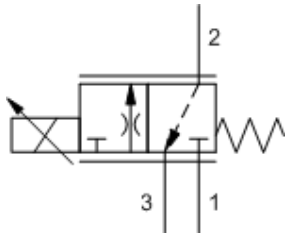
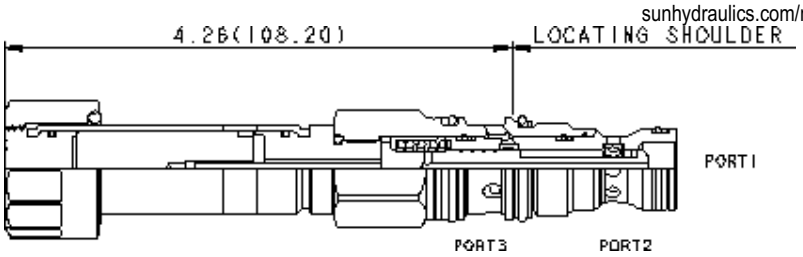
MODEL
**FMDA**

Electro-proportional 3-way flow control valve, meter in
**SERIES 1 / CAPACITY: 9 gpm / CAVITY: T-11A**

sunhydraulics.com/model/FMDA



X-Control




This valve is a 3-way, meter-in, electro-proportional throttle. The flow path, unenergized, has the supply blocked at port 1 and port 2 is drained to tank at port 3. Energizing the coil generates a closing force on the spool, creating a metering orifice in the 1 to 2 direction that is proportional to the coil command current. The valve self-compensates in the 1-to-2 direction and with the addition of an external compensator will provide pressure compensated flow control.

Flow in the 2-to-3 direction is not proportional and is limited in the interest of increased resolution and capacity. Flow capacity in the 2-to-3 direction is about 1.5 gpm (6 L/min). This valve is meant to be used in a circuit that has a separate passage to tank such as a cushion lock circuit. Two FMDAs in conjunction with a cushion lock circuit create a meter-in/meter-out 3-position 4-way.

## CONFIGURATION

| | | |
|---|---|---|
| **X** | Control | No Manual Override |
| **D** | Flow Rate | .1 - 9 gpm (0,4 - 34 L/min.) |
| **N** | Seal Material | Buna-N |
| **(none)** | Coil | No coil |

## TECHNICAL DATA

NOTE: DATA MAY VARY BY CONFIGURATION. SEE CONFIGURATION SECTION.

| | |
|---|---|
| Cavity | T-11A |
| Series | 1 |
| Capacity | 9 gpm |
| Maximum Valve Leakage at 110 SUS (24 cSt) | 2 $in^3$/min.@1000 psi |
| Manual Override Force Requirement | 5 lbs/1000 psi @ Port 1 |
| Manual Override Stroke | .10 in. |
| Solenoid Tube Diameter | .75 in. |
| Valve Hex Size | 7/8 in. |
| Valve Installation Torque | 30 - 35 lbf ft |
| Model Weight (with coil) | 1.10 lb |
| Seal kit - Cartridge | Buna: 990411007 |
| Seal kit - Cartridge | Viton: 990411006 |
| Seal and nut kit - Coil | Viton: 990770006 |
| Model Weight | 0.75 lb. |

## PROPORTIONAL PERFORMANCE DATA

| | |
|---|---|
| Hysteresis (with dither) | <4% |
| Hysteresis with DC input | <8% |
| Linearity (with dither) | <2% |
| Repeatability (with dither) | <2% |
| Recommended dither frequency | 140 Hz |
| Deadband, nominal (as a percentage of input) | 30% |

**NOTES** Please verify cartridge clearance requirements when choosing a Sun manifold. Different valve controls and coils require different clearances.

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## CONFIGURATION OPTIONS

**Model Code Example: FMDAXDN**

| CONTROL | (X) |
|---|---|
| **X** | No Manual Override |
| **D** | Twist/Lock (Dual) Manual Override |
| **E** | Twist (Extended) Manual Override |
| **L** | Twist/Lock (Detent) Manual Override |
| **M** | Manual Override |
| **T** | Twist (Momentary) Manual Override |

| FLOW RATE | (D) |
|---|---|
| **D** | .1 - 9 gpm (0,4 - 34 L/min.) |
| **A** | .1 - 1.6 gpm (0,4 - 6.1 L/min.) |
| **B** | .1 - 4 gpm (0,4 - 15 L/min.) |
| **C** | .1 - 6 gpm (0,4 - 23 L/min.) |

| SEAL MATERIAL | (N) |
|---|---|
| **N** | Buna-N |
| **E** | EPDM |
| **V** | Viton |

| COIL * | |
|---|---|
| | No coil |
| **212** | DIN 43650-Form A, 12 VDC |
| **224** | DIN 43650-Form A, 24 VDC |
| **224NX01** | DIN 43650-Form A, 24 VDC, no transient voltage suppression (TVS) diodes, with XMD-01 driver |
| **224NX02** | DIN 43650-Form A, 24 VDC, no transient voltage suppression (TVS) diodes, with XMD-02 driver |
| **912** | Deutsch DT04-2P, 12 VDC |
| **912NX01** | Deutsch DT04-2P, 12 VDC, no transient voltage suppression (TVS) diodes, with XMD-01 driver |
| **912NX02** | Deutsch DT04-2P, 12 VDC, no transient voltage suppression (TVS) diodes, with XMD-02 driver |
| **924** | Deutsch DT04-2P, 24 VDC |
| **924NX01** | Deutsch DT04-2P, 24 VDC, no transient voltage suppression (TVS) diodes, with XMD-01 driver |
| **924NX02** | Deutsch DT04-2P, 24 VDC, no transient voltage suppression (TVS) diodes, with XMD-02 driver |

