

# Directional Control Valves



## Product Overview



***Northman***



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# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G02 SERIES



### FEATURES

- Armature operates in oil system. Impact is cushioned, noise is reduced and solenoid life is increased.
- Wet armature solenoid eliminates pushpin seal, therefore no seal wear or leakage for longer valve life.
- Molded coils for maximum insulating properties, which is impervious to moisture and dirt.
- Plug-in solenoid, for ease of maintenance.
- All spools and bodies are interchangeable, simplifying maintenance.
- Indicating signal lights and bolt kits are standard.
- High pressure, high flow rating, and low-pressure drop.
- Specially designed, balanced spool allows proper shifting force, for maximum reliability and long life.
- Viton seal kits are available for fire-resistance fluids.

### Model Code

**SWH – G 02 – C2 – A120 – 10 – LS**

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#### 1 Series

**SWH:** High Pressure, High Flow Solenoid Directional Control Valve

#### 2 Mounting Style

**G:** Subplate Mounted

#### 3 Mounting Size

**02:** Interface 02  
NFPA D03 Size / ISO 4401-03 / CETOP 3 / NG 06

#### 4 Spool Type

(See Spool Chart)

#### 5 Coil Voltage

**A24:** AC24V, 60Hz  
**A110:** AC110V, 60HZ; AC100V, 50Hz  
**A120:** AC120V, 60HZ; AC110V, 50Hz  
**A220:** AC220V, 60HZ; AC200V, 50Hz  
**A240:** AC240V, 60HZ; AC220V, 50Hz  
**R110:** AC110V, 50/60Hz  
**R120:** AC120V, 50/60Hz  
**R220:** AC220V, 50/60Hz  
**R240:** AC240V, 50/60Hz  
**D12:** DC12V  
**D24:** DC24V

#### 6 Wiring Type

**10:** Junction Box with Indicator Light  
**20:** DIN 43650 Connector with Indicator Light  
**31:** Lead Wire (DC Only)  
**41:** Dual Spade (DC Only) SAE J858A)

#### 7 Option

**No Code:** Standard  
**LS:** Low Surge Voltage

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G02 SERIES

4-WAY, 3-POSITION SPRING CENTERED		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C2		C2B		C2BS		B2	
C24		C24B		C24BS		B3	
C3		C3B		C3BS		B5A	
C4		C4B		C4BS		B6	
C40		C40B		C40BS		B8	
C5		C5B		C5BS		B20	
C5S		C5SB		C5SBS		B21	
C6		C6B		C6BS		4-WAY, 2-POSITION DETENT, END-TO-END	
C60		C60B		C60BS			
C7		C7B		C7BS		D3	
C8		C8B		C8BS		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C8S		C8SB		C8SBS			
C9		C9B		C9BS		B3S	
C92		C92B		C92BS		B5AS	
C9S		C9SB		C9SBS		B6S	
						B8S	
						B20S	
						B21S	
						4-WAY, 2-POSITION NO SPRING, NO DETENT	
						N3	

## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

### SPECIFICATIONS:

Maximum operating pressure	310 BAR (4500 PSI)
Rated flow capacity	63 LPM (16.8 GPM) MAX - Varies by spool type
Maximum tank line back pressure	138 BAR (2000 PSI)
Maximum frequencies of operation	300 CPM
Recommended filtration	25 MICRON
Hydraulic fluids	Mineral Oil, Viscosity 10 - 400 cST
Temperature range	-25° C to +90° C (-13° F to +194° F)

### SOLENOID RATINGS:

ELECTRIC SOURCE	COIL TYPE	VOLTAGE			CURRENT & POWER		WATTAGE
		Hz	SOURCE RATED	RANGE (+10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	
AC (-10 and -20 Options)	A24	60	AC24V	21.6-26.4	6.8	1.7	26
		A110	50	AC100V	90-110	1.60	
	60		AC100V	90-110	1.40	0.32	
			AC110V	99-121	1.50	0.39	
	A120		50	AC110V	99-121	1.30	
		60	AC120V	108-132	1.20	0.27	
	A220	50	AC200V	180-220	0.80	0.23	
			AC200V	180-220	0.70	0.16	
		AC220V	198-242	0.75	0.19		
	A240	50	AC220V	198-242	0.67	0.19	
60		AC240V	216-264	0.59	0.13		
R (-10 and -20 Options)	R110	50	AC100V	90-110	0.30	0.30	
		60	AC110V	99-121	0.30	0.30	
	R220	50	AC200V	180-220	0.15	0.15	
		60	AC220V	198-242	0.15	0.15	
	R240	50	AC220V	180-220	0.14	0.14	
		60	AC240V	216-264	0.14	0.14	
DC (-10 and -20 Options)	D12	DC 12V	10.8-13.2	2.20	2.20		
	D24	DC 24V	21.6-26.4	1.10	1.10		
DC (-31 and -41 Options)	D12	DC 12V	10.8-13.2	2.60	2.60		
	D24	DC 24V	21.6-26.4	1.30	1.30		

### TECHNICAL DATA:

- Solenoid can be used within -10% to +10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100mQ
- Conforms to rating IP65
- A momentary signal of approx 0.1 second is required for shifting action.

### ACCESSORIES:

- Mounting bolt kits are supplied with valve socket head cap screws (#10-24UNCx1-3/4"L 4 pcs) for tightening torque 50-70 kgf-cm (43.3-60.6 lb-in).
- O-Ring AS568-012 4 pcs.

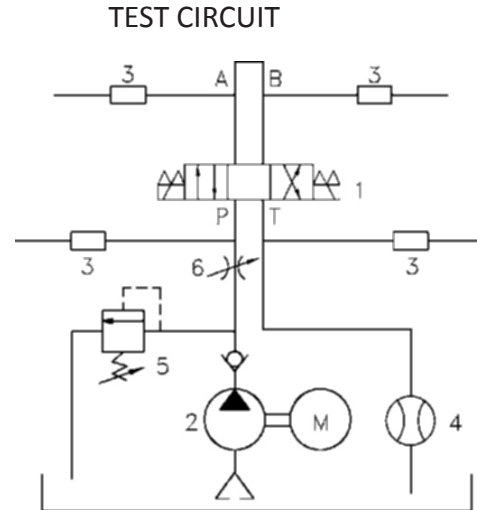
# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

## PRESSURE DROP AND PERFORMANCE CURVES TEST SYSTEMS

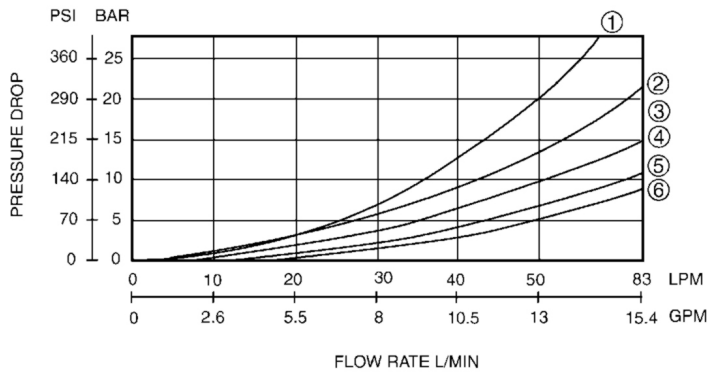
1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
Flow Rate: 63 LPM(16.8GPM)  
Viscosity: 35 cSt (175SSU)



## PERFORMANCE CURVES:



## CONTRAST CHART BETWEEN FACTORS AND VISCOSITIES

VISCOSITY	cSt	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
FACTOR (G)		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

MODEL	PRESSURE DROP CURVE NUMBER				
	NO.	P>A	B>T	P>B	A>T
C2	5	5	5	5	4
C3	6	6	6	6	4
C4	5	6	5	6	4
C40	5	5	5	5	4
C5	2	2	2	2	4
C6	1	1	1	1	4
C60	1	1	1	1	3
C7	6	5	6	5	4
C8	5	5	5	6	4
C9	6	5	5	5	4
D2	5	5	5	5	4
D3	5	3	5	3	4
B2	4	5	4	5	4
B3	3	3	5	5	4
B20	2	—	5	—	4
B2S	4	5	4	5	4
B3S	5	5	3	3	4
B20S	5	—	2	—	4

The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

### LIST OF SPOOL FUNCTIONS:

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI)								
SPOOL TYPE								
NORMAL POSITION	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)
C2	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32 (8.5)	40 (10.7) 40 (10.7)
C3	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)
C4	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32 (8.5)	40 (10.7) 25 (6.7)
C40	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32 (8.5)	40 (10.7) 25 (6.7)
C5	50 (13.3)	50 (13.3)	50 (13.3)	50 (13.3)	50 (13.3)		50 (13.3)	50 (13.3)
C6	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)		40 (10.7)	40 (10.7)
C7	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32 (8.5)	40 (10.7) 25 (6.7)
C8	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32(8.5)	40 (10.7) 25 (6.7)
C9	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7) 32 (8.5)	40 (10.7) 25 (6.7)
B2	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	20(5.3)
B3	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)
B20							35 (9.3)	32 (8.5)
D2	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7)	30 (8.0)
D3	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	40 (10.7)	30 (8.0)

NOTE: 40(10.7) 32(8.5)

1. The figures in the square show the flow under saturated temperature and 90% rated voltage.
2. The upper number in table describes the maximum flow under DC and R. the lower number in table describes the maximum flow under AC.



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G02 SERIES

150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
50 (13.3)	50 (13.3)	50 (13.3)	-	50 (13.3)	50 (13.3)	50 (13.3)	50 (13.3)	50 (13.3)	-
40 (10.7)	40 (10.7)	40 (10.7)	-	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	-
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)	40 (10.7)	40 (10.7)	18 (4.8)	14 (3.7)	10 (2.7)	10 (2.7)
12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)	32 (8.5)	25 (6.7)	12 (3.2)	9 (2.4)	7 (1.9)	7 (1.9)
20 (5.3)	20 (5.3)	20 (5.3)	20 (5.3)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)
63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	63 (16.8)	37 (9.9)	30 (8.0)	28 (7.5)
				45 (12.0)	45 (12.0)	45 (12.0)	45 (12.0)	45 (12.0)	45 (12.0)
25 (6.7)	20 (5.3)	18 (4.8)	15 (4)	63 (16.8)	50 (13.3)	45 (12.0)	40 (10.7)	32 (8.5)	25 (6.7)
				45 (12.0)	30 (8.0)	28 (7.5)	25 (6.7)	22 (5.9)	18 (4.8)
25 (6.7)	21 (5.6)	16 (4.3)	13 (3.5)	40 (10.7)	30 (8.0)	25 (6.7)	21 (5.6)	16 (4.3)	13 (3.5)
25 (6.7)	21 (5.6)	16 (4.3)	13 (3.5)	40 (10.7)	30 (8.0)	25 (6.7)	21 (5.6)	16 (4.3)	13 (3.5)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

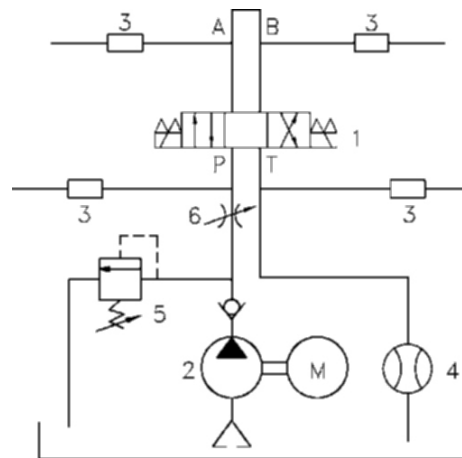
## TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

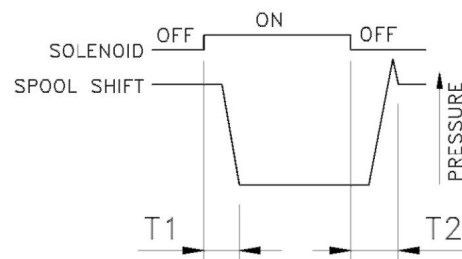
## TEST CONDITIONS

Pressure: 138 BAR (2000PSI)  
 Flow Rate: 30 LPM(8 GPM)  
 Viscosity: 35 cSt(175 SSU)

## TEST CIRCUIT



MODEL	CHANGE OVER TIME (sec)	
	T1	T2
SWH-G02-AC SERIES	0.01-0.04	0.02-0.04
SWH-G02-DC SERIES	0.02-0.06	0.02-0.04



## OPTION LS-

ELECTRICAL SURGE CONTROL MODEL  
 SWH - G02 - \*\*\* - D \*\* - \*\* - LS

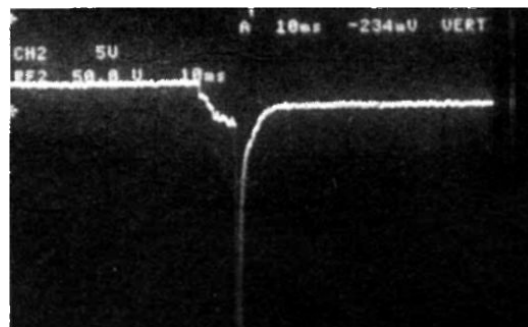
## FEATURES

- Suppresses the surge voltage.
- Eliminates sparks between relay contacts.
- Extends the life of the relay contact.

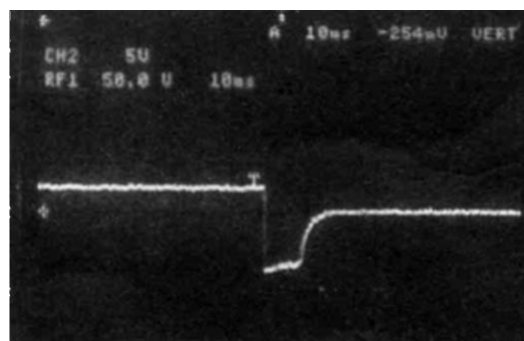
## EFFECTS

- Improves the reliability of the control relay.
- Extends the life of conventional relays.
- Can be operated with a miniature relay.
- The RAC rectifier built-in DC model eliminates sparks at the control relay contact. It can be directly operated with a PLC (programmable logic controller).

## Electrical surge control DC solenoid



## Electrical surge waveform standard DC solenoid

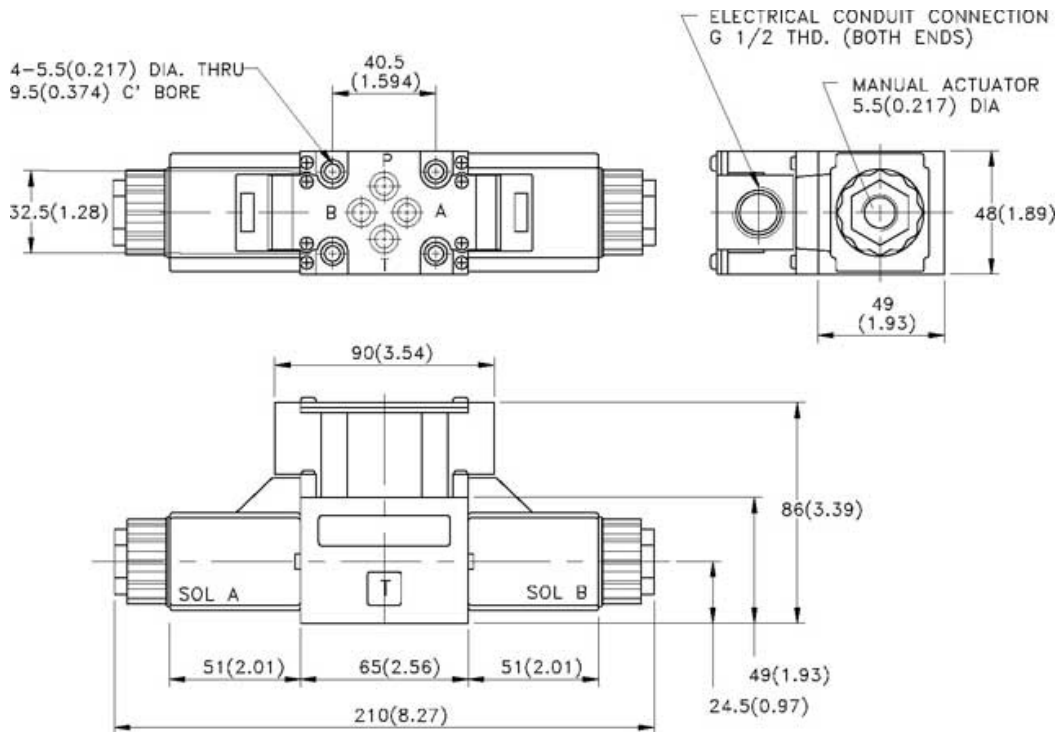


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

## Dimensions

SWH - G02 - C \*\* - \*\*\*\* - 10 - \*\*  
with AC/DC/RF solenoids

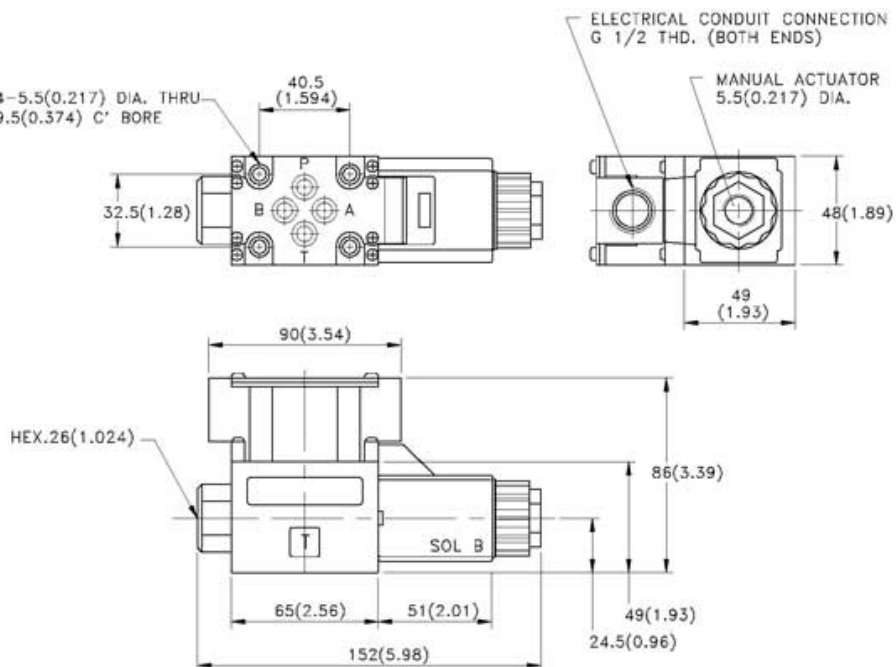
MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch) WEIGHT: 2.0 kgs (4.4 lbs)



## Dimensions

SWH - G02 - B \*\* - \*\*\*\* - 10 - \*\*  
with AC/DC/RF solenoids

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch) WEIGHT: 2.0 kgs (4.4 lbs)

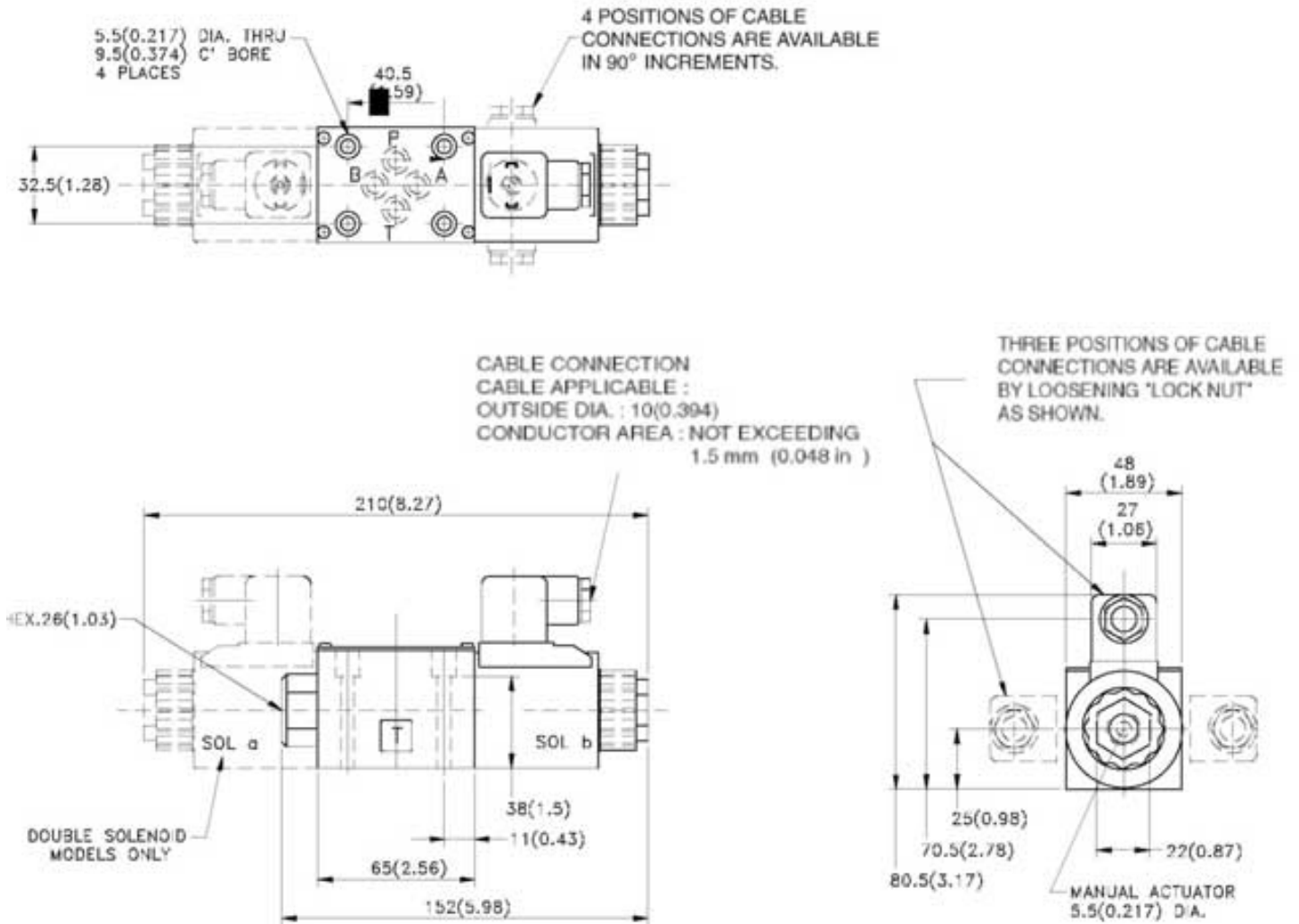


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SWH - G02 - \*\*\* - \*\*\*\* - 20 - \*\*  
with AC/DC/RF solenoids



MODEL	WEIGHT kg(lb)	MODEL	WEIGHT kg(lb)
SWH-G02-C**-A***-10-**-**	1.9(4.18)	SWH-G02-C-A***-20-**-**	1.9(4.18)
SWH-G02-B**-A***-10-**-**	1.6(3.52)	SWH-G02-B-A***-20-**-**	1.5(3.3)
SWH-G02-C**-D/R***-10-**-**	2.0(4.4)	SWH-G02-C-D/R***-20-**-**	2.0(4.4)
SWH-G02-B**-D/R**-10-**-**	1.6(3.52)	SWH-G02-B-D/R***-20-**-**	1.6(3.52)
SWH-G02-D**-A***-10-**-**	1.9(4.18)	SWH-G02-D-A***-20-**-**	1.9(4.18)
SWH-G02-D**-D/R***-10-**-**	1.9(4.18)	SWH-G02-D-D/R***-20-**-**	1.9(4.18)

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G02 SERIES SHOCKLESS TYPE



### FEATURES

- Armature operates in oil system. Impact is cushioned, noise is reduced, solenoid life is increased.
- Wet armature solenoid eliminates pushpin seal, therefore no seal wear, drop or leakage for longer valve life.
- Molded coils for maximum insulating properties, which is impervious to moisture and dirt.
- Plug-in solenoid, for ease of maintenance.
- All spools and bodies are interchangeable, simplifying maintenance.
- Indicating signal lights and bolt kits are standard.
- High pressure, high flow rating, provides low-pressure drop, with maximum performance.
- Specially designed, balanced spool allows proper shifting force, for maximum reliability and long life.
- A specially machined spool minimizes hydraulic shock caused by abrupt change in the flow condition at flow cut off.
- Hydraulic shock caused by abrupt change in the flow condition at flow cut off, is minimized by a specially machined

Model Code -

**SWH – G 02 – C2 – R120 – 10 – M**

1

2

3

4

5

6

7

**1 Series**

**SWH:** High Pressure, High Flow Solenoid Directional Control Valve

**2 Mounting Style**

**G:** Subplate Mounted

**3 Mounting Size**

**02:** Interface 02  
NFA D03 Size / ISO 4401-03 / CETOP 3 / NG 06

**4 Spool Type**

(See Spool Chart)

**5 Coil Voltage**

**R110:** AC 110V, 50/60Hz

**R120:** AC 120V, 50/60Hz

**R220:** AC 220V, 50/60Hz

**R240:** AC 240V, 50/60Hz

**D12:** DC 12V

**D24:** DC 24V

**6 Wiring Type**

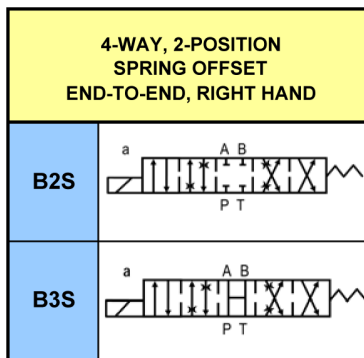
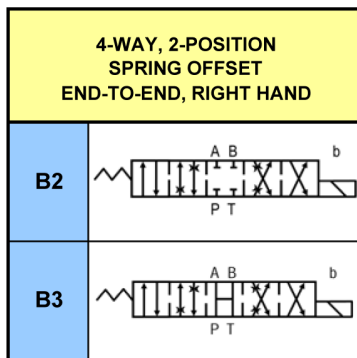
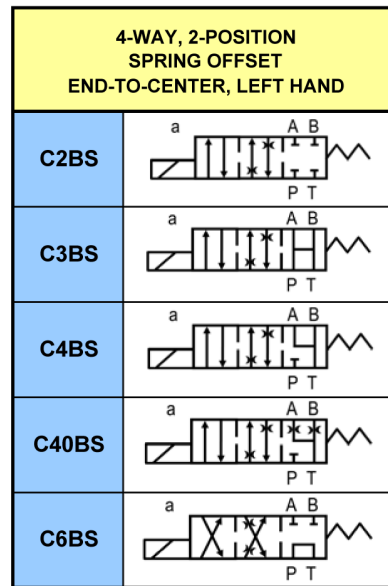
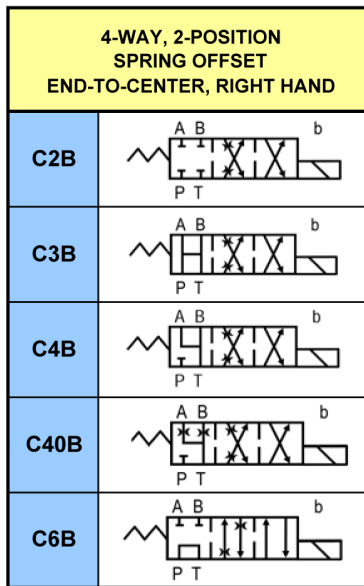
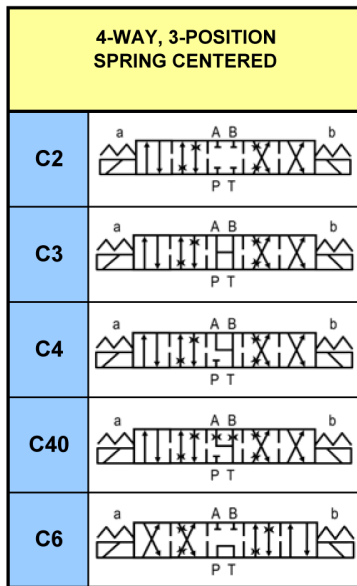
**10:** Junction Box with Indicator Light

**20:** DIN 43650 Connector with Indicator Light

**7 Option**

**M:** Hydraulic Shockless Type

SOLENOID OPERATED DIRECTIONAL VALVE  
 SWH-G02 SERIES SHOCKLESS TYPE



## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES SHOCKLESS TYPE

### SPECIFICATIONS:

Maximum operating pressure	207 BAR (3000 PSI)
Rated flow capacity	40 LPM (10.5 GPM) MAX - Varies by spool type
Maximum tank line back pressure	138 BAR (2000 PSI)
Maximum frequencies of operation	120 CPM
Recommended filtration	25 MICRON
Hydraulic fluids	Mineral Oil, Viscosity 10 - 400 cST
Temperature range	0° C to +55° C (32° F to +131° F)

### SOLENOID RATINGS:

COIL TYPE	VOLTAGE(V)			CURRENT & POWER AT RATED VOLTAGE		
	SOURCE RATED	Hz	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	WATTAGE
R110	AC110V	50	99-121	0.30	0.30	26
	AC110V	60				
R220	AC220V	50	198-242	0.15	0.15	
	AC220V	60				
D12	DC 12V		10.8-13.2	2.20	2.20	
D24	DC 24V		21.6-26.4	1.10	1.10	

### TECHNICAL DATA:

- Solenoid can be used within -10% to +10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100mQ
- Conforms to rating IP65
- A momentary signal of approx 0.1 second is required for shifting action.

### ACCESSORIES:

- Mounting bolt kits are supplied with valve socket head cap screws (#10-24UNCx1-3/4"L 4 pcs)  
for tightening torque 50-70 kgf-cm (43.3-60.6 lb-in).
- O-Ring AS568-012 4 pcs.

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES SHOCKLESS TYPE

## PRESSURE DROP AND PERFORMANCE CURVES

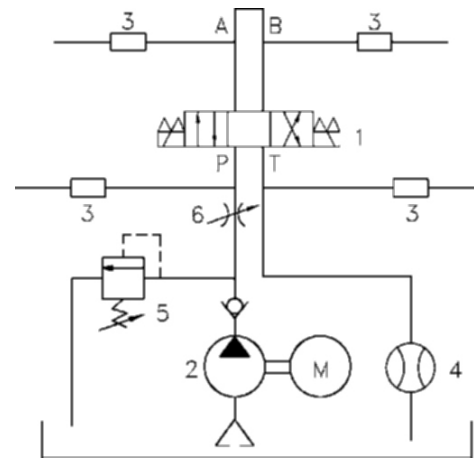
### TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

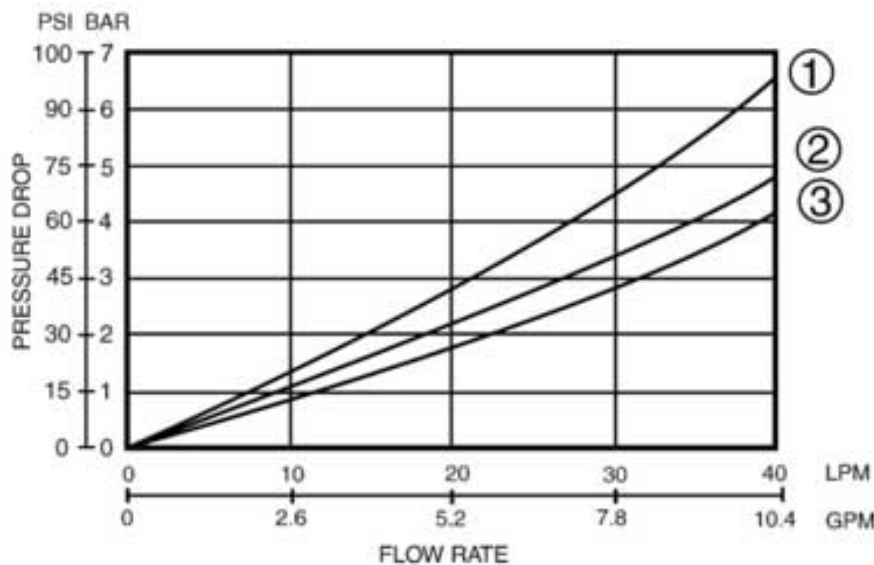
### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
 Flow Rate: 40 LPM(10.5GPM)  
 Viscosity: 35 cSt (175SSU)

### TEST CIRCUIT



### PERFORMANCE CURVES



The pressure drop ( $AP'$ ) can be obtained from the formula  $AP' = AP (G'/0.85)$  for other specific gravity ( $G'$ ).

