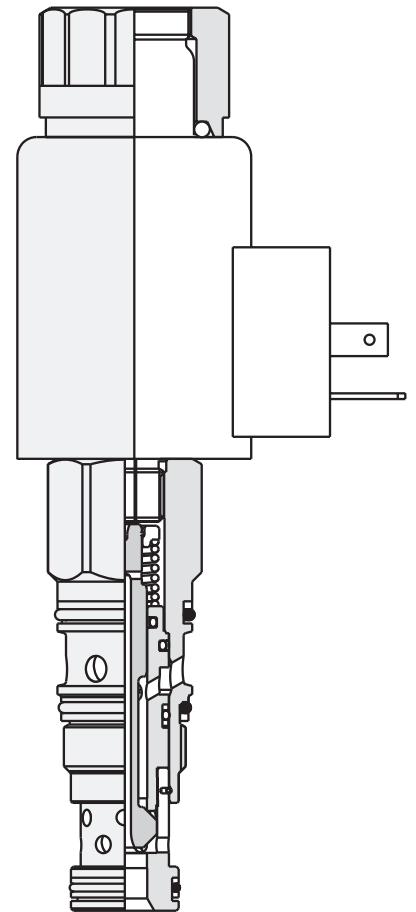


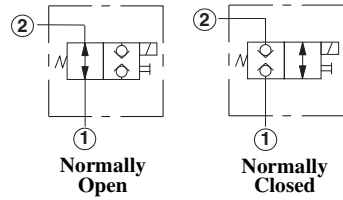
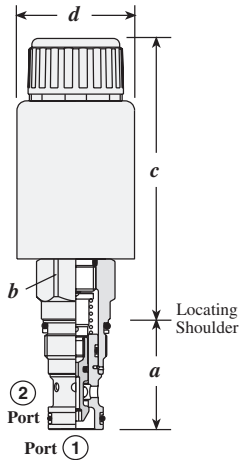
Solenoid Operated Cartridge Valves

	<i>Cartridge Type</i>	<i>Page</i>
	2-way, Direct Acting, Poppet Directional Valve	132
	2-way, Directional Spool Valve, Pilot Capacity	133
	2-way, Soft Shift, Directional Spool Valve	134
	3-way, 2-position, Direct Acting, Directional Poppet Valve	135
	3-way, 2-position, Directional Spool Valve, Pilot Capacity	136
	3-way, 2-position, Soft Shift, Directional Spool Valve	137
	4-way, 2-position, Directional Spool Valve	138
	4-way, 3-position, Spring Centred, Directional Spool Valve	139



Solenoid Operated Cartridge Valves

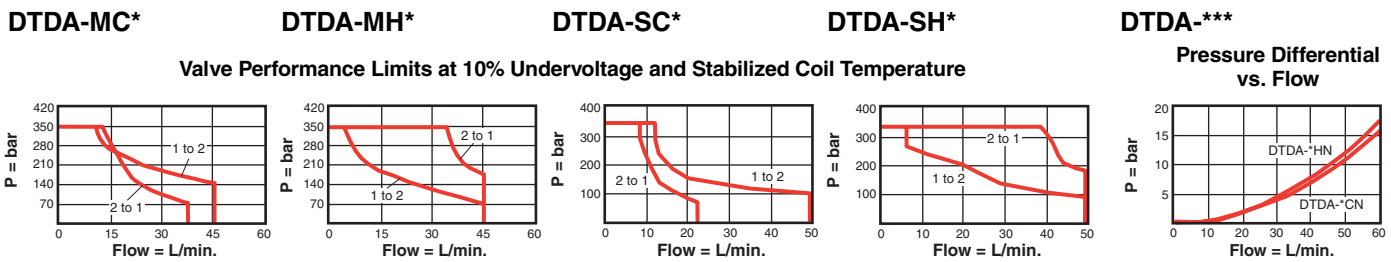
2-WAY, DIRECT ACTING, POPPET DIRECTIONAL VALVE



Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***		
40 L/min.	DTDA -***	T - 13A	35,0	22,2	M,X,S	D,L,T	45 - 50

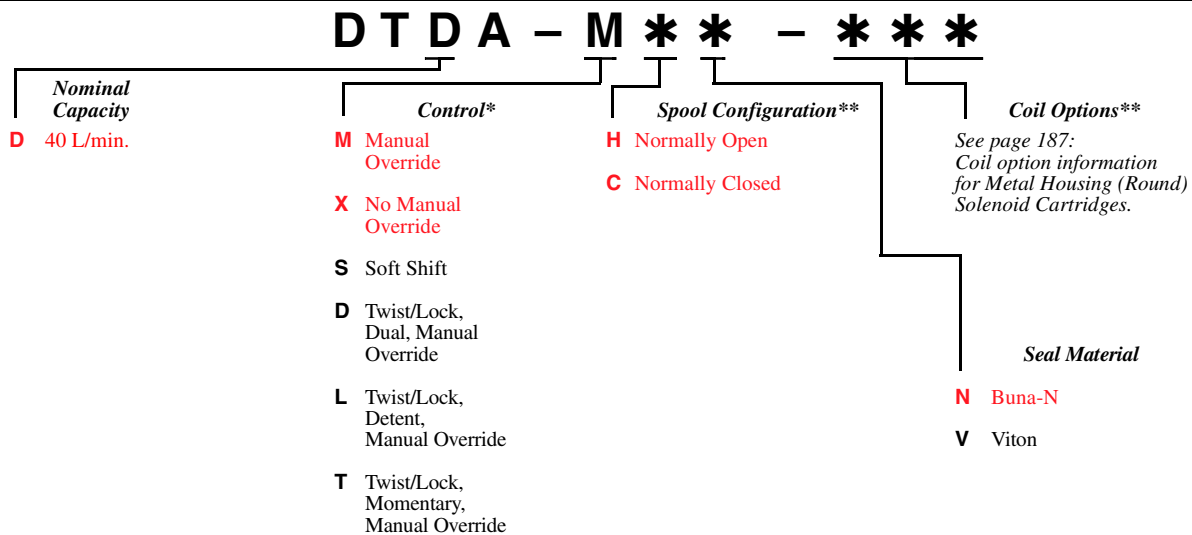
***An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,6 cc/min. at 350 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION



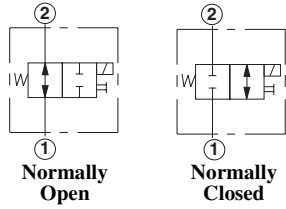
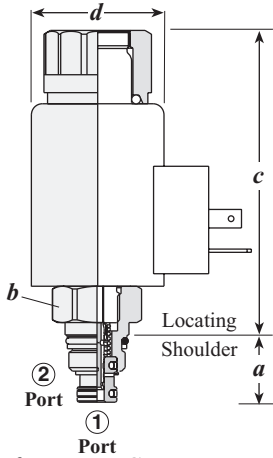
* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

Solenoid Operated Cartridge Valves

2-WAY, DIRECTIONAL SPOOL VALVE, PILOT CAPACITY



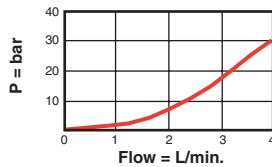
Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***	d	
1 L/min.	DAAL - ***	T - 8A	18,5	22,2	M,X,S D,L,T	108,7	35 - 40

