

## **Chapter 18 MODULATING VALVES**

### **MANUFACTURER/DISTRIBUTOR:**

#### **WOLSELEY Inc.**

4200, Hickmore

St-Laurent, QC, H4T 1K2

Phone: (514) 344-9378

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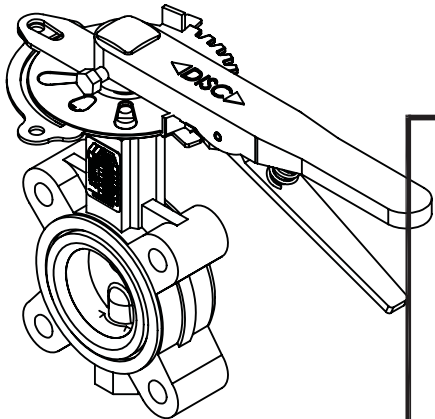
18.1      **BALL VALVE IPEX 053137 MV-1, MV-2, MV-3, MV-4**

18.2      **SOLENOID VALVE SV-01, SV-02**

18.3      **FLOW SWITCH FS4-3 MCDONNELL & MILLER**

in/mm									lbs/kgs
Size	L	Ø D	n x M	h1	h2	A	B	Q	Assembly Weight
2"	1.69	4.75	4 x 5/8-11 UNC	2.60	5.12	8.7	1.3	1.13	6.5
DN50	42.9	121		66.0	130	221	33	28.7	3.0
2.5"	1.81	5.50	4 x 5/8-11 UNC	3.23	5.55	8.7	1.3	1.79	7.8
DN65	46.0	140		82.0	141	221	33	45.5	3.5
3"	1.81	6.00	4 x 5/8-11 UNC	3.54	5.83	8.7	1.3	2.45	8.6
DN75	46.0	152		89.9	148	221	33	62.2	3.9
4"	2.05	7.50	8 x 5/8-11 UNC	4.25	6.69	10.2	1.4	3.50	14.8
DN100	52.1	191		108	170	260	36	88.9	6.7
5"	2.20	8.50	8 x 3/4-10 UNC	4.84	7.36	10.2	1.4	4.55	19.2
DN125	55.9	216		123	187	260	36	116	8.7
6"	2.20	9.50	8 x 3/4-10 UNC	5.43	7.95	10.2	1.4	5.71	22.7
DN150	55.9	241		138	202	260	36	145	10.3
8"	2.36	11.75	8 x 3/4-10 UNC	6.69	9.37	14.2	1.7	7.77	36.6
DN200	59.9	299		170	238	360	43	197	16.6
10"	2.68	14.25	12 x 7/8-9 UNC	7.87	10.7	14.2	1.7	9.76	57.8
DN250	68.1	362		200	272	360	43	248	26.3
12"	3.07	17.00	12 x 7/8-9 UNC	9.29	12.0	14.2	1.7	11.7	79.5
DN300	78.0	432		236	305	360	43	298	36.1

MV-1 @ MV-4



SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M. Reviewed ☒

Reviewed as noted ☐

Date: 29 June 2016 Resubmit ☐

CHIARELLI ENGINEERING LTD.

SHOP DRAWING

Reviewed by: Samuel Charbonneau  
Date: 27 June 2016

Reviewed ☒

Reviewed as noted ☐

Resubmit ☐

Out for Approval

SIFEC NORTH INC.

4 CSA/NSF-372 Compliance Tag:



NSF/ANSI 372  
LOW LEAD CONTENT ONLY  
MC#218481

Specifications

Temp. Rating -4-275°F (-20-135°C)

Press. Rating 200 PSI

Design to: MSS-SP-67 & API-609

Markings to: MSS-SP-25

NSF-372 Compliance: Low Lead Content Only

Materials

Valve	Body	Ductile Iron ASTM A536
	Stem	416 SS ASTM A582
	Disc	Stainless Steel ASTM A351 CF8M
	Seat	EPDM
Handle		Painted Malleable Iron w/ ABS Plug
Throttle plate		Zinc-Plated Steel

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONAL ±  
ANGULAR: MACH ± BEND ±  
TWO PLACE DECIMAL ±  
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC  
TOLERANCING PER:  
MATERIAL

FINISH

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	SE	5/3/13
CHECKED		
REVISIONS:	SE	11/18/13
	SE	5/13/14

PROJECT:

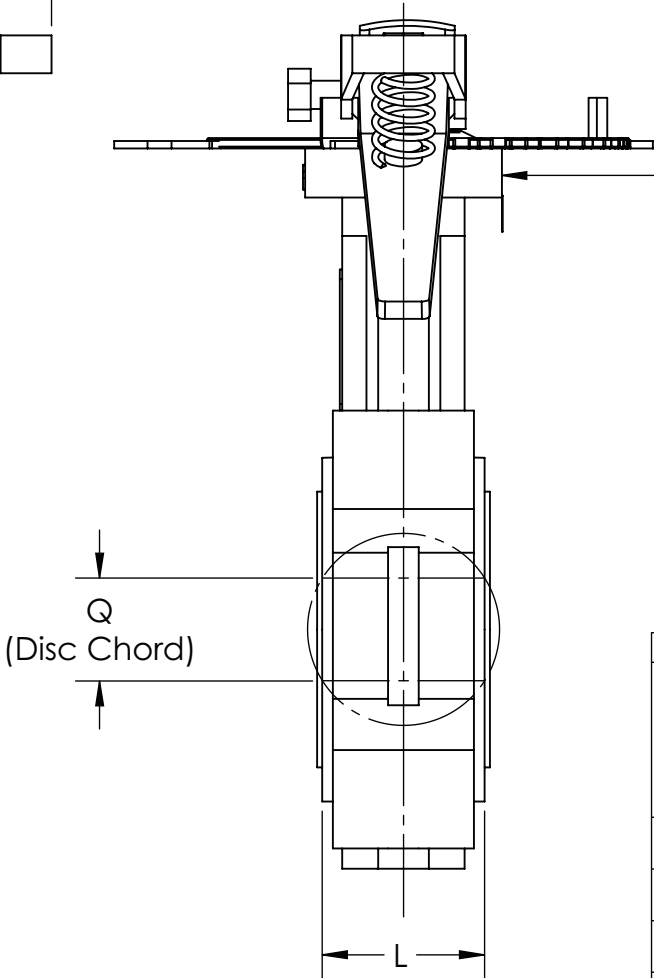
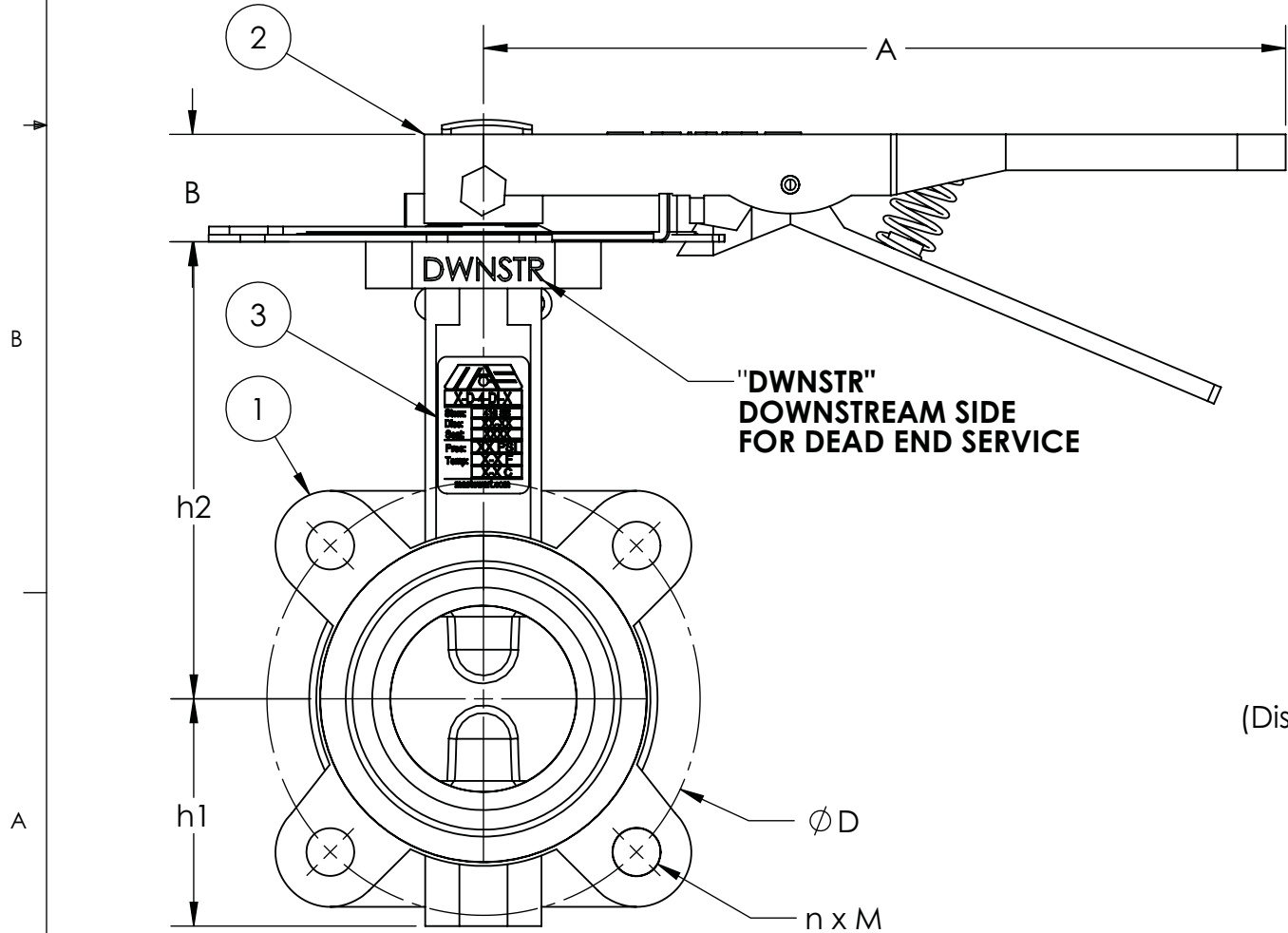


