	0.0212	**8**	0.0077
	30	0.0206	**7**	0.0071
	29	0.0200	**6**	0.0066
	28	0.0195	**5**	0.0060
	27	0.0189	**4**	0.0054
	26	0.0183	**3**	0.0048
	25	0.0177	**2**	0.0042
	24	0.0171	**1**	0.0036

Servo-Meter Output

2 Drop (0.060 ml)

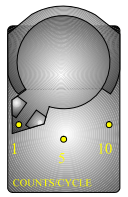
	2 Drop			
Clicks	ml			
Full Volume 46	0.0600		**23**	0.0375
45	0.0590		**22**	0.0365
44	0.0580		**21**	0.0355
43	0.0571		**20**	0.0346
42	0.0561		**19**	0.0336
41	0.0551		**18**	0.0326
40	0.0541		**17**	0.0316
39	0.0532		**16**	0.0307
38	0.0522		**15**	0.0297
37	0.0512		**14**	0.0287
36	0.0502		**13**	0.0277
35	0.0492		**12**	0.0267
34	0.0483		**11**	0.0258
33	0.0473		**10**	0.0248
32	0.0463		**9**	0.0238
31	0.0453		**8**	0.0228
30	0.0443		**7**	0.0218
29	0.0434		**6**	0.0209
28	0.0424		**5**	0.0199
27	0.0414		**4**	0.0189
26	0.0404		**3**	0.0179
25	0.0395		**2**	0.0170
24	0.0385		**1**	0.0160

Micro Dial

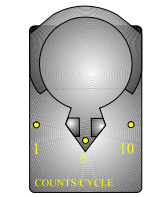
- Available on Servometers
- Visual indication of setting
- Eliminates changing setting to determine output
- Higher tech
- Improved aesthetics

Control-Actuate Pump

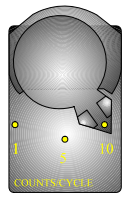
- **Pulse Counter**
- **Frequency Generator**
- **Interposed Solenoid Valve**
- **External Solenoid Valve**
  - **Not shown**



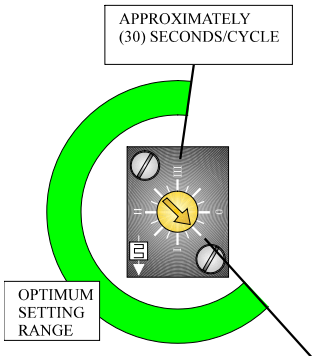
COUNTER ACTUATES SERVO-METER EVERY CYCLE