***An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves

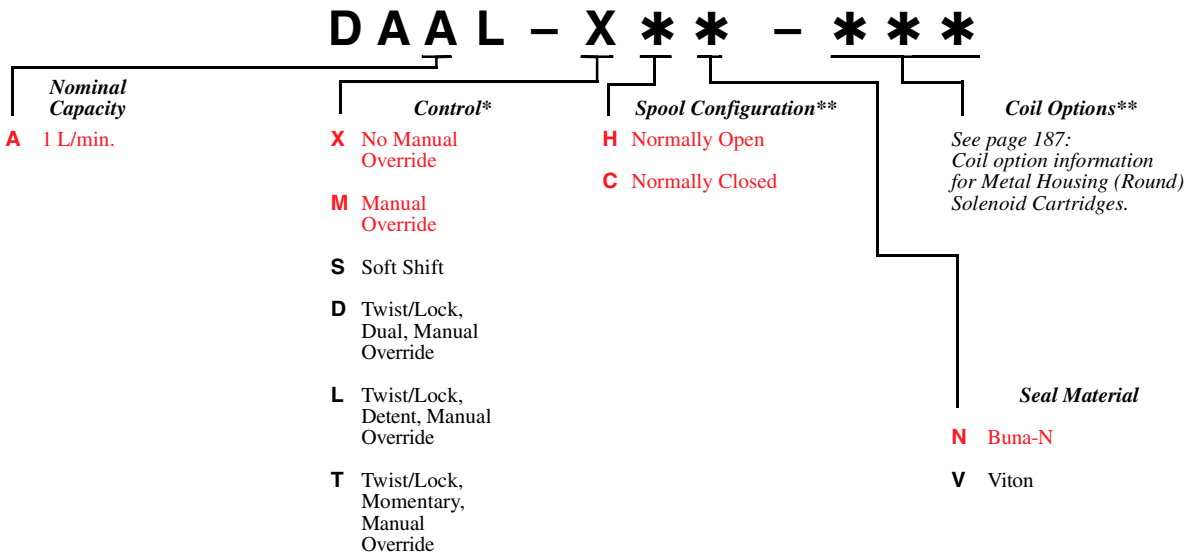
DAAL-X**, DAAL-S**

Pressure Differential vs. Flow



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,6 cc/min. at 350 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 6,6 kg at 100 bar at port 1.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION



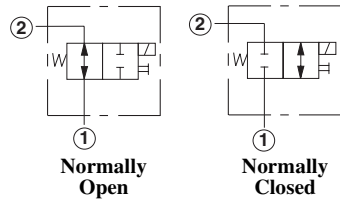
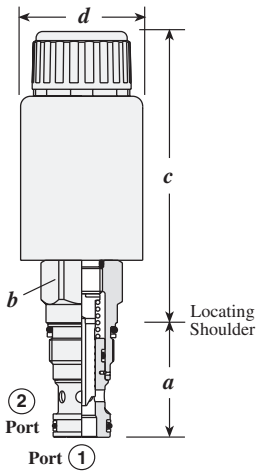
* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

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Solenoid Operated Cartridge Valves

2-WAY, SOFT SHIFT, DIRECTIONAL SPOOL VALVE

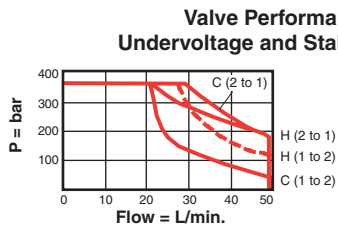


Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)	
			a	b	c***			d
					M,X,S	D,L,T		
45 L/min.	DLDA - ***	T - 13A	35,0	22,2	89,4	114,3	37,3	45 - 50

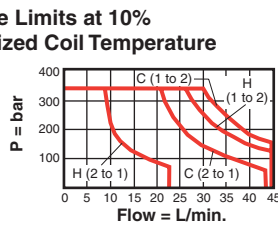
***An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves

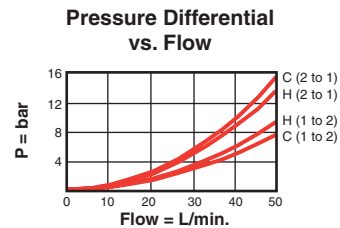
DLDA-M**



DLDA-S**

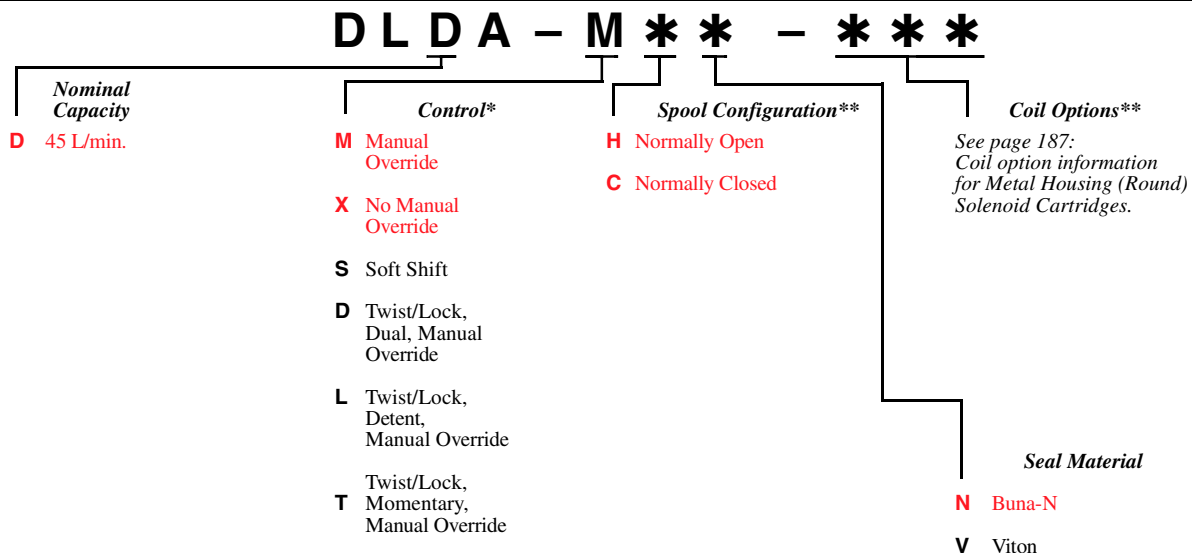


DLDA-***



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 80 cc/min. at 210 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION



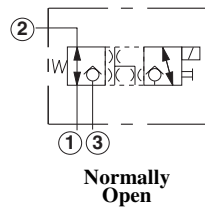
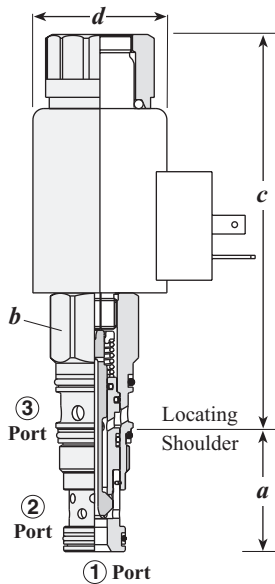
* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

Solenoid Operated Cartridge Valves

3-WAY, 2-POSITION, DIRECT ACTING, DIRECTIONAL POPPET VALVE



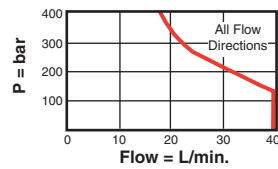
Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)	
			a	b	c***			d
30 L/min.	DWDA-XAN	T - 11A	34,8	22,2	M,X 108,2	D,L,T 133,1	37,3	45 - 50