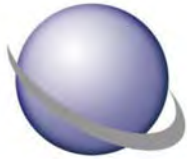
M.A. Stewart & Sons Ltd.  
12900 - 87th Avenue  
Surrey, B.C. V3W 3H9  
Toll-Free: (800) 594-8431  
Fax: (604) 594-4335

TITLE:  
MAS D Series Lug BFV  
L-D-4-S-E-LH (2-12")

SIZE	DWG. NO.	REV
B	2-12in L-D-4-S-E-LH	2

SCALE: 1:2 WEIGHT: Page 341 of 2421 SHEET 1 OF 1





# PROMATION ENGINEERING

Precision Actuation for Industry  
...Partners, Above and Beyond

SHOP DRAWING	
Reviewed by: Samuel Charbonneau	
Date: 27 June 2016	
Reviewed	<input checked="" type="checkbox"/>
Reviewed as noted	<input type="checkbox"/>
Resubmit	<input type="checkbox"/>
Out for Approval	
SIFEC NORTH INC.	

MV-1 @ MV-4

Data Sheet

## P2/3 DC Series

On/Off/Jog/Proportional

ISO5211 F07 8P22

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Reviewed as noted ☐  
Resubmit ☐  
Date: 29 June 2016

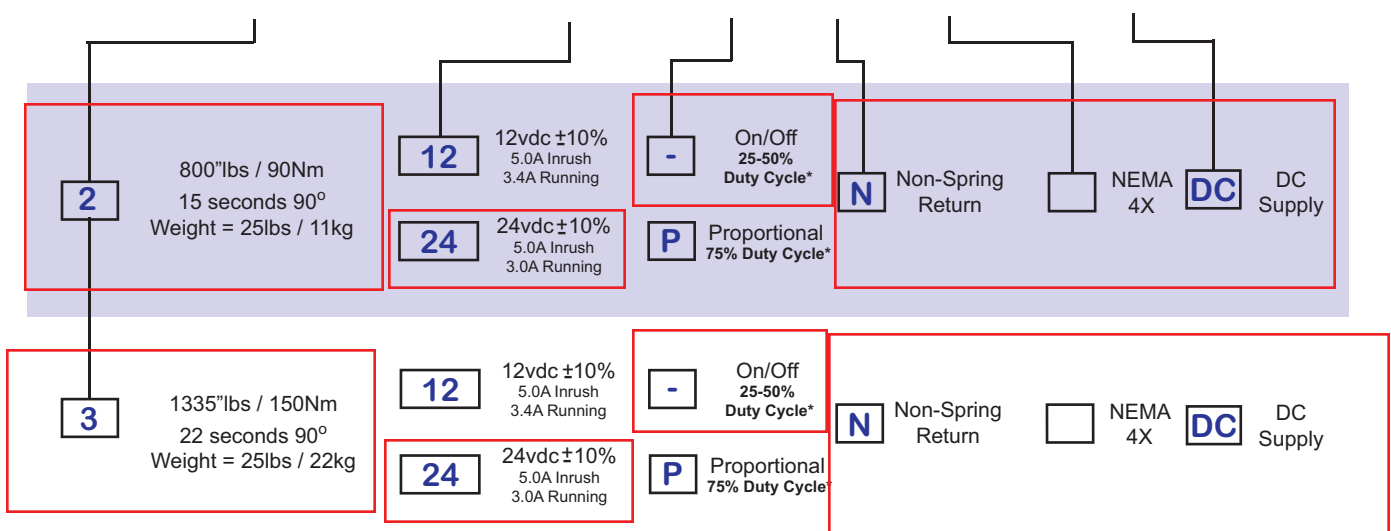


Actuator Specifications	P2		P3	
	800"lbs/90Nm		1335"lbs/150Nm	
Torque lb/Nm				
Supply Voltage	12vdc	24vdc	12vdc	24vdc
Max Inrush Current	5.0A	5.0A	5.0A	5.0A
Running Current	3.4A	3.0A	3.4A	3.0A
Runtime (90°)	15sec		22sec	
Weight	25lbs/11kg			
Mechanical Connections	ISO5211 F07 8 pt 22mm			
Electrical Entry	(2) 3/4" NPT			
Electrical Terminations	12 - 18 Ga.			
Environmental Rating	4, 4X			
Manual Override	5" HandWheel			
Control	On/Off/Jog/Proportional			
Duty Cycle	See Graph Below			
Case material	Aluminum Alloy, Powder Coated			
Motor Protection	DC Brush Type			
12/24VDC Operation	275°F/135°C Thermal F Class			
Ambient Temperature	-22°F to +150°F			
Operating Range	-30°C to +65°C			