* Additional coil options are available

## TECHNICAL FEATURES

- Note: Flow in the 2 to 3 direction is limited to about 1.5 gpm (5 L/pm).
- The transition between positions is closed.
- Using 2 3-ways to create a 4-way allows one to choose existing flow ranges instead of cutting a special spool.
- These valves may be pressure compensated by an external, modulating, logic element. Use LR_C-XHN for a bypass circuit or LP_C-XHN for a restrictive circuit.
- The valve provides a degree of self-compensation and may be used as a flow control. To increase the accuracy of flow control, an external, modulating, logic element can be used to maintain a constant flow over a wider range of flows and pressures. See performance curves for additional information.
- All ports will accept 5000 psi (350 bar).
- Coils are interchangeable with Sun's other full flow, solenoid-operated valves and can be mounted on the tube in either direction.
- For optimum performance, an amplifier with current sensing and adjustable dither should be used. Dither should be adjustable between 100 - 250 Hz.
- On models equipped with the D or L control, the detent mechanism in the manual override is meant for temporary actuation. The D, E, L and T manual control assemblies have a mechanical life expectancy of approximately 7,000 cycles.
- The momentary/twist override option "E" allows the operator to shift the valve by twisting the manual override clockwise 90 degrees.
- Incorporates the Sun floating style construction to minimize the possibility of internal parts binding due to excessive installation torque and/or cavity/cartridge machining variations.

## PERFORMANCE CURVES

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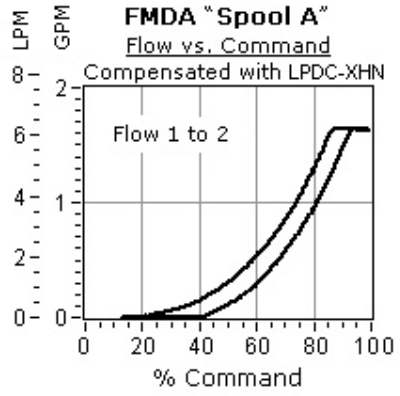