***An additional 50,8 mm clearance is needed for coil installation and removal.

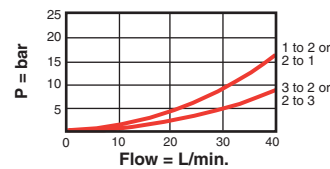
Performance Curves

DWDA-XAN

Valve Performance Limits at 10% Undervoltage and Stabilized Coil Temperature

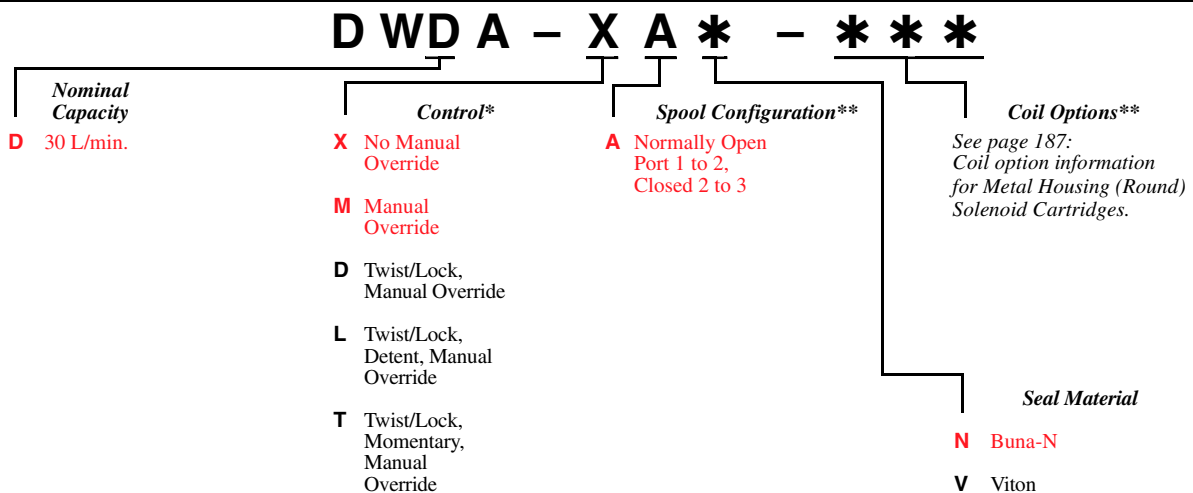


Pressure Differential vs. Flow



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,6 cc/min. at 350 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION



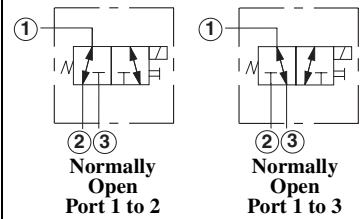
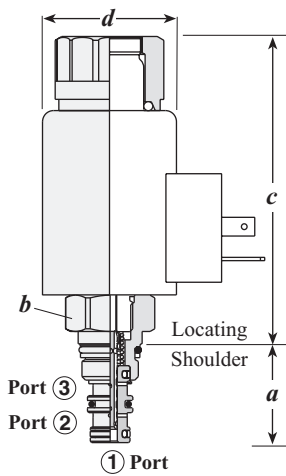
* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

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Solenoid Operated Cartridge Valves

3-WAY, 2-POSITION, DIRECTIONAL SPOOL VALVE, PILOT CAPACITY



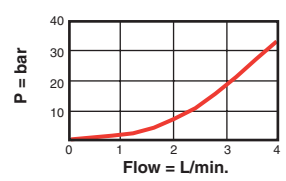
Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***	d	
1 L/min.	DBAL - ***	T - 9A	27,4	22,2	83,6	108,7	35 - 40