SPOOL TYPE	PRESSURE DROP CURVE			
	P - A	B - T	P - B	A - T
C2	2	2	2	2
C4	2	3	2	3
B3	1	1	2	2

### CONTRAST CHART BETWEEN FACTORS AND VISCOSITIES

VISCOSITY	CST	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
FACTOR ( $G'$ )		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30



# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES SHOCKLESS TYPE

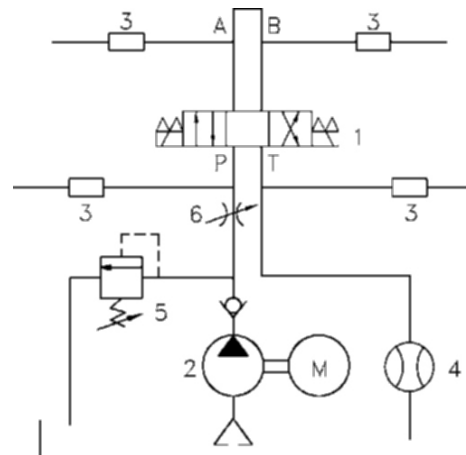
## TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

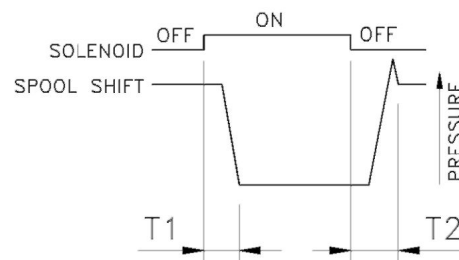
## TEST CONDITIONS

Pressure: 138 BAR (2000PSI)  
 Flow Rate: 30 LPM(8 GPM)  
 Viscosity: 35 cSt(175 SSU)

TEST CIRCUIT



MODEL	CHANGE OVER TIME (sec)	
	T1	T2
SWH-G02-RF-M SERIES	0.10-0.15	0.10-0.15
SWH-G02-DC-M SERIES	0.10-0.15	0.10-0.15



## LIST OF SPOOL FUNCTIONS

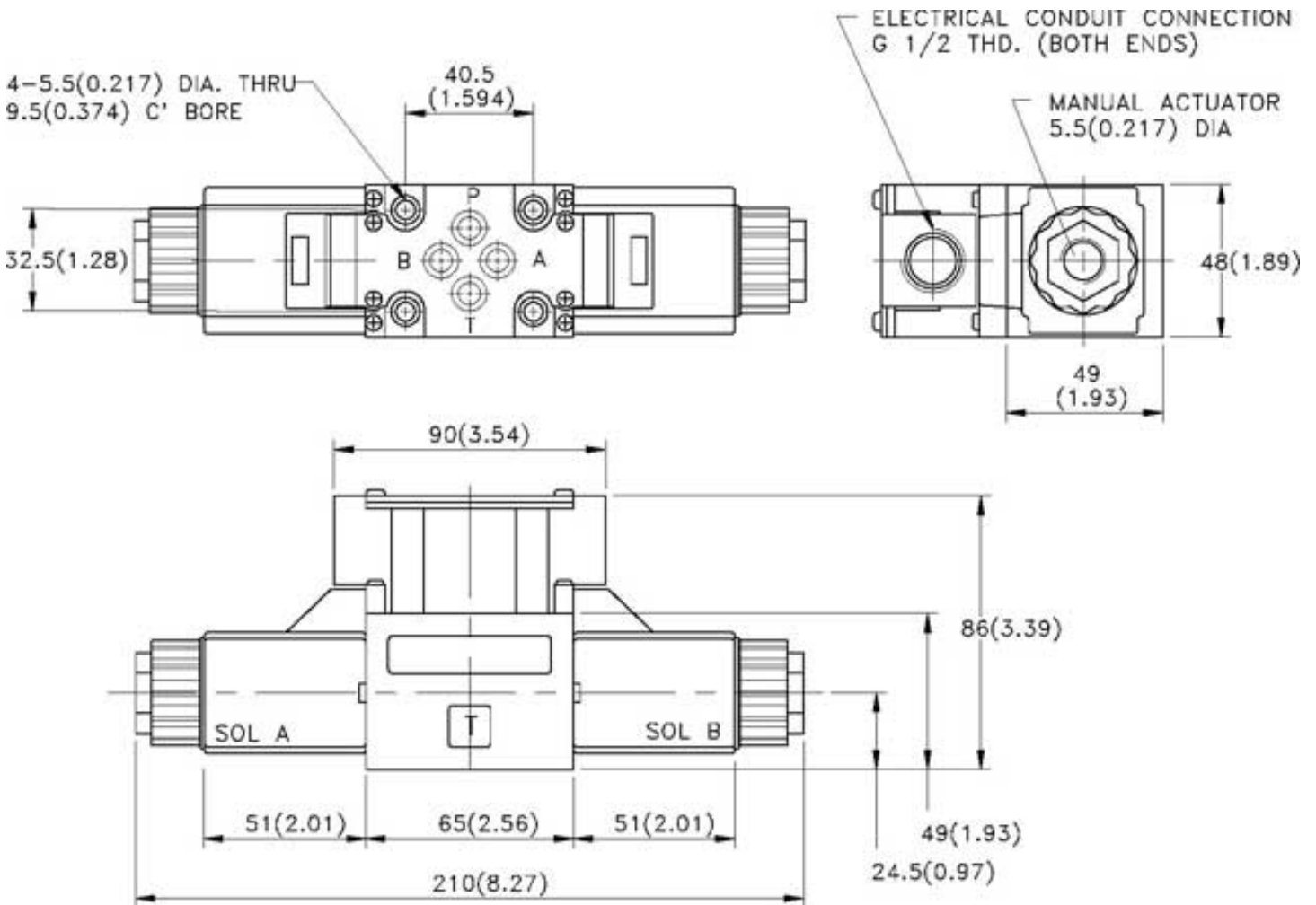
THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI)												
SPOOL TYPE NORMAL POSITION	50 BAR (735 PSI)	100 BAR (1470 PSI)	140 BAR (2000 PSI)	210 BAR (3000 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	140 BAR (2000 PSI)	210 BAR (3000 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	140 BAR (2000 PSI)	210 BAR (3000 PSI)
	C2	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	30 (8.0)	22 (5.9)	16 (4.3)	10 (2.7)	30 (8)	22 (5.9)	16 (4.3)
C4	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	30 (8.0)	22 (5.9)	16 (4.3)	10 (2.7)	30 (8)	22 (5.9)	16 (4.3)	10 (2.7)
B3	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)	40 (10.7)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES SHOCKLESS TYPE

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch) WEIGHT: 2.0 kgs (4.4 lbs)

SWH - G02 - C \*\* - \*\*\*\* - 10 - \*\* - M  
with AC/DC/RF solenoids

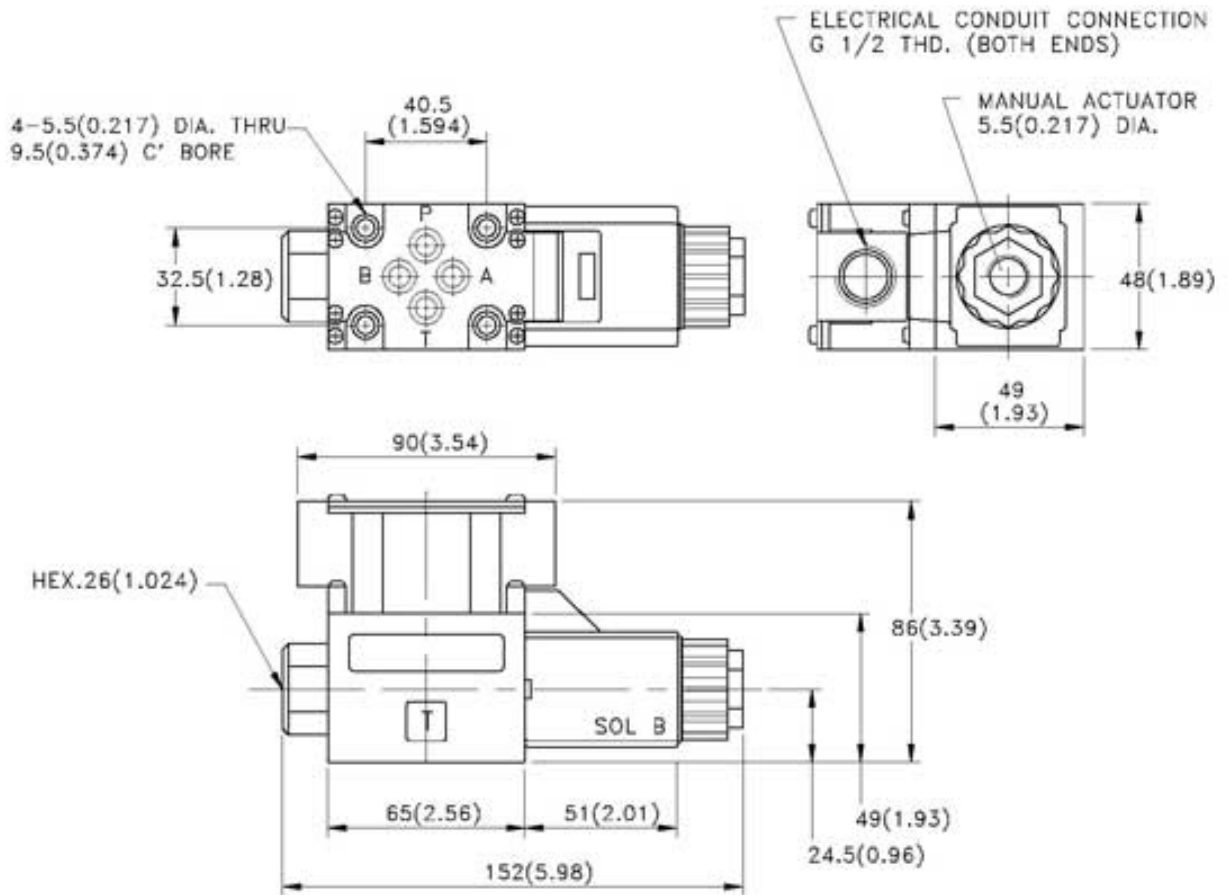


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G02 SERIES SHOCKLESS TYPE

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch) WEIGHT: 2.0 kgs (4.4 lbs)

SWH - G02 - B \*\* - \*\*\*\* - 10 - \*\* - M  
with AC/DC/RF solenoids



Model	Weight KGS(LBS)
SWH-G02-B- A***-20-** - M	1.5(3.3)
SWH-G02-C - D/R ***20-** - M	2.0(4.4)
SWH-G02-B - D/R ***-20- ** - M	1.6(3.52)
SWH-G02-D- A ***-20- ** - M	1.9(4.18)
SWH-G02-D - D/R *** -20-** - M	1.9(4.18)

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G03 SERIES



### FEATURES

- Indicating lights and bolt kits are standard.
- Coil screws are especially designed to prevent shocks.
- Electrical connections are joint box type or Hirschman DIN type plug-in connector.
- Joint box is waterproof and dust-resistance.
- Space for electrical connections is large enough for connection layout.
- Electrical connection points are aligned with the axial direction to be compatible with modular system.
- The valve mounting screws are on the outside of the body for ease of installation and repair.
- High pressure up to 310 BAR (4500 PSI), allows for large flow rates up to 120 LPM (32 GPM).
- Ideal design of flow passages to minimize pressure drop.
- High back pressure up to 160 BAR (2350 PSI)
- Manufactured with specifications that allows for parts and accessories interchangeability.

### Model Code

**SWH – G 03 – C2 – A120 – 10 – LS**

1      2   3      4      5      6      7

#### 1 Series

**SWH:** High Pressure, High Flow Solenoid Directional Control Valve

#### 2 Mounting Style

**G:** Subplate Mounted

#### 3 Mounting Size

**03:** Interface 03  
NFFA D05 Size / ISO 4401-05 / CETOP 5 / NG 10

#### 4 Spool Type

(See Spool Chart)

#### 5 Coil Voltage

**A24:** AC 24V, 60Hz  
**A110:** AC 110V, 60HZ; AC 100V, 50Hz  
**A120:** AC 120V, 60HZ; AC 110V, 50Hz  
**A220:** AC 220V, 60HZ; AC 200V, 50Hz  
**A240:** AC 240V, 60HZ; AC 220V, 50Hz  
**R110:** AC 110V, 50/60Hz  
**R120:** AC 120V, 50/60Hz  
**R220:** AC 220V, 50/60Hz  
**R240:** AC 240V, 50/60Hz  
**D12:** DC 12V  
**D24 :** DC 24V

#### 6 Wiring Type

**10:** Junction Box with Indicator Light  
**20:** DIN 43650 Connector with Indicator Light  
**31:** Lead Wire (DC Only)  
**41:** Dual Spade (DC Only) SAE J858A)

#### 7 Option

**No Code:** Standard  
**LS:** Low Surge Voltage

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G03 SERIES

4-WAY, 3-POSITION SPRING CENTERED		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C2		C2B		C2BS		B2	
C3		C3B		C3BS		B3	
C4		C4B		C4BS		B7	
C40		C40B		C40BS		B20	
C5		C5B		C5BS		B21	
C5S		C5SB		C5SBS		B22	
C6		C6B		C6BS		<b>4-WAY, 2-POSITION DETENT, END-TO-END</b>	
C60		C60B		C60BS			
C7		C7B		C7BS		D3	
C8		C8B		C8BS		<b>4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND</b>	
C80		C80B		C80BS			
C8S		C8SB		C8SBS		B3S	
C9		C9B		C9BS		B7S	
C90		C90B		C90BS		B20S	
C91		C91B		C91BS		B21S	
C9S		C9SB		C9SBS		B22S	
<b>4-WAY, 2-POSITION NO SPRING, NO DETENT</b>							

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G03 SERIES

### SPECIFICATIONS

Maximum operating pressure	310 BAR (4500 PSI)
Maximum flow capacity	120 LPM (32 GPM)
Maximum tank line back pressure	160 BAR (2350 PSI)
Maximum frequencies of operation	240 CPM
Recommended filtration	25 MICRON
Hydraulic fluids	Mineral Oil, Viscosity 10 - 400 Cst
Temperature range	-25° C to +90° C (-13° F to +194° F)

### SOLENOID RATINGS

ELECTRIC	COIL	VOLTAGE (V)			CURRENT & POWER		WATTAGE
		Hz	SOURCE RATED	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	
AC	A110	50	AC100V	90-110	4.79	0.86	42
		60	AC100V	90-110	3.71	0.62	
			AC110V	99-121	4.20	0.74	
	A120	50	AC110V	99-121	4.29	0.78	
		60	AC120V	108-132	3.99	0.70	
	A220	50	AC200V	180-220	2.31	0.42	
			AC200V	180-220	1.87	0.31	
		60	AC220V	198-252	2.05	0.36	
	A240	50	AC220V	198-242	2.04	0.37	
		60	AC240V	216-264	1.88	0.33	
	R110	50	AC100V	90-110	0.47	0.47	
		60	AC110V	99-121	0.47	0.47	
	R220	50	AC200V	180-220	0.24	0.24	
		60	AC220V	198-252	0.24	0.24	
DC	D12	DC 12V		10.8-13.2	2.58	2.58	32
	D24	DC 24V		21.6-26.4	1.33	1.33	

### TECHNICAL DATA

- Solenoid can be used within - 10% to + 10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100MQ.

### ACCESSORIES

- Mounting bolt kits are supplied with valve socket head cap screws M6x35L 4 pcs (1/4"-20UNCx1-3/8" 4 pcs) for tightening torque 120-150 kgf-cm (104-130 lbs-in).
- O-Ring AS568-014 5 pcs.

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

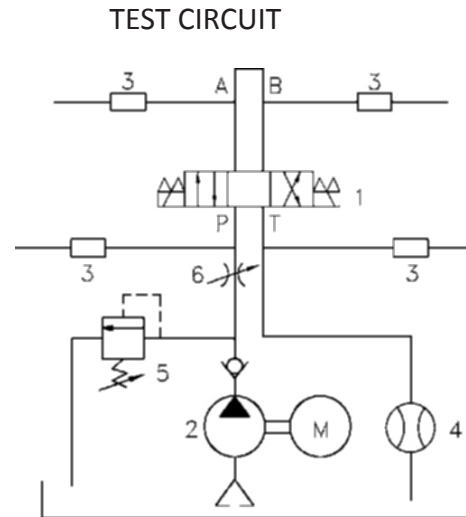
## PRESSURE DROP AND PERFORMANCE CURVES

### TEST SYSTEMS

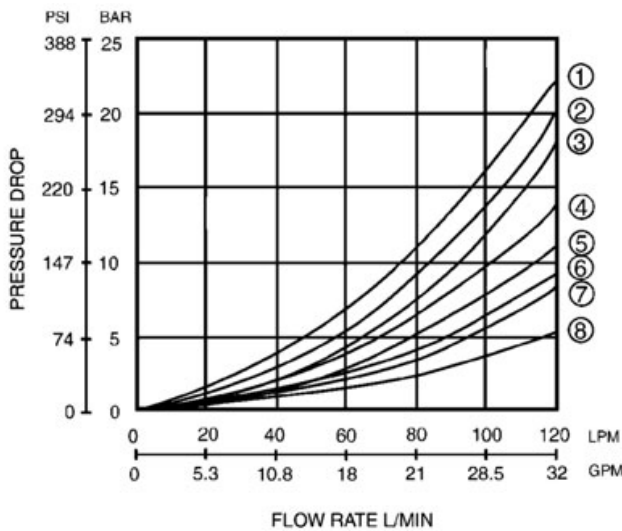
1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
Flow Rate: 140 LPM(37 GPM)  
Viscosity: 35 cSt (175SSU)



## PERFORMANCE CURVES



MODEL NO.	P-A	B-T	P-B	A-T	P-T
C2	6	6	6	6	-
C3	7	7	7	7	5
C4	6	7	6	7	-
C40	6	7	6	7	-
C5	5	2	2	5	8
C6	2	2	2	2	5
C60	1	1	1	1	4
C7	7	6	7	6	-
C8	6	6	6	7	-
C9	7	6	6	6	-
B2	2	2	6	6	-
B3	3	3	6	6	-
B20	5	-	5	-	-
B2S	6	6	2	2	-
B3S	6	6	3	3	-
B20S	5	-	5	-	-

## CONTRAST CHART BETWEEN FACTORS AND VISCOSITIES

VISCOSITY	cSt	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
FACTOR (G')		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 AC TYPE								
SPOOL TYPE NORMAL POSITION								
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)
C2	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	54(14.3) 38(10.0)
C3	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)
C4	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	54(14.3) 42(11.1)
C40	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4) 75(19.8)
C5	88(23.2)	88(23.2)	88(23.2)	88(23.2)	88(23.2)	-	100(26.4)	100(26.4)
	82(21.7)	82(21.7)	82(21.7)	82(21.7)	82(21.7)			
C6	84(22.2)	84(22.2)	84(22.2)	84(22.2)	84(22.2)	-	100(26.4)	100(26.4)
	75(19.8)	75(19.8)	75(19.8)	75(19.8)	75(19.8)		95(25.1)	95(25.1)
C7	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	63(16.6)	63(16.6)
C8	100(26.4)	100(26.4)	100(26.4)	44(11.6)	30(7.9)	19(5.0)	100(26.4)	100(26.4)
			76(20.1)	28(7.4)	21(5.5)	14(3.7)		53(14)
C9	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	57(15.1)	57(15.1)
B2	90(23.8)	90(23.8)	90(23.8)	90(23.8)	90(23.8)	90(23.8)	63(16.6)	63(16.6)
	72(19.0)	72(19.0)	72(19.0)	72(19.0)	72(19.0)	72(19.0)		
B3	89(23.5)	89(23.5)	89(23.5)	89(23.5)	89(23.5)	89(23.5)	100(26.4)	100(26.4)
	81(21.4)	81(21.4)	81(21.4)	81(21.4)	81(21.4)	81(21.4)		
B20	-	-	-	-	-	-	81(21.4)	29(7.7)
D2	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	60(15.9)	40(10.6)
D3	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	70(18.5)	60(15.9)

- NOTE:** 1.The figures in the square shows the parameter among voltage & flow under saturated temperature and 90% applied voltage.  
2.The upper number in table describes the maximum flow under 100%.  
3.The lower number in table describes the maximum flow under saturated temperature and 90% applied voltage.



## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 AC TYPE										
SPOOL TYPE NORMAL POSITION										
	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
C2	40(10.6)	28(7.4)	25(6.6)	20(5.3)	100(26.4)	54(14.3)	40(10.6)	28(7.4)	25(6.6)	20(5.3)
	27(7.1)	17(4.5)	13(3.4)	10(2.6)		38(10.0)	27(7.1)	17(4.5)	13(3.4)	10(2.6)
C3	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)
C4	30(7.9)	23(6.1)	18(4.8)	14(3.7)	100(26.4)	54(14.3)	30(7.9)	23(6.1)	18(4.8)	14(3.7)
	27(7.1)	16(4.2)	11(2.9)	8(2.1)		42(11.1)	27(7.1)	16(4.2)	11(2.9)	8(2.1)
C40	33(8.7)	28(7.4)	22(5.8)	18(4.8)	100(26.4)	100(26.4)	33(8.7)	28(7.4)	22(5.8)	18(4.8)
	23(6.1)	21(5.5)	15(4)	12(3.2)		75(19.8)	23(6.1)	21(5.5)	15(4)	12(3.2)
C5	100(26.4)	100(26.4)	100(26.4)	-	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)
C6	100(26.4)	100(26.4)	100(26.4)	-	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	-
	95(25.1)	95(25.1)	95(25.1)		95(25.1)	95(25.1)	95(25.1)	95(25.1)	95(25.1)	
C7	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)	63(16.6)
C8	37(9.8)	34(9.0)	28(7.4)	20(5.3)	100(26.4)	61(16.1)	33(8.7)	27(7.1)	20(5.3)	16(4.2)
	32(8.5)	28(7.4)	21(5.5)	15(4)		48(12.7)	27(7.1)	21(5.5)	15(4)	9(2.4)
C9	57(15.1)	57(15.1)	57(15.1)	57(15.1)	100(26.4)	53(14)	47(12.4)	45(11.9)	40(10.6)	34(9.0)
						40(10.6)	37(9.8)	34(9.0)	29(7.7)	25(6.6)
B2	63(16.6)	63(16.6)	63(16.6)	63(16.6)	100(26.4)	78(20.6)	45(11.9)	43(11.4)	38(10.0)	32(8.5)
						74(19.6)	38(10.0)	36(9.5)	31(8.2)	27(7.1)
B3	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	95(25.1)	82(21.7)	75(19.8)	65(17.2)
						89(23.5)	84(22.2)	77(20.3)	70(18.5)	62(16.4)
B20	19(5.0)	12(3.2)	9(2.4)	7(1.8)	100(26.4)	80(21.1)	32(8.5)	25(6.6)	20(5.3)	14(3.7)
						42(11.1)	28(7.4)	22(5.8)	17(4.5)	12(3.2)
D2	40(10.6)	40(10.6)	30(7.9)	28(7.4)	60(15.9)	40(10.6)	40(10.6)	40(10.6)	30(7.9)	28(7.4)
D3	60(15.9)	60(15.9)	42(11.1)	36(9.5)	70(18.5)	60(15.9)	60(15.9)	60(15.9)	42(11.1)	36(9.5)

## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 DC TYPE								
SPOOL TYPE NORMAL POSITION							50 BAR (735 PSI)	100 BAR (1470 PSI)
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)		
C2	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7) 100(26.4)
C3	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)
C4	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7) 100(26.4)
C40	120(31.7)	120(31.7)	120(31.7)	97(25.6)	78(20.6)	60(15.9)	120(31.7)	120(31.7)
			100(26.4)	75(19.8)	54(14.3)	41(10.8)		115(30.4)
C5	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)
C6	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)
C7	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	65(17.2)	65(17.2)
C8	120(31.7)	120(31.7)	120(31.7)	97(25.6)	78(20.6)	66(17.4)	120(31.7)	120(31.7)
			100(26.4)	85(22.5)	54(14.3)	41(10.8)		
C9	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	65(17.2)	65(17.2)
B2	95(25.1)	95(25.1)	95(25.1)	95(25.1)	95(25.1)	95(25.10)	69(18.2)	69(18.2)
B3	89(23.5)	89(23.5)	89(23.5)	89(23.5)	89(23.5)	89(23.5)	120(31.7)	120(31.7)
B20	-	-	-	-	-	-	85(22.5)	35(9.2)
D2	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	60(15.9)	40(10.6)
D3	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	70(18.5)	60(15.9)

## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 DC TYPE										
SPOOL TYPE NORMAL POSITION										
	150 bar (2200 psi)	207 bar (3000 psi)	250 bar (3675 psi)	310 bar (4500 psi)	50 bar (735 psi)	100 bar (1470 psi)	150 bar (2200 psi)	207 bar (3000 psi)	250 bar (3675 psi)	310 bar (4500 psi)
C2	73(19.3)	63(16.6)	54(14.3)	37(9.8)	120(31.7)	120(31.7)	73(19.3)	63(16.6)	54(14.3)	37(9.8)
	55(14.5)	48(12.7)	38(10.0)	29(7.7)		100(26.4)	55(14.5)	48(12.7)	38(10.0)	29(7.7)
C3	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)	120(31.7)
C4	90(23.8)	73(19.3)	60(15.9)	47(12.4)	120(31.7)	120(31.7)	90(23.8)	73(19.3)	60(15.9)	47(12.4)
	78(20.6)	64(16.9)	51(13.5)	39(10.3)		100(26.4)	78(20.6)	64(16.9)	51(13.5)	39(10.3)
C40	75(19.8)	54(14.3)	42(11.1)	37(9.8)	120(31.7)	120(31.7)	75(19.8)	54(14.3)	42(11.1)	37(9.8)
	50(13.2)	39(10.3)	30(7.9)	21(5.5)		115(30.4)	50(13.2)	39(10.3)	30(7.9)	21(5.5)
C5	100(26.4)	100(26.4)	100(26.4)	-	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	-
C6	100(26.4)	100(26.4)	100(26.4)	-	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	-
C7	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)	65(17.2)
C8	68(18.0)	51(13.5)	37(9.8)	27(7.1)	120(31.7)	85(22.5)	50(13.2)	36(9.5)	25(6.6)	19(5.0)
	52(13.7)	39(10.3)	28(7.4)	18(4.8)		65(17.2)	40(10.6)	28(7.4)	15(4)	12(3.2)
C9	65(17.2)	65(17.2)	65(17.2)	65(17.2)	120(31.7)	100(26.4)	94(24.8)	85(22.5)	76(20.1)	70(18.5)
						85(22.5)	80(21.1)	74(19.6)	54(14.3)	49(12.9)
B2	69(18.2)	69(18.2)	69(18.2)	69(18.2)	120(31.7)	120(31.7)	77(20.3)	63(16.6)	57(15.1)	45(11.9)
							66(17.4)	55(14.5)	44(11.6)	38(10.0)
B3	120(31.7)	120(31.7)	120(31.7)	120(31.7)	100(26.4)	100(26.4)	95(25.1)	82(21.7)	75(19.8)	65(17.2)
						89(23.5)	84(22.2)	77(20.3)	70(18.5)	62(16.4)
B20	28(7.4)	19(5.0)	15(4)	10(2.6)	120(31.7)	120(31.7)	95(25.1)	74(19.6)	61(16.1)	43(11.4)
						95(25.1)	84(22.2)	63(16.6)	50(13.2)	34(9.0)
D2	40(10.6)	40(10.6)	30(7.9)	28(7.4)	60(15.9)	40(10.6)	40(10.6)	40(10.6)	30(7.9)	28(7.4)
D3	60(15.9)	60(15.9)	42(11.1)	36(9.5)	70(18.5)	60(15.9)	60(15.9)	60(15.9)	42(11.1)	36(9.5)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

## TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

## TEST CONDITIONS

Pressure: 138 BAR (2000PSI)  
Flow Rate: 30 LPM(8 GPM)  
Viscosity: 35 cSt(175 SSU)

MODEL	CHANGE OVER TIME (sec)	
	T1	T2
SWH-G03-AC SERIES	0.02	0.02
SWH-G03-DC SERIES	0.07	0.07

## OPTION LS

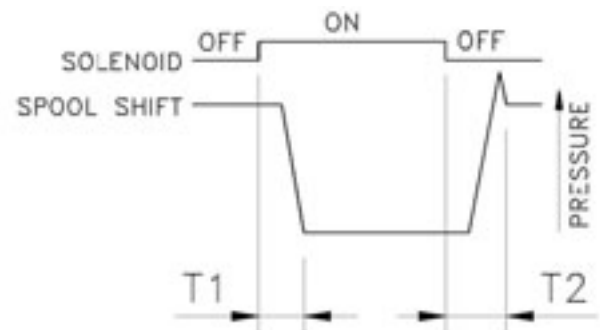
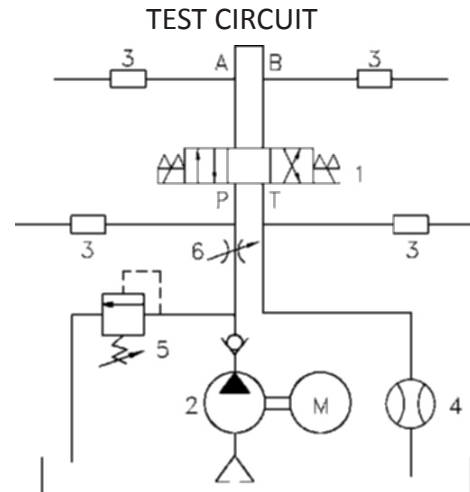
ELECTRICAL SURGE CONTROL MODEL SWH - G03 -  
\*\*\* - D \*\* - \*\* - LS

## FEATURES

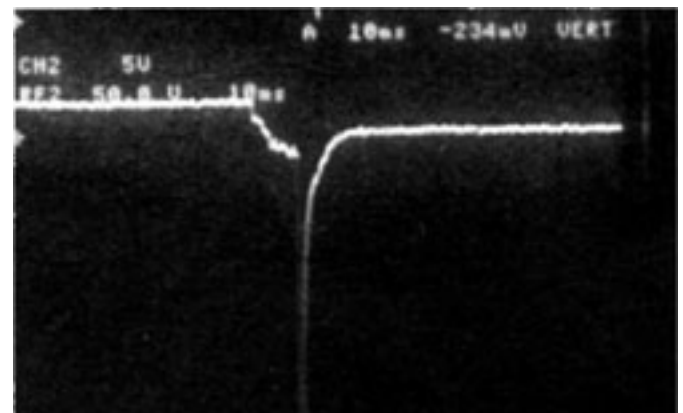
- Suppresses the surge voltage.
- Eliminates sparks between relay contacts.
- Extends the life of the relay contact.

## EFFECTS

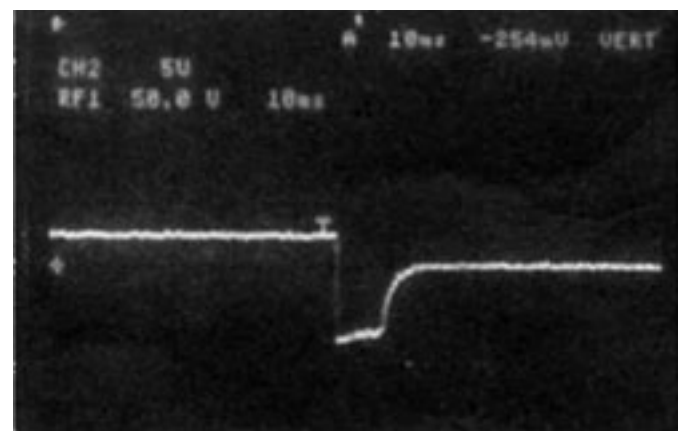
- Improves the reliability of the control relay.
- Extends the life of conventional relays.
- Can be operated with a miniature relay.
- The RAC rectifier built-in DC model eliminates sparks at the control relay contact. It can be directly operated with a PLC (programmable logic controller).



