# Sun FLeX Series Solenoid Valves

### HIGH RELIABILITY
*Designed & tested to 10-million operational cycles at full rated pressure*

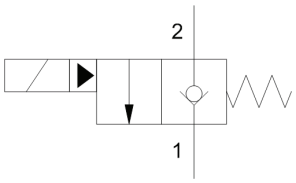
### ZINC-NICKEL COATING STANDARD
*Offers 1,000-hour salt fog protection*

### USE WITH ANY OF THREE COILS
*Energy-saving (3000 psi), high-power (5000 psi) & hazardous location coils*

# DFB*

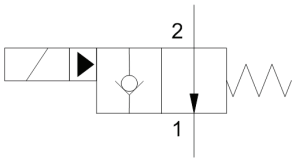
3000/5000 psi (210/350 bar)
T-162A cavity

## 2-WAY, 2-STAGE SOLENOID-OPERATED DIRECTIONAL POPPET VALVES



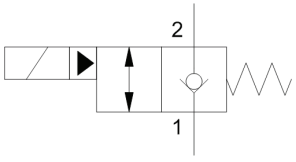

DFBD-*C*
3000 psi (210 bar)

DFBF-*C*
5000 psi (350 bar)



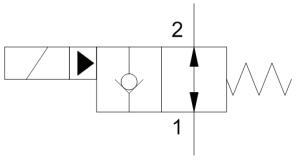

DFBD-*H*
3000 psi (210 bar)

DFBF-*H*
5000 psi (350 bar)




DFBE-*C*
3000 psi (210 bar)

DFBG-*C*
5000 psi (350 bar)




DFBE-*H*
3000 psi (210 bar)

DFBG-*H*
5000 psi (350 bar)

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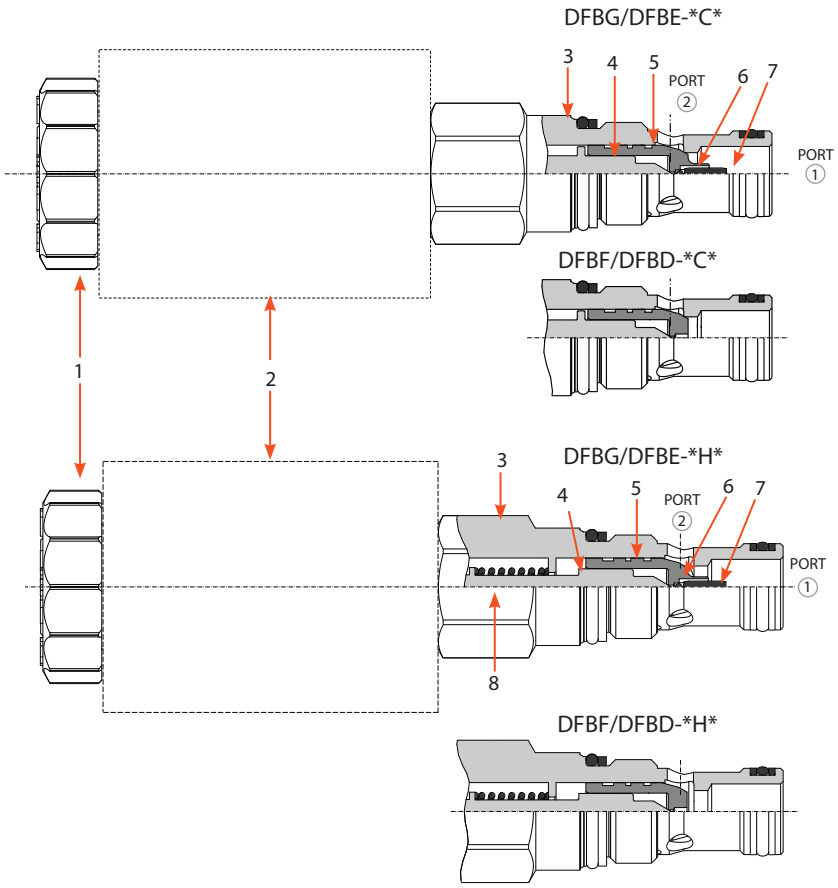
sunhydraulics.com/model/DFB*



Pub.#999-901-710

## DFB* 2-WAY, 2-STAGE, SOLENOID-OPERATED DIRECTIONAL POPPET VALVE, FLOW 2-1




### SERIES 0, CAVITY: T-162A

The 2/2 directional poppet valves are pilot operated. They comprise a hex body (3), solenoid with coil (2), poppet (5), dart (4), coil nut (1), ball (6), pin (7), and a spring (8).