COUNTER ACTUATES SERVO-METER EVERY FIFTH CYCLE



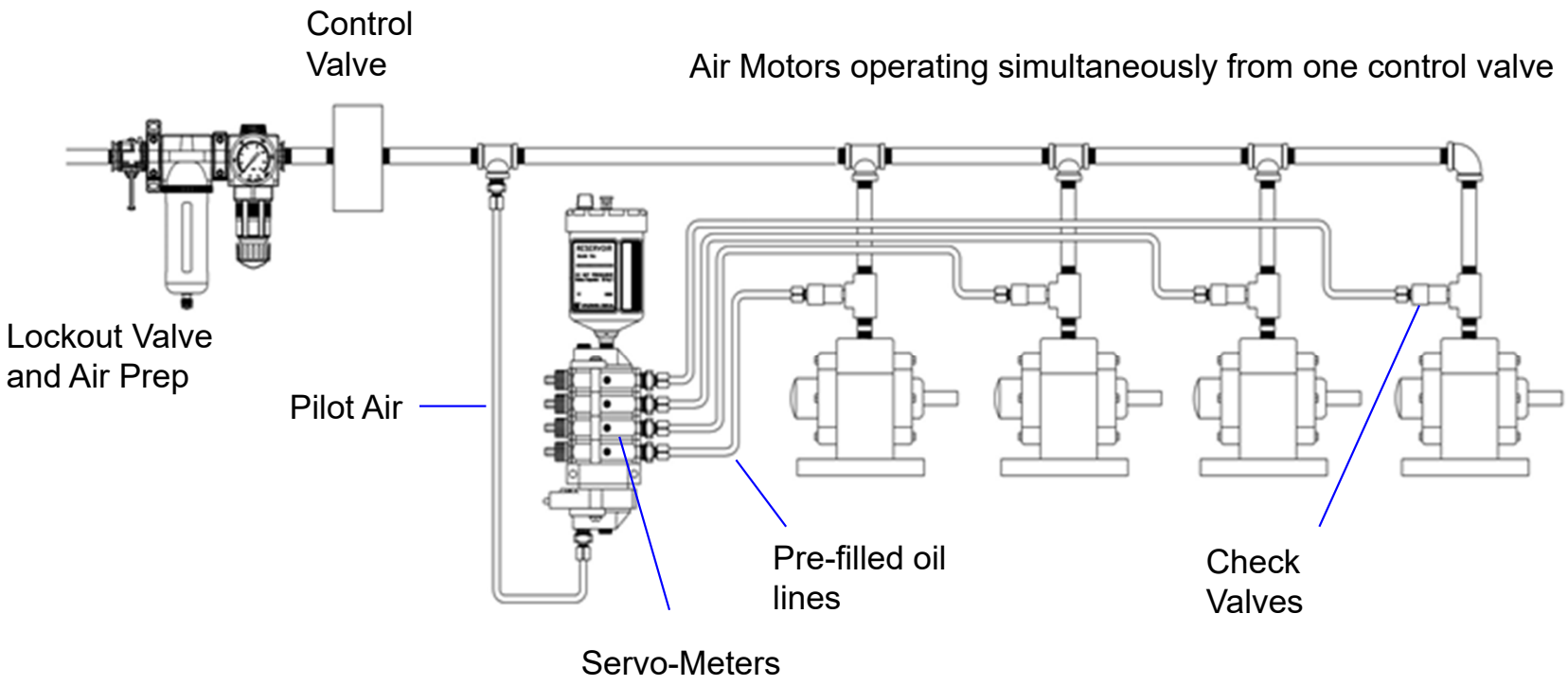
COUNTER ACTUATES SERVO-METER EVERY TENTH CYCLE



Fluid Delivery