Electrical surge waveform standard DC solenoid



Electrical surge control DC solenoid

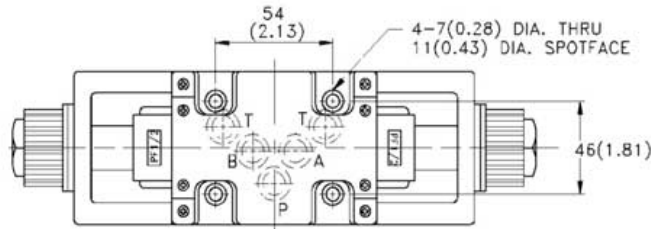


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

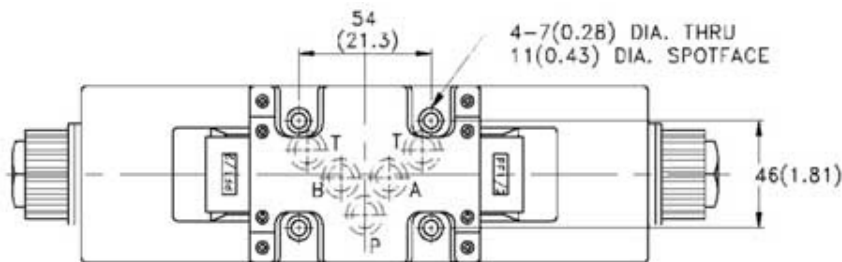
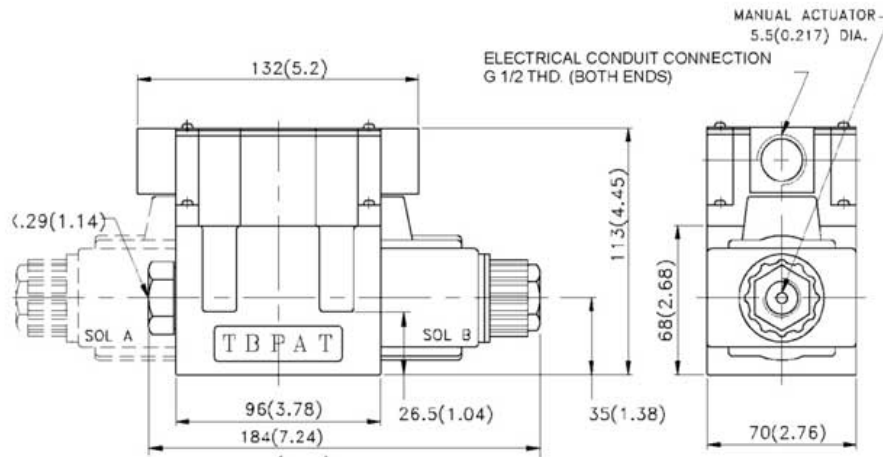
## Dimensions

SWH - G03 - A \*\* - \*\*\*\* - 10 - \*\*  
with AC/DC/RF solenoids

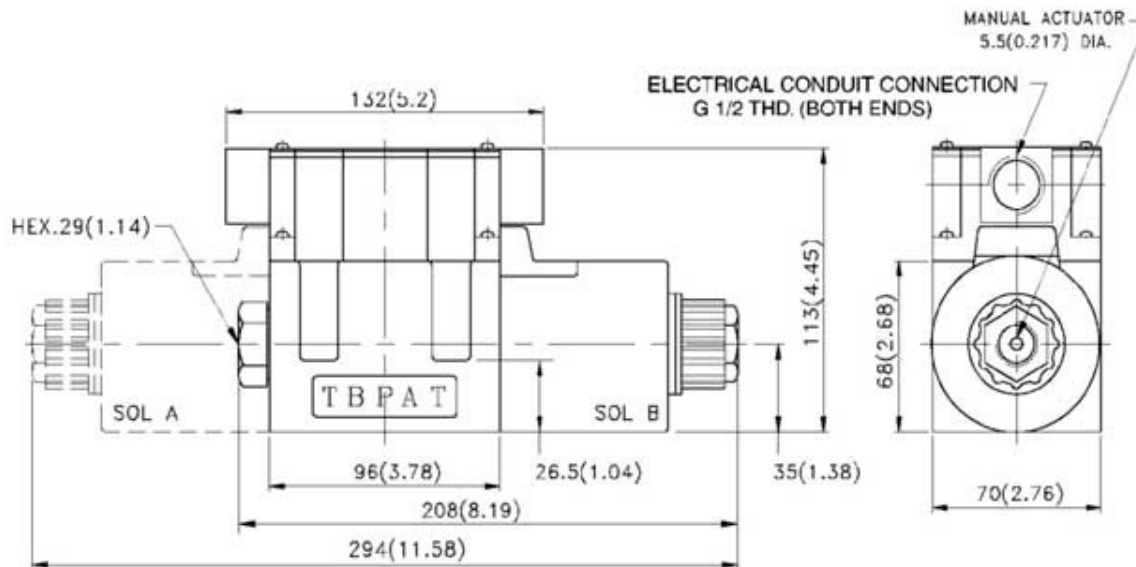
MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



MODEL	WEIGHT KGS (LBS)
SWH-G03-C**-A***	4.1(9.02)
SWH-G03-B**-A***-	3.4(7.48)



MODEL	WEIGHT KGS (LBS)
SWH-G03-C**-D**	5.5(12.1)
SWH-G03-C**-R***	
SWH-G03-B**-D**	4(9.68)
SWH-G03-B**-R***	



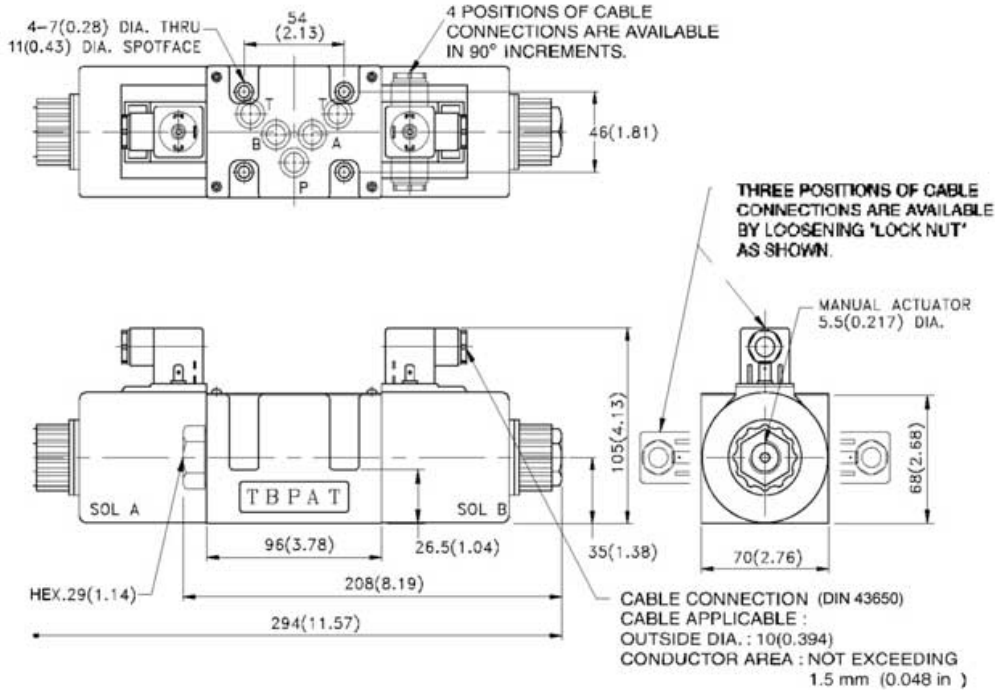
# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SWH - G03 - \*\*\* - \*\*\*\* - 20 - \*\*  
with AC solenoids

MODEL	WEIGHT KGS (LBS)
SWH-G03 -C**-A***	4.1(9.02)
SWH-G03 -B**-A***	3.4(7.48)

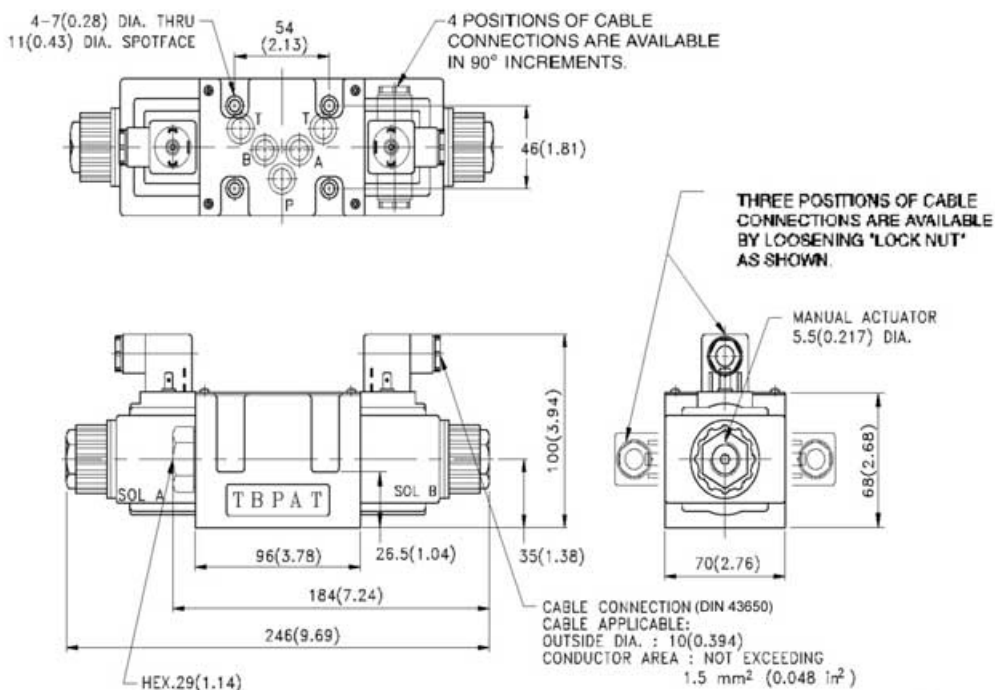


## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SWH - G03 - \*\*\* - \*\*\*\* - 20 - \*\*  
with DC,RF solenoids

MODEL	WEIGHT KGS (LBS)
SWH-G03-C**-D **	5.5(12.1)
SWH-G03-C**-R ***	
SWH-G03-B**-D **	4(9.68)
SWH-G03-B**-R ***	



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G03 SERIES SHOCKLESS TYPE



### FEATURES

- Indicating lights and bolt kits are standard.
- Coil screws are especially designed to prevent shocks.
- Electrical connections are joint box type or Hirschman DIN type plug-in connector.
- Joint box is waterproof and dust-resistance.
- The space for electrical connections is large enough for connection layout.
- Electrical connection points are aligned with the axial direction to be compatible with modular system.
- The valve mounting screws are on the outside of the body for ease of installation and repair.
- High pressure up to 310 BAR (4500 PSI), large flow rates up to 80 LPM (21 GPM).
- The ideal design of flow passages to minimize pressure drop.
- High back pressure up to 160 BAR (2350 PSI)
- Manufactured with specifications that allows for parts and accessories interchangeability.
- Specifically designed to control the shock or "bang" in hydraulic systems.
- Minimizes the effect of pressure peaks or instantaneous high flow rates common in many hydraulic systems.

### Model Code

**SWH – G 03 – C2 – R120 – 10 – M**

1      2   3      4      5      6      7

**1 Series**

**SWH:** High Pressure, High Flow Solenoid Directional Control Valve

**2 Mounting Style**

**G:** Subplate Mounted

**3 Mounting Size**

**03:** Interface 03  
NFFA D05 Size / ISO 4401-05  
/CETOP 5 / NG 10

**4 Spool Type**

(See Spool Chart)

**5 Coil Voltage**

**R110:** AC110V, 50/60Hz

**R120:** AC120V, 50/60Hz

**R220:** AC220V, 50/60Hz

**R240:** AC240V, 50/60Hz

**D12:** DC12V

**D24:** DC24V

**6 Wiring Type**

**10:** Junction Box with Indicator Light

**20:** DIN 43650 Connector with Indicator Light

**7 Option**

**M:** Hydraulic Shockless Type

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G03 SERIES SHOCKLESS TYPE

4-WAY, 3-POSITION SPRING CENTERED	
C2	
C3	
C3I	
C4	
C40	
C5	
C6	

4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND	
C2B	
C3B	
C3IB	
C4B	
C40B	
C5B	
C6B	

4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND	
C2BS	
C3BS	
C3IBS	
C4BS	
C40BS	
C5BS	
C6BS	

4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
B2	
B3	

4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
B2S	
B3S	



## SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES SHOCKLESS TYPE

### SPECIFICATIONS

Maximum operating pressure	207BAR (3000 PSI)
Maximum flow capacity	80 LPM (21 GPM) MAX. - Varies by spool type
Maximum tank line back pressure	160 BAR (2350 PSI)
Maximum frequencies of operation	240 CPM
Recommended filtration	25 MICRON
Hydraulic fluids	Mineral Oil, Viscosity 10 - 400 cST
Temperature range	0° C to +55° C (32° F to +131° F)

### SOLENOID RATINGS

ELECTRIC SOURCE	COIL TYPE	VOLTAGE(V)			CURRENT & POWER AT RATED VOLTAGE		
		SOURCE RATED	Hz	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	WATTAGE
RF	R110	AC110V	50	99-126	0.47	0.47	46
		AC110V	60				
	R220	AC220V	60	198-253	0.24	0.24	
		AC220V	50				
DC	D12	DC 12V		10.8-13.2	2.58	2.58	32
	D24	DC 24V		21.6-26.4	1.33	1.33	

### TECHNICAL DATA

- Solenoid can be used within - 10% to + 10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100MQ.

### ACCESSORIES

- Mounting bolt kits are supplied with valve socket head cap screws M6x35L 4 pcs (1/4"-20UNCx1-3/8" 4 pcs) for tightening torque 120-150 kgf-cm (104-130 lbs-in).
- O-Ring AS568-014 5 pcs.

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES SHOCKLESS TYPE

## PRESSURE DROP AND PERFORMANCE CURVES

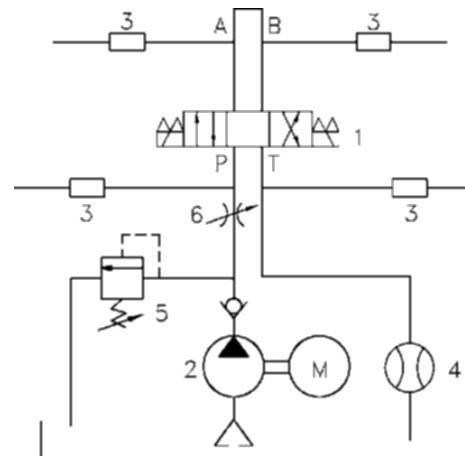
### TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

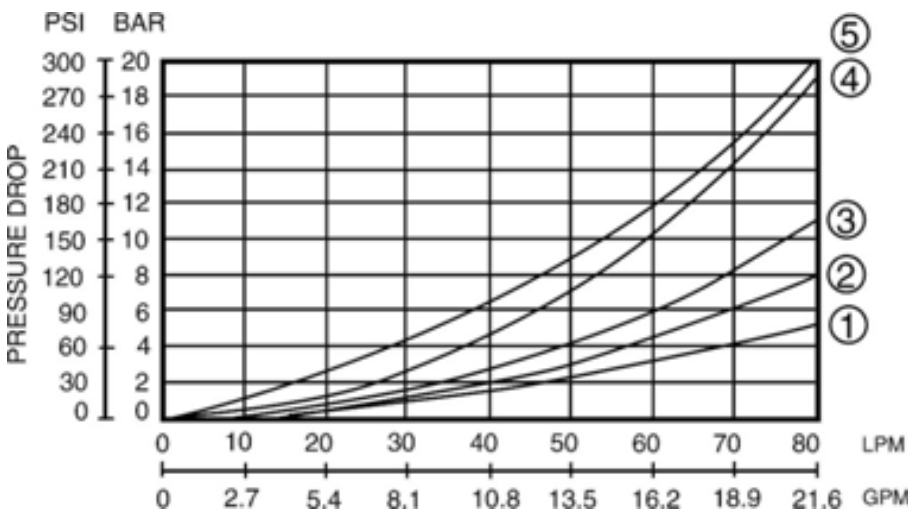
### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
Flow Rate: 80 LPM(21 GPM)  
Viscosity: 35 cSt (175SSU)

### TEST CIRCUIT



### PERFORMANCE CURVES



SPOOL TYPE	Pressure Drop Curve Number				
	P-A	B-T	P-B	A-T	P-T
C2	1	1	1	1	-
C3	5	5	5	5	2
C4	1	1	1	1	-
C6	4	4	4	4	3
B2	2	2	2	2	-
B3	2	2	2	2	-

### CONTRAST CHART BETWEEN FACTORS AND VISCOSITIES

VISCOSITY	CST	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
FACTOR(G')		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES SHOCKLESS TYPE

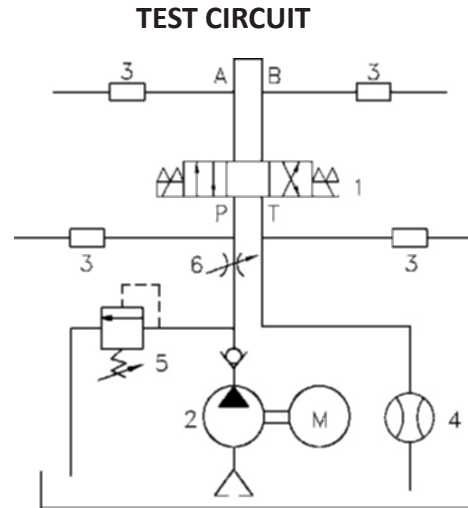
## RESULTS OF MEASUREMENTS

### TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

### TEST CONDITIONS

Pressure: 138 BAR (2000PSI)  
Flow Rate: 30 LPM(8 GPM)  
Viscosity: 35 cSt(175 SSU)



MODEL	CHANGE OVER TIME(SEC.)	
	T1	T2
SWH-G03-RF-M SERIES	0.1-0.15	0.1-0.15
SWH-G03-DC-M SERIES	0.1-0.15	0.1-0.15

## LIST OF SPOOL FUNCTIONS

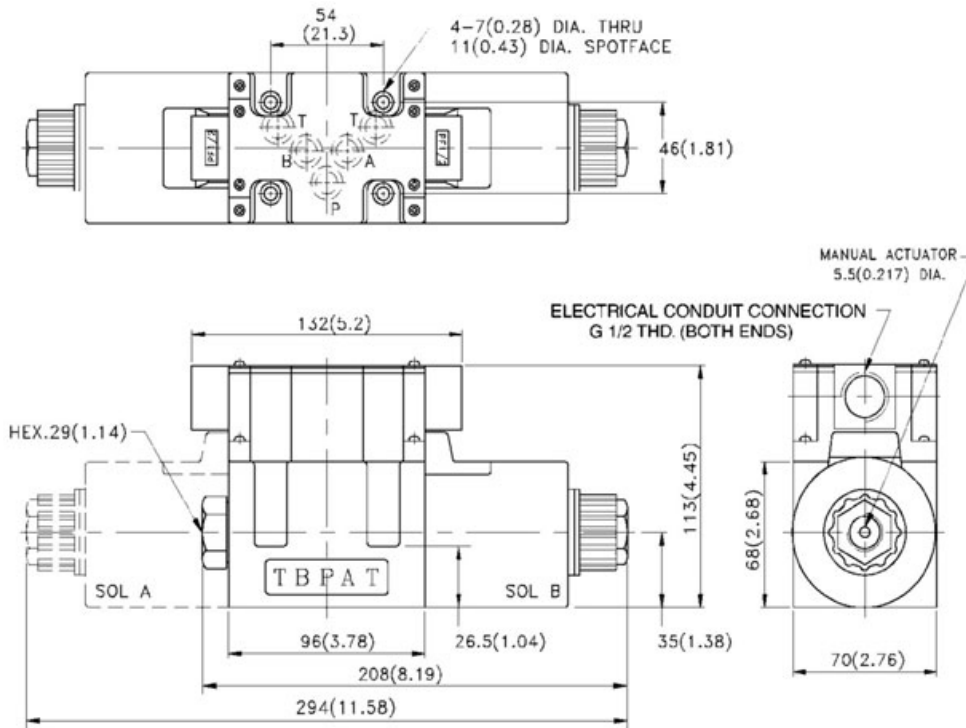
SPOOL TYPE NORMAL POSITION	THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI)											
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)
C2	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	67 (18.0)	80 (21.5)	80 (21.5)	80 (21.5)	67 (18.0)
C3	80 (21.5)	80 (21.5)	80 (21.5)	67 (18.0)	80 (21.5)	50 (13.5)	32 (8.5)	28 (7.5)	80 (21.5)	50 (13.5)	32 (8.5)	28 (7.5)
C4	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)
C6	80 (21.5)	30 (8)	28 (7.5)	20 (5.4)	80 (21.5)	35 (9.4)	30 (8)	20 (5.4)	80 (21.5)	35 (9.4)	30 (8)	20 (5.4)
B2	80 (21.5)	80 (21.5)	80 (21.5)	28 (7.5)	70 (18.5)	70 (18.5)	70 (18.5)	70 (18.5)	70 (18.5)	70 (18.5)	70 (18.5)	70 (18.5)
B3	80 (21.5)	80 (21.5)	80 (21.5)	28 (7.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)	80 (21.5)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES SHOCKLESS TYPE

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SWH - G03 - \*\*\* - \*\*\*\* - 10 - \*\*  
with DC/RF solenoids

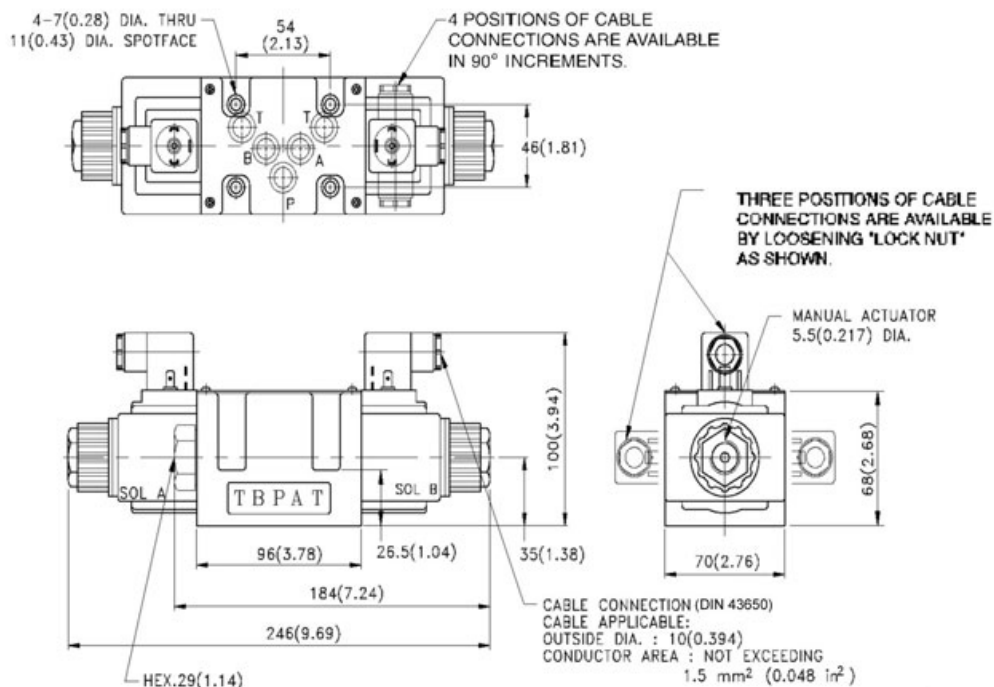


MODEL	WEIGHT KGS (LBS)
SWH-G03-C**-D **	5.5(12.1)
SWH-G03-C**-R ***	
SWH-G03-B**-D **	4(9.68)
SWH-G03-B**-R ***	

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SWH - G03 - \*\*\* - \*\*\*\* - 20 - \*\*  
with DC,RF solenoids



MODEL	WEIGHT KGS (LBS)
SWH-G03-C**-D **	5.5(12.1)
SWH-G03-C**-R ***	
SWH-G03-B**-D **	4(9.68)
SWH-G03-B**-R ***	

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G04 SERIES



### FEATURES

- Armature operates in system oil. Impact is decreased and cushioning added, making less noise & prolonged solenoid life.
- Wet armature solenoid eliminates push pin seal, reducing seal wear and leakage for longer valve life.
- Molded coil gives maximum insulating properties. They are protected by a special resin and impervious to moisture and dirt for ease of maintenance.
- Plug-in solenoid, easy to change coil.
- Change of pilot and drain can be easily accomplished by plugging or unplugging.
- Spool is designed to avoid creating jet flow or turbulence under high pressure and flow.
- Indicating light and bolt kits are standard.

### Model Code

**SW – G 04 – C2 – ET – A120 – 10 – ABK – PO**

1

2

3

4

5

6

7

8

9

10

#### 1 Series

**SW:** High Pressure, High Flow Solenoid Directional Control Valve

#### 2 Mounting Style

**G:** Subplate Mounted

#### 3 Mounting Size

**04:** Interface 04  
NFPA D07 Size / ISO 4401-07 / CETOP 7 / NG 16

#### 4 Spool Type

(See Spool Chart)

#### 5 Pilot Type

**No Code:** Standard Internal Pilot  
**E:** External Pilot

#### 6 Drain Type

**No Code:** Standard Internal Drain  
**T:** External Drain

#### 7 Coil Voltage

**A24:** AC 24V, 60Hz  
**A110:** AC 110V, 60Hz; AC 100V, 50Hz  
**A120:** AC 120V, 60Hz; AC 110V, 50Hz  
**A220:** AC 220V, 60Hz; AC 200V, 50Hz  
**A240:** AC 240V, 60Hz; AC 220V, 50Hz  
**R110:** AC 110V, 50/60Hz  
**R120:** AC 120V, 50/60Hz  
**R220:** AC 220V, 50/60Hz  
**R240:** AC 240V, 50/60Hz  
**D12:** DC 12V  
**D24:** DC 24V

#### 8 Wiring Type

**10:** Junction Box with Indicator Light  
**20:** DIN 43650 Connector with Indicator Light  
**31:** Lead Wire (DC Only)  
**41:** Dual Spade (DC Only) SAE J858A

#### 9 Option

**No Code:** Standard  
**ABK:** With Stroke Adj. Both "A" and "B" Ports  
**AK:** With Stroke Adj. "A" Port End Only  
**BK:** With Stroke Adj. "B" Port End Only

#### 10 Option

**No Code:** Standard  
**PO:** Pilot Choke, Meter-Out  
**PI:** Pilot Choke, Meter-In

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G04 SERIES

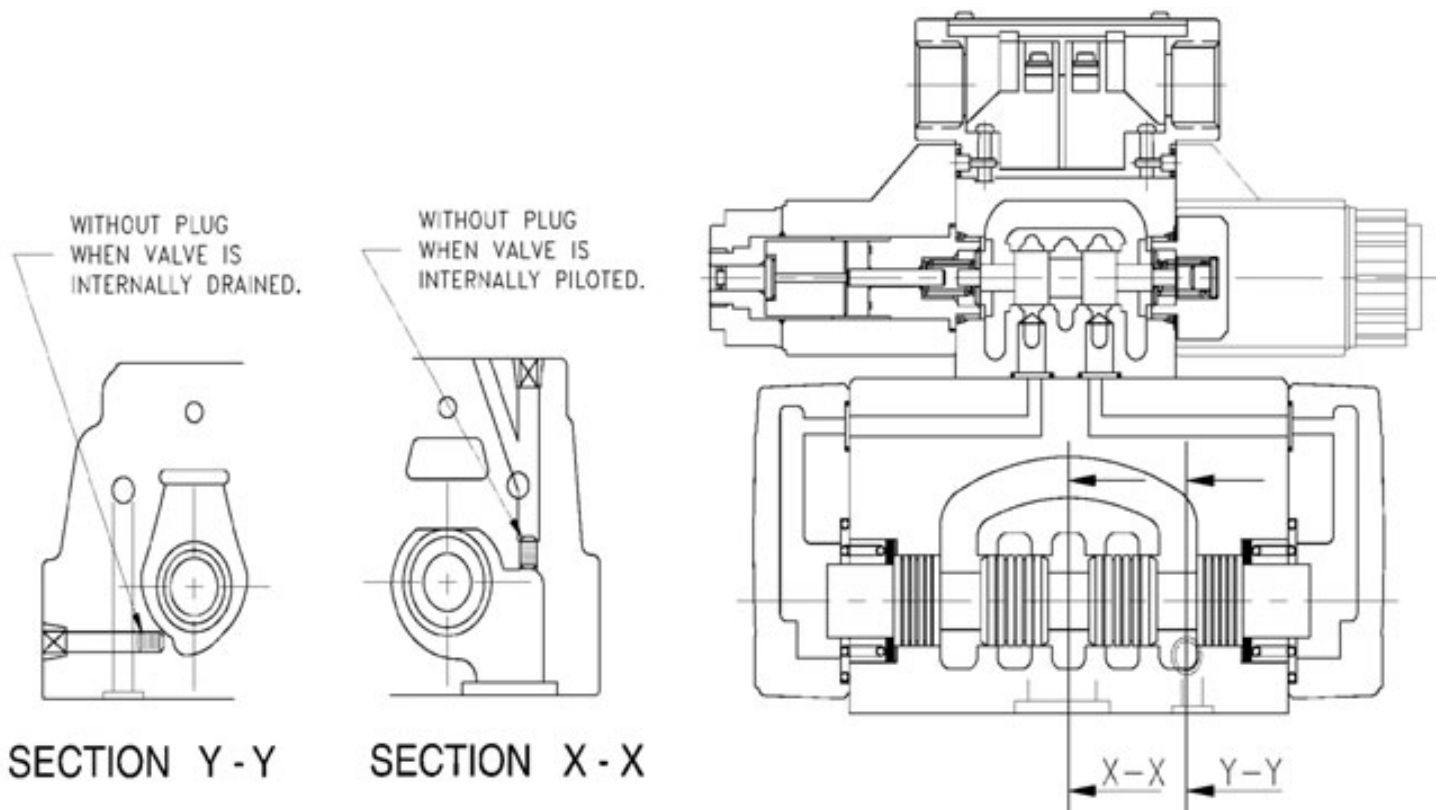
4-WAY, 3-POSITION SPRING CENTERED		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C2		C2B		C2BS		B2	
C3		C3B		C3BS		B3	
C4		C4B		C4BS		B20	
C40		C40B		C40BS		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C5		C5B		C5BS		B2S	
C5S		C5SB		C5SBS		B3S	
C6		C6B		C6BS		B20S	
C7		C7B		C7BS		4-WAY, 2-POSITION DETENT, END-TO-END	
C8		C8B		C8BS		D2	
C8S		C8SB		C8SBS		D3	
C9		C9B		C9BS		4-WAY, 2-POSITION NO SPRING, NO DETENT	
C9S		C9SB		C9SBS		N2	
						N3	

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G04 SERIES

## SPECIFICATIONS

Maximum operating pressure	310 BAR (4500 PSI)
Maximum tank line back pressure	207 BAR (3000 PSI) externally drained
	138 BAR (2000 PSI) internally drained
Pilot pressure	Min. 8 BAR (113 PSI)
	Max. 245 BAR (3550 PSI)
Maximum flow	300 LPM (80 GPM)
Weight	SW-G04-C,D SERIES 8.2 kgs (18 lbs)
	SW-G04-B SERIES 7.9 kgs (17.5 lbs)

## OPTION ET



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G04 SERIES

### SOLENOID RATINGS

ELECTRIC SOURCE	COIL TYPE	VOLTAGE			CURRENT & POWER		WATTAGE
		Hz	SOURCE RATED	RANGE (+10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	
AC (-10 and -20 Options)	A24	60	AC24V	21.6-26.4	6.8	1.7	26
		50	AC100V	90-110	1.60	0.46	
	A110	60	AC100V	90-110	1.40	0.32	
			AC110V	99-121	1.50	0.39	
	A120	50	AC110V	99-121	1.30	0.38	
		60	AC120V	108-132	1.20	0.27	
	A220	50	AC200V	180-220	0.80	0.23	
		60	AC200V	180-220	0.70	0.16	
	A240		50	AC220V	198-242	0.67	
		60	AC240V	216-264	0.59	0.13	
R (-10 and -20 Options)	R110	50	AC100V	90-110	0.30	0.30	26
		60	AC110V	99-121	0.30	0.30	
	R220	50	AC200V	180-220	0.15	0.15	
		60	AC220V	198-242	0.15	0.15	
	R240	50	AC220V	180-220	0.14	0.14	
		60	AC240V	216-264	0.14	0.14	
DC (-10 and -20 Options)	D12	DC 12V		10.8-13.2	2.20	2.20	28.8
	D24	DC 24V		21.6-26.4	1.10	1.10	
DC (-31 and -41 Options)	D12	DC 12V		10.8-13.2	2.60	2.60	28.8
	D24	DC 24V		21.6-26.4	1.30	1.30	

### TECHNICAL DATA

- Solenoid can be used within - 10% to + 10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100MQ.
- A momentary signal of approx 0.1 second is required for shifting action.
- Pilot pressure of internally drained valves must always exceed tank port pressure by a minimum of 8.0 BAR(113 PSI) Valve must be externally drained if there is a possibility of tank line pressure surges overcoming this differential.
- If the hydraulic circuit does not provide sufficient pilot pressure to shift valves with open center spool configurations C3, C5, C6, C60, do either: (1) Use the external pilot option ("-E-"). Provide 113 PSI (8 Bar) minimum pilot pressure to the "X" port on the manifold or subplate from another source in your system to shift the valve. (2) If the valve must be internally piloted in your system, then install back pressure of 113 PSI (8 Bar) minimum at the tank line of the main valve. The valve must be externally drained ("-T-") with this method.
- Conforms to IP65

### ACCESSORIES

- Mounting bolt kits are supplied with valve socket head cap screws  
2 pieces 1/4" - 20 UNC - 2B x 1- 3/4"L for tightening torque 120-150 kgf-cm (104-130 lbs-in).  
4 pieces 3/8" - 16 UNC-2B x 2"L for tightening torque 580-720 kgf-cm (502-624 lbs-in).
- O-ring P22A 4 pieces, P9 2 pieces.