***An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves

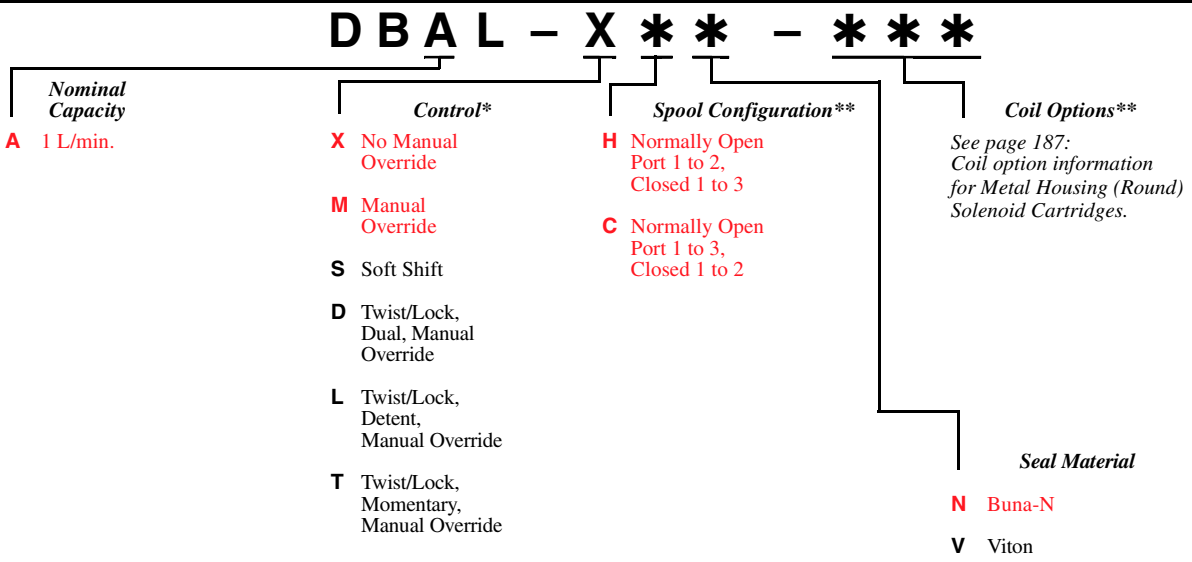
DBAL-M**, DBAL-S

Pressure Differential vs. Flow



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 0,6 cc/min. at 350 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 6,6 kg at 100 bar at port 1.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION



* See page 178 for information on Control Options

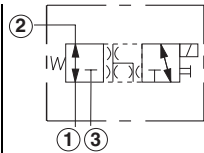
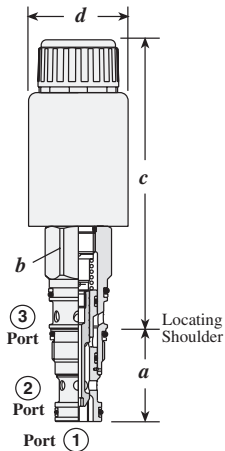
** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

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Solenoid Operated Cartridge Valves

3-WAY, 2-POSITION, SOFT SHIFT, DIRECTIONAL SPOOL VALVE



DMDA-***

Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***	d	
45 L/min.+	DMDA-***	T - 11A	35,0	22,2	108,2	132,8	45 - 50

***An additional 50,8 mm clearance is needed for coil installation and removal.

+ Only for A and N spools. View performance curves for other spool configurations.

Performance Curves

DMDA-MA*

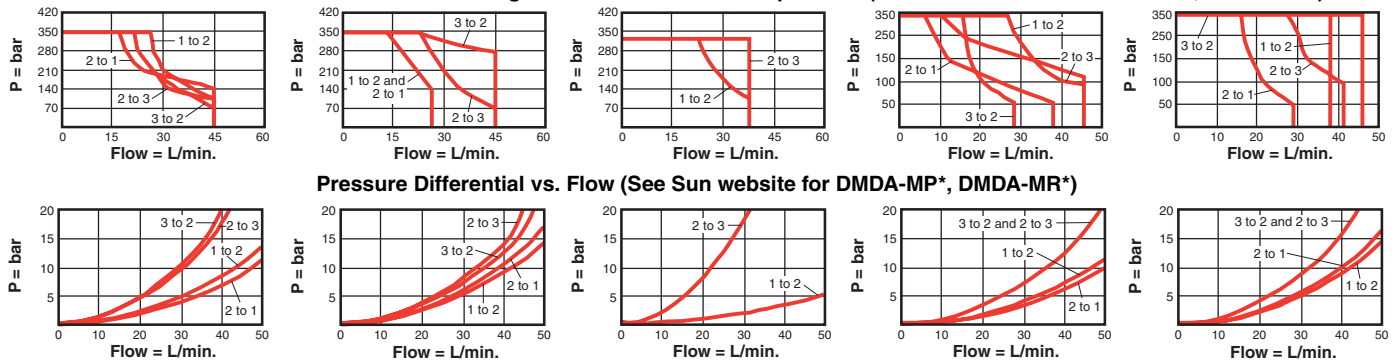
DMDA-MN*

DMDA-MB*

DMDA-SA*

DMDA-SN*

Valve Performance Limits at 10% Undervoltage and Stabilized Coil Temperature (See Sun website for DMDA-MP*, DMDA-MR*)