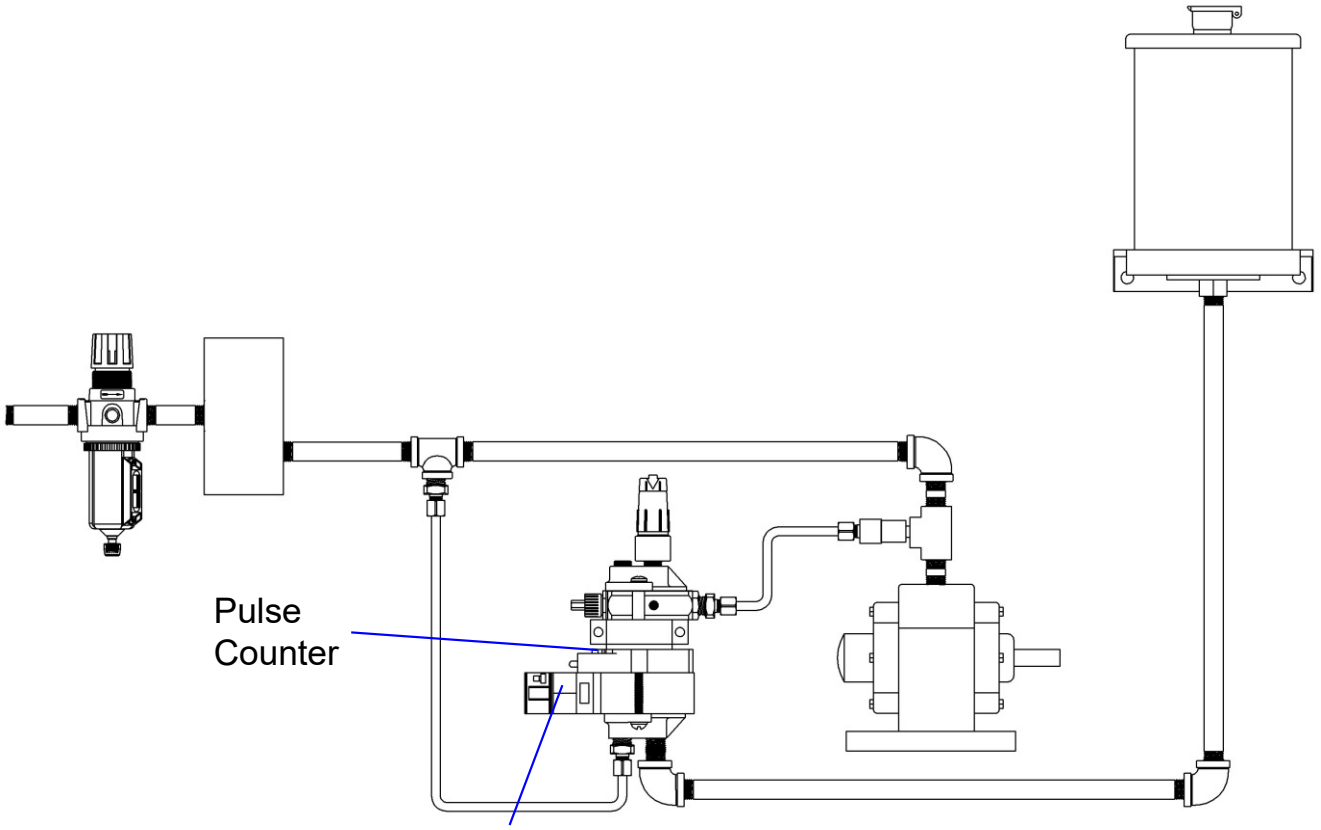
Connect M/P tubing from Servo-Meter outlet to straight or 90° check valve at air inlet to pneumatic product being lubricated