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G04 SERIES

### LIST OF SPOOL FUNCTIONS

SPOOL TYPE NORMAL POSITION	SPRING CENTERED					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
C2	300(80.0)	300(80.0)	300(80.0)	260(69.3)	200(53.3)	140(37.3)
	300(80.0)	300(80.0)	260(69.3)	155(41.3)	120(32.0)	110(29.3)
C3	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
C4	300(80.0)	300(80.0)	300(80.0)	260(69.3)	245(65.3)	160(42.7)
	300(80.0)	300(80.0)	260(69.3)	185(49.3)	140(37.3)	110(29.3)
C40	300(80.0)	300(80.0)	300(80.0)	260(69.3)	200(53.3)	145(38.7)
	300(80.0)	300(80.0)	260(69.3)	155(41.3)	120(32.0)	110(29.3)
C5	260(69.3)	255(68.0)	250(66.6)	245(65.3)	240(64.0)	240(64.0)
C6	300(80.0)	300(80.0)	265(80.0)	255(68.0)	245(65.3)	235(62.7)
C60	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
C7	300(80.0)	300(80.0)	300(80.0)	290(80.0)	280(74.7)	255(68.0)
C8	300(80.0)	300(80.0)	285(76.0)	230(61.3)	170(45.3)	135(36.0)
	300(80.0)	300(80.0)	255(68.0)	165(44.0)	120(32.0)	110(29.3)
C9	300(80.0)	300(80.0)	270(72.0)	200(53.3)	160(42.7)	140(37.3)

NOTE: The upper number in table describes the maximum flow for standard type. The lower number in table describes the maximum flow for shock-less type.

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)						
SPOOL TYPE NORMAL POSITION	NO SPRING					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
N2	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
N3	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
N4	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
N40	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)						
SPOOL TYPE NORMAL POSITION	SPRING OFFSET					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
B2	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
B3	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
B4	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)
B40	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)	300(80.0)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G04 SERIES

## PRESSURE DROP AND PERFORMANCE CURVES

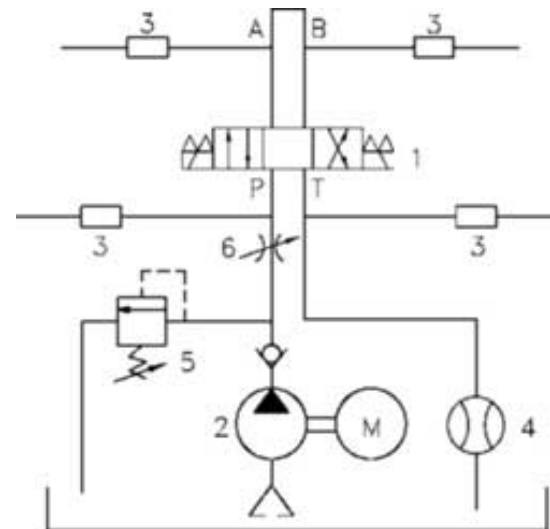
### TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

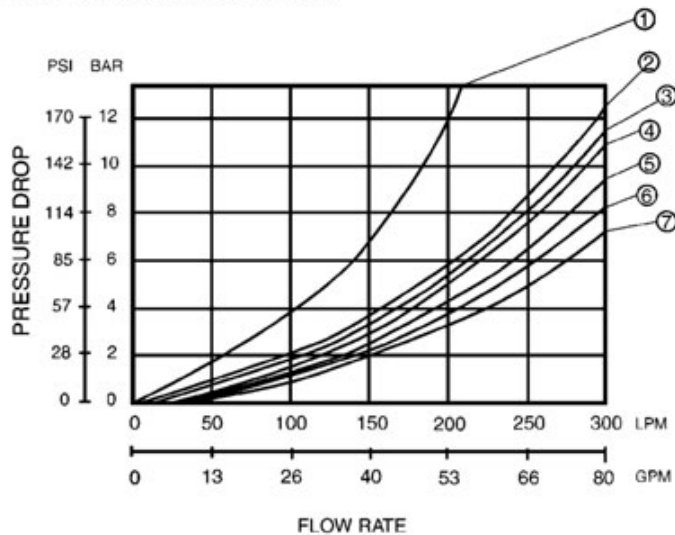
### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
 Flow Rate: 140 LPM(37 GPM)  
 Viscosity: 35 cSt (175SSU)

### TEST CIRCUIT



## PERFORMANCE CURVES



SPOOL TYPE	PRESSURE DROP CURVE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	5	4	5	6	-
C3	5	3	5	5	7
C4	5	3	5	5	-
C40	5	4	5	6	-
C5	7	4	5	5	5
C6	5	3	5	6	1
C60	7	5	7	7	2
C7	5	4	5	6	-
C8	5	4	5	5	-
C9	6	4	5	6	-

## CONTRAST CHART BETWEEN FACTORS AND VISCOSITIES

VISCOSITY	cSt	15	20	30	40	50	60	70	80	90	100
		SSU	77	98	141	186	232	278	324	371	417
FACTOR(G')		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

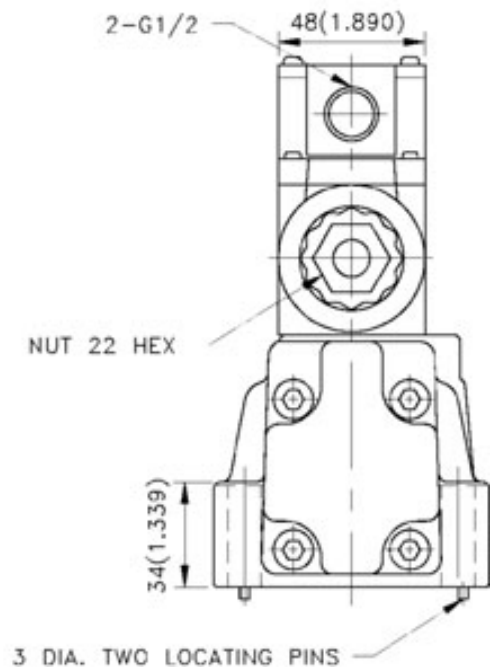
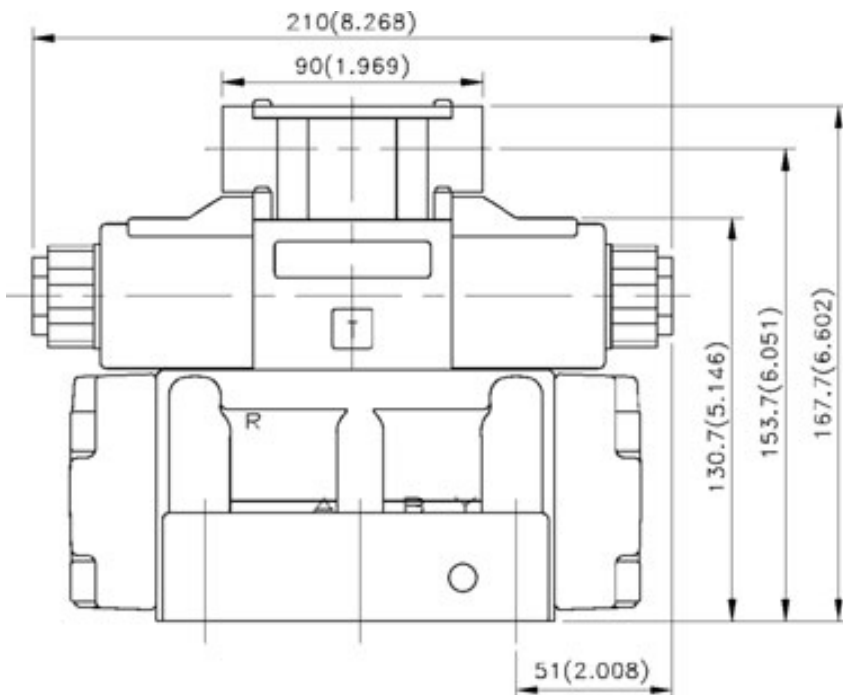
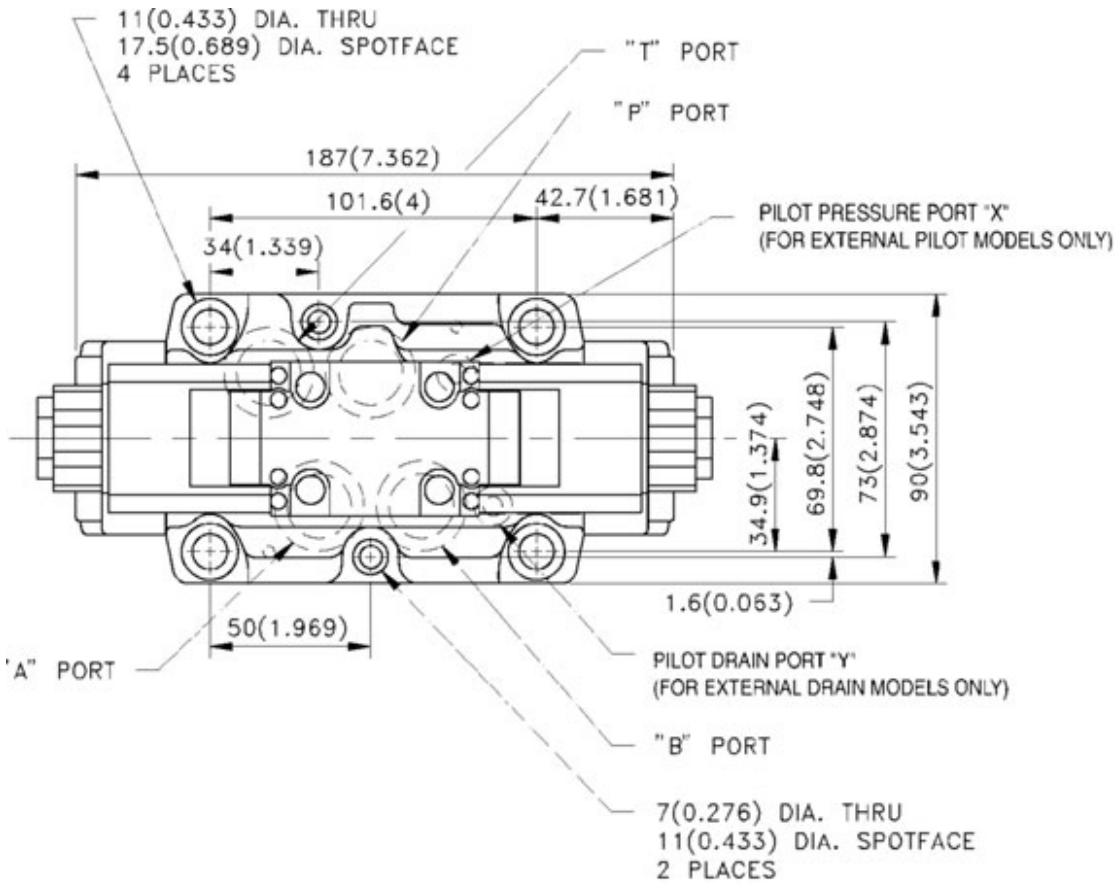
The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G04 SERIES

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SW - G04 - \*\* - \*\*\*\* - 10

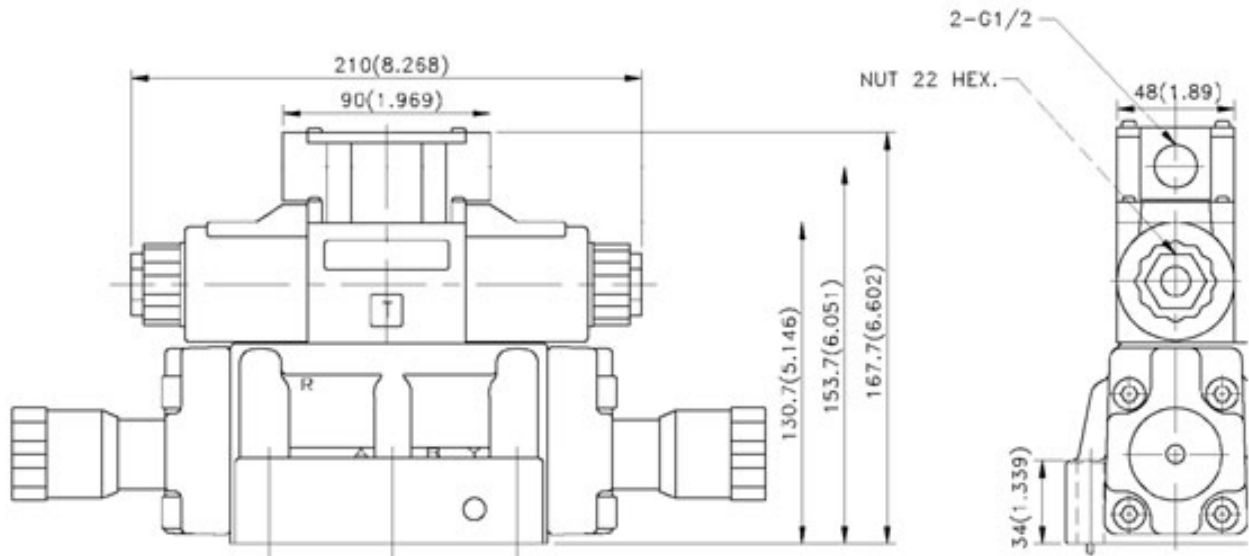
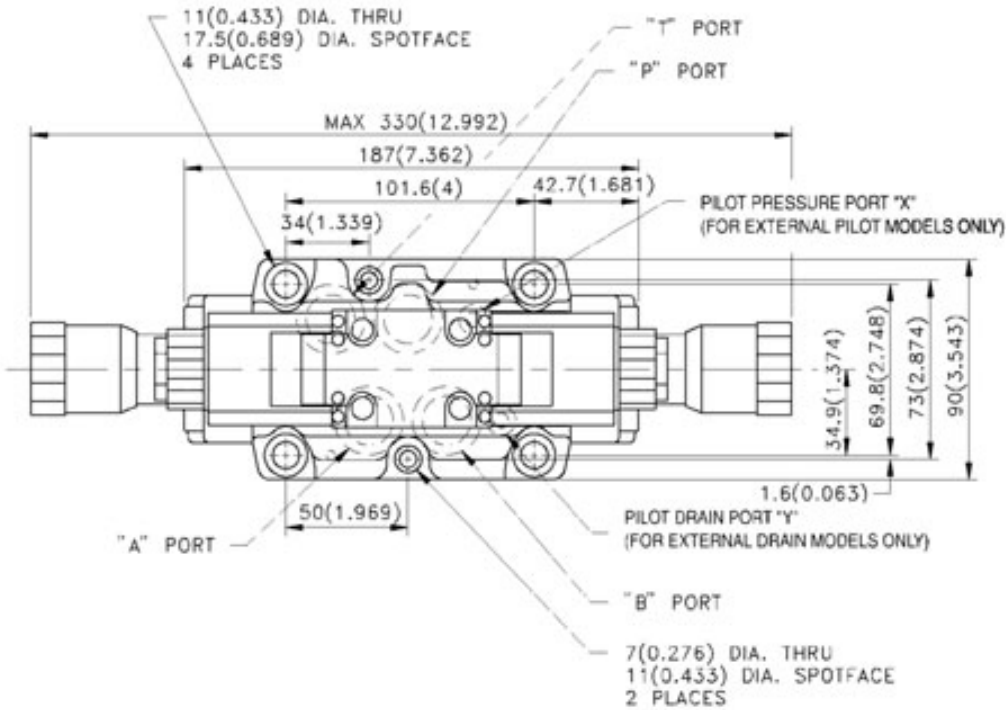


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G04 SERIES

## Dimensions

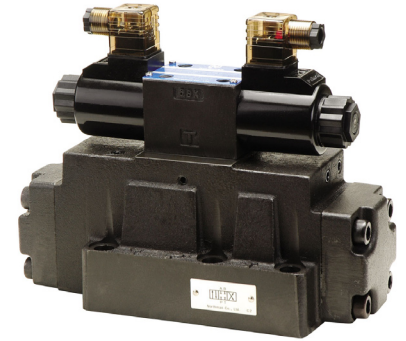
MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

SW - G04 - \*\*\* - \*\*\*\* - 10 - AB-K  
with DC/RF solenoids



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES



### FEATURES

- Armature operates in system oil. Impact is decreased and cushioning added, making less noise & prolonged solenoid life.
- Wet armature solenoid eliminates push pin seal, reducing seal wear and leakage for longer valve life.
- Molded coil gives maximum insulating properties. They are protected by a special resin and impervious to moisture and dirt for ease of maintenance.
- Plug-in solenoid, easy to change coil.
- Change of pilot and drain can be easily accomplished by plugging or unplugging.
- Spool is designed to avoid creating jet flow or turbulence under high pressure and flow.
- Indicating light and bolt kits are standard.

### Model Code

**SW – G 06 – C2 – E T – A120 – 10 – ABK – PO**

1      2   3      4      5   6      7      8      9      10

**1 Series**  
**SW:** High Pressure, High Flow Solenoid Directional Control Valve

**2 Mounting Style**  
**G:** Subplate Mounted

**3 Mounting Size**  
**06:** Interface 06  
 NFPA D08 Size / ISO 4401-08 / CETOP 8 / NG 25

**4 Spool Type**  
 (See Spool Chart)

**5 Pilot Type**  
**No Code:** Standard Internal Pilot  
**E:** External Pilot

**6 Drain Type**  
**No Code:** Standard Internal Drain  
**T:** External Drain

**7 Coil Voltage**  
**A24:** AC24V, 60Hz  
**A110:** AC110V, 60Hz; AC100V, 50Hz  
**A120:** AC120V, 60Hz; AC110V, 50Hz  
**A220:** AC220V, 60Hz; AC200V, 50Hz  
**A240:** AC240V, 60Hz; AC220V, 50Hz  
**R110:** AC110V, 50/60Hz  
**R120:** AC120V, 50/60Hz  
**R220:** AC220V, 50/60Hz  
**R240:** AC240V, 50/60Hz  
**D12:** DC12V  
**D24:** DC24V

**8 Wiring Type**  
**10:** Junction Box with Indicator Light  
**20:** DIN 43650 Connector with Indicator Light  
**31:** Lead Wire (DC Only)  
**41:** Dual Spade (DC Only) SAE J858A

**9 Option**  
**No Code:** Standard  
**ABK:** With Stroke Adj. Both "A" and "B" Ports  
**AK:** With Stroke Adj. "A" Port End Only  
**BK:** With Stroke Adj. "B" Port End Only

**10 Option**  
**No Code:** Standard  
**PO:** Pilot Choke, Meter-Out  
**PI:** Pilot Choke, Meter-In

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

4-WAY, 3-POSITION SPRING CENTERED		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
C2		C2B		C2BS		B2	
C3		C3B		C3BS		B3	
C4		C4B		C4BS		B20	
C40		C40B		C40BS		<b>4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND</b>	
C5		C5B		C5BS			
C5S		C5SB		C5SBS		B3S	
C6		C6B		C6BS		B20S	
C60		C60B		C60BS		<b>4-WAY, 2-POSITION DETENT, END-TO-END</b>	
C7		C7B		C7BS			
C8		C8B		C8BS		D3	
C8S		C8SB		C8SBS		<b>4-WAY, 2-POSITION NO SPRING, NO DETENT</b>	
C9		C9B		C9BS			
C9S		C9SB		C9SBS		N3	

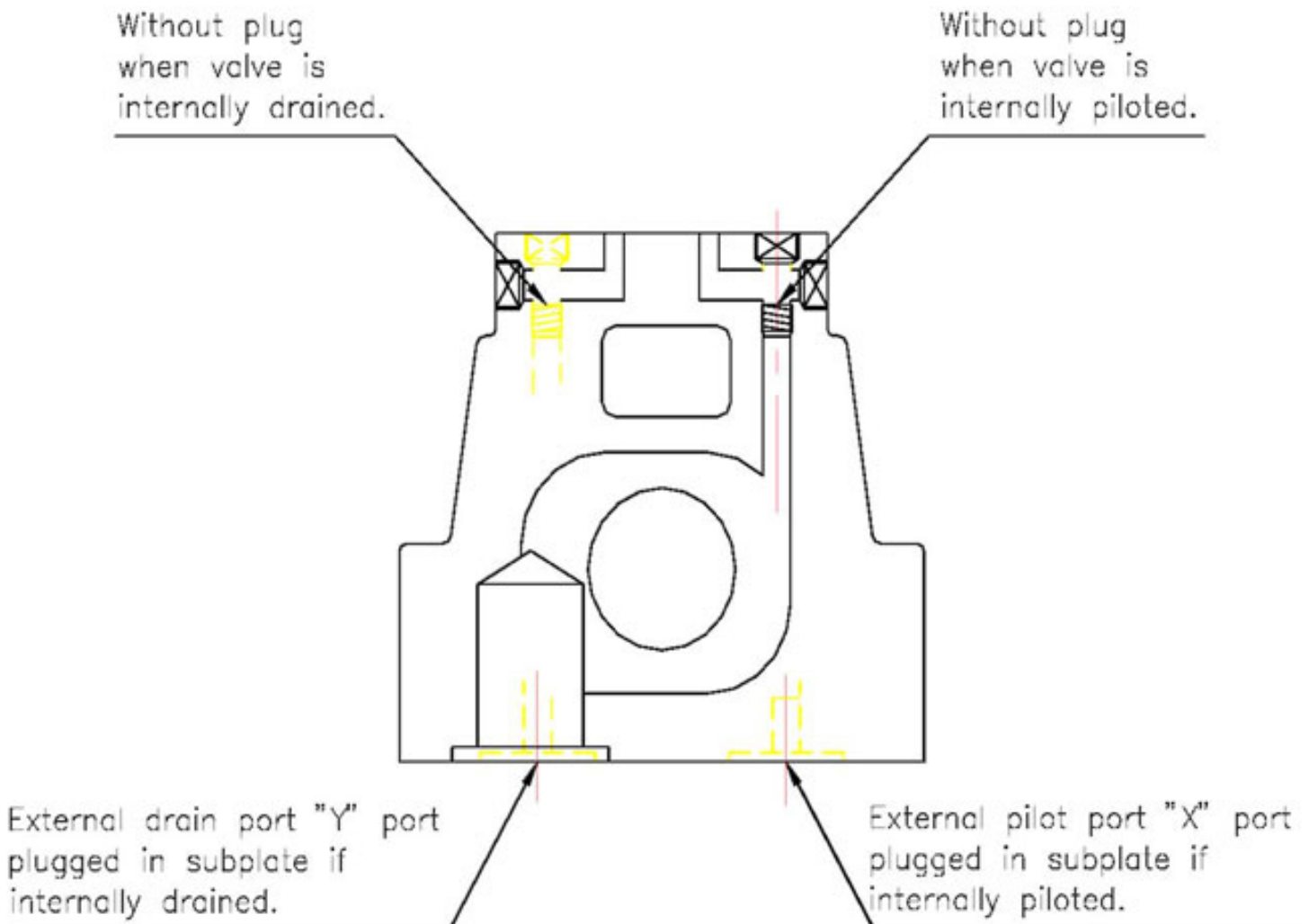
# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

### SPECIFICATIONS

Maximum operating pressure	310 BAR (4500 PSI)
Maximum tank line back pressure	207 BAR (3000 PSI) EXTERNALLY DRAINED
	138 BAR (2000 PSI) INTERNALLY DRAINED
Pilot pressure	MIN. 3.5 BAR (50 PSI)
	MAX. 250 BAR (3550 PSI)
Maximum flow	500 LPM (133 GPM)
Weight	SW-G06 - C/D SERIES 12.8 KGS (28 LBS)
	SW-G06 - B SERIES 12.5 KGS (27.5 LBS)

### OPTION ET



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

### SOLENOID RATINGS

ELECTRIC SOURCE	COIL TYPE	VOLTAGE			CURRENT & POWER		WATTAGE
		Hz	SOURCE RATED	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	
AC (-10 and -20 Options)	A24	60	AC24V	21.6-26.4	6.8	1.7	26
	A110	50	AC100V	90-110	1.60	0.46	
		60	AC100V	90-110	1.40	0.32	
			AC110V	99-121	1.50	0.39	
	A120	50	AC110V	99-121	1.30	0.38	
		60	AC120V	108-132	1.20	0.27	
	A220	50	AC200V	180-220	0.80	0.23	
			AC200V	180-220	0.70	0.16	
		60	AC220V	198-242	0.75	0.19	
	A240	50	AC220V	198-242	0.67	0.19	
		60	AC240V	216-264	0.59	0.13	
	R110	50	AC100V	90-110	0.30	0.30	
		60	AC110V	99-121	0.30	0.30	
	R220	50	AC200V	180-220	0.15	0.15	
60		AC220V	198-242	0.15	0.15		
R240	50	AC220V	180-220	0.14	0.14		
	60	AC240V	216-264	0.14	0.14		
DC (-10 and -20 Options)	D12	DC 12V		10.8-13.2	2.20	2.20	28.8
	D24	DC 24V		21.6-26.4	1.10	1.10	
DC (-31 and -41 Options)	D12	DC 12V		10.8-13.2	2.60	2.60	28.8
	D24	DC 24V		21.6-26.4	1.30	1.30	

### TECHNICAL DATA

- Solenoid can be used within -10% to +10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100MQ.
- A momentary signal of approx. 0.1 second is required for shifting action.
- Pilot pressure of internally drained valves must always exceed tank port pressure by a minimum of 3.5 BAR (50 PSI) Valve must be externally drained if there is a possibility of tank line pressure surges overcoming this differential.
- If the hydraulic circuit does not provide sufficient pilot pressure to shift valves with open center spool configurations C3, C5, C6, C60, do either: (1) Use the external pilot option ("-E-"). Provide 50 PSI (3.5 Bar) minimum pilot pressure to the "X" port on the manifold or subplate from another source in your system to shift the valve. (2) If the valve must be internally piloted in your system, then install back pressure of 50 PSI (3.5 Bar) minimum at the tank line of the main valve. The valve must be externally drained ("-T-") with this method.

### ACCESSORIES

- Mounting bolt kits are supplied with valve socket head cap screws M12x60L 6 pcs (1/2"-13UNC-2Bx2 - 3/8"L 6 pcs) for tightening torque 1000-1230 kgf-cm (886 1066 lbs-in).
- O-Ring P28 90° 4 pcs and P21 90° 2 pcs.



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

### LIST OF SPOOL FUNCTIONS

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)						
SPOOL TYPE NORMAL POSITION	SPRING CENTERED					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
C2	500(133.0)	500(133.0)	500(133.0)	450(120.0)	410(109.3)	310(82.6)
	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
C3	500(133.0)	500(133.0)	500(133.0)	480(128.0)	460(122.6)	360(96.0)
C4	500(133.0)	500(133.0)	500(133.0)	450(120.0)	410(109.3)	310(82.6)
	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
C40	500(133.0)	500(133.0)	500(133.0)	450(120.0)	410(109.3)	310(82.6)
	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
C5	500(133.0)	500(133.0)	500(133.0)	450(120.0)	420(112.0)	350(93.3)
C6	500(133.0)	470(125.3)	400(106.6)	350(93.3)	300(80.0)	230(61.3)
C60	500(133.0)	470(125.3)	425(113.3)	385(102.6)	340(90.6)	280(74.6)
	500(133.0)	470(125.3)	425(113.3)	385(102.6)	340(90.6)	280(74.6)
C7	500(133.0)	500(133.0)	500(133.0)	480(128.0)	450(120.0)	360(96.0)
C8	500(133.0)	500(133.0)	500(133.0)	450(120.0)	410(109.3)	310(82.6)
	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
C9	500(133.0)	500(133.0)	500(133.0)	450(120.0)	410(109.3)	310(82.6)
	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)

NOTE: The upper-side number in table describes the maximum flow for standard type.

The lower-side number in table describes the maximum flow for shock-less type.