Pressure Differential vs. Flow (See Sun website for DMDA-MP*, DMDA-MR*)

- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 80 cc/min. at 210 bar.
- Response time - typical = 50 ms.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Maximum switching frequency = 15000 cycles/hr.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- Spools B and R are closed in the transition between their two positions. This results in a higher performance limit at the expense of lower capacity. When used as pilot controls, where capacity is not a factor, the closed transition will provide faster and more consistent response times.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION

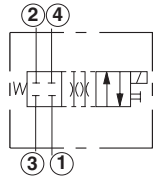
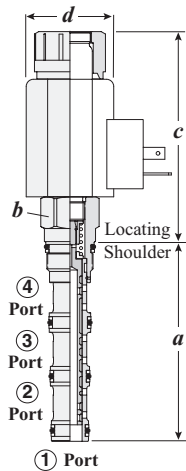
DMDA - M*** - ***

<p>Nominal Capacity</p> <p>D 45 L/min.</p>	<p>Control*</p> <p>M Manual Override</p> <p>X No Manual Override</p> <p>S Soft Shift</p> <p>D Twist/Lock, Dual, Manual Override</p> <p>L Twist/Lock, Detent, Manual Override</p> <p>T Twist/Lock, Momentary, Manual Override</p> <p>* See page 178 for information on Control Options</p>	<p>Spool Configuration**</p> <p>A Normally Open Port 1 to 2, Closed 2 to 3</p> <p>N Normally Open Port 2 to 3, Closed 1 to 2</p> <p>B Normally Open Ports 1 to 2, Closed 2 to 3, Closed Transition</p> <p>P Normally Open Ports 1 to 3, Closed 1 to 2</p> <p>R Normally Open Ports 2 to 3, Closed 1 to 2, Closed Transition</p>	<p>Coil Options**</p> <p>See page 187: Coil option information for Metal Housing (Round) Solenoid Cartridges.</p> <p>Seal Material</p> <p>N Buna-N</p> <p>V Viton</p> <p>** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.</p>
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Solenoid Operated Cartridge Valves

4-WAY, 2-POSITION, DIRECTIONAL SPOOL VALVE



DNDA-***

Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***	d	
40 L/min.	DNDA - ***	T - 31A	84,8	22,2	89,4	114,3	45 - 50

***An additional 50,8 mm clearance is needed for coil installation and removal.

Performance Curves

DNDA-X**

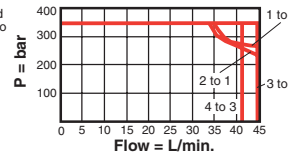
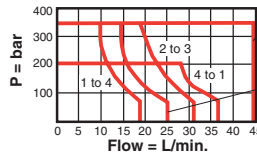
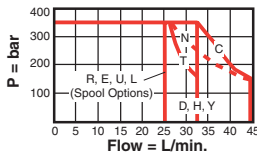
DNDA-SC*

DNDA-SN*

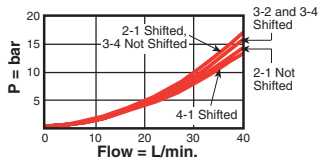
DNDA-***

Valve Performance Limits at 10% Undervoltage and Stabilized Coil Temperature

Note: Performance limits are derived with 4-way operation and symmetrical flow. For valve applications where either asymmetrical flow or 3-way operation are present, these performance limits may be reduced.