An electric actuator designed for load requirements ranging from 800 to 1335"lbs. The actuator comes standard with two auxiliary switches (Form C), an internal low power heater, a NEMA 4X environmental rating, and in 12VDC or 24VDC supply voltages. The P2/3 mechanical connections are ISO5211 compliant. The P2/3 DC Series is available as an on/off or two position model that can also be used in bump/jog applications. Additionally, a proportional control is available to accept 0-5vdc, 0-10vdc, 1-5vdc or 4-20mA input signals.

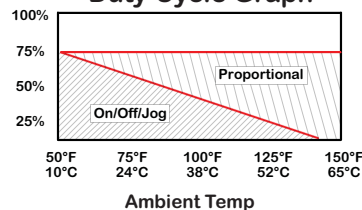
P2-24-N4DC  
P3-24-N4DC

P 2 - 1 2 - N 4 DC



\* Duty cycle is defined as the ratio of run time vs. off time and is a function of ambient temperature. (see graph at left)

Duty Cycle Graph

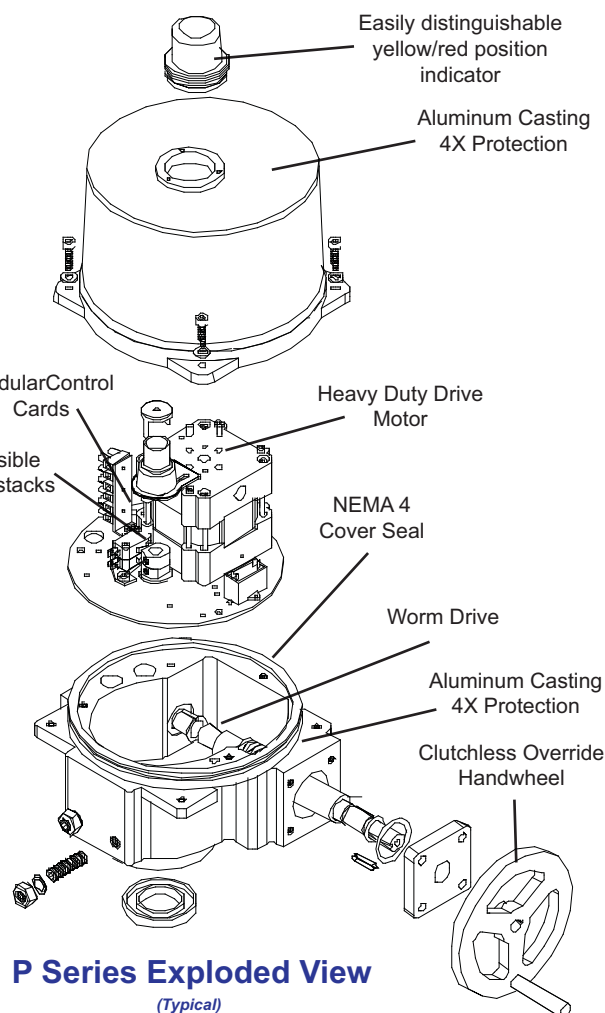
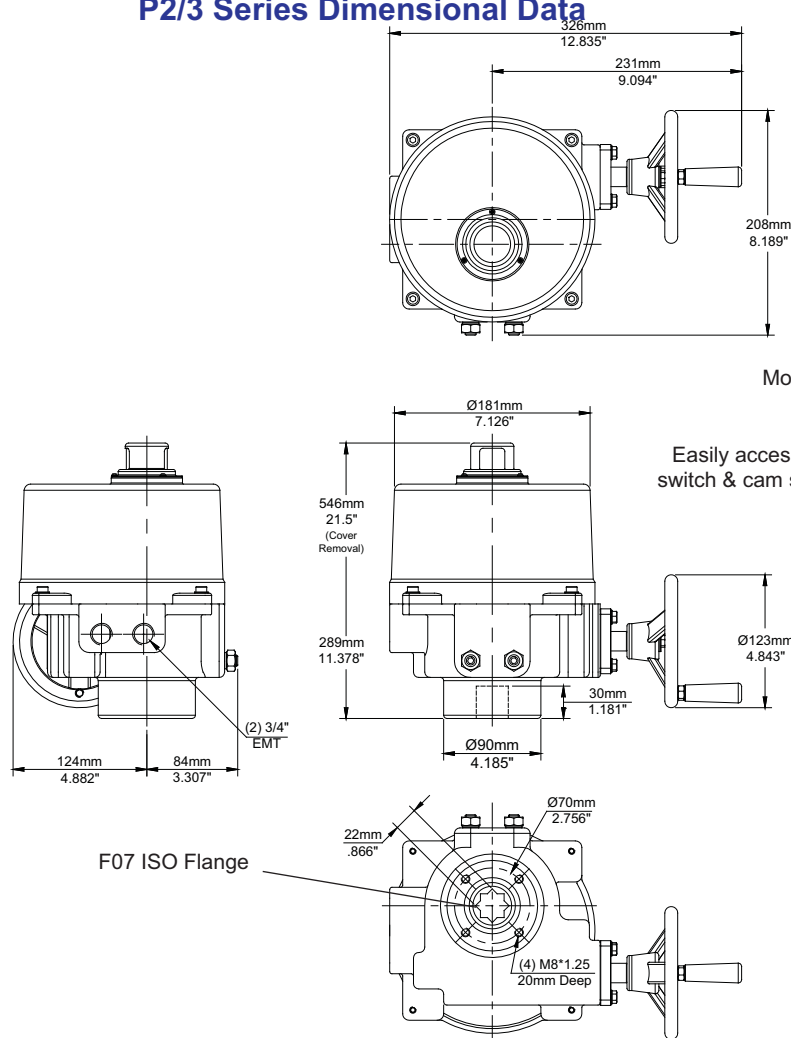