**DFB-*C* (normally closed)**
Function: When de-energized, the dart (4) rests on the poppet (5), which in turn rests on the sleeve seat (3). In this condition, flow is blocked from 2 to-1 but will free flow 1 to 2. When energized, the dart lifts from the poppet, the poppet follows the dart and lifts away from the seat, creating an open path from 2 to 1.
If the DFBF or DFBD is open and flow is routed 1 to 2, the valve will auto close and only pilot flow will pass from 1 to 2. For the DFBG & DFBE, the check valve (6 & 7) at the nose of the poppet will allow free flow from 1 to 2 whether the valve is open or closed.

**DFB-*H* (normally open)**
Function: When de-energized, the dart (4) and poppet (5) are lifted away from the sleeve seat by the spring (8), allowing an open flow path from 2 to 1. When energized, the dart pushes into the poppet seat, and the poppet pushes into the sleeve seat, closing the valve. Flow is blocked 2 to 1 but can free flow 1 to 2.
If the DFBF or DFBD is open and flow is routed 1 to 2, the valve will auto close and only pilot flow will pass from 1 to 2. For the DFBG & DFBE, the check valve (6 & 7) at the nose of the poppet will allow free flow 1 to 2 whether the valve is open or closed.

## TECHNICAL FEATURES

- All FLeX Series valves incorporate the Sun floating-style construction to minimize the possibility of internal parts binding due to excessive installation torque and/or cavity/cartridge machining variations.
- Designed and tested to 10 million on-off operational cycles.
- Meets new NFPA test standard T2.6.1 R2014 for fatigue and burst pressure ratings.
- Higher flow rates than competing valves of similar size.
- Designed using CFD fluid simulation for optimized geometries.
- Valves have extremely low leakage rate – less than 1 drop/min or 0.004 $in^3$ (0.07 $cc^3$)/min
- Zinc-nickel plating standard for 1000-hour salt fog protection.
- On normally open configurations, a push-type manual override option is available. On normally closed configurations, a pull-type manual override option is available.
- A wide variety of coil termination and voltage options are available, with and without surge protection. See the CONFIGURATION section.
- The 5000-psi (350-bar) valves in the DFB* family use the high-power (25-W) 740 Series coils; the 3000-psi (210-bar) DFB* valves use the low-power (17-W) coils. Note that all DFB* valves can be used with the hazardous location coils. See table on page 3.
- Coil connector options offer ratings up to IP69K. See individual coil product pages for details.

## MODEL CODE EXPLANATION

Sun cartridges have a base seven-digit part number. Each of the digits in the sequence has significance as shown in the model code explanation below. Available options and modifiers for specific cartridges, manifolds, and valve packages are shown on the individual product pages and data sheets. Not all modifiers are applicable for every model.

### VALVE

BASE MODEL CODE — CONFIGURATIONS

**D F B * – X C N**

- D F B: Directional; Poppet style; Series 0
- *: D = 3000 psi (210 bar); E = 3000 psi (210 bar) with reverse flow check; F = 5000 psi (350 bar); G = 5000 psi (350 bar) with reverse flow check
- X: X = no manual override; M = manual override; P = manual pull override
- C: C = normally closed; H = normally open
- N: N = Buna-N; V = Viton

**Important Note**:

When performing model code searches on www.sunhydraulics.com, do not include setting(s). When ordering, no spaces or dashes are used.

### COIL

COIL TYPE — CONFIGURATIONS

**74* – * * * * * *** 

- 740: Low- or high-power coils; DIN or Deutsch connector; 12, 14, 24, or 28 Vdc; 115, 230 Vac; With or without TVS diode
- 747: Hazardous location coils; Explosion-proof; CSA, ATEX, IECEx certified; 12, 24 Vdc; 115, 230 Vac

See individual coil data sheets for full coil configuration.

## COMPATIBLE COILS

The DFBD and DFBE 3000-psi (210-bar) valves use the low-power (17-W) coils; the DFBF and DFBG 5000-psi (350-bar) valves use the high-power (25-W) coils. Note that all DFB* valves can be used with the hazardous location coils.