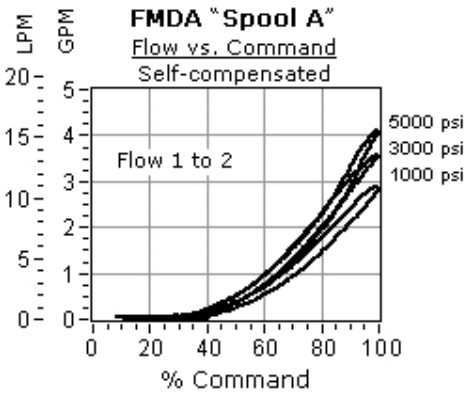


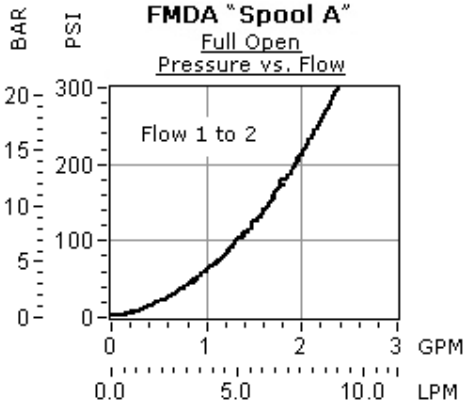


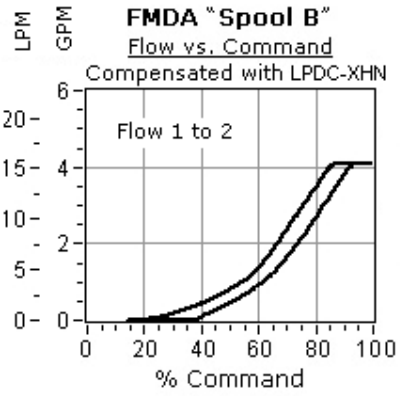


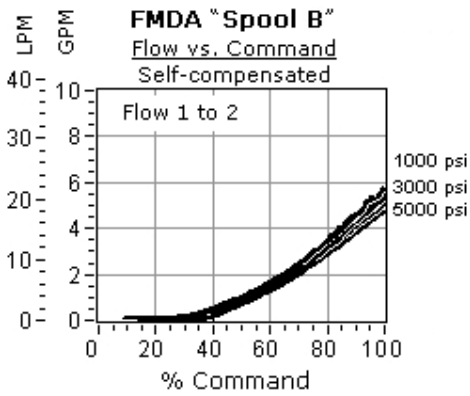


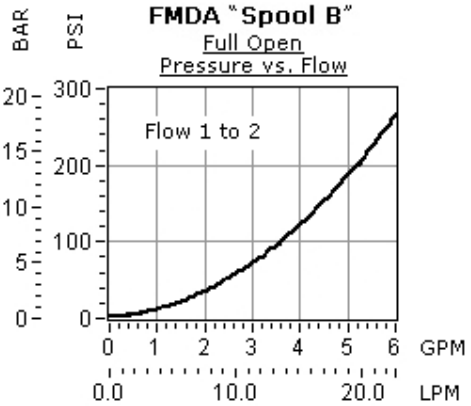


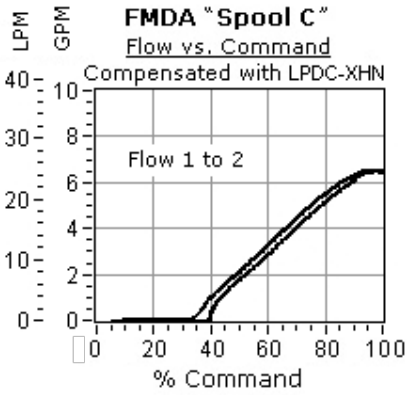


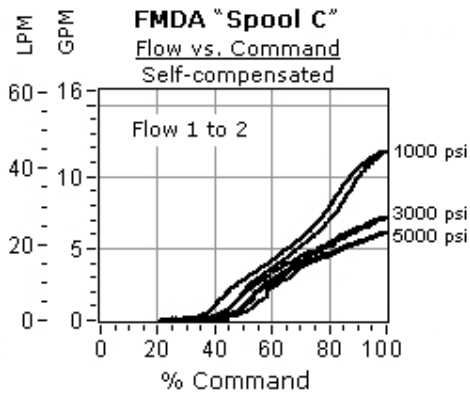


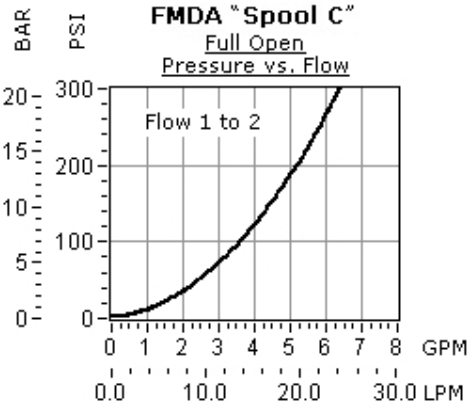


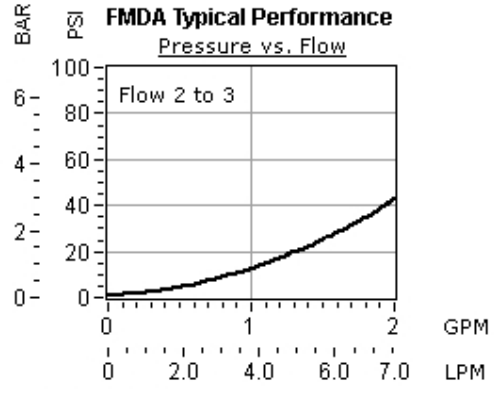


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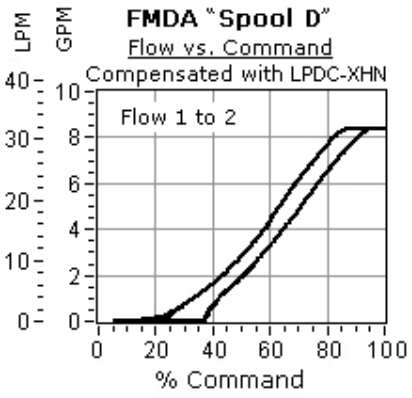


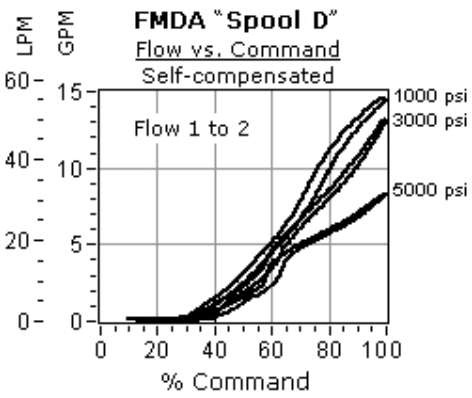


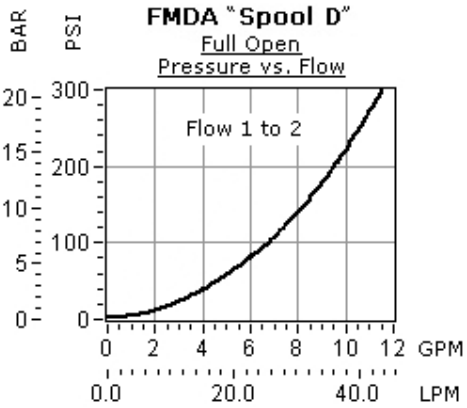


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