See Pg 4 for Options

Also available in 12V & 24V AC operation, 120v & 230v single phase operation, and in 3 phase models for 230/3/60, 380/3/60 & 480/3/60 supplies. Separate spec sheets are available for these configurations.

**Application Notes:**

1. These actuators are designed to be used in either a horizontal or upright position.  
Do NOT mount the actuator with the top below a horizontal position.
2. When installing conduit, use proper techniques for entry into the actuator. Use drip loops to prevent conduit condensate from entering the actuator.
3. Both NPT conduit ports MUST use proper equipment to protect the NEMA 4x integrity of the housing.
4. The internal heater is to be used in ALL applications.
5. **Do NOT install or store the actuator outdoors or in humid environments unless it is powered up and the heater is functioning.**
6. Use proper wire size to prevent actuator failure (see chart below for proper wire sizing).
7. Mechanical travel stops are factory calibrated for 90 degree operation. These stops are NOT designed to adjust mechanical rotation by more than +/- 3 degrees.

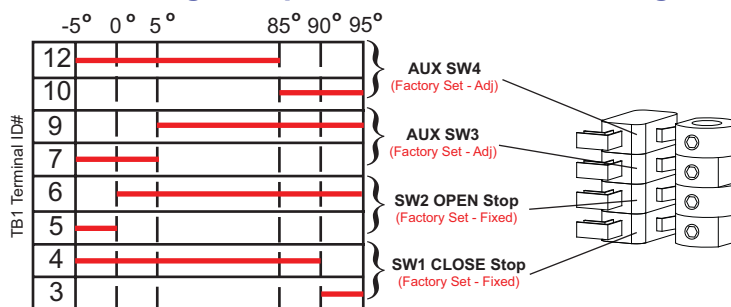
**P2/3 Series Dimensional Data**

Wire sizing data is provided in the table below to assist in the selection of the proper wire size for ProMation P2/3 series actuators using various wire sizes over distance. Please make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

**Wire Sizing Data**

MAX distance between Actuator and Supply (feet)		
Wire Gage	P2/3-12DC 5.0A	P2/3-24DC 5.0A
18		
16	26	52
14	42	84
12	64	128
10	109	218
8	163	326