### Low-Power (17-W) & High-Power (25-W) Coils

| Voltage | DIN 43650 Form A (IP65/IP67) | | Deutsch DT04-2P (IP69K) | | Resistance @20°C (ohms) ±10% (with diode*) | | TVS Diode (Nominal) Breakdown Voltage (with diode*) |
|---|---|---|---|---|---|---|---|
| | High-Power | Low-Power | High-Power | Low-Power | High-Power | Low-Power | |
| 12 Vdc | 740-212 | 740-212L | 740-912 | 740-912L | 5.8 Ω | 8.5 Ω | 68 Vdc |
| 14 Vdc | 740-214 | 740-214L | 740-914 | 740-914L | 7.8 Ω | 11.5 Ω | 68 Vdc |
| 24 Vdc | 740-224 | 740-224L | 740-924 | 740-924L | 23.0 Ω | 33.9 Ω | 68 Vdc |
| 28 Vdc | 740-228 | 740-228L | 740-928 | 740-928L | 31.4 Ω | 46.1 Ω | 68 Vdc |
| 115 Vac | 740-211 | 740-211L | N/A | N/A | 416 Ω | 612 Ω | 250 Vac |
| 230 Vac | 740-223 | 740-223L | N/A | N/A | 1686 Ω | 2479 Ω | 400 Vac |

*** Above model codes are shown without transient voltage suppression (TVS) diodes. To order 740 Series coils with a TVS diode, append model code with "D" (Example: 740-212LD).**

### Hazardous Location, Explosion-Proof (30-W) Coils

| Voltage | M20 x 1.5 180° | M20 x 1.5 90° | 1/2" NPT 180° | 1/2" NPT 90° | Wattage @ 20°C | Circuitry |
|---|---|---|---|---|---|---|
| 12 Vdc | 747-JM12BD | 747-JM12CD | 747-JN12BD | 747-JN12CD | 29.6 W | With diode |
| 24 Vdc | 747-JM24BD | 747-JM24CD | 747-JN24BD | 747-JN24CD | 29.9 W | With diode |
| 115 Vac | 747-JM11BD | 747-JM11CD | 747-JN11BD | 747-JN11CD | 29.7 W | Rectified |
| 230 Vac | 747-JM23BD | 747-JM23CD | 747-JN23BD | 747-JN23CD | 28.9 W | Rectified |