Lubricating Air Motors



When Control Valve is actuated to run Air Motors, pilot air is used from supply to actuate the Servo-Meters. Oil is delivered through the check valves into the inrush of the supply air-lubricating the Air Motors.

Lubricating Air Motors



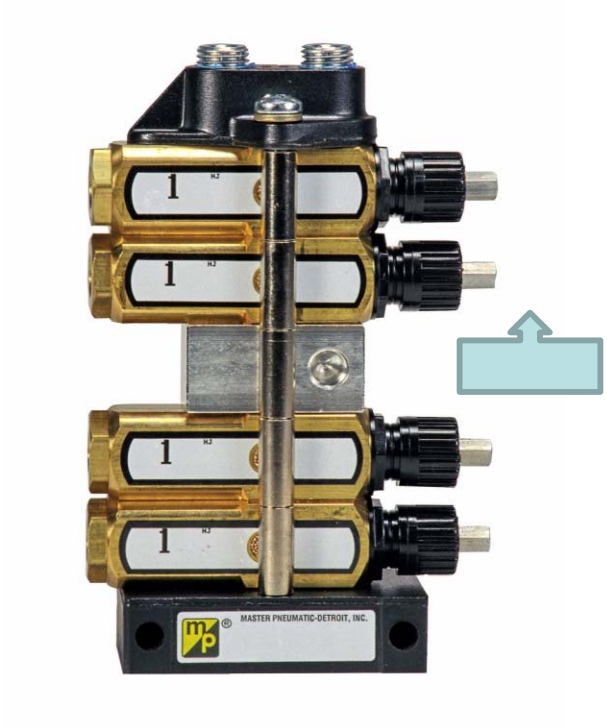
Reservoirs
- 1 Quart
- 2 Quarts
- 1,5 & 10 gallon

Long duty cycle may require a pneumatic timer. Adjust to deliver fluid every second, up to every 30 seconds. Use counter to extend time out to deliver fluid every 5 minutes.