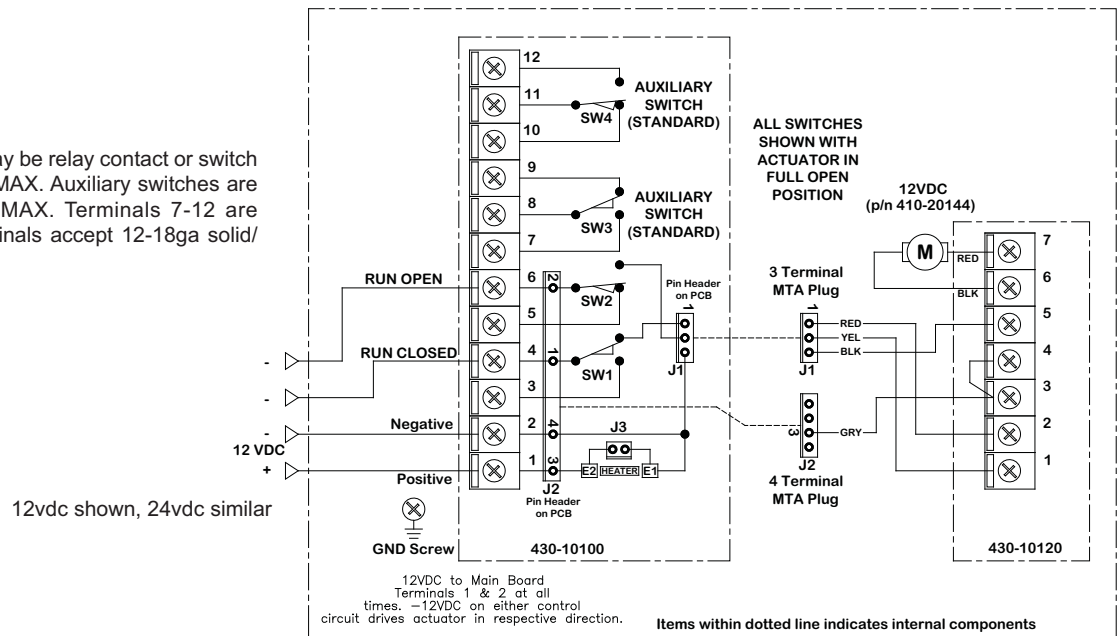
Switch sequencing data is provided in the table below to show the change-of-state points during the rotation of the actuator from OPEN to CLOSED and back again. Switches for terminals 3 thru 6 are set at the factory and should NOT be changed. The INCLUDED auxiliary switches SW3 & SW4 are for terminals 7 thru 12 and those setpoints may be modified if need be. When so optioned, SW5 & SW6 auxiliary switches are initially set to function the same as auxiliary switches SW3 & SW4.

**Switch Logic Map and Switch/Cam Arrangement**

# Wiring Diagrams for P Series -

## On/Off/Jog Control

Field Control Device may be relay contact or switch type. Pilot device 10A MAX. Auxiliary switches are rated 10A @ 250vac MAX. Terminals 7-12 are dry type Form C. Terminals accept 12-18ga solid/stranded wire.



## Proportional Control

Control Signal Input: 4-20mA ONLY

Input impedance: 250 ohms (4-20mA)

Feedback Signal Output: 4-20mA ONLY

Referenced to the common terminal.

Max Load: 500 ohms

Control Card Fuse: 8A Bussman ABC-8

Control Adjustments:

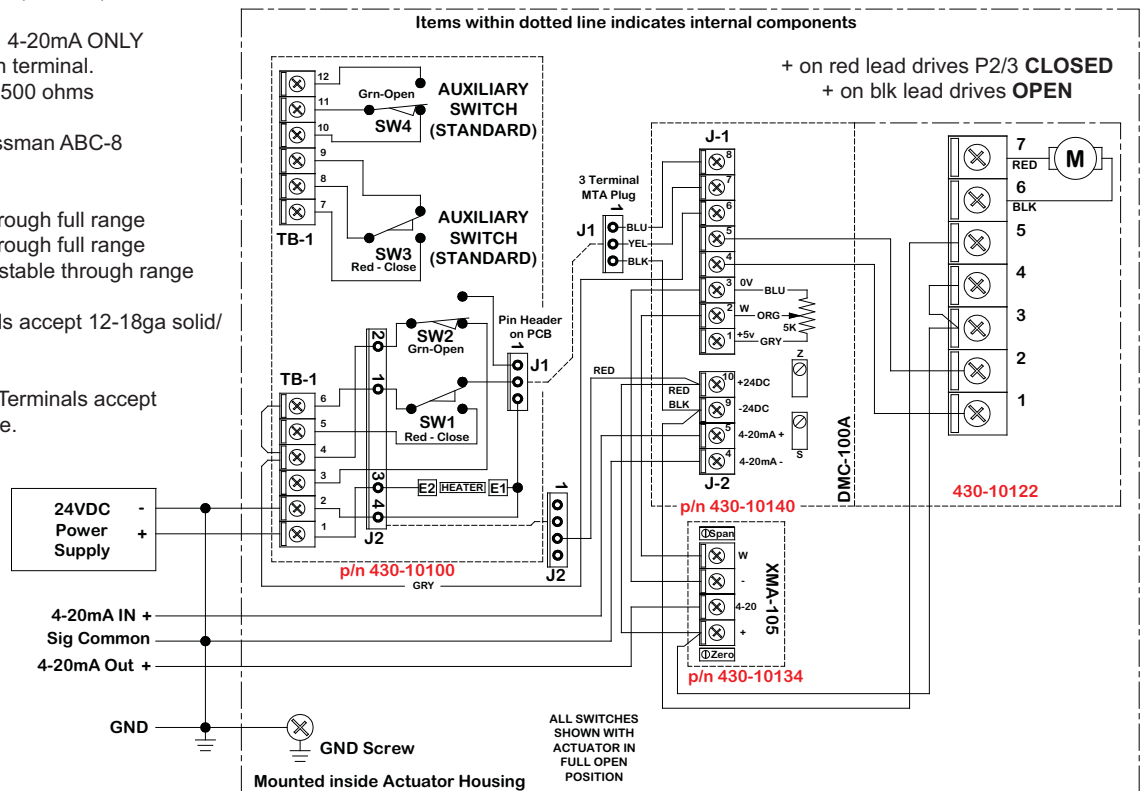
Zero: Adjustable through full range

Span: Adjustable through full range

Deadband: Linearly adjustable through range

Main Switch Card Terminals accept 12-18ga solid/stranded wire.

Proportional Control Card Terminals accept 14-22ga solid/stranded wire.



Note: The GND line MUST be installed AT the control point of origin (signal generator). Do NOT use Sig Common and DC supply Negative as a common wire between actuator and controller. GND should be EARTH ground as well for noise cancellation.

SD11\_P23\_DC\_F078P22\_Ver C\_061511



## AVAILABLE OPTIONS

- Advanced Proportional Controller Kit. Includes Electronic Torque Monitor And Alarm. Converts 2 position to proportional control.
- Basic Proportional Controller Kit. Converts 2 position to proportional control.
- Extended Duty Motor - 75% Duty Cycle
- 0-45-90 degree rotation kit. Mid-point is center-off position.
- 0-90-180 degree rotation kit. Mid-point is center-off position.
- 0-180 degree rotation kit. No Mid-point position is offered. (On/Off/Jog only)
- Auxiliary Switch set. Provides 3rd and 4th auxiliary switches (Form C x 2).
- 1k ohm position feedback potentiometer.
- 5k ohm position feedback potentiometer.
- 10k ohm position feedback potentiometer.
- Single Wire Control Relay (Internal) Units operate NORMALLY CLOSED - ENERGIZE TO OPEN
- Single Wire Control Relay (Internal) Units operate NORMALLY OPEN- ENERGIZE TO CLOSED
- Adjustable Timer, Dual Set Point Timer (Duration and Frequency) (Contact factory for application assistance)
- Proportional Control Signal override capability (OPEN OR CLOSED).
- Integral Thermostat for Heater Control - turns on at +32 deg F, turns off at +50 deg F
- Cold weather auxiliary heater kit. Thermostatically controlled, On 32F, Off 50F, auto reset, hermetically sealed, 120/230vac On/Off/Jog type actuators. 175W Internal Heater, 2A power consumption.
- Kit, 4-20mA feedback generator for On/Off/Jog actuators.
- Local Control Unit offers "HAND/OFF/AUTO" Switch and OPEN/OFF/CLOSE Switch, No Indicator Lights. (See catalog for additional Local Control Selections)
- Mechanical Torque Switch Assembly (2 Position Jog only)
- Motor Control Center for 3 Phase models (Includes Local Control P/N: LCS-D)

## ProMation Product Line



**PL Series Linear Drive**

**Up to 4400lbs down/up force and up to 100mm (4") stem travel** for globe valves, gate valves and linear travel devices. With override handwheel. Available with On/Off/Jog or Proportional control for 24vac, 120vac & 230vac supplies.



**P Series Non-Spring Return**

**50"lbs through 40,500"lbs. Quarter-Turn, w/ manual Override**  
Available with On/Off/Jog or Proportional control for 12vac/dc, 24vac/dc, 120vac, 230vac, 230v/3 phase, 380v/3 phase & 460v/3phase supplies.



**D Series Spring Return**

**90"lbs through 450"lbs.**  
Quarter-Turn, w/ manual Override  
Available with On/Off/Jog or Proportional control for 24...230vac/dc



**PA~PD Series Spring Return**

**450"lbs through 2300"lbs.**  
Quarter-Turn, both with and w/o manual override handwheel. Spring either CW or CCW  
Available with On/Off or Proportional control for 24vac/dc, 120vac & 230vac supplies. Stepdown for 3ph available.



**PBU Battery Back-Up Systems**

**Provides power sufficient to drive P Series actuators** to field-selectable fail-safe positions.  
For P Series & PL Series actuators in On/Off and Proportional control modes  
Available for 24/120vac actuators. Requires 120vac supply.