## DFB* 2-WAY, 2-STAGE, SOLENOID-OPERATED DIRECTIONAL POPPET VALVE, FLOW 2-1

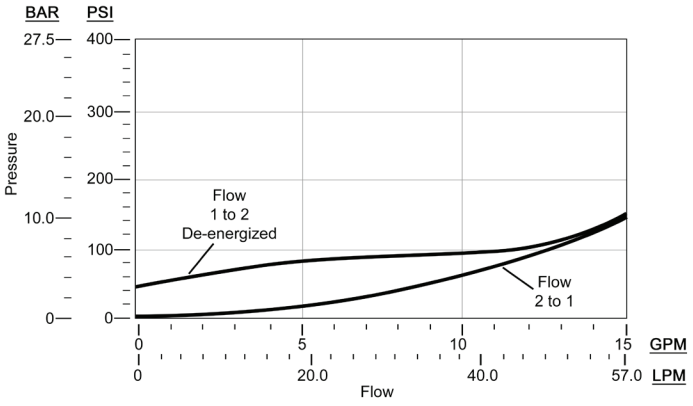
**SERIES 0, CAVITY: T-162A**

| TECHNICAL SPECIFICATIONS | DFBD | DFBF | DFBE | DFBG |
|---|---|---|---|---|
| **Maximum Operating Pressure** | 3000 psi (210 bar) | 5000 psi (350 bar) | 3000 psi (210 bar) | 5000 psi (350 bar) |
| **Nominal Flow Rate/Capacity** | 10 gpm (40 L/min)* | | | |
| **Sun Cavity** | T-162A | | | |
| **Sun Cartridge Series** | Series 0 | | | |
| **Check Cracking Pressure - Typical** | 50 psi (3.45 bar) | | | |
| **Response Time - Typical** | 50 ms (open & close) | | | |
| **Maximum Internal Leakage at 110 SUS (24 cSt) at Maximum Operating Pressure** | 0.004 $in^3$ (0.07 $cc^3$)/min (1 drop/min) | | | |
| **Switching Frequency - Maximum** | 4 Hz (15,000 cycles/hour) | | | |
| **Manual Override Option** | Push-type for normally open, pull-type for normally closed | | | |
| **Viscosity Range** | 2,8 to 380 cSt or 35 to 2000 SUS | | | |
| **Filtration** | Minimum cleanliness (ISO 4406 1999, 4/6/14 µm) 19/17/14 | | | |
| **Valve Hex Size** | 0.75 in (19,1 mm) | | | |
| **Valve Installation Torque** | 20 - 25 lbf ft (27 - 34 N-m) | | | |
| **Mounting Position** | No restrictions | | | |
| **Valve Weight (excluding coil)** | 5.6 oz (159 g) | | | |
| **Seal Kit - Viton** | 990-162-006 | | | |
| **Seal Kit - Buna N** | 990-162-007 | | | |

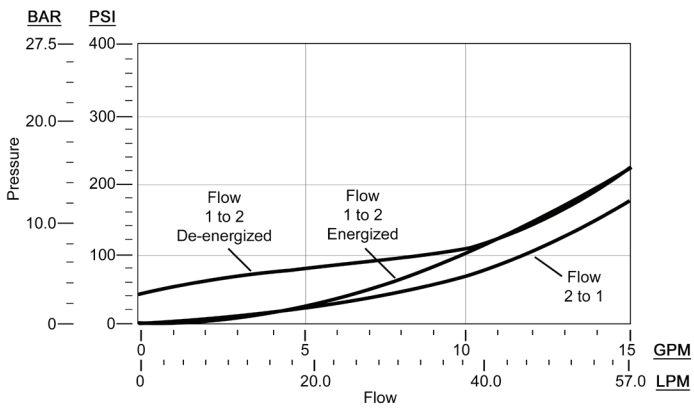
* See performance curves on page 5 for more details.

## TYPICAL PRESSURE DIFFERENTIAL VS. FLOW

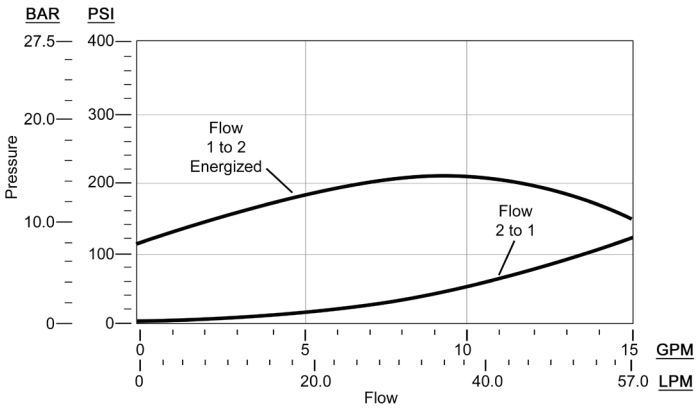
### DFBD-*C* & DFBF-*C*
(Normally closed)