Block Plate

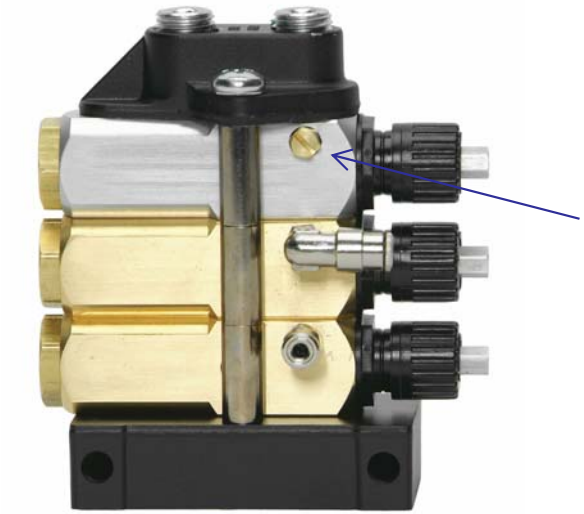
(Old Design)

- 71004104B-B3
- Separate Control Air Signals



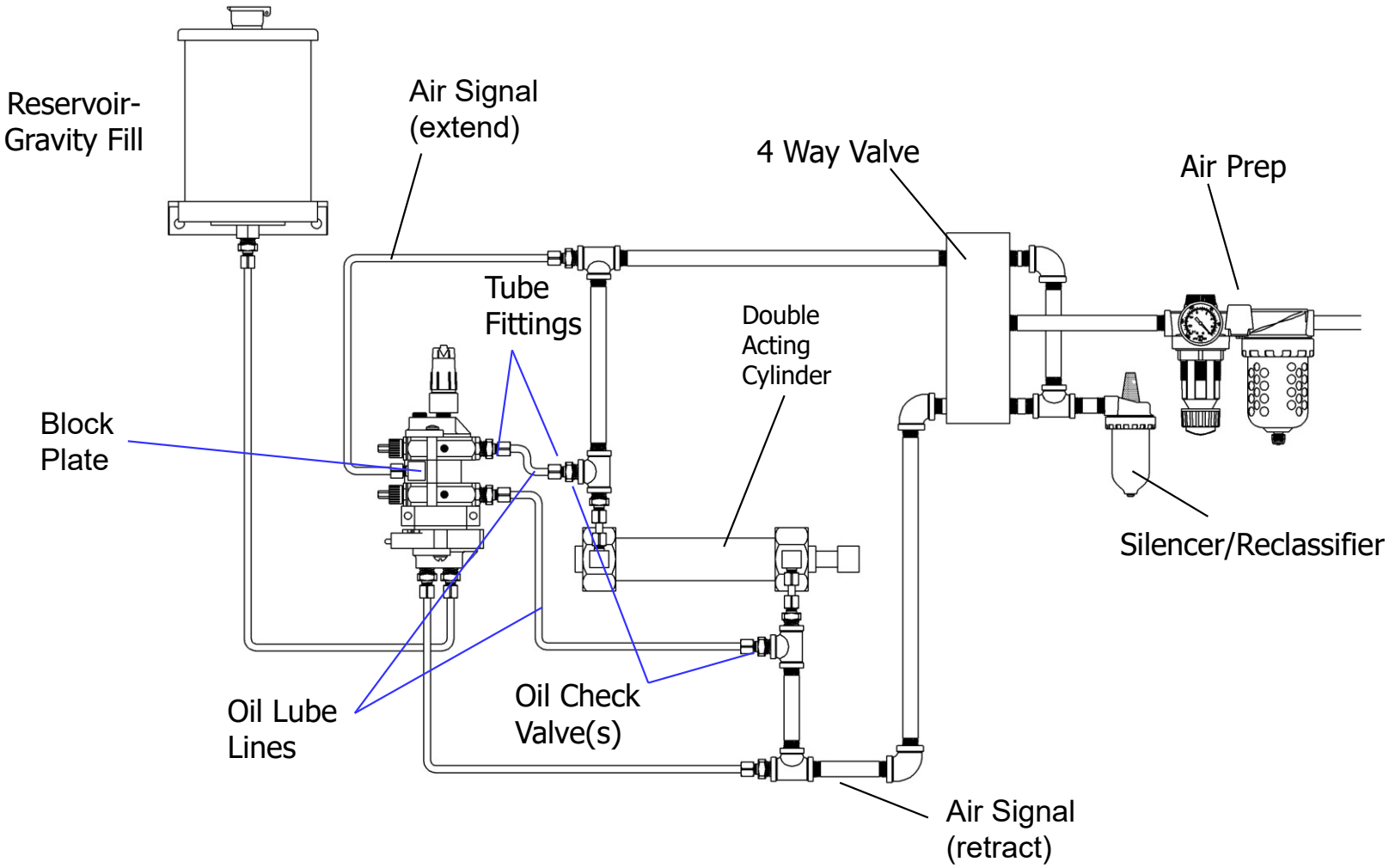
Air signal to all Servo-Meters above

New Design



10-32 Port

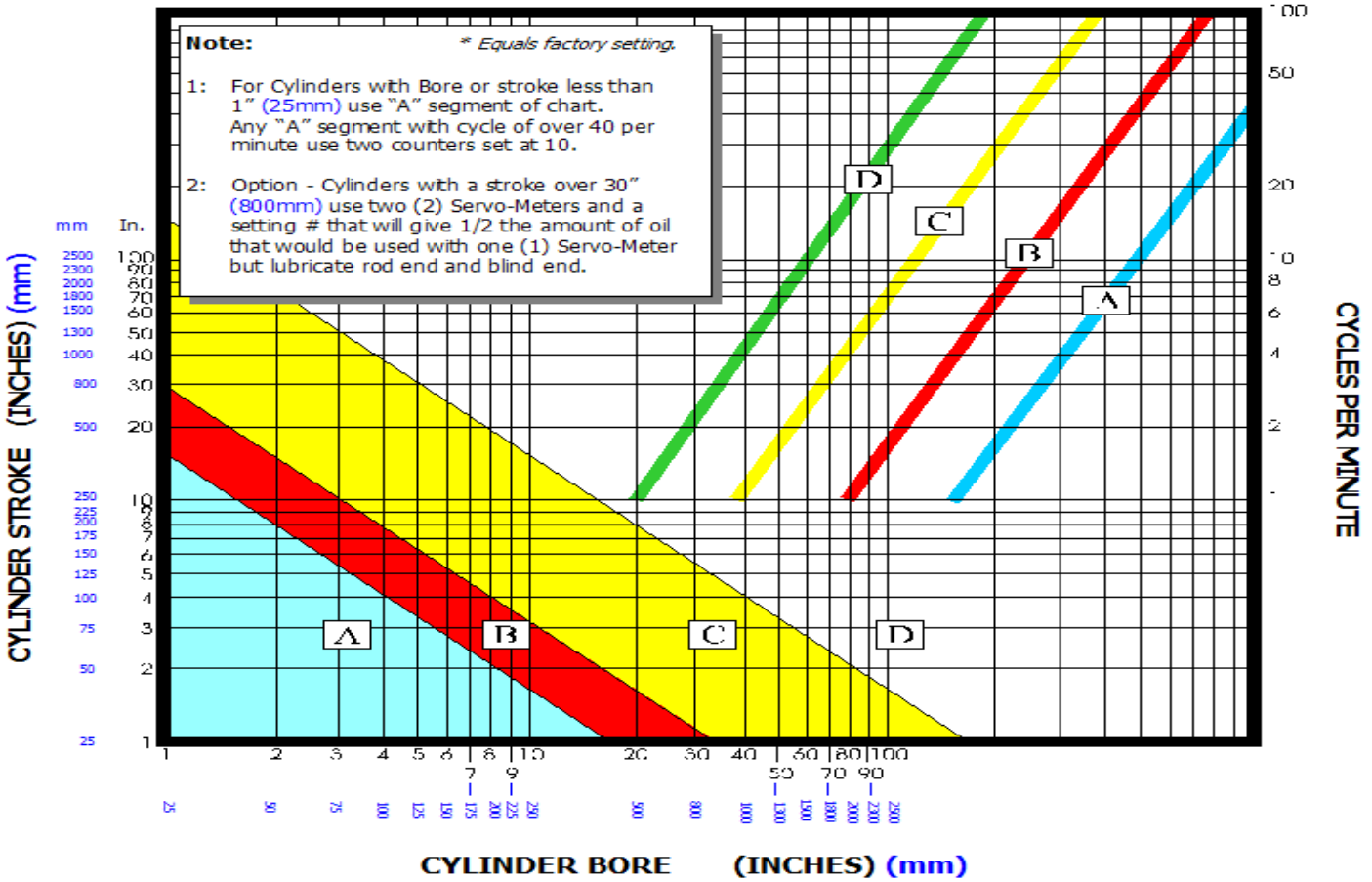
Lubricating Cylinders



This is an example of the use of Serv-Oil MPL in an air cylinder application. A double acting cylinder installed in the horizontal or vertical position could require two lube points. Above illustrate lubricating both ends of the cylinder independently.

Determining Lubrication Rates

Counter Setting	Set at number 1	*Set at 5	Set at 10	Use 2 counters. Set at 5
Servo-Meter setting with **one drop (.030 ml)** maximum model	Set at one full Drop	Set at 25 clicks from full	Set at 25 Clicks from full	Set at 20 clicks from full