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)						
SPOOL TYPE NORMAL POSITION	NO SPRING					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
N2	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
N3	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
N4	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
N40	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)						
SPOOL TYPE NORMAL POSITION	SPRING OFFSET					
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)	250 BAR (3675 PSI)	310 BAR (4500 PSI)
B2	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
B3	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
B4	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)
B40	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)	500(133.0)

# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G06 SERIES

## PRESSURE DROP AND PERFORMANCE CURVES

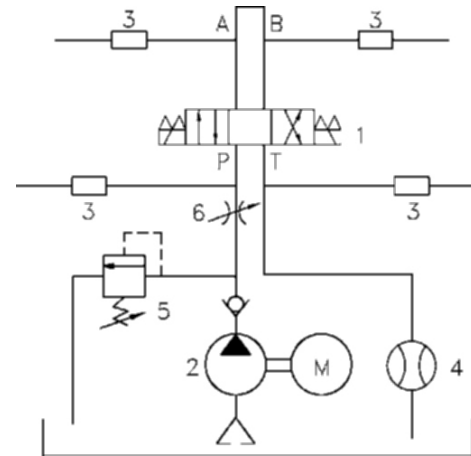
### TEST SYSTEMS

1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

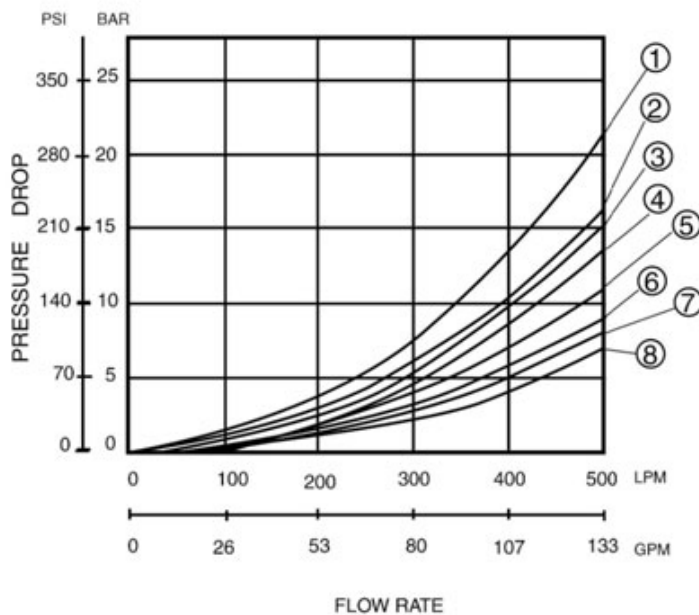
### TEST CONDITIONS

Pressure: 69 BAR (1000PSI)  
 Flow Rate: 140 LPM(37 GPM)  
 Viscosity: 35 cSt (175SSU)

### TEST CIRCUIT



## PERFORMANCE CURVES



SPOOL TYPE	PRESSURE DROP CURVE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	8	5	8	7	-
C3	6	4	6	7	6
C4	8	5	8	7	-
C40	8	5	8	7	-
C5	8	4	5	7	2
C6	5	1	5	4	3
C60	6	5	6	7	3
C7	6	5	6	7	-
C8	8	5	8	7	-
C9	8	4	5	7	-
D2	8	5	8	7	-
D3	6	4	6	7	-
B2	8	5	8	7	-
B3	6	4	6	7	-
B20	5	-	8	-	-
B2S	8	5	8	7	-
B3S	6	4	6	7	-
B20S	8	-	5	-	-

VISCOSITY	cS t	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
FACTOR (G')		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

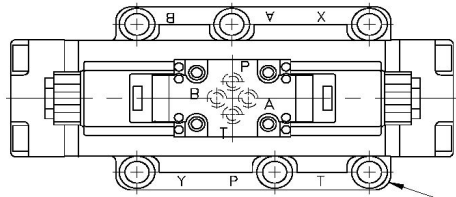
# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

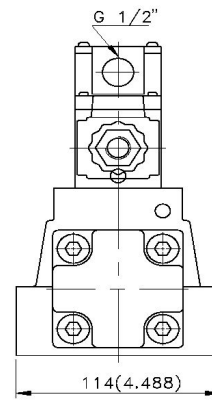
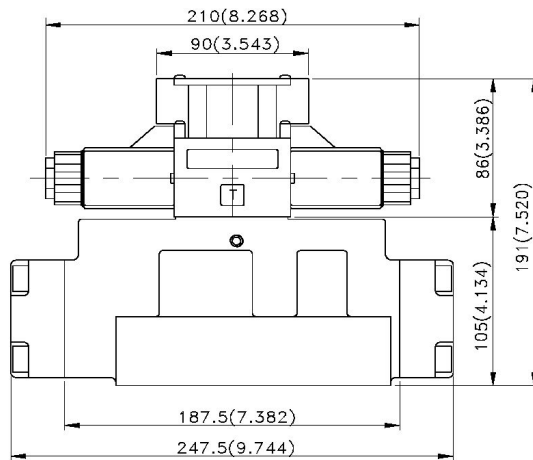
### Dimensions

SW - G06 - \*\* - \*\*\*\* - 10

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



6-13.5(0.531) DIA.  
THRU 20(0.787) DIA.  
SPOTFACE



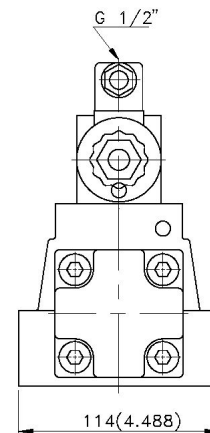
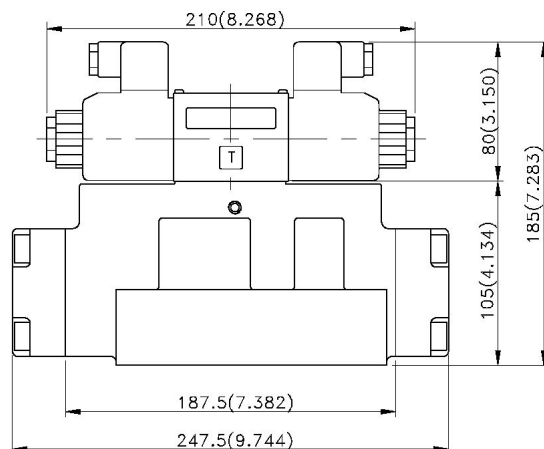
### Dimensions

SW - G06 - \*\* - \*\*\*\* - 20

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



6-13.5(0.531) DIA.  
Thru 20(0.787) DIA.  
SPOTFACE



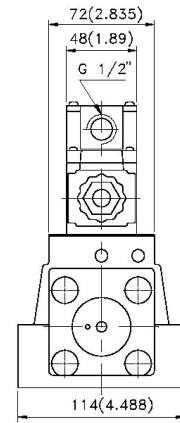
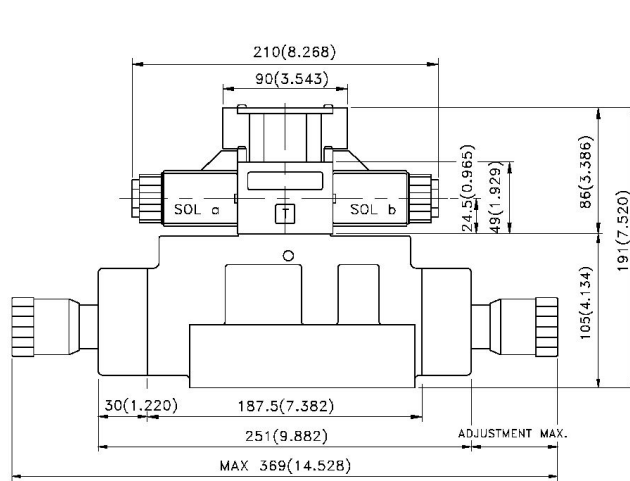
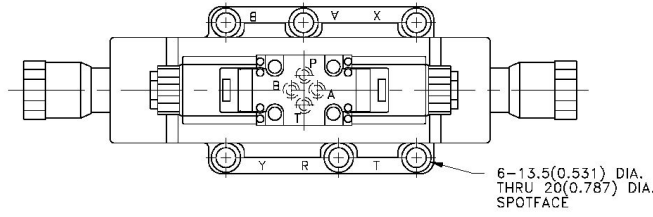
# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G06 SERIES

### Dimensions

SW - G06 - \*\* - \*\*\*\* - 10

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G10 SERIES



### FEATURES

- Armature operates in system oil. Impact is decreased and cushioning added, making less noise & solenoid life is prolonged.
- Wet armature solenoid eliminates pushpin seal, reducing seal wear and leakage for longer valve life.
- Molded coil gives maximum insulating properties. They are protected by a special resin and impervious to moisture and dirt for ease of maintenance.
- Plug-in solenoid, easy to change coil.
- Change of pilot and drain can be easily accomplished by plugging or unplugging.
- Spool is designed to avoid creating jet flow or turbulence under high pressure and flow.
- Indicating light and bolt kits are standard.

## SW – G 10 – C2 – E T – A120 – 10 – ABK – PO

1

2

3

4

5

6

7

8

9

10

### 1 Series

**SW:** High Pressure, High Flow Solenoid Directional Control Valve

### 2 Mounting Style

**G:** Subplate Mounted

### 3 Mounting Size

**10:** Interface 10  
NFPA D10 Size / ISO 4401-10 / CETOP 10 / NG 32

### 4 Spool Type

(See Spool Chart)

### 5 Pilot Type

**No Code:** Standard Internal Pilot  
**E:** External Pilot

### 6 Drain Type

**No Code:** Standard Internal Drain  
**T:** External Drain

### 7 Coil Voltage

**A24:** AC24V, 60Hz  
**A110:** AC110V, 60Hz; AC100V, 50Hz  
**A120:** AC120V, 60Hz; AC110V, 50Hz  
**A220:** AC220V, 60Hz; AC200V, 50Hz  
**A240:** AC240V, 60Hz; AC220V, 50Hz  
**R110:** AC110V, 50/60Hz  
**R120:** AC120V, 50/60Hz  
**R220:** AC220V, 50/60Hz  
**R240:** AC240V, 50/60Hz  
**D12:** DC12V  
**D24:** DC24V

### 8 Wiring Type

**10:** Junction Box with Indicator Light  
**20:** DIN 43650 Connector with Indicator Light  
**31:** Lead Wire (DC Only)  
**41:** Dual Spade (DC Only) SAE J858A

### 9 Option

**No Code:** Standard  
**ABK:** With Stroke Adj. Both "A" and "B" Ports  
**AK:** With Stroke Adj. "A" Port End Only  
**BK:** With Stroke Adj. "B" Port End Only

### 10 Option

**No Code:** Standard  
**PO:** Pilot Choke, Meter-Out  
**PI:** Pilot Choke, Meter-In

# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G10 SERIES

4-WAY, 3-POSITION SPRING CENTERED		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, RIGHT HAND		4-WAY, 2-POSITION SPRING OFFSET END-TO-CENTER, LEFT HAND	
C2		C2B		C2BS	
C3		C3B		C3BS	
C4		C4B		C4BS	
C5		C5B		C5BS	
C6		C6B		C6BS	
C8		C8B		C8BS	
C8S		C8SB		C8SBS	

4-WAY, 2-POSITION SPRING OFFSET END-TO-END, RIGHT HAND	
B2	 Closed Center Crossover
B3	 Open Center Crossover

4-WAY, 2-POSITION SPRING OFFSET END-TO-END, LEFT HAND	
B2S	 Closed Center Crossover
B3S	 Open Center Crossover

4-WAY, 2-POSITION DETENT, END-TO-END	
D2	 Closed Center Crossover
D3	 Open Center Crossover

4-WAY, 2-POSITION NO SPRING, NO DETENT	
N2	 Closed Center Crossover
N3	 Open Center Crossover

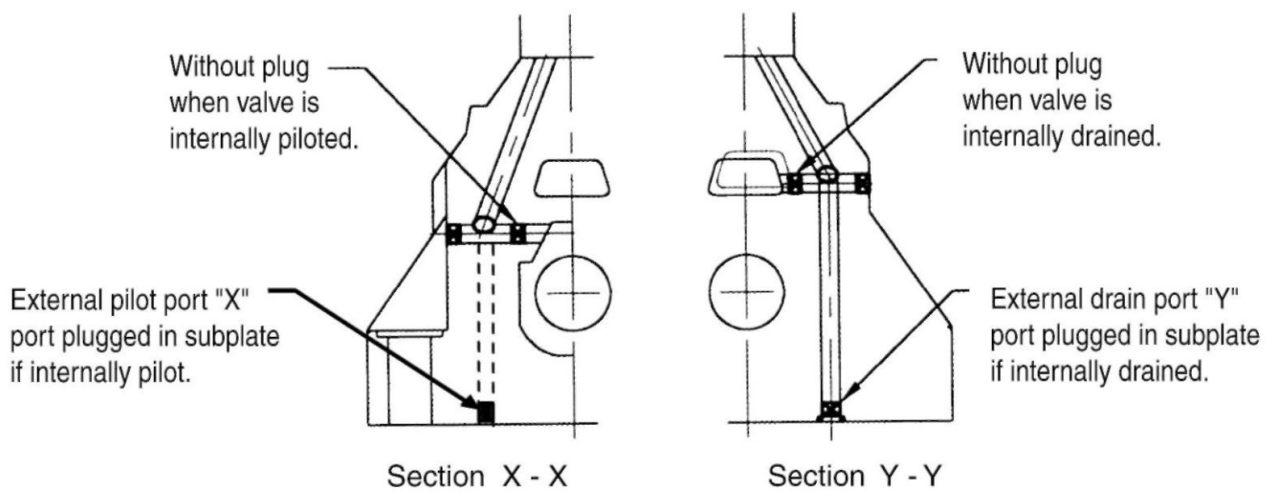
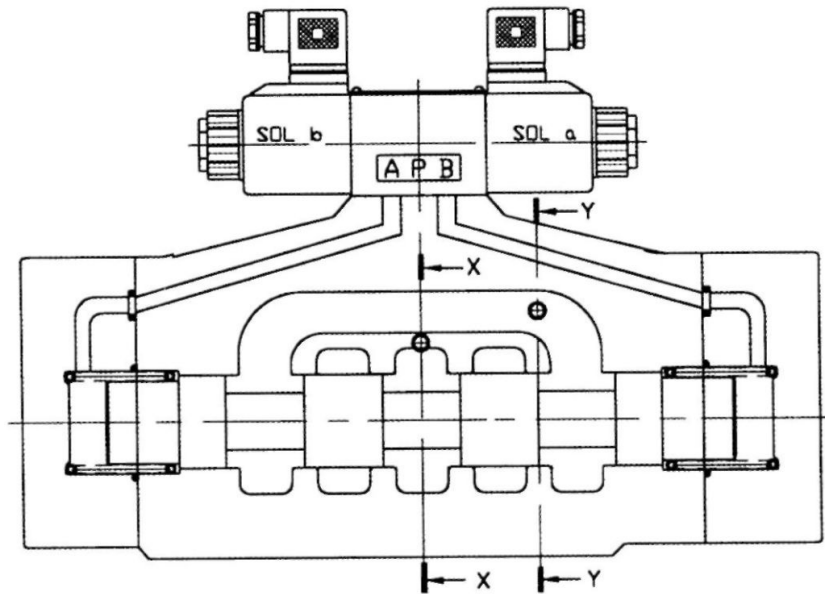
# SOLENOID OPERATED DIRECTIONAL VALVE

## SWH-G10 SERIES

### SPECIFICATIONS

Maximum operating pressure	207 BAR (3000 PSI)
Maximum tank line back pressure	207 BAR (3000 PSI) EXTERNALLY DRAINED
	138 BAR (2000 PSI) INTERNALLY DRAINED
Pilot pressure	MIN. 10 BAR (140 PSI)
	MAX. 207 BAR (3000 PSI)
Maximum flow	1100 LPM (292 GPM)
Weight	SW-G10-B/C/D SERIES 50 kgs (110 lbs)

### Option ET



SOLENOID OPERATED DIRECTIONAL VALVE  
SW-G10 SERIES

SOLENOID RATINGS

ELECTRIC SOURCE	COIL TYPE	VOLTAGE			CURRENT & POWER		WATTAGE
		Hz	SOURCE RATED	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	
AC (-10 and -20 Options)	A24	60	AC24V	21.6-26.4	6.8	1.7	26
		50	AC100V	90-110	1.60	0.46	
	A110	60	AC100V	90-110	1.40	0.32	
			AC110V	99-121	1.50	0.39	
	A120	50	AC110V	99-121	1.30	0.38	
			AC120V	108-132	1.20	0.27	
	A220	60	AC200V	180-220	0.80	0.23	
			AC200V	180-220	0.70	0.16	
			AC220V	198-242	0.75	0.19	
	A240	50	AC220V	198-242	0.67	0.19	
			AC240V	216-264	0.59	0.13	
	R110	50	AC100V	90-110	0.30	0.30	
			AC110V	99-121	0.30	0.30	
	R220	50	AC200V	180-220	0.15	0.15	
AC220V			198-242	0.15	0.15		
R240	50	AC220V	180-220	0.14	0.14		
		AC240V	216-264	0.14	0.14		
DC (-10 and -20 Options)	D12	DC 12V		10.8-13.2	2.20	2.20	
		DC 24V		21.6-26.4	1.10	1.10	
DC (-31 and -41 Options)	D12	DC 12V		10.8-13.2	2.60	2.60	
		DC 24V		21.6-26.4	1.30	1.30	

TECHNICAL DATA:

- Solenoid can be used within -10% to +10% of the rated voltage of the coil.
- Withstand voltage 1500 v/sec.
- Insulation resistance over 100MQ.
- A momentary signal of approx. 0.1 second is required for shifting action.
- Pilot pressure of internally drained valves must always exceed tank port pressure by a minimum of 3.5 BAR (50 PSI) Valve must be externally drained if there is a possibility of tank line pressure surges overcoming this differential.
- If the hydraulic circuit does not provide sufficient pilot pressure to shift valves with open center spool configurations C3, C5, C6, do either: (1) Use the external pilot option ("-E-"). Provide 140 PSI (10 Bar) minimum pilot pressure to the "X" port on the manifold or subplate from another source in your system to shift the valve. (2) If the valve must be internally piloted in your system, then install back pressure of 140 PSI (10 Bar) minimum at the tank line of the main valve. The valve must be externally drained ("-T-") with this method.

PORT INTERCONNECTION

- With solenoid "b" energized P-A B-T.
  - With solenoid "a" energized P-B A-T.
- (But port interconnections are reversed for C3 C5, C6 and C60 type)

ACCESSORIES:

- Mounting bolt kits are supplied with valve socket head cap screws 3/4"-10UNC-2Bx3" L 6 pcs for tightening torque 4730-5850 kgf-cm (4100-5060 lbs-in).
- O-Ring P41 90° 4 pcs and P20 90° 2 pcs.



SOLENOID OPERATED DIRECTIONAL VALVE  
SW-G10 SERIES

**LIST OF SPOOL FUNCTIONS**

THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)				
SPOOL TYPE NORMAL POSITION	SPRING CENTERED			
	50BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)
C2	1100(292)	1100(292)	1100(292)	1030(274)
C3	1100(292)	1100(292)	1100(292)	1090(290)
C4	1100(292)	1100(292)	1100(292)	1030(274)
C5	1100(292)	1100(292)	1100(292)	1040(276)
C6	1100(292)	1050(278)	880(234)	800(212)
C7	1100(292)	1100(292)	1100(292)	1060(282)
C8	1100(292)	1100(292)	1100(292)	1060(282)
C9	1100(292)	1100(292)	1100(292)	1060(282)
THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)				
SPOOL TYPE NORMAL POSITION	NO SPRING			
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)
N2	1100(292)	1100(292)	1100(292)	1100(292)
N3	1100(292)	1100(292)	1100(292)	1100(292)
N4	1100(292)	1100(292)	1100(292)	1100(292)
THE MAXIMUM FLOW RATE LPM (GPM) UNDER DIFFERENT PRESSURE BAR (PSI)				
SPOOL TYPE NORMAL POSITION	SPRING OFFSET			
	50 BAR (735 PSI)	100 BAR (1470 PSI)	150 BAR (2200 PSI)	207 BAR (3000 PSI)
B2	1100(292)	1100(292)	1100(292)	1100(292)
B3	1100(292)	1100(292)	1100(292)	1100(292)
B4	1100(292)	1100(292)	1100(292)	1100(292)

SOLENOID OPERATED DIRECTIONAL VALVE  
SW-G10 SERIES

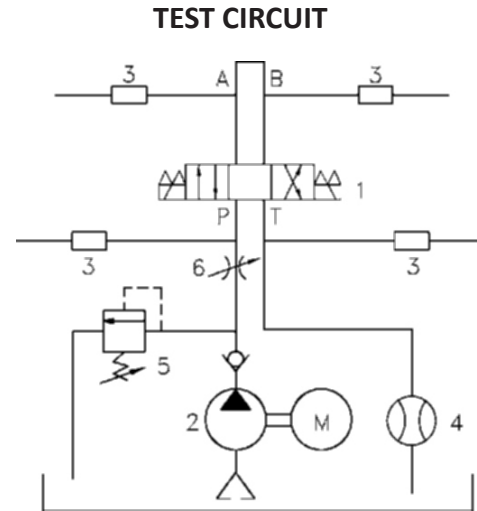
**PRESSURE DROP AND PERFORMANCE CURVES**

**TEST SYSTEMS**

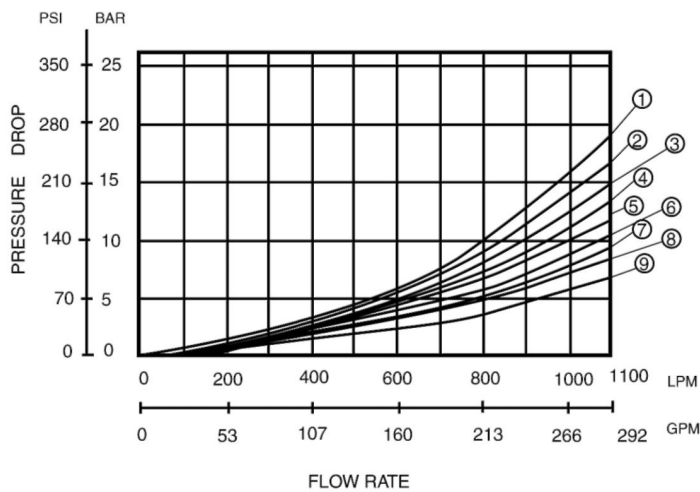
1. Testing Valve
2. Pump
3. Pressure Sensor
4. Flow Sensor
5. Relief Valve
6. Throttle Valve

**TEST CONDITIONS**

Pressure: 69 BAR (1000PSI)  
Flow Rate: 140 LPM(37 GPM)  
Viscosity: 35 cSt (175SSU)



**PERFORMANCE CURVES**



SPOOL TYPE	PRESSURE DROP CURVE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	9	6	9	8	-
C3	7	6	7	7	5
C4	9	6	9	6	-
C40	9	6	9	8	-
C5	9	6	8	6	1
C6	5	3	5	4	2
C60	8	5	8	5	3
C7	7	6	7	7	-
C8	7	6	7	7	-
C9	7	6	7	8	-

VISCOSITY	cSt	15	20	30	40	50	60	70	80	90	100
	SSU		77	98	141	186	232	278	324	371	417
FACTOR (G')		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

The pressure drop (AP') can be obtained from the formula  
 $AP' = AP (G'/0.85)$  for other specific gravity (G').

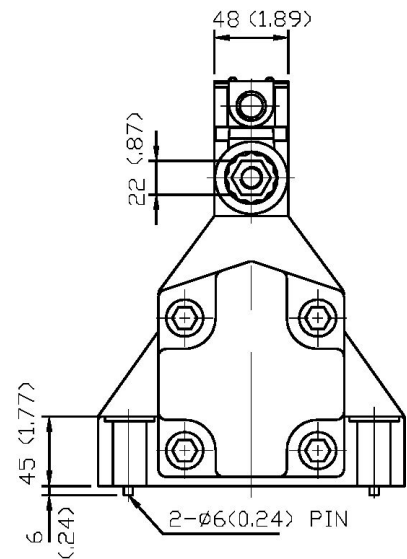
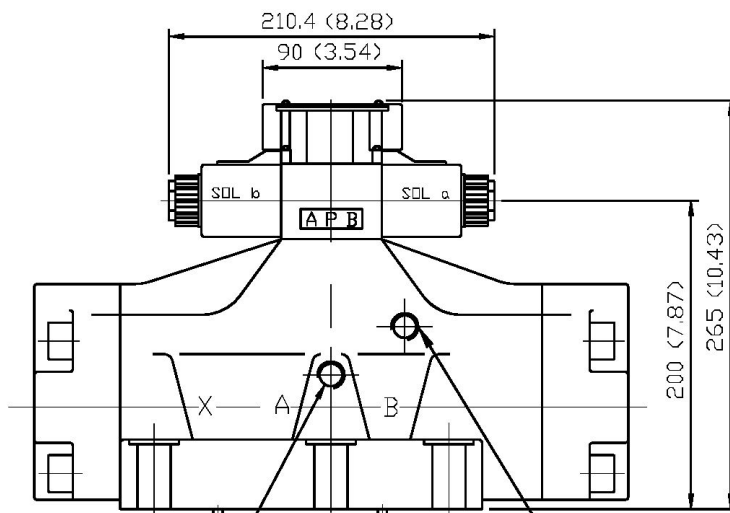
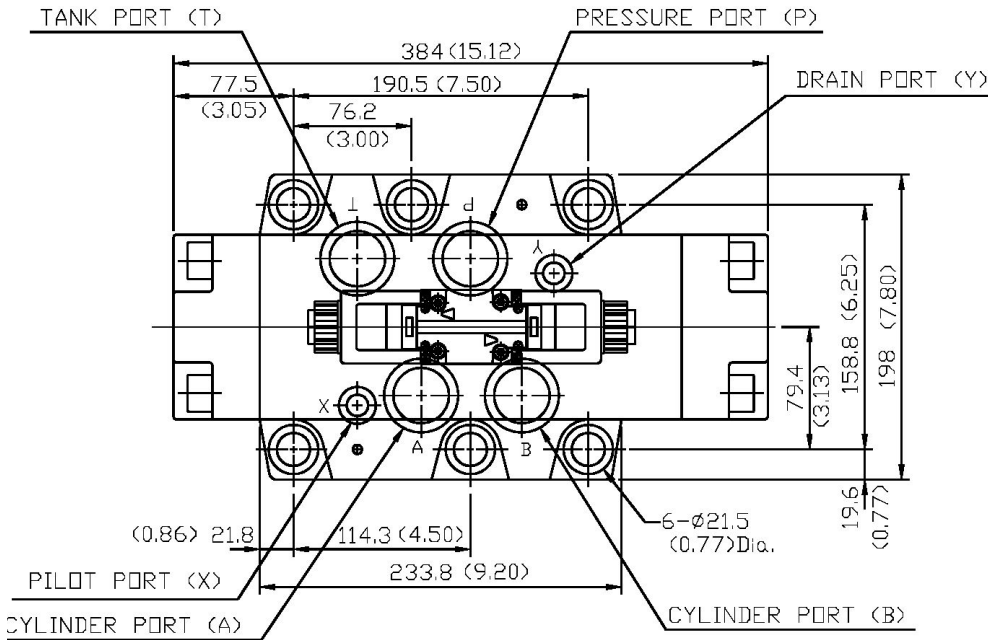
SOLENOID OPERATED DIRECTIONAL VALVE  
SW-G10 SERIES

Dimensions

SW - G10 - \*\* - \*\*\*\* - 10

MOUNTING SURFACE: ISO 4401-AB-03-4-A

UNIT: mm( inch)



MACHINED PLUG FOR PILOT PORT

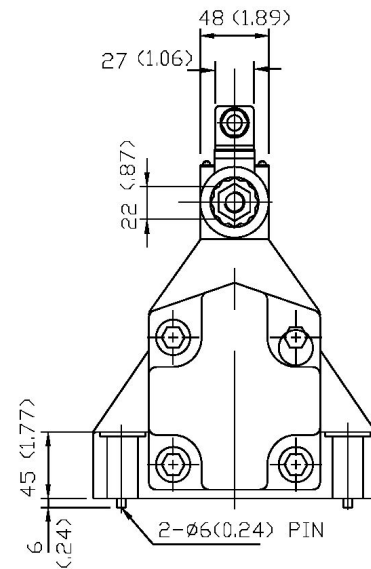
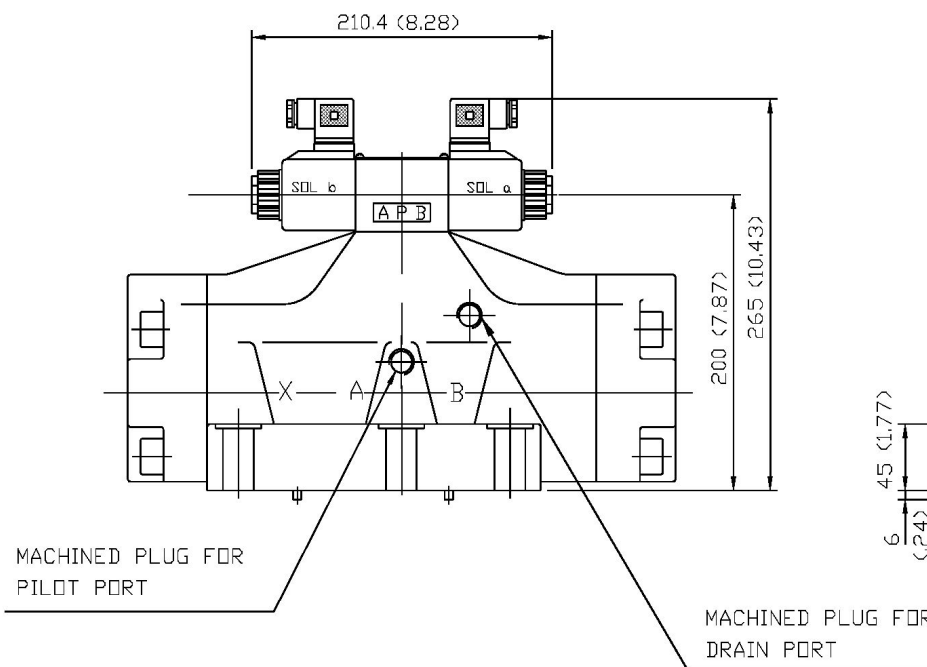
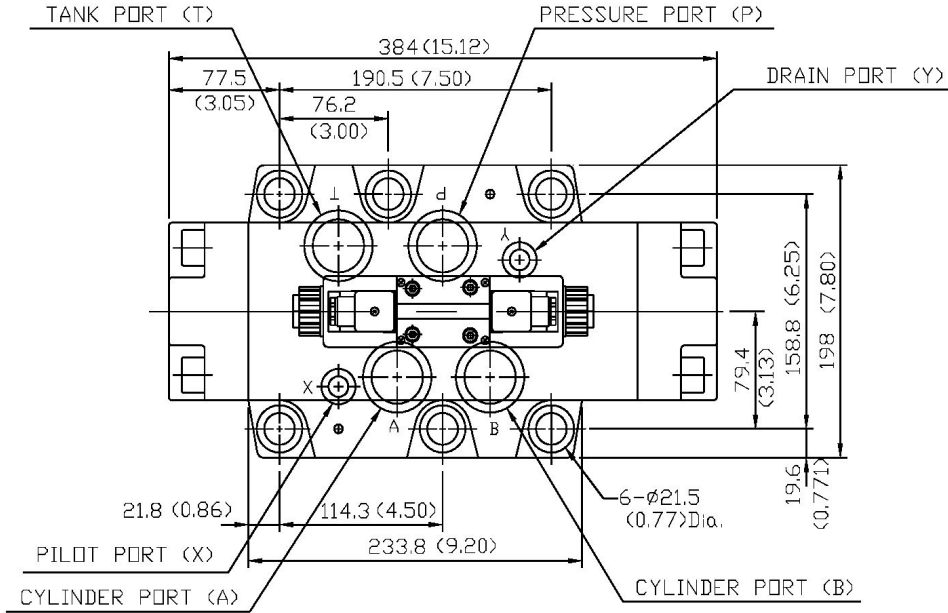
MACHINED PLUG FOR DRAIN PORT

**SOLENOID OPERATED DIRECTIONAL VALVE**  
**SW-G10 SERIES**

**Dimensions**

SW - G06 - \*\* - \*\*\*\* - 20

**MOUNTING SURFACE: ISO 4401-AB-03-4-A**  
**UNIT: mm( inch)**



MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G02 SERIES

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**FEATURES**

This industrial hydraulic four-way valve is actuated manually with the hand-lever. It may be ordered as a 2-position or a 3-position valve. Other options include a spring-offset design, or spring-centered or detented.

The valve mounts on the M02 Subplate series.

Note: Modular pressure and flow control valves in the M\*\*-02 series that mount under this directional control are available separately to make a convenient control valve package.

---

**HD - G 02 - 2 B2 - \*\***

**1**   **2**   **3**   **4**   **5**   **6**

**1 Series**

**HD:** Manually Operated  
Directional Control  
Valve

**2 Body Style**

**G:** Subplate Mounted

**3 Mounting / Ports**

**02:** Interface 02  
NFPA D03 Size / ISO 4401-03  
/ CETOP 3 / NG06

**4 Valve Positions**

**2:** Two Position Valve  
**3:** Three Position Valve

**5 Spool**

**Spool Type:** See Chart

**6 Design Number**

4 Way 3 Position Spring Centered	
3C2	
3C3	
3C4	
3C6	

4-Way 3-Position Detent	
3D2	
3D3	
3D4	
3D6	

4-Way 2-Position Spring Offset	
2B2 Closed Crossover	
2B3 Open Crossover	

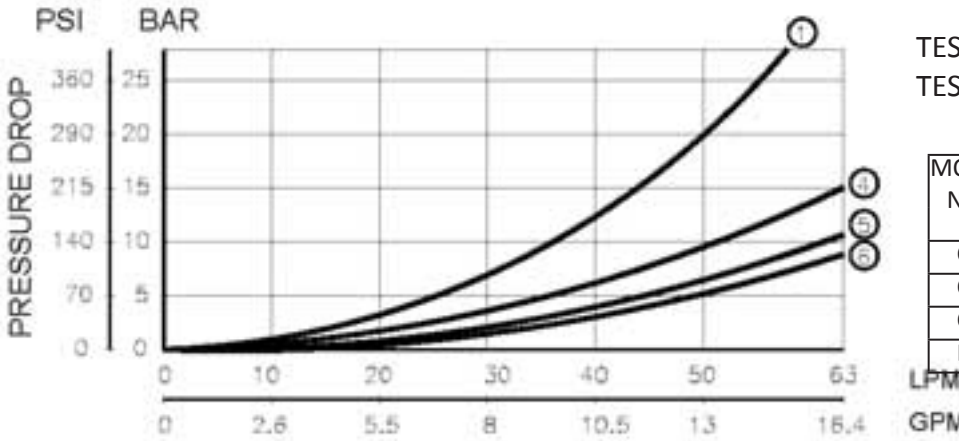
4-Way 2-Position Detent	
2D2 Closed Crossover	
2D3 Open Crossover	

MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G02 SERIES

**SPECIFICATIONS**

Maximum operating pressure	207 BAR (3000 PSI)
Maximum flow	63 LPM (16.6 GPM)

**PRESSURE DROP AND PERFORMANCE CURVES**



TEST FLUID VISCOSITY : 35 cSt (175 SSU)  
TEST TEMPERATURE: 50C(122F)

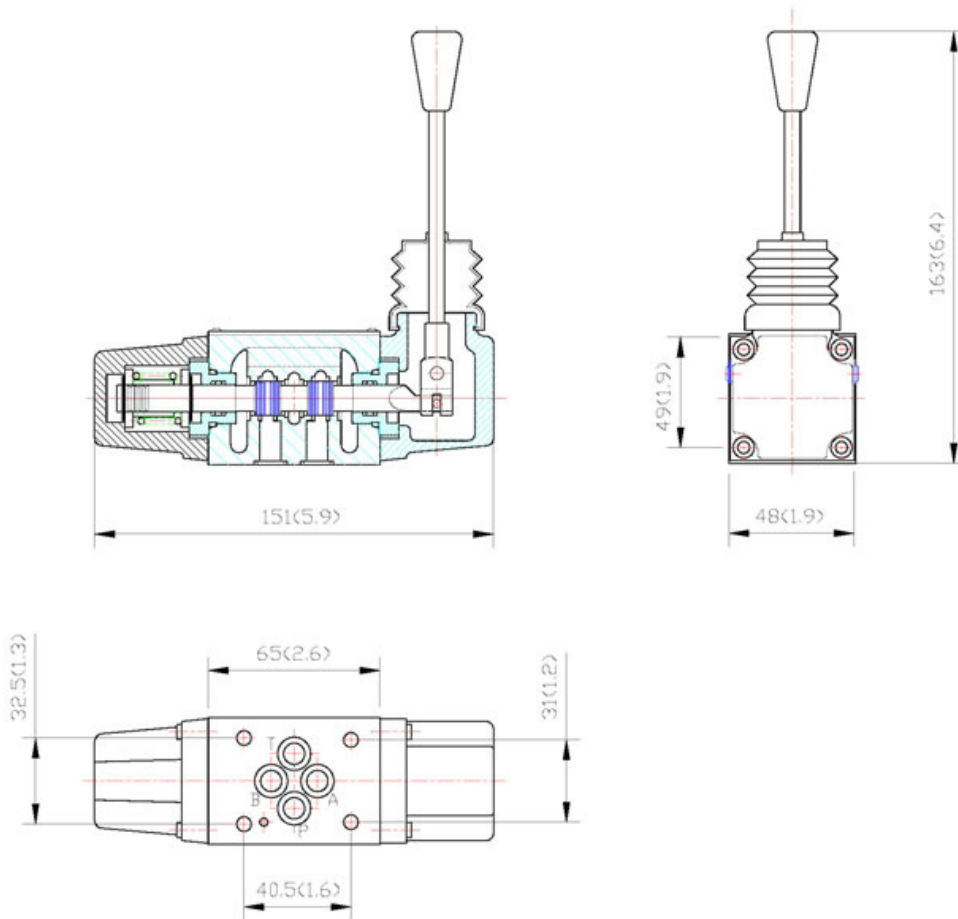
MODEL NO :	PRESSURE DROP CURVE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	5	5	5	5	-
C4	5	6	5	6	-
C6	1	1	1	1	4
B2	4	5	4	5	-

**Dimensions**

HD - G02 - \*\*\* - \*\*

MOUNTING SURFACE: ISO 4401-AB-03-4-A

UNIT: mm( inch)



MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G03 SERIES



**FEATURES**

This industrial hydraulic four-way valve is actuated manually with the hand-lever. It may be ordered as a 2-position or a 3-position valve. Other options include a spring-offset design, or spring-centered or detented.