### DFBE-*C* & DFBG-*C*
(Normally closed)

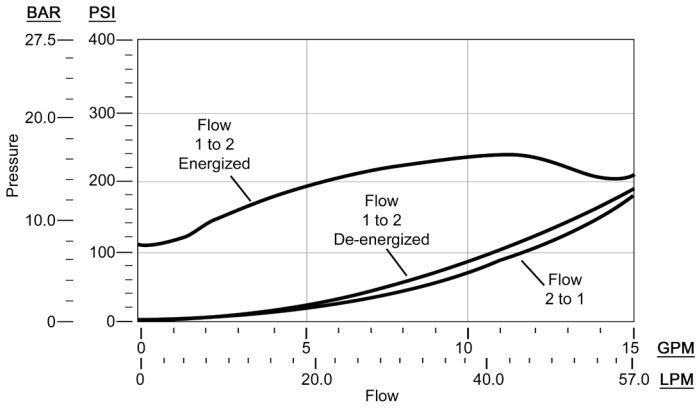



### DFBD-*H* & DFBF-*H*
(Normally open)

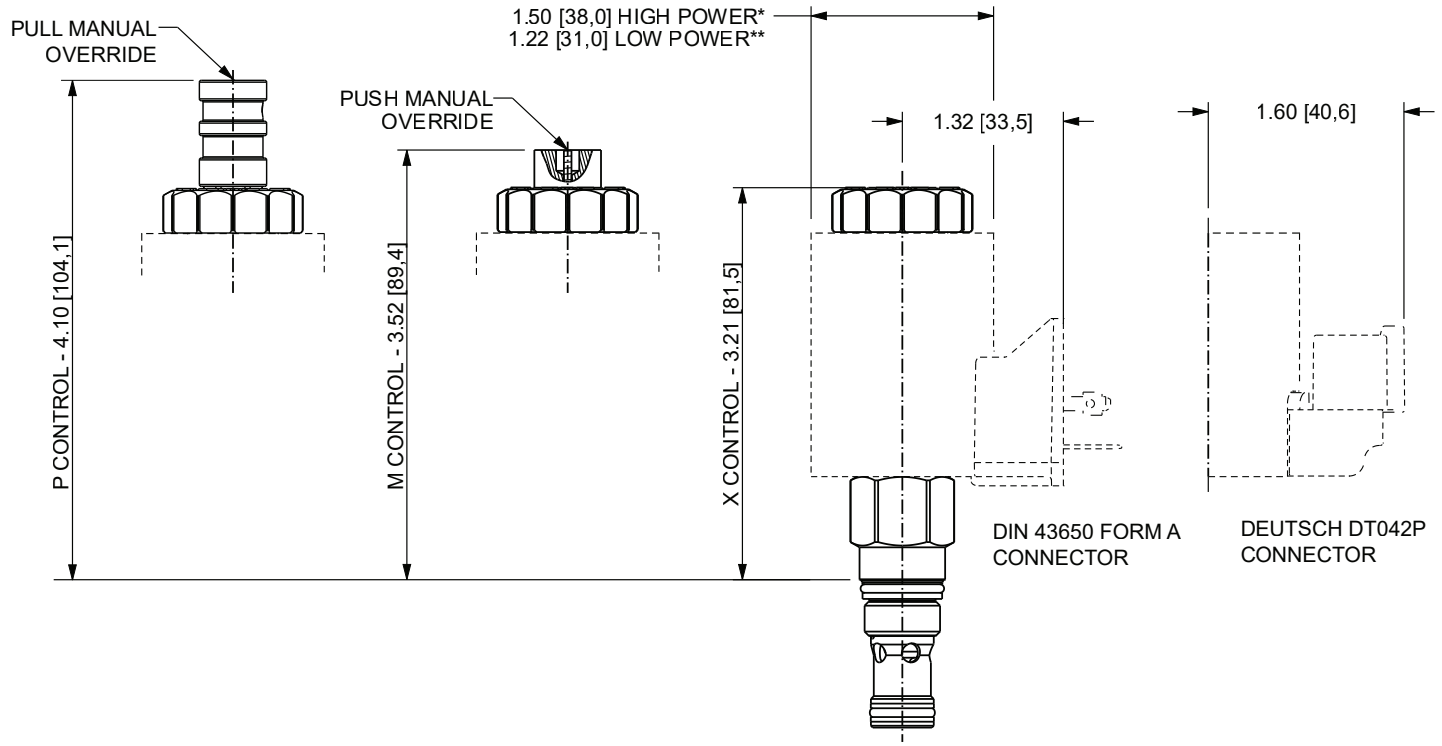



(Flow 1 to 2 with coil energized)