Pressure Differential vs. Flow



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 160 cc/min. at 210 bar.
- Manual override force requirement = 10 kg at 350 bar.
- Manual override stroke = 2,5 mm.
- Response time - typical = 50 ms.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- The soft shift feature results in significantly longer response time over Sun's standard solenoid. Response time is dependant on flow, pressure, coil voltage, oil viscosity and ambient temperature. Typical response time ranges from 150 ms to 300 ms.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION

DNDA - X** - ***

Nominal Capacity	Control*	Spool Configuration**	Spool Configuration**	Coil Options**
D 40 L/min.	<p>X No Manual Override</p> <p>M Manual Override</p> <p>S Soft Shift</p> <p>D Twist/Lock Dual, Manual Override</p> <p>L Twist/Lock, Detent, Manual Override</p> <p>T Twist/Lock, Momentary, Manual Override</p>	<p>C Closed, Shift to Through</p> <p>D Closed, Shift to Cross</p> <p>E Cross, Shift to Closed</p> <p>H Open, Shift to Cross</p> <p>L Cross, Shift P to A, B and T Blocked</p>	<p>N Through, Shift to Cross</p> <p>R Regen, Shift to Cross</p> <p>T Tandem, Shift to Through</p> <p>U Through, Shift to Through</p> <p>Y Motor, Shift to Cross</p>	<p>See page 187: Coil option information for Metal Housing (Round) Solenoid Cartridges.</p> <p>Seal Material</p> <p>N Buna-N</p> <p>V Viton</p>

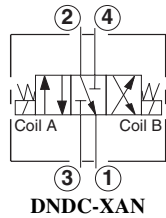
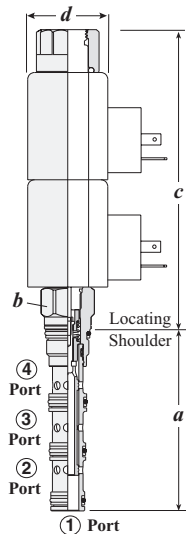
* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

Visit www.sunhydraulics.com for current list pricing and complete technical information on all Sun products.

Solenoid Operated Cartridge Valves

4-WAY, 3-POSITION, SPRING CENTRED, DIRECTIONAL SPOOL VALVE

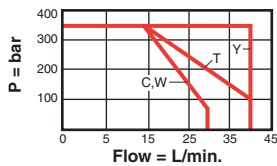


Nominal Capacity	Typical Cartridge Model Code	Cavity	Cartridge Dimensions				Installation Torque (Nm)
			a	b	c***	d	
20 L/min.	DNDC - X**	T - 31A	84,8	22,2	139,4	37,3	45 - 50

***An additional 50,8 mm clearance is needed for coil installation and removal.

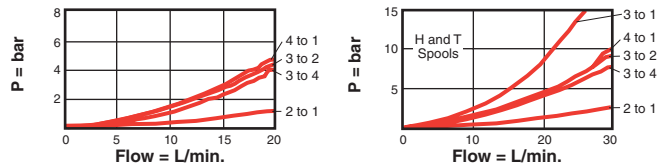
Performance Curves

Valve Performance Limits at 10% Undervoltage and Stabilized Coil Temperature



DNDC-X**

Pressure Differential vs. Flow



- Maximum operating pressure = 350 bar.
- Maximum valve leakage at 24 cSt = 160 cc/min. at 210 bar.
- Response time - typical = 50 ms.
- Maximum switching frequency = 15000 cycles/hr.
- Viscosity range = 10 - 600 cSt.
- This valve is direct actuated and requires no minimum hydraulic pressure for operation.
- The solenoid tube assembly is fatigue rated for 350 bar service.
- A wide variety of coil termination and voltage options are available. See Sun website: Products: Accessories: Coils.

OPTION ORDERING INFORMATION

DNDC - X - *****

Nominal Capacity	Control*	Spool Configuration**	Spool Configuration**	Coil Options**
D 20 L/min.	X No Manual Override	A A to T Centre B B to T Centre C Blocked Centre H Open Centre	R Regen Centre T Tandem Centre W A and B, Bleed to T Centre Y A and B to T Centre	See page 187: Coil option information for Metal Housing (Round) Solenoid Cartridges. Sea Material N Buna-N V Viton

* See page 178 for information on Control Options

** Consult the Sun website for complete information on Spool Configurations, the full line of Coil Options and Embedded Amplifier Coils/Controllers.

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NOTES