The valve mounts on the M03 Subplate series.

Note: Modular pressure and flow control valves in the M\*\*-03 series that mount under this directional control are available separately to make a convenient control valve package.

**HD - G 03 - 2 B2 - \*\***

1 2 3 4 5 6

1 **Series**

**HD:** Manually Operated  
Directional Control  
Valve

2 **Mounting Style**

**G:** Subplate Mounted

3 **Body Style**

**03:** Interface 03  
NFPA D05 Size / ISO 4401-05  
/ CETOP 5 / NG 10

4 **Valve Positions**

**2:** Two Position Valve  
**3:** Three Position Valve

5 **Spool**

**Spool Type:** See Chart

6 **Design Number**



4 Way 3 Position Spring Centered	
3C2	
3C3	
3C4	
3C6	

4-Way 3-Position Detent	
3D2	
3D3	
3D4	
3D6	

4-Way 2-Position Spring Offset	
2B2 Closed Crossover	
2B3 Open Crossover	

4-Way 2-Position Detent	
2D2 Closed Crossover	
2D3 Open Crossover	

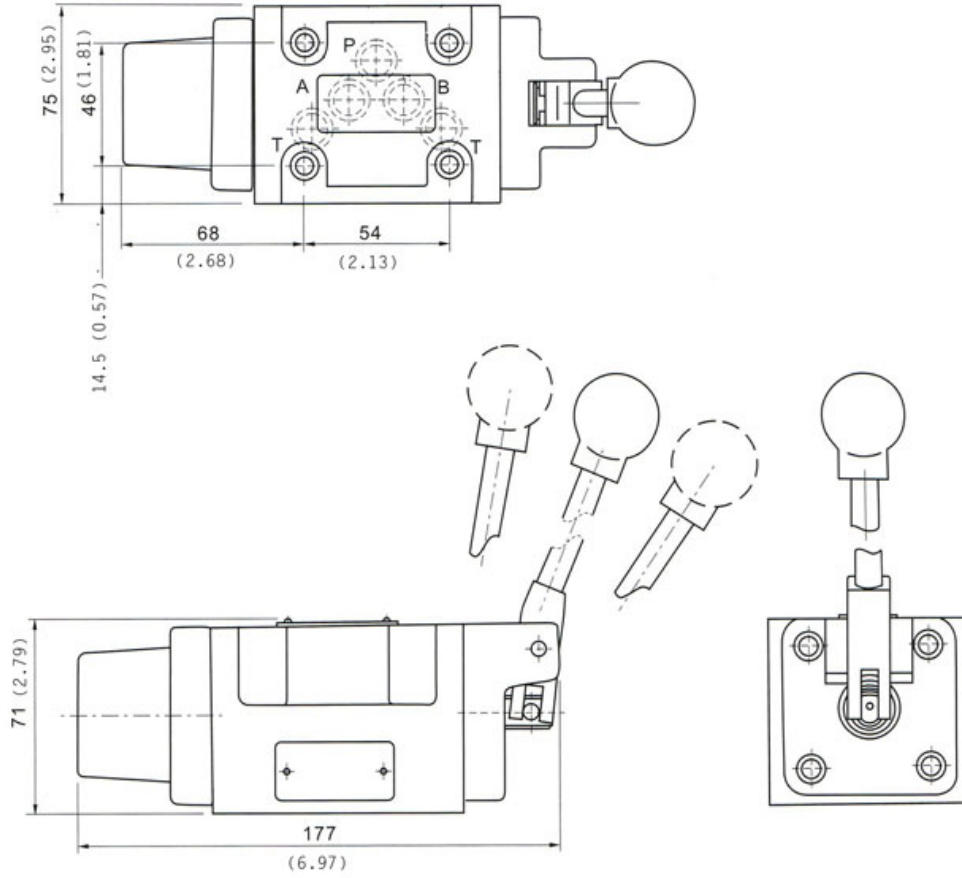
MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G03 SERIES

**Dimensions**

HD - G03 - \*\*\* - \*\*

MOUNTING SURFACE: ISO 4401-AB-03-4-A

UNIT: mm( inch)



# MANUALLY OPERATED DIRECTIONAL VALVE HD-G04 SERIES



## FEATURES

This industrial hydraulic four-way valve is actuated manually with the hand-lever. It may be ordered as a 2-position or a 3-position valve. Other options include a spring-offset or spring-centered design.

The valve mounts on the M04 Subplate series.

Note: Modular pressure and flow control valves in the M\*\*-04 series that mount under this directional control are available separately to make a convenient control valve package.

## HD - G 04 - 2 B2 - \*\*

1 2 3 4 5 6

### 1 Series

**HD:** Manually Operated  
Directional Control  
Valve

### 2 Mounting Style

**G:** Subplate Mounted

### 3 Body Style

**04:** Interface 04  
NFPA D07 Size / ISO 4401-07  
/ CETOP 7 / NG 16

### 4 Valve Positions

**2:** Two Position Valve  
**3:** Three Position Valve

### 5 Spool

**Spool Type:** See Chart

### 6 Design Number

4 Way 3 Position Spring Centered	
3C2	
3C3	
3C4	
3C6	

4-Way 3-Position Detent	
3D2	
3D3	
3D4	
3D6	

4-Way 2-Position Spring Offset	
2B2 Closed Crossover	
2B3 Open Crossover	

4-Way 2-Position Detent	
2D2 Closed Crossover	
2D3 Open Crossover	

MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G04 SERIES

**Dimensions**

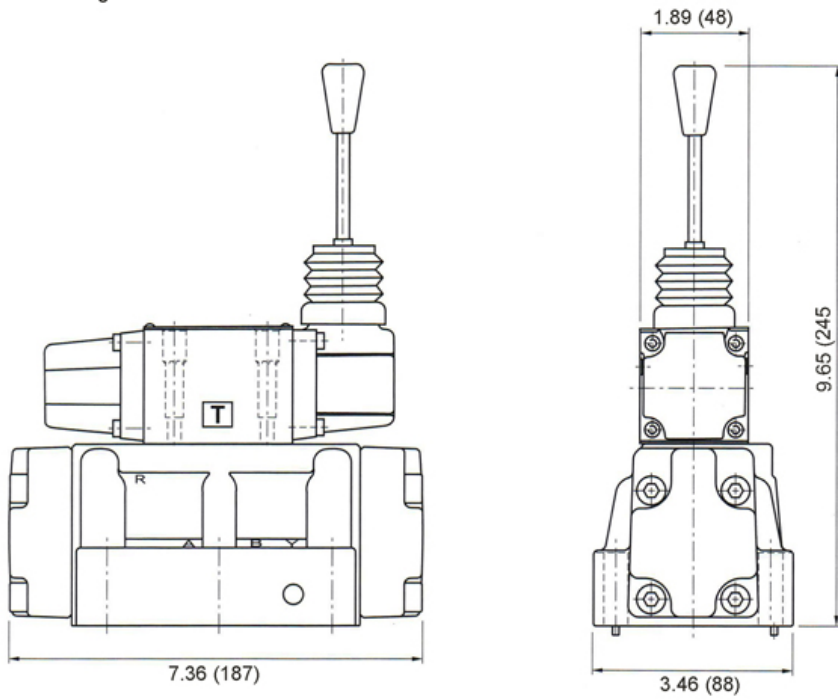
HD - G04 - \*\*\* - \*\*

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

● HD-G04

Mounting: NFPA 07

in (mm)



# MANUALLY OPERATED DIRECTIONAL VALVE

## HD-G06 SERIES



### FEATURES

This industrial hydraulic four-way valve is actuated manually with the hand-lever. It may be ordered as a 2-position or a 3-position valve. Other options include a spring-offset or spring-centered design.

The valve mounts on the M06 Subplate series.

Note: Modular pressure and flow control valves in the M\*\*-06 series that mount under this directional control are available separately to make a convenient control valve package.

## HD – G 06 – 2 B2 – \*\*

1 2 3 4 5 6

### 1 Series

**HD:** Manually Operated  
Directional Control  
Valve

### 2 Mounting Style

**G:** Subplate Mounted

### 3 Body Style

**06:** Interface 06  
NFPA D08 Size / ISO 4401-08  
/ CETOP 8 / NG 25

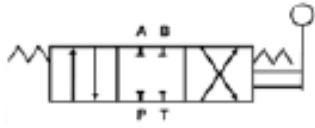


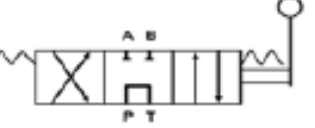
### 4 Valve Positions

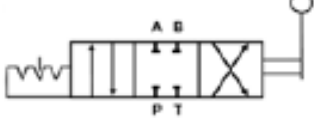

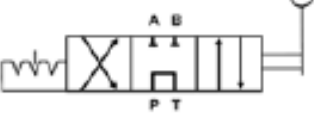

**2:** Two Position Valve  
**3:** Three Position Valve



### 5 Spool



**Spool Type:** See Chart

### 6 Design Number

4 Way 3 Position Spring Centered	
3C2	
3C3	
3C4	
3C6	

4-Way 3-Position Detent	
3D2	
3D3	
3D4	
3D6	

4-Way 2-Position Spring Offset	
2B2 Closed Crossover	
2B3 Open Crossover	

4-Way 2-Position Detent	
2D2 Closed Crossover	
2D3 Open Crossover	

MANUALLY OPERATED DIRECTIONAL VALVE  
HD-G04 SERIES

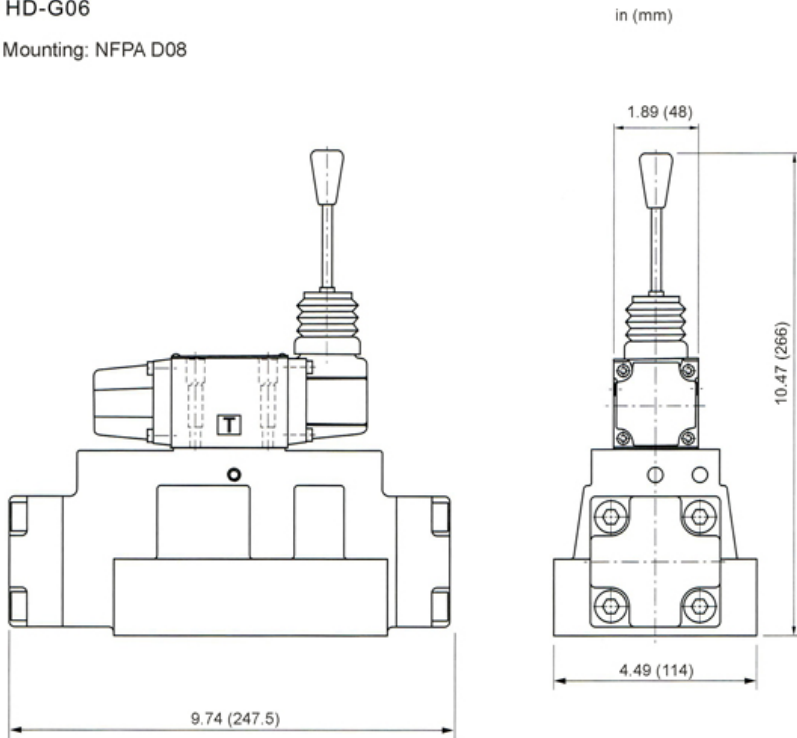
**Dimensions**

HD - G06- \*\*\* - \*\*

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

● HD-G06

Mounting: NFPA D08





MANUALLY OPERATED DIRECTIONAL VALVE  
HD-T03/T06 SERIES



**FEATURES**

This industrial hydraulic four-way valve is actuated manually with the hand-lever. It may be ordered as a 2-position or a 3-position valve. Other options include a spring-offset design, or spring-centered or detented.

The valve is available in two body sizes with ports either 3/8" NPT or 3/4" NPT.

**HD - T 03 - 2 B2 - \*\* - N**

**1**   **2** **3**   **4** **5**   **6**   **7**

**1 Series**

**HD:** Manually Operated  
Directional Control  
Valve

**2 Mounting Style**

**T:** Threaded Body Valve

**3 Body Size**

**03:** 25 GPM (100 LPM)  
**06:** 52 GPM (3C3, 3C5, 3C6, 2B\*)  
80 GPM (Other Spools)

**4 Valve Positions**

**2:** Two Position Valve  
**3:** Three Position Valve

**5 Spool**

**Spool Type:** See Chart

**6 Design Number**

**7 Ports**

**N:** (T03) 3/8" NPT  
(T06) 3/4" NPT

4 Way 3 Position Spring Centered	
3C2	
3C3	
3C4	
3C6	

4-Way 3-Position Detent	
3D2	
3D3	
3D4	
3D6	

4-Way 2-Position Spring Offset	
2B2 Closed Crossover	
2B3 Open Crossover	

4-Way 2-Position Detent	
2D2 Closed Crossover	
2D3 Open Crossover	

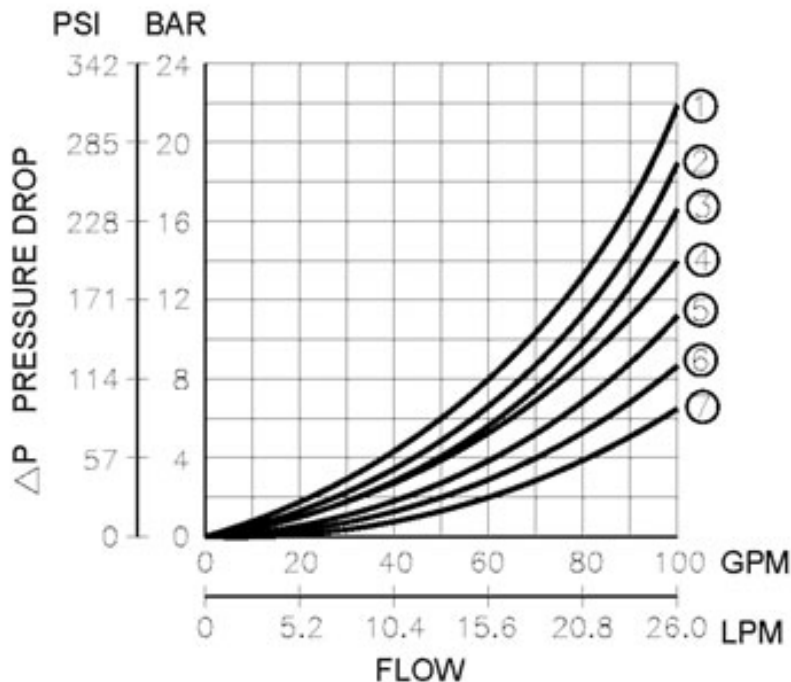
MANUALLY OPERATED DIRECTIONAL VALVE  
HD-T03/T06 SERIES

**SPECIFICATIONS**

MODEL CODE	MAX. FLOW LPM (GPM)	MAX. PRESSURE BAR (PSI)
HD-T03-*C*-10	100 (25)	207 (3000)
HD-T03-2D*-10	100 (25)	207 (3000)
HD-T03-2B*-10	100 (25)	207 (3000)
HD-T06-*C*-10	300 (80) / * 200(52)	207 (3000)
HD-T06-2D*-10	300 (80)	207 (3000)
HD-T06-2B*-10	200 (52)	207 (3000)

\* IS THE RATING FOR 3C3, 3C5, 3C6

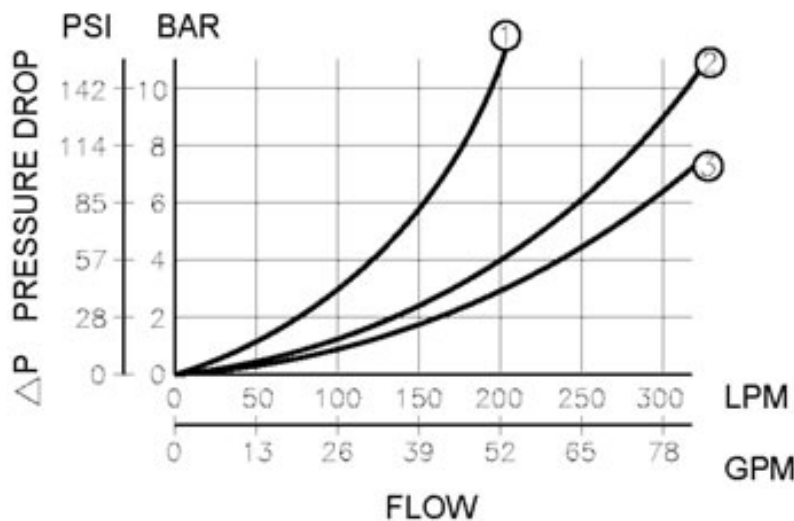
**HD-T03 PRESSURE DROP CURVES**



TEST FLUID VISCOSITY : 35 cSt (175 SSU)  
TEST TEMPERATURE: 50C(122F)

SPOOL	PRESSURE DROP LINE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	4	5	4	5	-
C3	6	6	6	6	6
C4	4	7	4	7	-
C40	4	5	4	5	-
C5	6	5	4	6	2
C6	5	5	5	5	1
C60	5	5	5	5	1

**HD-T06 PRESSURE DROP CURVES**



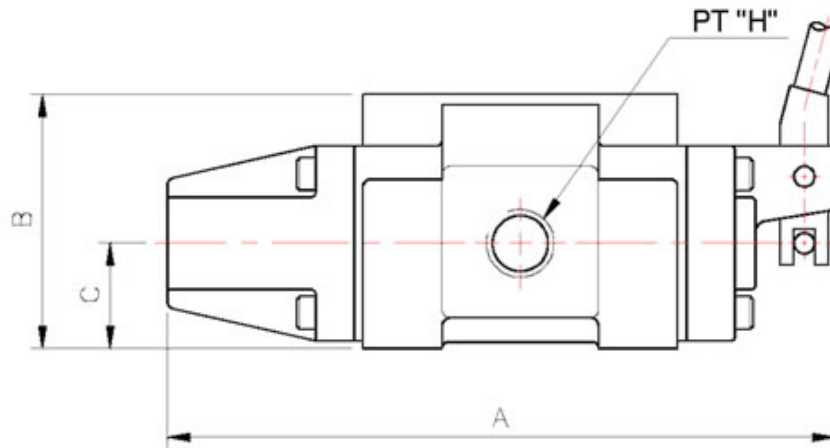
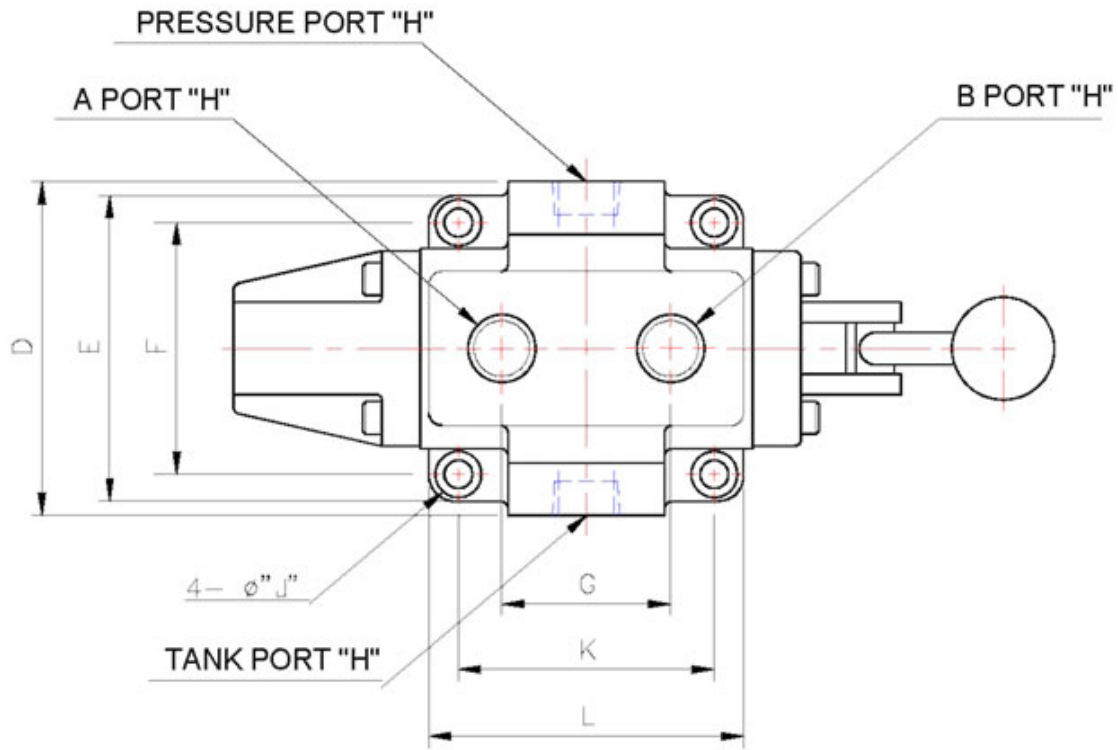
TEST FLUID VISCOSITY : 35 cSt (175 SSU)  
TEST TEMPERATURE: 50C(122F)

SPOOL	PRESSURE DROP LINE NUMBER				
	P-A	B-T	P-B	A-T	P-T
C2	2	2	2	2	-
C3	3	2	3	2	2
C4	2	3	2	2	-
C40	2	2	2	2	-
C5	3	2	2	2	-
C6	3	2	3	2	1
C60	3	2	3	2	1

MANUALLY OPERATED DIRECTIONAL VALVE  
HD-T03/T06 SERIES

**Dimensions**  
HD-T03/T06 SERIES

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



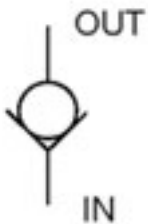
MODEL	A	B	C	D	E	F	G	H	J	K	L	WEIGHT	
												KGS	LBS
HD-T03 SERIES	174 (6.85)	82 (3.23)	39 (1.53)	74 (2.91)	68 (2.68)	50 (1.96)	33 (1.30)	M10 (3/8")	68 (0.27)	58 (2.29)	92 (3.62)	4.0	8.9
HD-T06 SERIES	258 (10.16)	99 (3.90)	41 (1.61)	130 (5.12)	120 (4.72)	98 (3.86)	66 (2.60)	M19 (3/4")	11 (0.43)	100 (3.94)	125 (4.92)	11.5	25.8



**FEATURES**

This in-line check valve is designed to allow free flow of oil in a hydraulic system in one direction and block flow in the reverse direction. Port sizes range from 3/8" NPT to 2" NPT.

**SYMBOL**



**CI - T 06 - 05 - \*\* - N**

1 2 3 4 5 6

**1 Series**  
 CI: In-Line Check Valve

**2 Body Style**  
 T: Threaded Body

**3 Valve Size**  
 03: 3/8" NPT  
 04: 1/2" NPT  
 06: 3/4" NPT  
 08: 1" NPT  
 10: 1-1/4" NPT  
 12: 1-1/2" NPT  
 16: 2" NPT

**4 Cracking Pressure**  
 05: 5 PSI (0.35 BAR)  
 50: 50 PSI (3.5 BAR)

**5 Design Number**

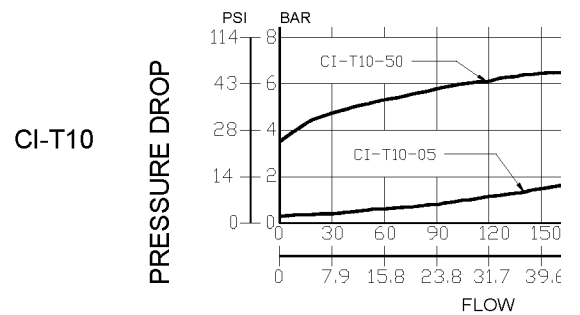
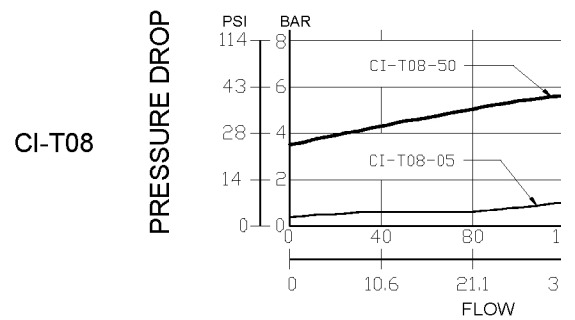
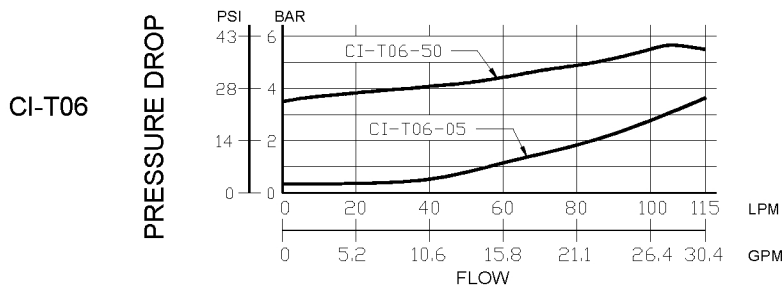
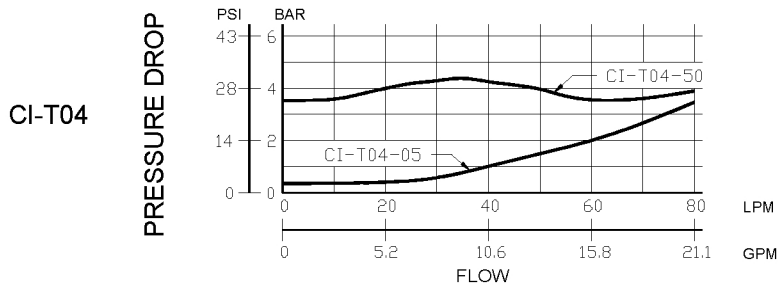
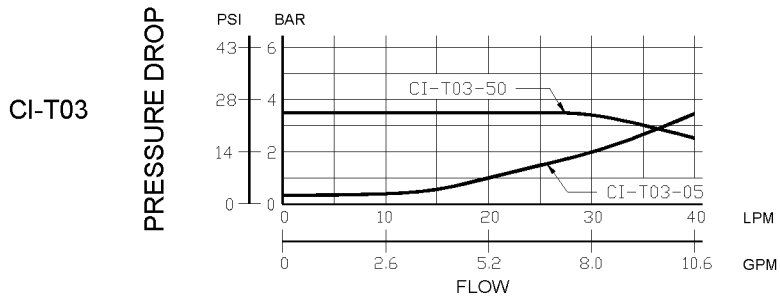
**6 Port Type**  
 N: NPT Ports

**SPECIFICATIONS**

MODEL	RATE FLOW LPM(GPM)	MAX. OPERATED PRESSURE BAR (PSI)	CRACKING PRESSURE BAR (PSI)
CI-T03	30(7.9)	207(3000)	05: 0.35(5) 50: 3.5(50)
CI-T04	65(17.1)		
CI-T06	115(30.4)		
CI-T08	165(43.6)		
CI-T10	210(55.5)		

**PERFORMANCE CURVES**

TEST FLUID VISCOSITY : 35 cSt (175 SSU)  
TEST TEMPERATURE: 50C(122F)

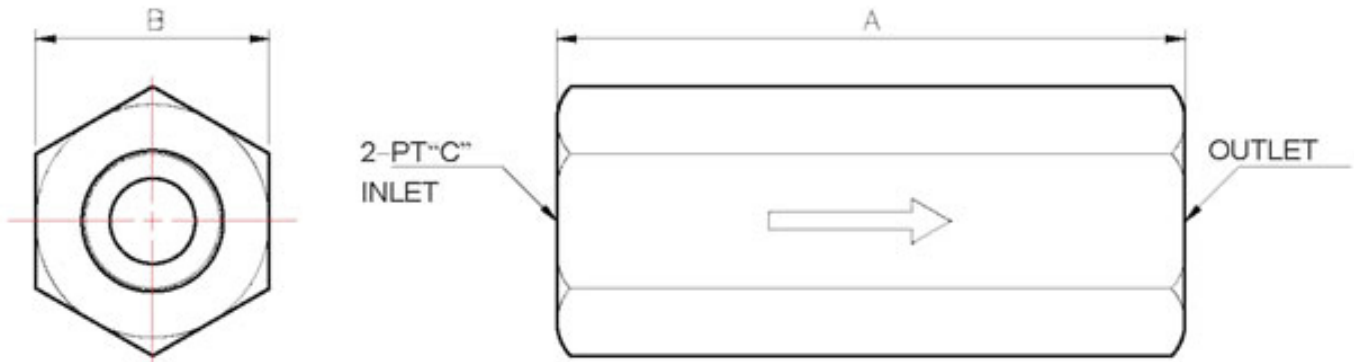


INLINE CHECK VALVE

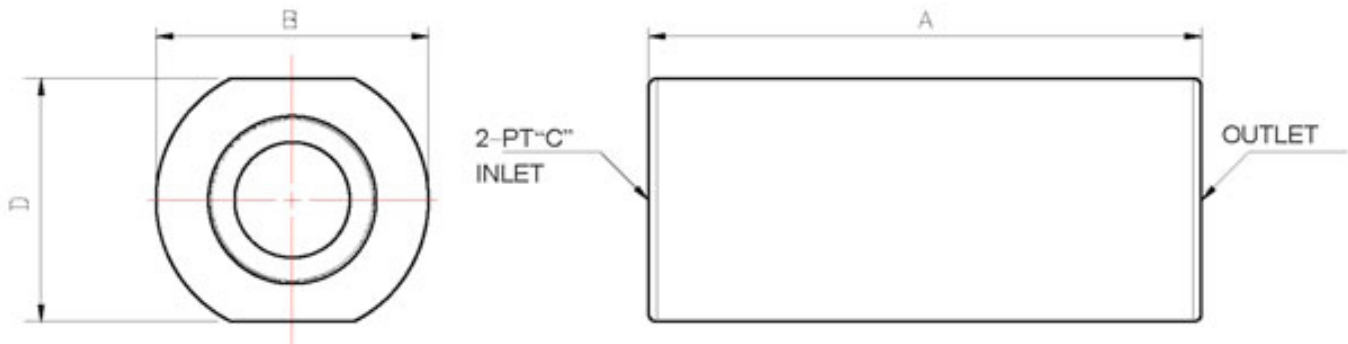
**Dimensions**  
IN LINE CHECK VALVE

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

CI-T03/04/06/08/16



CI-T10



MODEL	A	B	C	D	WEIGHT KGS(LBS)
CI-T03	70 (2.76)	26 (1.02)	3/8"	--	0.20 (0.44)
CI-T04	82 (3.23)	29 (1.14)	1/2"	--	0.40 (0.88)
CI-T06	91.5 (3.60)	35 (1.38)	3/4"	--	0.70 (1.54)
CI-T08	112 (4.41)	51 (2.01)	1"	--	1.00 (2.20)
CI-T10	132 (5.20)	65 (2.56)	1-1/4"	58 (2.28)	2.10 (4.62)
CI-T16	159 (6.25)	80 (3.13)	2"	--	3.63 (8.00)

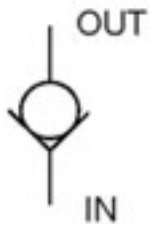
## RIGHT ANGLE CHECK VALVE



### FEATURES

This subplate mounted check valve is designed to allow free flow of oil in a hydraulic system in one direction and block flow in the reverse direction. It mounts on the CVM-\*\* series subplate, also shown on this page.