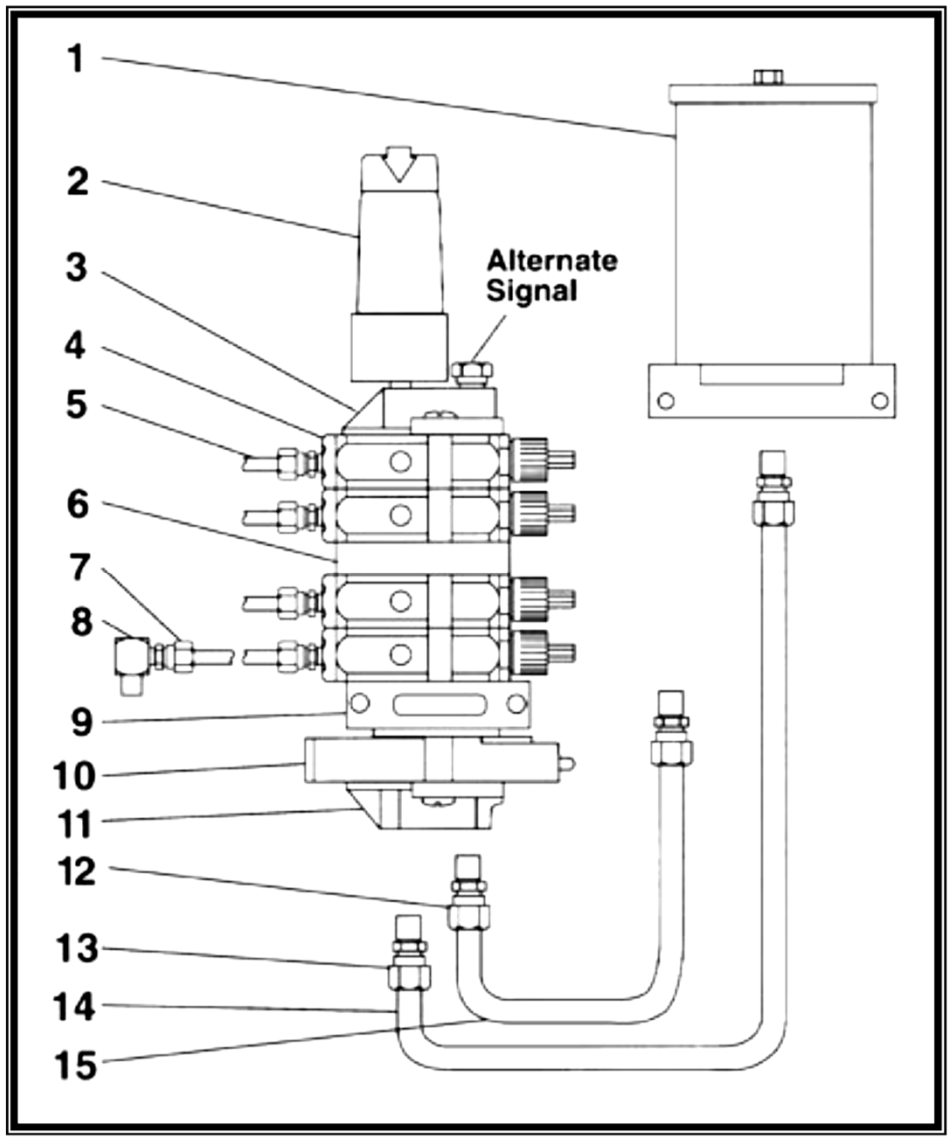


First identify where the bore and stroke intersect on the lower chart. With the appropriate letter use the cycles of the cylinder per minute and draw a line to intersect the A, B, C or D line on the upper chart. Draw a line vertically from there to the appropriate setting of the counter and Servo-Meter.

Example: Cylinder with 4" bore and 5" stroke falls into the "B" segment of the selection chart. If the operating rate of the cylinders is 15 per minute, the counter setting should be at 10 and the injector *(Servo-Meter)* knob turned counter - clockwise 25 clicks.

To increase Servo-Meter output, turn volume control knob clockwise. **NOTE:** This chart is a tool for establishing a baseline only. Specific applications may require more or less fluid output.

How to Choose Serv-Oil



1 - Reservoir
2 - Sight Dome
3 - Clamp
(2-1/4” inlets)
4 - Servo-Meter
5 - Oil Delivery Line
6 - Air Block
7 - Compression Fitting
8 - Ball Check
9 - Mounting Plate
10 - Pneumatic Pulse Counter
11 - Clamp (2-1/4” inlets)
12 - 1/4” NPT to 3/8” tube
14 - 3/8” Liquid Delivery Line
15 - 1/4” Air Supply Line

Types of M/P Reservoirs

- 10 oz.
- Polycarbonate
- Nylon
- Polypropylene

Types of M/P Reservoirs

- 10 oz.
- 1 quart
- 2 quart

Low or High-Low Switches are Available from 1 Quart-up.

Types of M/P Reservoirs

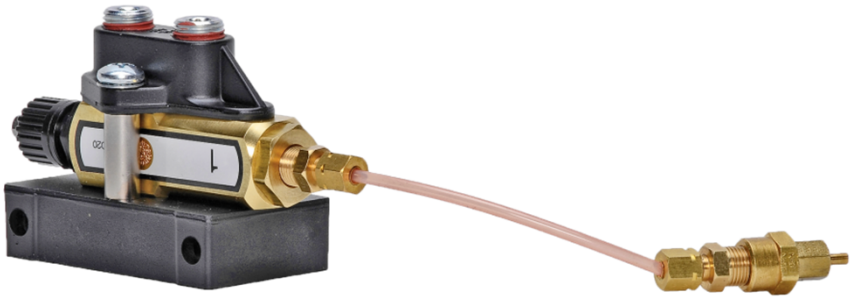
- 10 oz.
- 1 quart
- 2 quart
- 1 gallon
- 5 gallon
- 10 gallon

Low or High-Low Switches are Available from 1 Quart-up.