### DFBE-*H* & DFBG-*H*
(Normally open)

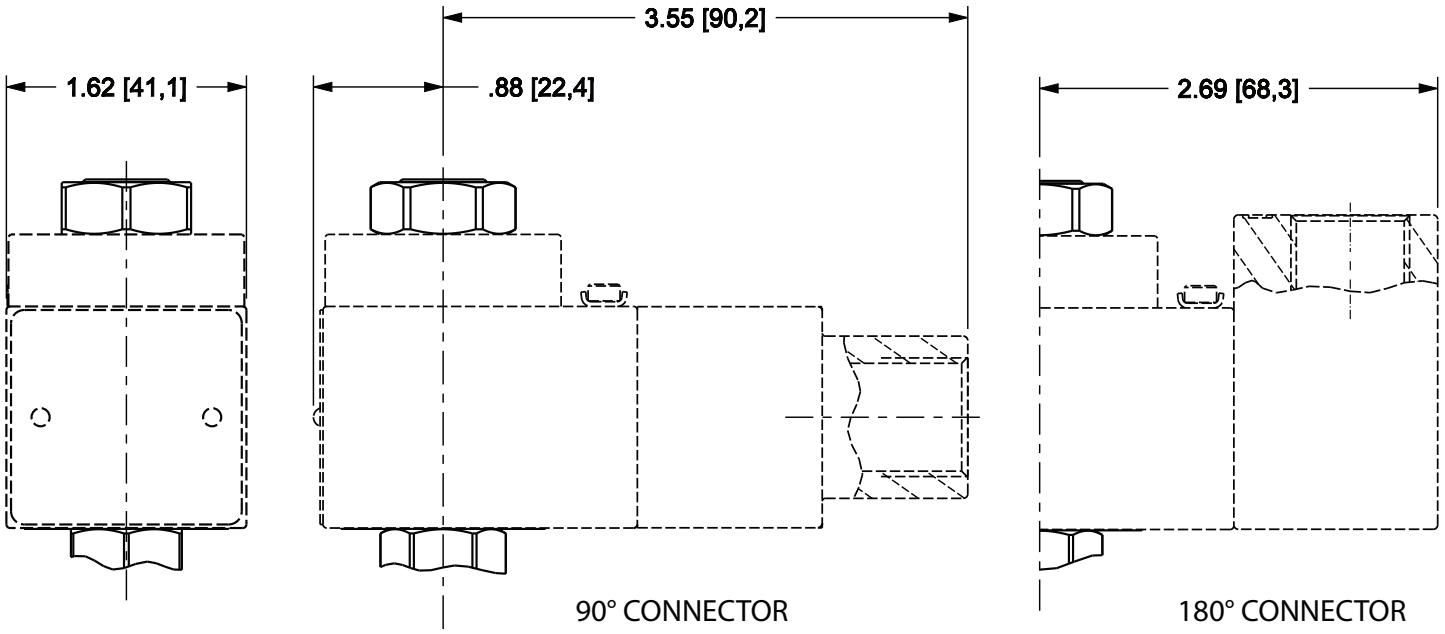


## DFB* FAMILY WITH 740 SERIES LOW- & HIGH-POWER COILS



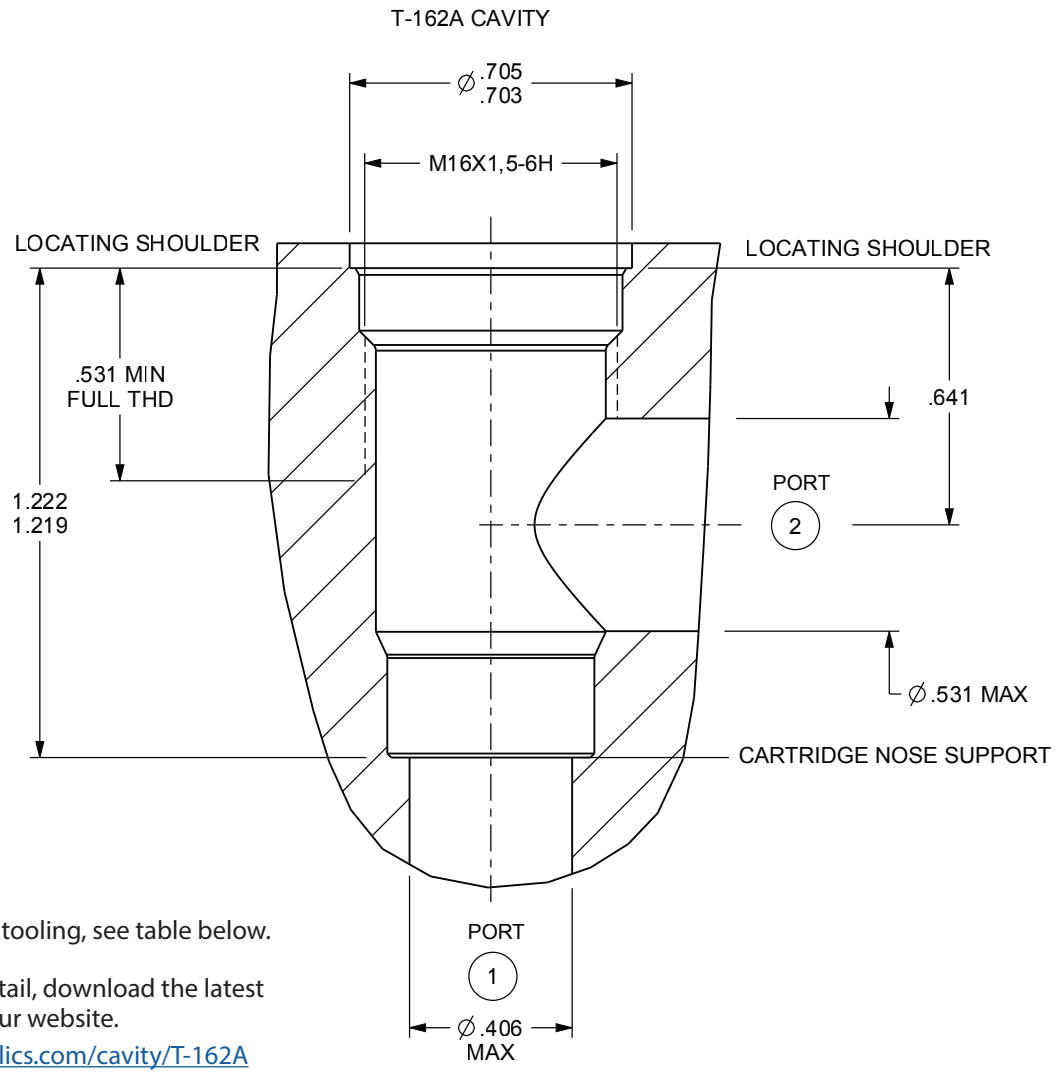

*HIGH POWER COILS ONLY COMPATIBLE WITH DFBG-*** & DFBF-***
**LOW POWER COILS ONLY COMPATIBLE WITH DFBD-*** & DFBE-***

## 747 SERIES HAZARDOUS LOCATION COILS




NOTE: Please verify cartridge clearance requirements when choosing a Sun manifold. Different valve controls and coils require different clearances. An additional minimum 2.0 in. (50,8 mm) beyond the valve extension is needed for coil installation and removal.

## T-162A CAVITY DIMENSIONAL DRAWING




NOTE: For cavity tooling, see table below.

For full cavity detail, download the latest drawings from our website.
www.sunhydraulics.com/cavity/T-162A

## T-162A CAVITY TOOLING

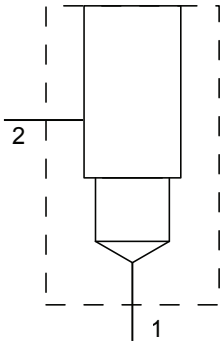
| DESCRIPTION | HIGH-SPEED STEEL | TITANIUM COATED |
|---|---|---|
| M16 X 1.5-6H tap, straight shank | 998991 | 998991101 |
| Series 0 deep hex socket | 998100005 | |
| T-162A cavity form drill, morse taper | 994162001 | 994162101 |
| T-162A cavity form drill, straight shank | | 994162102 |
| T-162A cavity form reamer, morse taper | 995162001 | 995162101 |
| T-162A cavity form reamer, straight shank | | 995162102 |

# ADDITIONAL INFORMATION

## ACCESSORIES

| DESCRIPTION | PART NUMBER |
|---|---|
| Wire harness, 2-pin Deutsch-to-Metri-Pack Conversion | 991-717 |
| Wire harness, 2-pin Deutsch-to-Amp Jr Timer Conversion | 991-718 |
| Wire harness, 2-pin Deutsch-to-Twin-Lead Conversion | 991-719 |

## STANDARD LINE-MOUNT & SANDWICH MANIFOLDS




Compatible with the DFB* family of FLeX valves, Sun Hydraulics offers 31 standard line-mount manifolds in 90°, in-line, through port 1 with gauge port, cross port and direct mount (banjo bolt) versions for the T-162A cavity. Standard products include one- and two-cavity versions in a wide range of port sizes. The popular AAJ model line-mount 90° manifold (shown at left) has a single cavity and SAE 8 ports.

In sandwich manifolds, we offer 26 standard bodies based on the T-162A cavity that include a range of interfaces in one- or two-cavity versions.

To search our complete line of standard manifolds, go to www.SunHydraulics.com/models/manifolds.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