### SYMBOL



## CV – G 06 – 05 – 10 – N

1 2 3 4 5 6

### 1 Series

**CV:** Right Angle Check Valve

### 4 Cracking Pressure

**05:** 5 PSI (0.35 BAR)

**50:** 50 PSI (3.5 BAR)

### 2 Body Style

**G:** Subplate Mounted

### 5 Mounting

**10:** Non-ISO Standard

### 3 Valve Size

**03:** 3/8" (10.5 GPM Max)

**06:** 3/4" (33.0 GPM Max)

**10:** 1-1/4" (66.0 GPM Max)

### 6 Mtg. Bolt Thread

**N:** Bolt Kit w/ Inch Threads



# RIGHT ANGLE CHECK VALVE

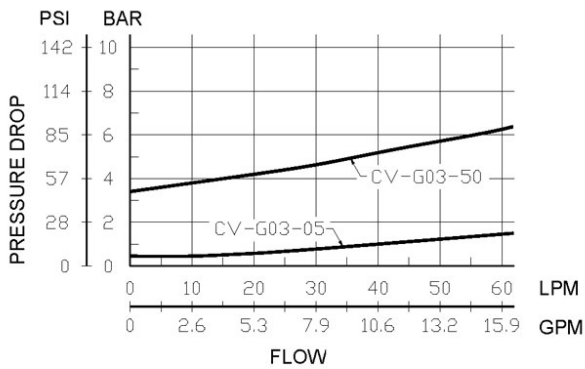
## SPECIFICATIONS

MODEL	RATE FLOW LPM(GPM)	MAX. OPERATED PRESSURE BAR (PSI)	CRACKING PRESSURE BAR (PSI)
CV-G03	40(10.5)	245 (3550)	05: 0.35(5) 50: 3.5(50)
CV-G06	125(33.0)		
CV-G10	250(66.0)		

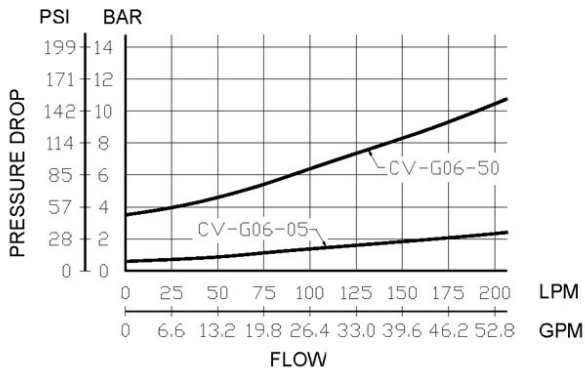
## PERFORMANCE CURVES

CV-G03

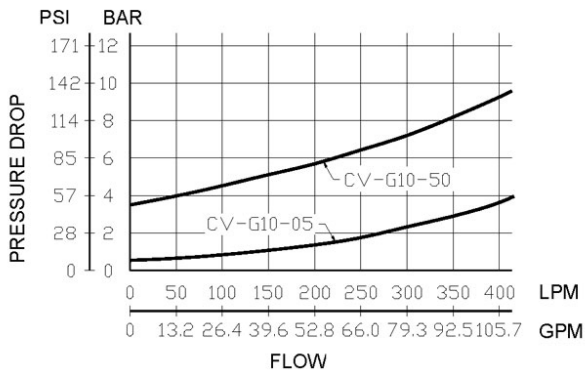
TEST FLUID VISCOSITY : 35 cSt (175 SSU)  
TEST TEMPERATURE: 50C(122F)



CV-G06



CV-G10

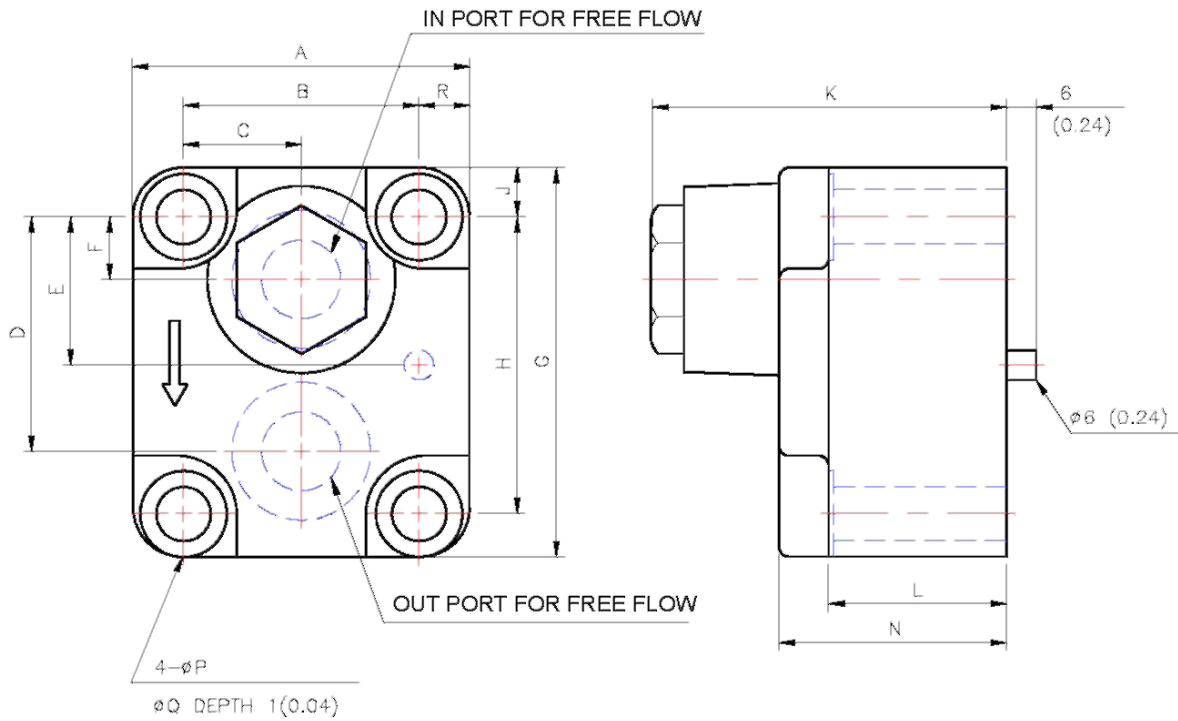


# RIGHT ANGLE CHECK VALVE

## Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

CV-G03/06/10-\*\*-10



MODEL	A	B	C	D	E	F	G	H	J
CV-G03	68 (2.68)	47.6 (1.87)	23.8 (0.94)	47.6 (1.87)	30.1 (1.19)	12.7 (0.50)	80 (3.15)	60.3 (2.27)	10 (0.39)
CV-G06	101 (3.98)	65.2 (2.56)	32.6 (1.28)	68.2 (2.69)	40.5 (1.59)	22.2 (0.87)	114 (4.49)	80.9 (3.19)	16.5 (0.65)
CV-G10	130 (5.12)	92.1 (3.63)	46.1 (1.81)	71.4 (2.81)	46.0 (1.81)	20.6 (0.81)	130 (5.12)	92.1 (3.63)	19 (0.75)

MODEL	K	L	N	P	Q	BOLT	WEIGHT	
							KGS	LBS
CV-G03	70 (2.76)	36 (1.42)	46 (1.81)	11 (0.43)	17.5 (0.69)	M10x50x4PCS (3/8"x2") x4PCS	1.7	3.7
CV-G06	81 (3.19)	38 (1.49)	54 (2.12)	17.5 (0.69)	26 (1.02)	M16x55x4PCS (5/8"x2-1/2") x4PCS	4.1	9.0
CV-G10	100 (3.94)	50 (1.97)	67 (2.64)	21.5 (0.85)	30 (1.18)	M20x75x4PCS (3/4"x3") x4PCS	6.6	14.5

MODEL	R	SUBPLATE
CV-G03	10.2 (0.405)	GM-03
CV-G06	16.45 (0.65)	GM-06
CV-G10	18.95 (0.745)	GM-10

RIGHT ANGLE CHECK VALVE

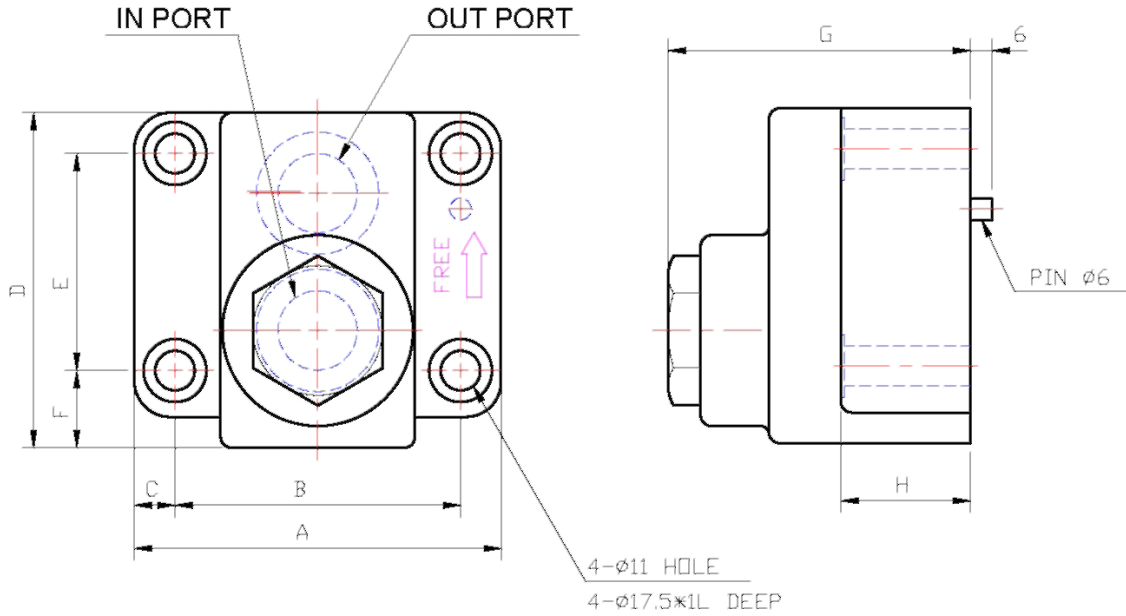
Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

CV-G03/G06-\*\*-20

G03: ISO 5781-AG-06-2-A

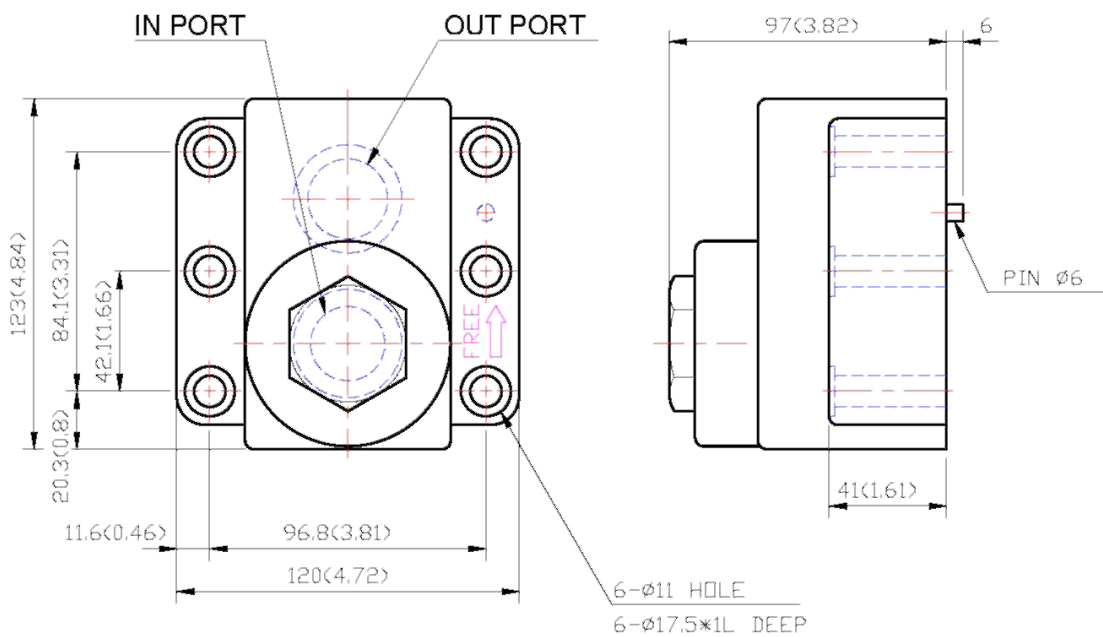
G06: ISO 5781-AH-08-2-A



MODEL	A	B	C	D	E	F	G	H
CV-G03	90(3.54)	66.7(2.63)	11.7(0.46)	72(2.83)	42.9(1.69)	17.5(0.69)	72.5(2.85)	31(1.22)
CV-G06	102(4.02)	79.4(3.13)	11.3(0.44)	93(3.66)	60.3(2.37)	21.4(0.84)	84(3.31)	36(1.42)

CV-G10-\*\*-20

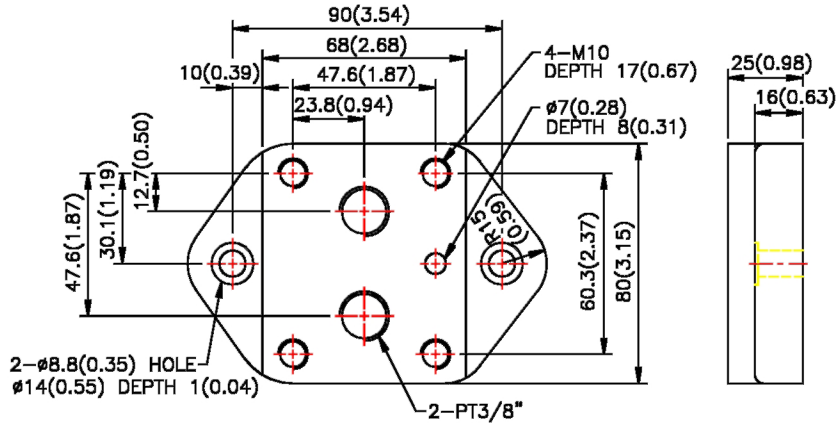
G10: ISO 5781-AG-10-2-A



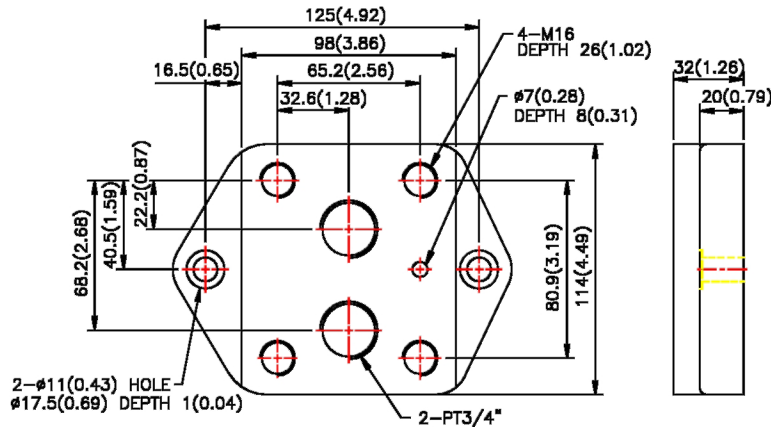
Dimensions

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

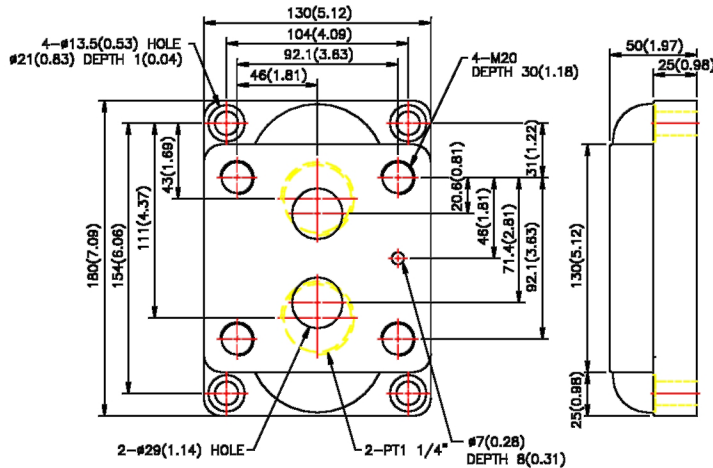
CVM-03-10



CVM-06-10



CVM-10-10

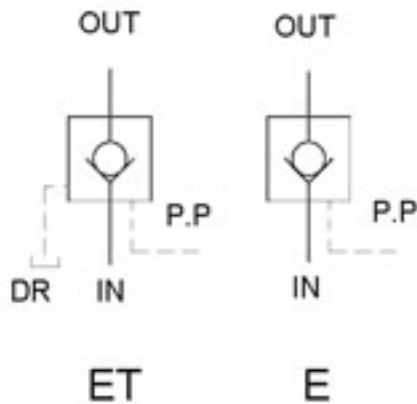




**FEATURES**

As a pilot-operated check valve, this in-line valve is designed to block the flow of oil in a line of a hydraulic system. Flow is restored by a pilot pressure signal releasing the check valve.

**SYMBOL**



**PCV - T 06 - 05 - ET - \*\* - N**



**1 Series**

**PCV:** Pilot Controlled Check Valve  
**PCDV:** Decompression Pilot Controlled Check Valve

**2 Mounting Style**

**T:** Threaded Body

**3 Body Size**

**03:** 3/8" - 10.6 GPM  
**06:** 3/4" - 33 GPM  
**10:** 1-1/4" - 66 GPM

**4 Cracking Pressure**

**05:** 5 PSI (0.35 BAR)  
**50:** 50 PSI (3.5 BAR)

**5 Pilot Pressure**

**E:** External Pilot

**6 Drain**

**No Code:** Internal Drain  
**T:** External Drain

**7 Design Number**

**8 Ports**

**N:** NPT Ports for "T" Threaded Body Style  
**03:** 3/8" NPT  
**06:** 3/4" NPT  
**10:** 1-1/4" NPT

# PILOT CONTROLLED CHECK VALVE

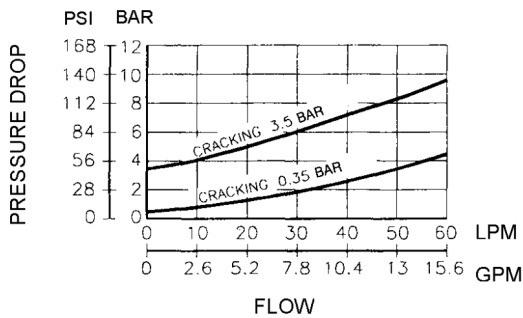
## SPECIFICATIONS

MODEL	RATE FLOW LPM(GPM)	MAX. PRESSURE BAR (PSI)	CRACKING PRESSURE BAR (PSI)
PCV/PCDV-*03	40(10.6)	245(3550)	05: 0.35(5) 50: 3.5(50)
PCV/PCDV-*06	125(33)		
PCV/PCDV-*10	250(66)		

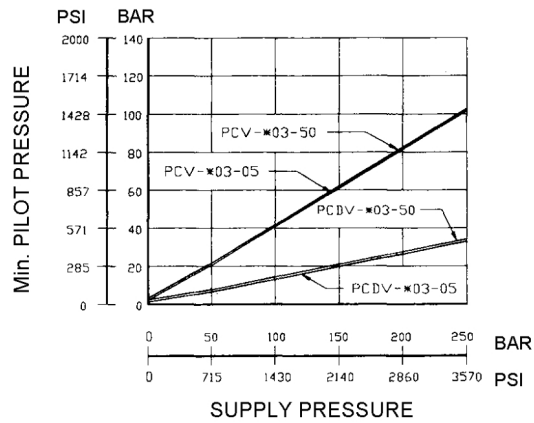
## PERFORMANCE CURVES

### PRESSURE DROP

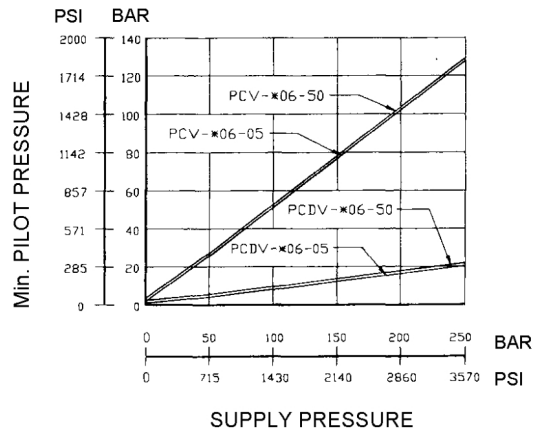
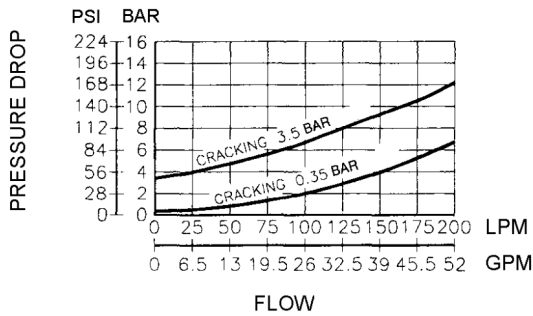
#### PCV-\*03/PCDV-\*03



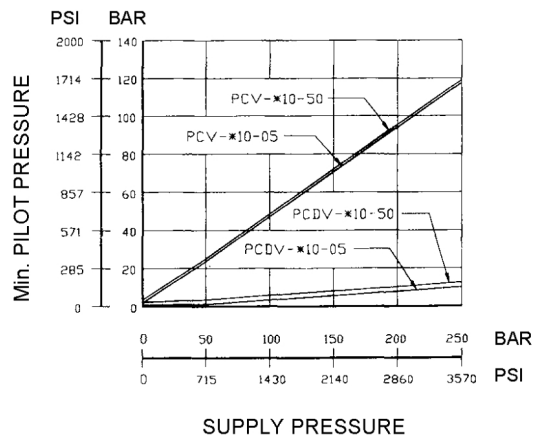
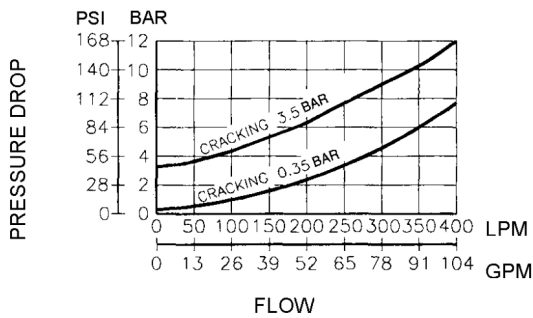
### MIN. PILOT PRESSURE



#### PCV-\*06/PCDV-\*06



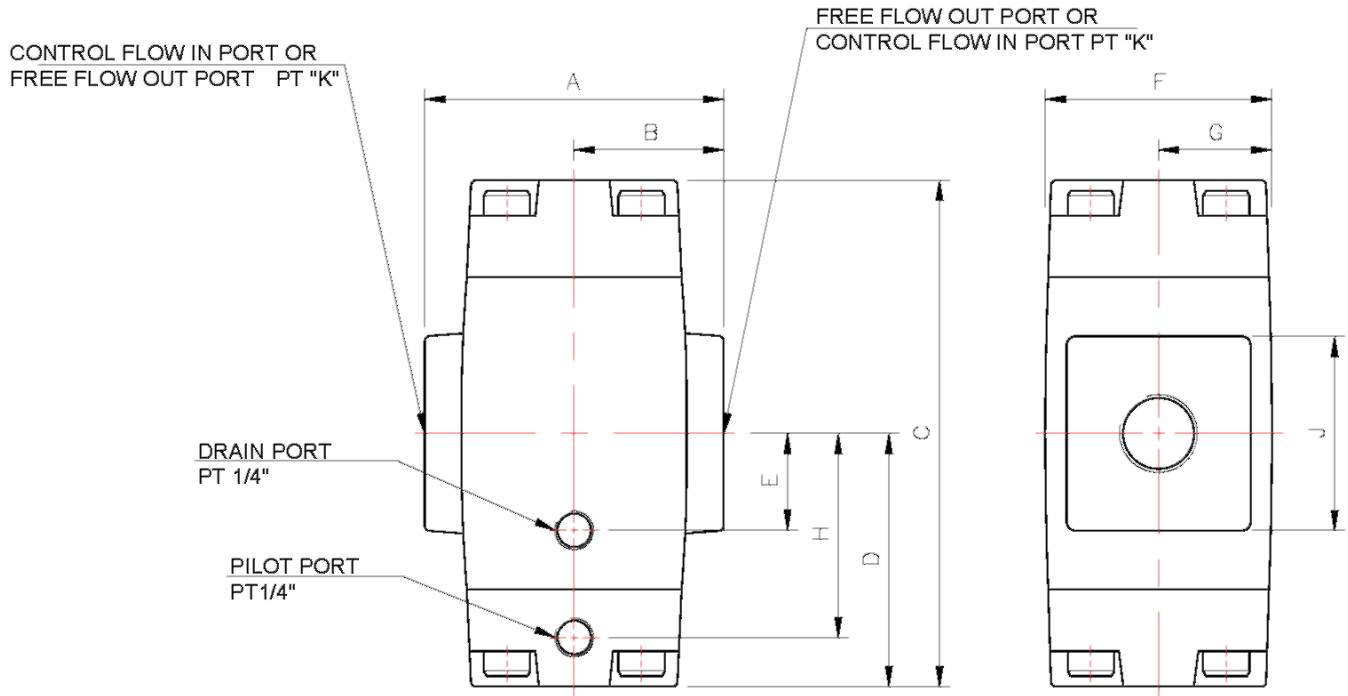
#### PCV-\*10/PCDV-\*10



**SOLENOID CONTROLLED BIFUNCTIONAL VALVE**  
**M02 SUBPLATE**

**Dimensions**  
**PCV-T03/06/10**

**MOUNTING SURFACE: ISO 4401-AB-03-4-A**  
**UNIT: mm( inch)**

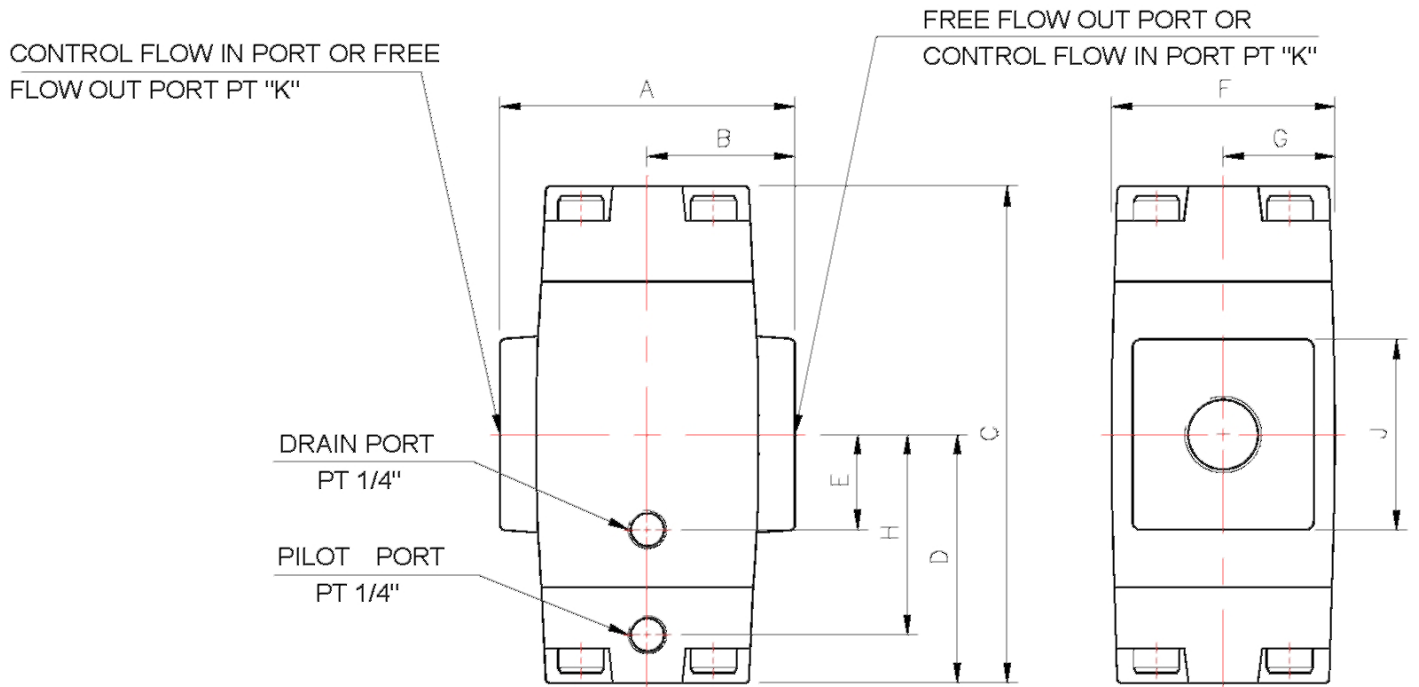


MODEL	A	B	C	D	E	F	G	H	J	K	WEIGHT KGS(LBS)
PCV-T03	80 (3.15)	40 (1.57)	150.5 (5.93)	75 (2.95)	21 (0.83)	64 (2.52)	35.5 (1.40)	58 (2.28)	41 (1.61)	M10 (3/8")	3.4(7.5)
PCV-T06	99.6 (3.92)	49.8 (1.96)	174 (6.85)	84 (3.31)	26 (1.02)	73 (2.87)	38 (1.50)	68 (2.68)	65 (2.56)	M19 (3/4")	6.0(13.2)
PCV-T10	140 (5.51)	70 (2.76)	208 (8.19)	104 (4.09)	35 (1.38)	92 (3.62)	45 (1.77)	84 (3.31)	79 (3.11)	M32 (1-1/4")	11.6 (25.5)

# PILOT CONTROLLED CHECK VALVE

## Dimensions PCDV-T03/06/10

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



MODEL	A	B	C	D	E	F	G	H	J	K	WEIGHT KGS(LBS)
PCV-T03	80 (3.15)	40 (1.57)	150.5 (5.93)	75 (2.95)	21 (0.83)	64 (2.52)	35.5 (1.40)	58 (2.28)	41 (1.61)	M10 (3/8")	3.4(7.5)
PCV-T06	99.6 (3.92)	49.8 (1.96)	174 (6.85)	84 (3.31)	26 (1.02)	73 (2.87)	38 (1.50)	68 (2.68)	65 (2.56)	M19 (3/4")	6.0(13.2)
PCV-T10	140 (5.51)	70 (2.76)	208 (8.19)	104 (4.09)	35 (1.38)	92 (3.62)	45 (1.77)	84 (3.31)	79 (3.11)	M32 (1-1/4")	11.6 (25.5)



SOLENOID OPERATED DIRECTIONAL VALVE  
M02 SUBPLATE

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**FEATURES**

This single-station subplate for mounting an industrial hydraulic directional control valve conforms to the National Fluid Power Association (NFPA) D03 mounting pattern. It accepts Northman valves in the SWH-G02 and HD-G02 Series. NPT and SAE Ports are available on the side or the bottom for Pressure, Tank, A and B connections.