Other Serv-Oil Products

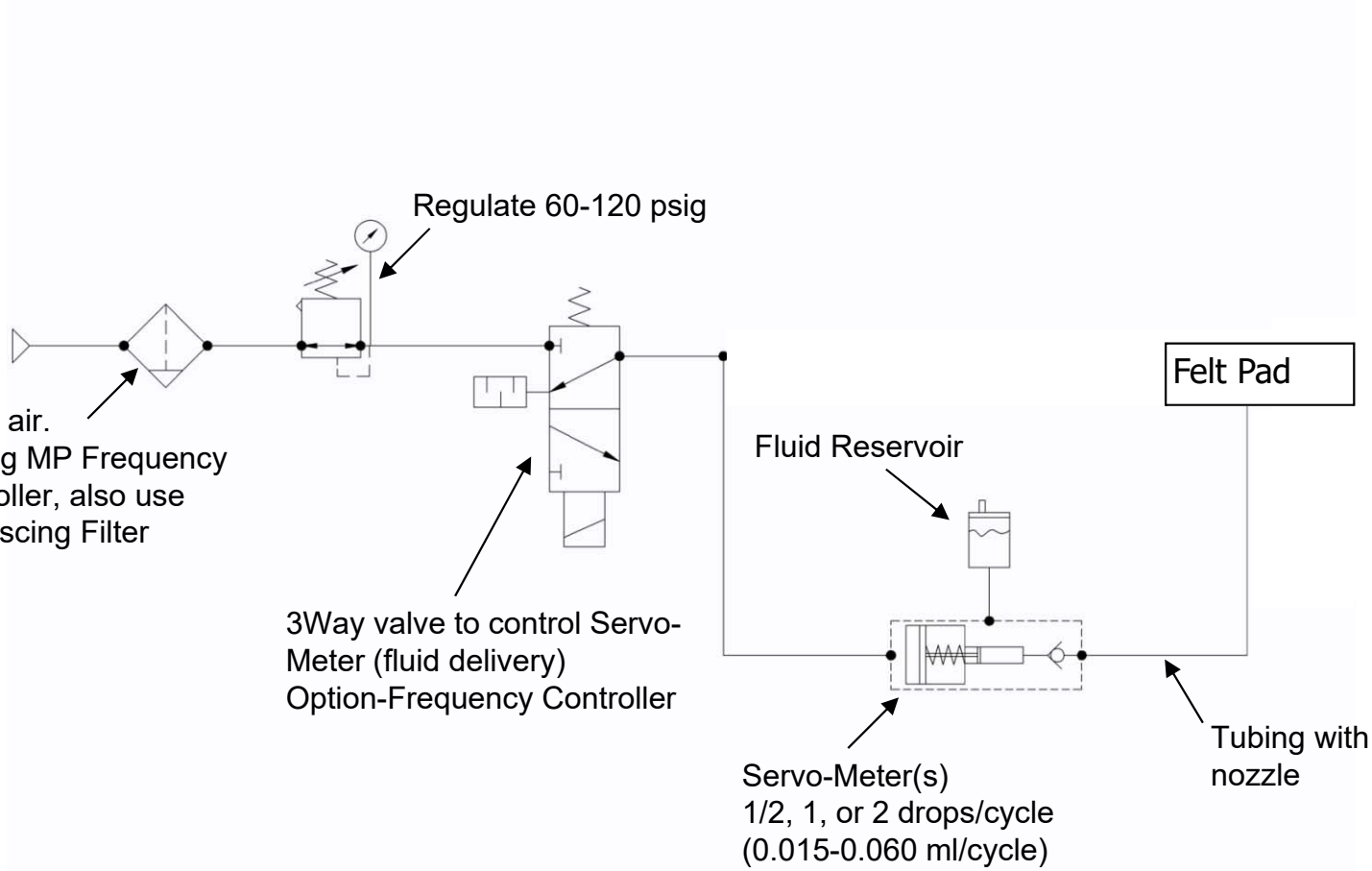
- Automation Pacs
  - Up to 20 servo-meters
  - Integral ½ gallon aluminum reservoir
  - Level switches
  - Frequency Generator

- Liquid Only
  - Assembly
  - Sliding surfaces
  - Metal working



Fluid Only Micro-Lubrication

Master Pneumatic Serv-Oil Series 740/770



Fluid can be dispensed in volumes from as low as 1/20th drop (0.0015ml) to 2 drops (0.060ml) every cycle. Air controls how often this occurs. A 3way valve can be used as shown above or an optional Master Pneumatic Frequency Controller can be used. The Frequency Generator can be adjusted to provide the air signal 1-30 seconds with a continuous air supply to the 740 or 770 series product.

Other Serv-Oil Products (cont.)

- Jetmaster
  - Air & Fluid Delivery
  - Sliding surfaces
  - Chain

Micro Lubrication

Dispense small volumes of fluid

Consistent delivery

Deliver to point of use

Serv-Oil

Thank you!