**PROMATION  
ENGINEERING**

*Precision Actuation for Industry  
...Partners, Above and Beyond*

# Flow Switches

## Flow Switches – Liquid

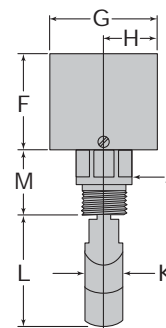
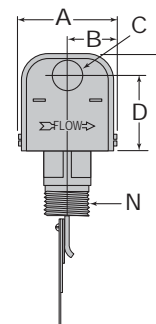
### Series FS4-3 General Purpose Liquid Flow Switches



- Universal design serves the widest variety of applications
- For starting or stopping electrically operated equipment such as signal lights, alarms, motors, automatic burners, metering devices and others
- Replacement for common flow switches from Johnson/Penn, Potter/Taco, Watts, Hydrolevel and other manufacturers
- 1" NPT
- Two electrical knock-outs allows connection from either end
- Sensitivity adjusting screw makes flow adjustment easy
- Single pole, double throw snap switch
- Hardened stainless steel bearings minimize friction
- Sealed Monel bellows
- Four stainless steel paddles included - 1", 2", 3" & 6" (25, 50, 80, & 150mm)
- Optional features
  - Two SPDT switches to make or break two separate circuits
  - Materials of construction suitable for corrosive liquids
  - BSPT threads
- Minimum temperature (fluid or ambient) 32°F (0°C)
- Maximum temperature 300°F (149°C)
- Maximum pressure 160 psi (11.3 kg/cm<sup>2</sup>)



Series FS4-3



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CHIARELLI ENGINEERING LTD.

#### Electrical Ratings

Voltage	Motor Switch Rating (Amperes)		Pilot Duty
	Full Load	Locked Rotor	
120 VAC	7.4	44.4	125 VA at 120 or 240 VAC 50 or 60 cycles
240 VAC	3.7	22.2	

#### Dimensions, in. (mm)

A	B	C	D	E	F	G
3 (76)	1½ (38)	7⁄8 (22)	27⁄32 (56)	87⁄16 (211)	215⁄16 (75)	33⁄8 (86)
H	J	K	L	M	N NPT	
11⁄16 (43)	17⁄16 (37)	1½ (29)	37⁄16 (87)	21⁄16 (52)	1	

## Flow Switches Liquid

 Series FS4-3 (continued)  
 General Purpose Liquid Flow Switches

## Flow Rates

Pipe Size NPT in.	Settings	Mode of Operation		Max. Flow Rate gpm (lpm) w/o Paddle Damage
		Flow gpm (lpm)	No Flow gpm (lpm)	
1	Factory or Minimum	6 (22.7)	3.6 (13.6)	27 (102.2)
	Maximum	10.2 (38.6)	9.2 (34.8)	
1¼	Factory or Minimum	9.8 (37.1)	5.6 (21.2)	47 (177.9)
	Maximum	16.8 (63.6)	15 (56.8)	
1½	Factory or Minimum	12.7 (48.1)	7 (26.5)	63 (238.5)
	Maximum	23 (87.1)	19.5 (73.8)	
2	Factory or Minimum	18.8 (71.2)	9.4 (35.6)	105 (397.4)
	Maximum	32.8 (124.1)	24 (90.8)	
2½	Factory or Minimum	24.3 (92)	11.6 (43.9)	149 (564)
	Maximum	42.4 (160.5)	37.5 (141.9)	
3	Factory or Minimum	30 (113.6)	12 (45.4)	230 (870.6)
	Maximum	52.1 (197.2)	46.1 (174.5)	
4	Factory or Minimum	39.7 (150.3)	19.8 (74.9)	397 (1502.7)
	Maximum	73.5 (278.2)	64.2 (242)	
5	Factory or Minimum	58.7 (222.2)	29.3 (110.9)	654 (2415.4)
	Maximum	115 (435.3)	92 (348.2)	
6	Factory or Minimum	79.2 (300)	39.6 (150)	900 (3406.5)
	Maximum	166 (628.3)	123 (465.6)	

Values are 10%

 NOTE DO NOT USE LIQUID FLOW SWITCHES  
 ON SYSTEMS WITH FLOW GREATER  
 THAN 1 FEET (3M) PER SECOND.

## Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
FS4-3	114400	General purpose flow switch	1.9 (0.9)
FS4-3J	114610	FS4-3 w/BSPT connections	1.9 (0.9)
FS4-3-RPT	114639	FS4-3 w/test button	1.9 (0.9)
FS4-3Z	114410	FS4-3 w/ANSI terminal connections	1.9 (0.86)
FS4-3D	114550	FS4-3 w/2 SPDT switches	2.3 (1.0)
FS4-3S	114641	FS4-3 w/SS body, monel bellows	1.9 (0.9)
FS4-3SJ	176216	FS4-3S w/BSPT connections	1.9 (0.9)
FS4-3DS	114642	FS4-3S w/2 SPDT switches	3.3 (1.5)
FS4-3J-E	114611	FS4-3J-CE conformance rated	1.9 (0.9)
FS4-3D-E	114552	FS4-3D-CE conformance rated	1.9 (0.9)
FS4-3S-E	114646	FS4-3S-CE conformance rated	1.9 (0.9)

See page 120 for CE Conformance information