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**M 02 - 02 - S - 2**

1 2 3 4 5

1 **Series** \_\_\_\_\_

**M:** Subplate

2 **Size** \_\_\_\_\_

**02:** NFPA Size D03

3 **Port Size** \_\_\_\_\_

**02:** 1/4" NPT or 7/16-20 SAE

**03:** 3/8" NPT or 9/16-18 SAE

4 **Port Location** \_\_\_\_\_

**S:** Side Ports

**B:** Bottom Ports

**SB:** Side and Bottom Ports

5 **Port Thread** \_\_\_\_\_

**2:** NPT

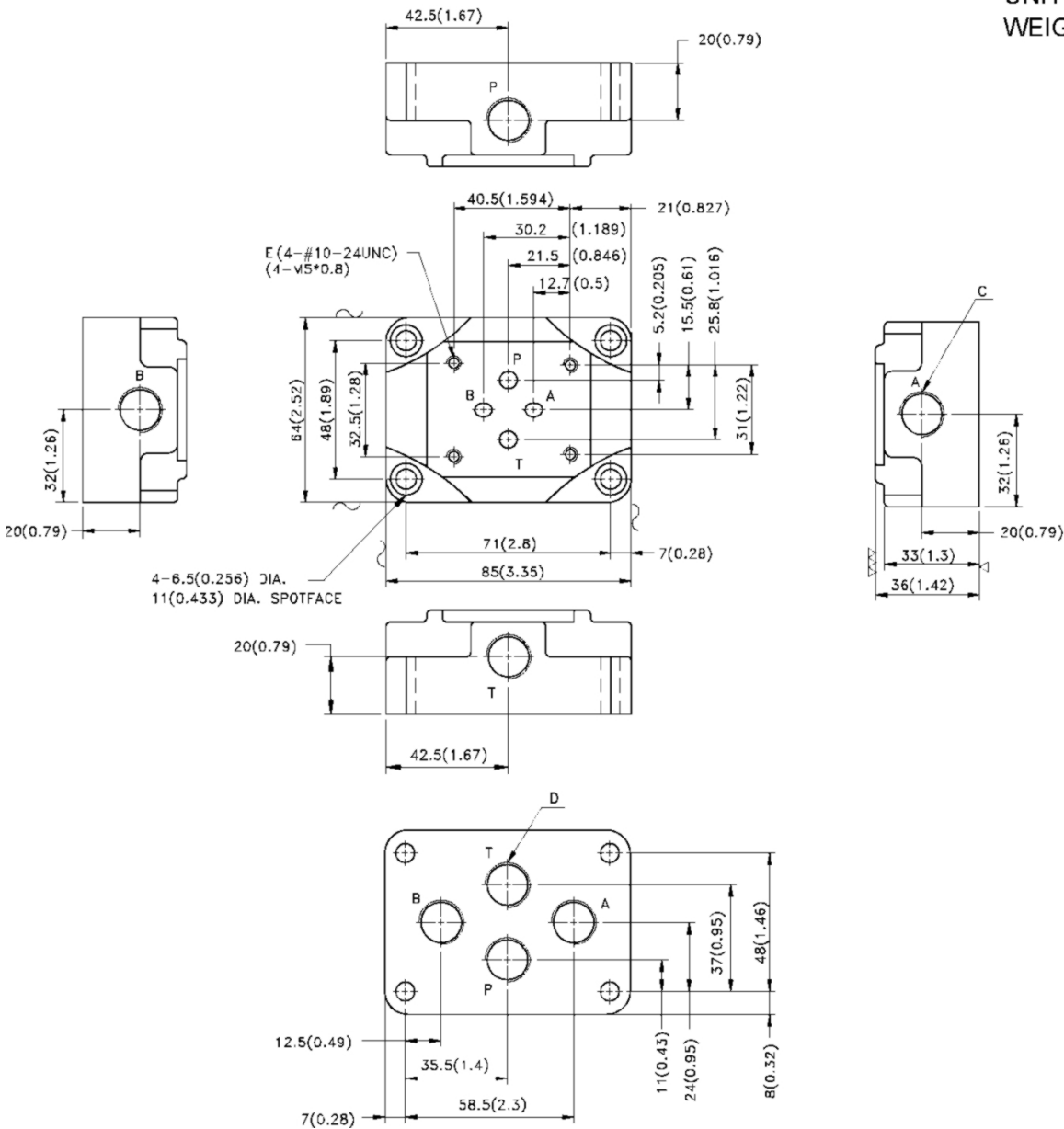
**3:** SAE St. Thd. O-Ring

SOLENOID OPERATED DIRECTIONAL VALVE  
M02 SUBPLATE

Dimensions  
M02 SUBPLATE

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)

UNIT: mm (inch)  
WEIGHT: 1.07 kgs (2.35 lbs)



MODEL		PORT SIZE			MODEL		PORT SIZE				
		C	D	E			C	D	E		
M02-02	- S	-1	4-1/4" PT	-	4-M5x0.8P	M02-03	- S	-1	4-3/8" PT	-	4-M5x0.8P
		-2	4-1/4" NPT	-	4-#10-24UNC			-2	4-3/8" NPT	-	4-#10-24UNC
		-3	4-1/4" SAE-2B	-	4-#10-24UNC			-3	4-3/8" SAE-2B	-	4-#10-24UNC
	- B	-1	-	4-1/4" PT	4-M5x0.8P		- B	-1	-	4-3/8" PT	4-M5x0.8P
		-2	-	4-1/4" NPT	4-#10-24UNC			-2	-	4-3/8" NPT	4-#10-24UNC
		-3	-	4-1/4" SAE-2B	4-#10-24UNC			-3	-	4-3/8" SAE-2B	4-#10-24UNC
	- SB	-1	4-1/4" PT	4-1/4" PT	4-M5x0.8P		- SB	-1	4-3/8" PT	4-3/8" PT	4-M5x0.8P
		-2	4-1/4" NPT	4-1/4" NPT	4-#10-24UNC			-2	4-3/8" NPT	4-3/8" NPT	4-#10-24UNC
		-3	4-1/4" SAE-2B	4-1/4" SAE-2B	4-#10-24UNC			-3	4-3/8" SAE-2B	4-3/8" SAE-2B	4-#10-24UNC

SOLENOID OPERATED DIRECTIONAL VALVE  
M03 SUBPLATE

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**FEATURES**

This single-station subplate for mounting an industrial hydraulic directional control valve conforms to the National Fluid Power Association (NFPA) D05 mounting pattern. It accepts Northman valves in the SWH-G03 and HD-G03 Series. NPT and SAE Ports are available on the side or the bottom for Pressure, Tank, A and B connections.

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**M 03 - 03 - S - 2**

1 2 3 4 5

**1 Series**  
M: Subplate

**2 Mounting Style**  
03: NFPA Size D05

**3 Port Size**  
03: 3/8" NPT or 9/16-18 SAE  
04: 1/2" NPT or 3/14-16 SAE  
06: 3/4" NPT or 1-1/16-12 SAE

**4 Port Location**  
S: Side Ports  
B: Bottom Ports  
SB: Side and Bottom Ports

**5 Port Thread**  
2: NPT  
3: SAE St. Thd. O-Ring

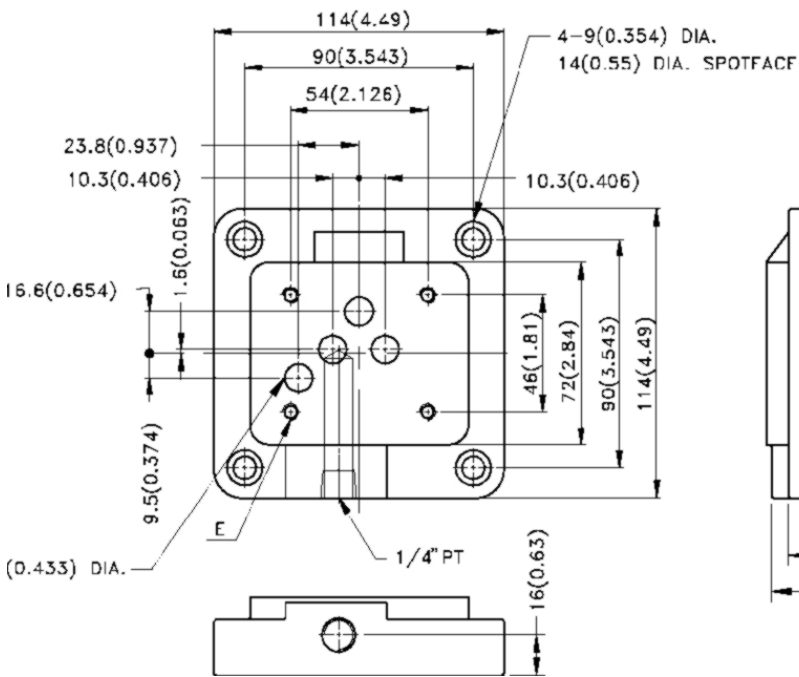
SOLENOID OPERATED DIRECTIONAL VALVE  
M03 SUBPLATE

Dimensions

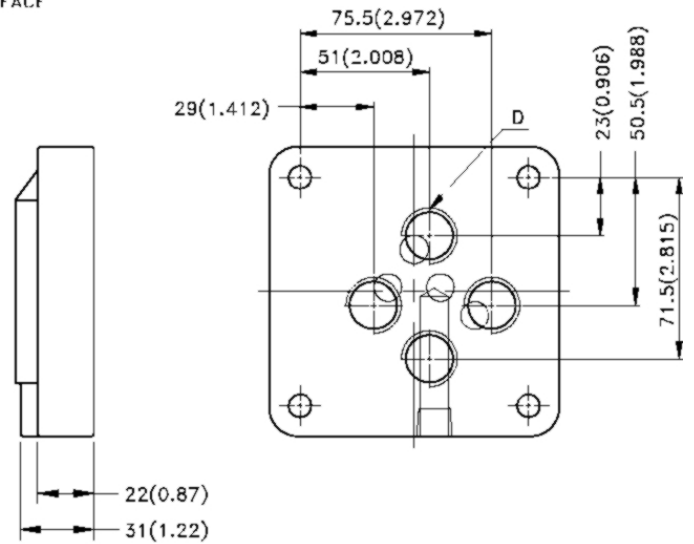
M03 - \*\* - B - \*

MOUNTING SURFACE: ISO 4401-AB-03-4-A

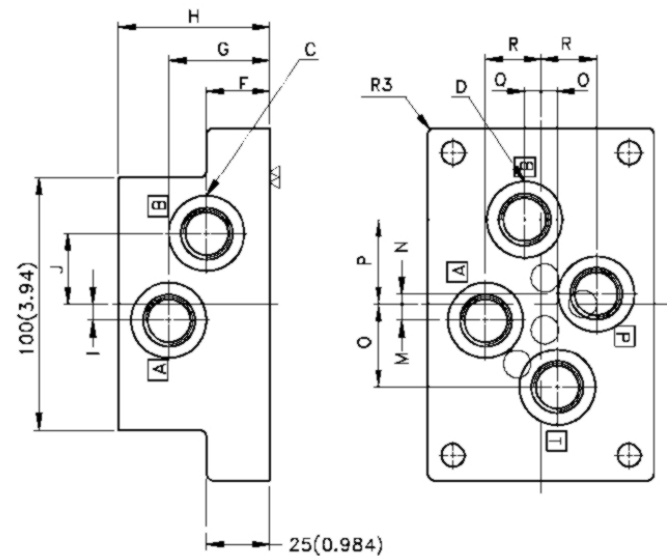
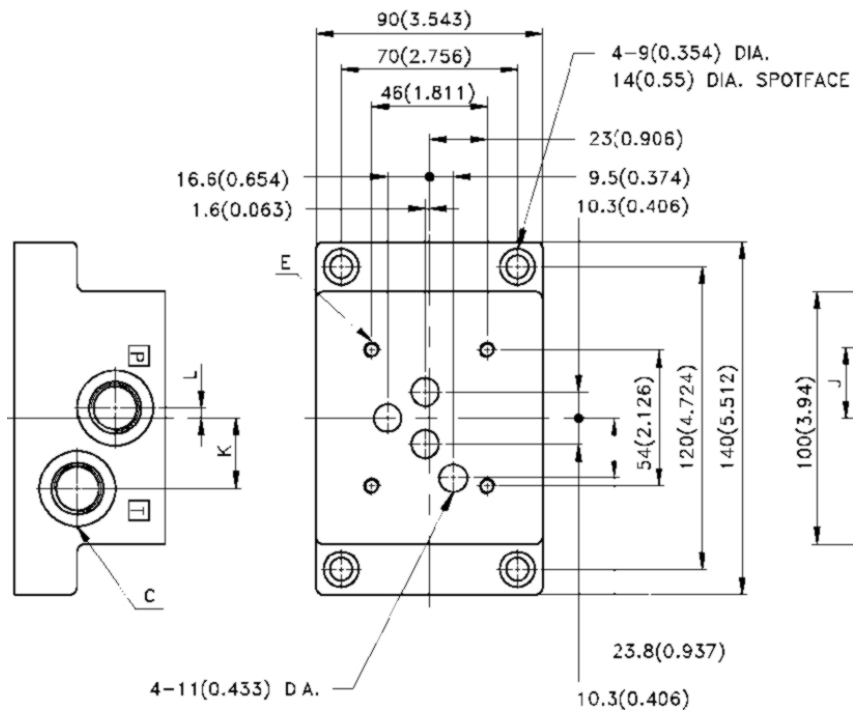
UNIT: mm (inch)



WEIGHT: 1kgs (2.3 lbs)



M03 - \*\* - S/SB - \*



SOLENOID OPERATED DIRECTIONAL VALVE  
M03 SUBPLATE

MODEL		PORT SIZE & INSTALLATION DIMENSIONS								
		C	D	E	F	G	H	I	J	
M03-03	-S	-2	3/8"NPT		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	9/16 - 18 SAE		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
	-B	-2		3/8"NPT	1/4"-20UNC					
		-3		9/16 - 18 SAE	1/4"-20UNC					
	-SB	-2	3/8"NPT	3/8"NPT	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	9/16 - 18 SAE	9/16 - 18 SAE	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
MODEL		INSTALLATION DIMENSIONS								
		K	L	M	N	O	P	Q	R	
M03-03	S	-2	28(1.10)	4(0.16)						
		-3	28(1.10)	4(0.16)						
	-B	-2			6.5(0.26)		4(0.16) 33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3			6.5(0.26)		4(0.16) 33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
	-SB	-2	28(1.10)	4(0.16)	6.5(0.26)		4(0.16) 33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3	28(1.10)	4(0.16)	6.5(0.26)		4(0.16) 33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
MODEL		PORT SIZE & INSTALLATION DIMENSIONS								
		C	D	E	F	G	H	I	J	
M03-04	-S	-2	1/2"NPT		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	3/4 - 16 SAE		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
	-B	-2		1/2"NPT	1/4"-20UNC					
		-3		3/4 - 16 SAE	1/4"-20UNC					
	-SB	-2	1/2"NPT	1/2"NPT	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	3/4 - 16 SAE	3/4 - 16 SAE	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
MODEL		INSTALLATION DIMENSIONS								
		K	L	M	N	O	P	Q	R	
M03-04	-S	-2	28(1.10)	4(0.16)						
		-3	28(1.10)	4(0.16)						
	-B	-2			6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3			6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
	-SB	-2	28(1.10)	4(0.16)	6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3	28(1.10)	4(0.16)	6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
MODEL		PORT SIZE & INSTALLATION DIMENSIONS								
		C	D	E	F	G	H	I	J	
M03-06	-S	-2	3/4"NPT		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	1-1/16 - 12 SAE		1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
	-B	-2		3/4"NPT	1/4"-20UNC					
		-3		1-1/16 - 12 SAE	1/4"-20UNC					
	-SB	-2	3/4"NPT	3/4"NPT	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
		-3	1-1/16 - 12 SAE	1-1/16 - 12 SAE	1/4"-20UNC	25(0.98)	40(1.58)	60(2.36)	6.5(0.26)	28(1.10)
MODEL		INSTALLATION DIMENSIONS								
		K	L	M	N	O	P	Q	R	
M03-06	-S	-2	28(1.10)	4(0.16)						
		-3	28(1.10)	4(0.16)						
	-B	-2			6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3			6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
	-SB	-2	28(1.10)	4(0.16)	6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)
		-3	28(1.10)	4(0.16)	6.5(0.26)	4(0.16)	33(1.30)	33.5(1.32)	6.5(0.26)	22(0.87)

SOLENOID OPERATED DIRECTIONAL VALVE  
M04 SUBPLATE



**FEATURES**

This single-station subplate for mounting an industrial hydraulic directional control valve conforms to the National Fluid Power Association (NFPA) D07 mounting pattern. It accepts Northman valves in the SW-G04 and HD-G04 Series. NPT and SAE Ports are available on the side or the bottom for Pressure, Tank, A and B connections.

**M 04 – 04 – S – 2**

1 2 3 4 5

**1 Series**

**M:** Subplate

**2 Mounting Style**

**04:** NFPA Size D07

**3 Port Size**

**04:** 1/2" NPT or 3/4-16 SAE

**06:** 3/4" NPT or 1-1/16-12 SAE

**4 Port Location**

**S:** Side Ports

**B:** Bottom Ports

**SB:** Side and Bottom Ports

**5 Port Thread**

**2:** NPT

**3:** SAE St. Thd. O-Ring

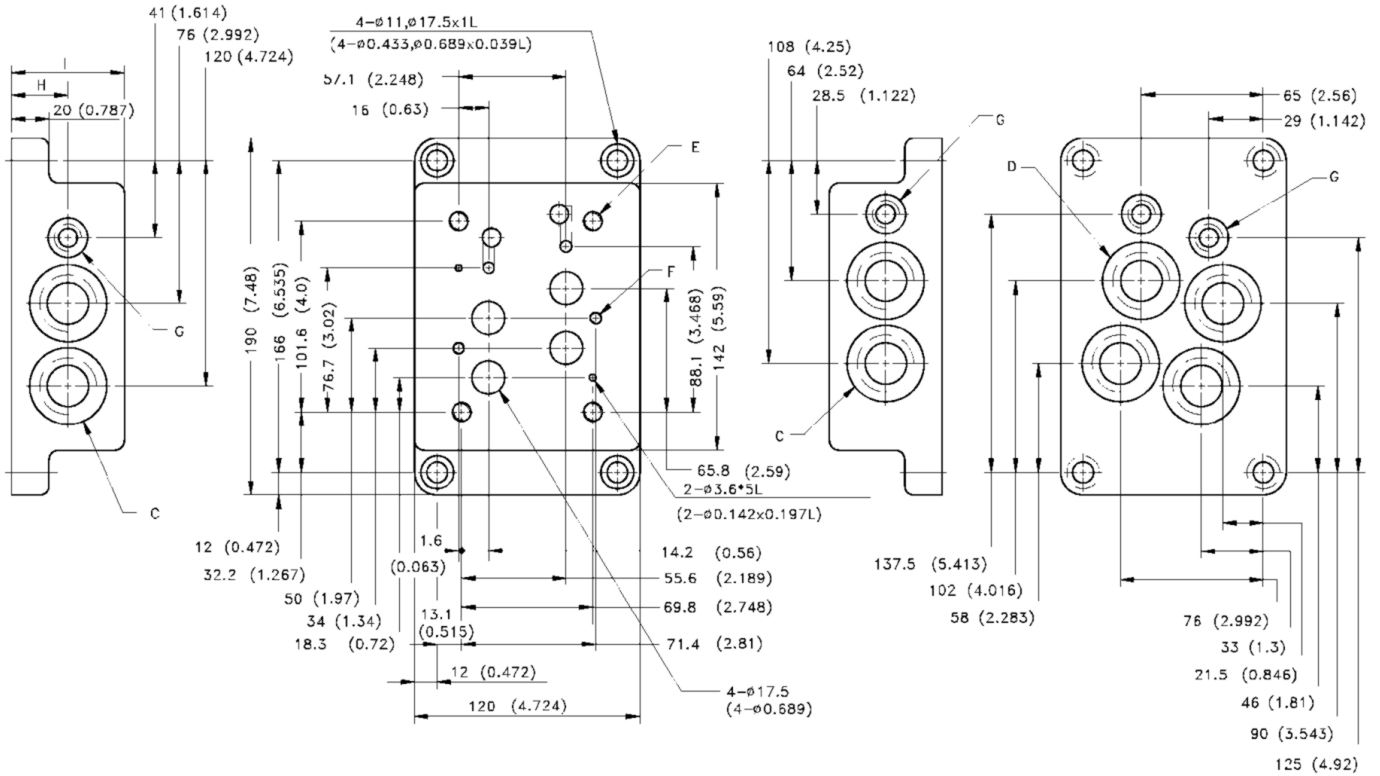
**SOLENOID OPERATED DIRECTIONAL VALVE  
M04 SUBPLATE**

**Dimensions**

M04 - \*\* - B - \*

MOUNTING SURFACE: ISO 4401-AB-03-4-A

UNIT: mm( inch)



MODEL		PORT SIZE & INSTALLATION DIMENSIONS							
		C	D	E	F	G	H	I	
M04-04	-S	-2	1/2" NPT	-	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	-	36 (1.417)
		-3	3/4 - 16 SAE	-	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-
	-B	-2-	1/2" NPT	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	30 (1.181)	60 (2.362)	
		-3-	3/4 - 16 SAE	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-	
	-SB	-2	1/2" NPT	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	30 (1.181)	60 (2.362)	
		-3	3/4 - 16 SAE	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-	

MODEL		PORT SIZE & INSTALLATION DIMENSIONS							
		C	D	E	F	G	H	I	
M04-06	-S	-2	3/4" NPT	-	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	-	36 (1.417)
		-3	1-1/16 - 12 SAE	-	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-
	-B	-2-	3/4" NPT	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	30 (1.181)	60 (2.362)	
		-3-	1-1/16 - 12 SAE	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-	
	-SB	-2	3/4" NPT	3/8-16 UNC-2B	1/4-20 UNC-2B	1/4" NPT	30 (1.181)	60 (2.362)	
		-3	1-1/16 - 12 SAE	3/8-16 UNC-2B	1/4-20 UNC-2B	7/16 - 20 SAE	-	-	

## SOLENOID OPERATED DIRECTIONAL VALVE M06 SUBPLATE



### FEATURES

This single-station subplate for mounting an industrial hydraulic directional control valve conforms to the National Fluid Power Association (NFPA) D08 mounting pattern. It accepts Northman valves in the SW-G06 and HD-G06 Series. NPT and SAE Ports are available on the side or the bottom for Pressure, Tank, A and B connections.

## **M 06 – 06 – S – 2**

**1** **2** **3** **4** **5**

### **1 Series**

**M:** Subplate

### **2 Mounting Style**

**06:** NFPA Size D08

### **3 Port Size**

**06:** 3/4" NPT or 1-1/16-12 SAE

**08:** 1" NPT or 1-5/16-12 SAE

**10:** 1-1/4" NPT or 1-5/8-12 SAE

### **4 Port Location**

**S:** Side Ports

**B:** Bottom Ports

**SB:** Side and Bottom Ports

### **5 Port Thread**

**2:** NPT

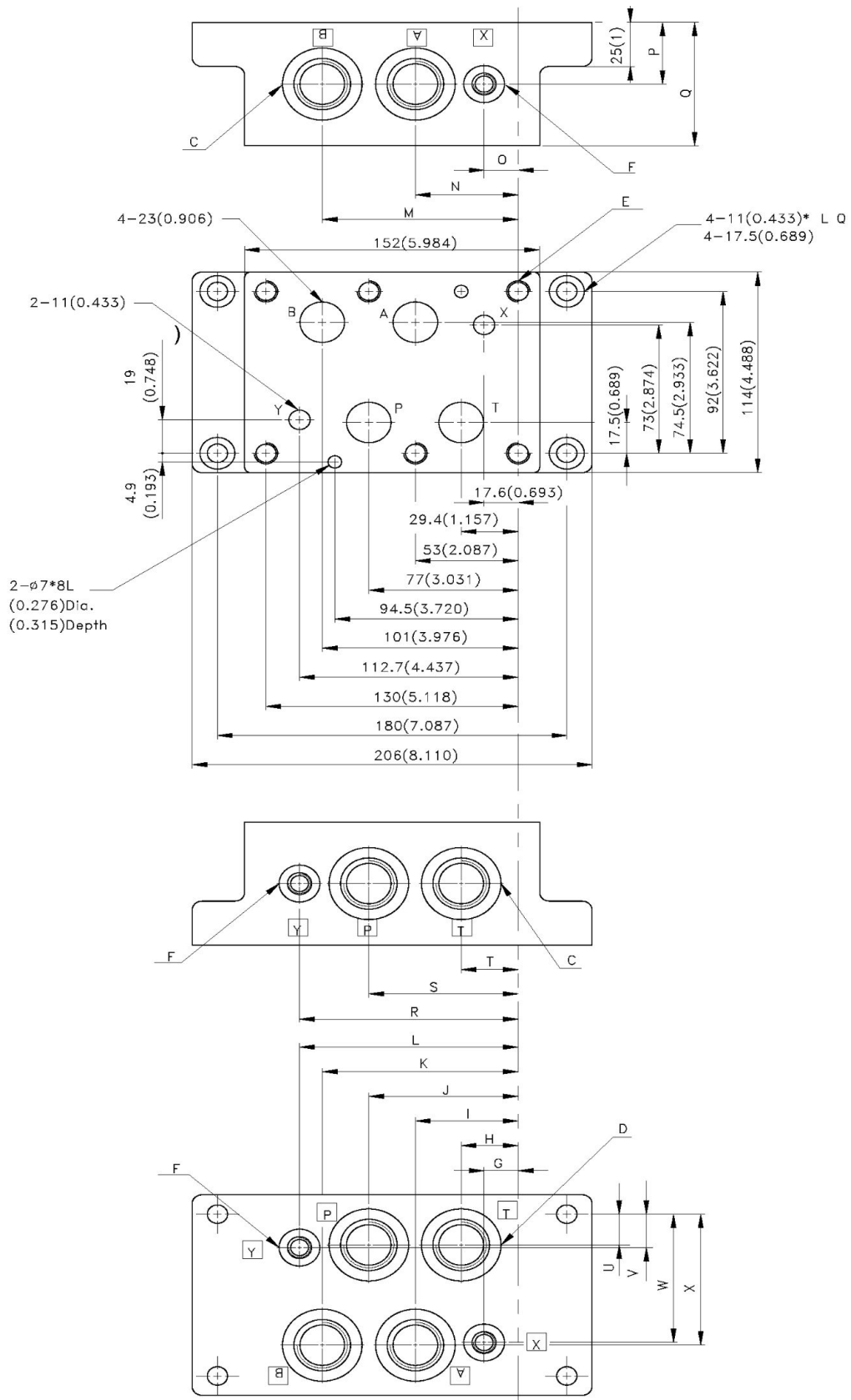
**3:** SAE St. Thd. O-Ring



SOLENOID OPERATED DIRECTIONAL VALVE  
M06 SUBPLATE

Dimensions  
M06 - \*\* - B - \*

MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)



**SOLENOID OPERATED DIRECTIONAL VALVE  
M06 SUBPLATE**

**MOUNTING SURFACE: ISO 4401-AB-03-4-A  
UNIT: mm( inch)**

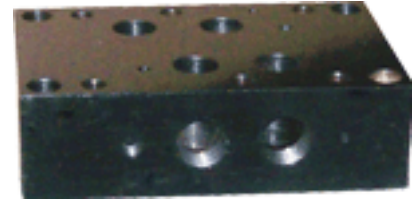
**Dimensions  
M06 - \*\* - B - \***

MODEL		PORT SIZE & INSTALLATION DIMENSIONS																	
		C					D			E				F					
M06-06	-S	-2	3/4"NPT					-			1/2"-13UNC-2B				1/4" NPT				
		-3	1-1/16 - 12 SAE					-			1/2"-13UNC-2B				7/16 - 20 SAE				
	-B	-2	-					3/4"NPT			1/2"-13UNC-2B				1/4"NPT				
		-3	-					1-1/16 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
	-	-2	3/4"NPT					3/4"NPT			1/2"-13UNC-2B				1/4" NPT				
	SB	-3	1-1/16 - 12 SAE					1-1/16 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
MODEL		INSTALLATION DIMENSIONS																	
		G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
M06-06	-S	-	-	-	-	-	-	101 (3.98)	53 (2.09)	17.6 (0.69)	35 (1.38)	70 (2.76)	112.7 (4.44)	77 (3.03)	29.4 (1.16)	-	-	-	-
	-B	17.6 (0.69)	29.4 (1.16)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	-	-	-	-	-	-	-	-	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)
	-	17.6 (0.69)	29.4 (1.16)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	101 (3.98)	53 (2.09)	17.6 (0.69)	35 (1.38)	70 (2.76)	112.7 (4.44)	77 (3.03)	29.4 (1.16)	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)
	SB	17.6 (0.69)	29.4 (1.16)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	101 (3.98)	53 (2.09)	17.6 (0.69)	35 (1.38)	70 (2.76)	112.7 (4.44)	77 (3.03)	29.4 (1.16)	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)

MODEL		PORT SIZE & INSTALLATION DIMENSIONS																	
		C					D			E				F					
M06-08	-S	-2	1" NPT					-			1/2"-13UNC-2B				1/4" NPT				
		-3	1-5/16 - 12 SAE					-			1/2"-13UNC-2B				7/16 - 20 SAE				
	-B	-2	-					1" NPT			1/2"-13UNC-2B				1/4"NPT				
		-3	-					1-5/16 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
	-SB	-2	1" NPT					1" NPT			1/2"-13UNC-2B				1/4" NPT				
		-3	1-5/16 - 12 SAE					1-5/16 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
MODEL		INSTALLATION DIMENSIONS																	
		G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
M06-08	-S	-	-	-	-	-	-	106 (4.17)	53 (2.09)	17.6 (0.69)	35 (1.38)	70 (2.76)	112.7 (4.44)	77 (3.03)	24.4 (0.96)	-	-	-	-
	-B	17.6 (0.69)	24.4 (0.691)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	-	-	-	-	-	-	-	-	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)
	-SB	17.6 (0.69)	24.4 (0.96)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	106 (4.17)	53 (2.09)	6 (0.69)	35 (1.38)	70 (2.76)	7 (4.44)	77 (3.03)	4 (0.96)	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)
		17.6 (0.69)	24.4 (0.96)	53 (2.09)	77 (3.03)	101 (3.98)	112.7 (4.44)	106 (4.17)	53 (2.09)	6 (0.69)	35 (1.38)	70 (2.76)	7 (4.44)	77 (3.03)	4 (0.96)	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)

MODEL		PORT SIZE & INSTALLATION DIMENSIONS																	
		C					D			E				F					
M06-10	-S	-2	1-1/4" NPT					-			1/2"-13UNC-2B				1/4" NPT				
		-3	1-5/8 - 12 SAE					-			1/2"-13UNC-2B				7/16 - 20 SAE				
	-B	-2	-					1-1/4" NPT			1/2"-13UNC-2B				1/4"NPT				
		-3	-					1-5/8 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
	-SB	-2	1-1/4" NPT					1-1/4" NPT			1/2"-13UNC-2B				1/4" NPT				
		-3	1-5/8 - 12 SAE					1-5/8 - 12 SAE			1/2"-13UNC-2B				7/16 - 20 SAE				
MODEL		INSTALLATION DIMENSIONS																	
		G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
M06-10	-S	-	-	-	-	-	-	106 (4.17)	48 (1.89)	85 (0.34)	45 (1.77)	90 (3.54)	121.5 (4.78)	82 (3.23)	24.4 (0.96)	-	-	-	-
	-B	85 (0.34)	24.4 (0.96)	48 (1.89)	82 (3.23)	106 (4.17)	121.5 (4.78)	-	-	-	-	-	-	-	-	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)
	-SB	85 (0.34)	24.4 (0.96)	48 (1.89)	82 (3.23)	106 (4.17)	121.5 (4.78)	106 (4.17)	48 (1.89)	85 (0.34)	45 (1.77)	90 (3.54)	121.5 (4.78)	82 (3.23)	24.4 (0.96)	17.5 (0.69)	19 (0.75)	73 (2.87)	74.5 (2.93)

SOLENOID OPERATED DIRECTIONAL VALVE  
M10 SUBPLATE



**FEATURES**

This single-station subplate for mounting an industrial hydraulic directional control valve conforms to the National Fluid Power Association (NFPA) D10 mounting pattern. It accepts Northman valves in the SW-G10 Series. NPT and SAE Ports are available on the side or the bottom for Pressure, Tank, A and B connections.

**M 10 – 10 – S – 2**

1 2 3 4 5

1 **Series**

**M:** Subplate

2 **Mounting Style**

**10:** NFPA Size D10

3 **Port Size**

**10:** 1-1/4" NPT or 1-5/8-12 SAE

4 **Port Location**

**S:** Side Ports

**B:** Bottom Ports

**SB:** Side and Bottom Ports

5 **Port Thread**

**2:** NPT

**3:** SAE St. Thd. O-Ring

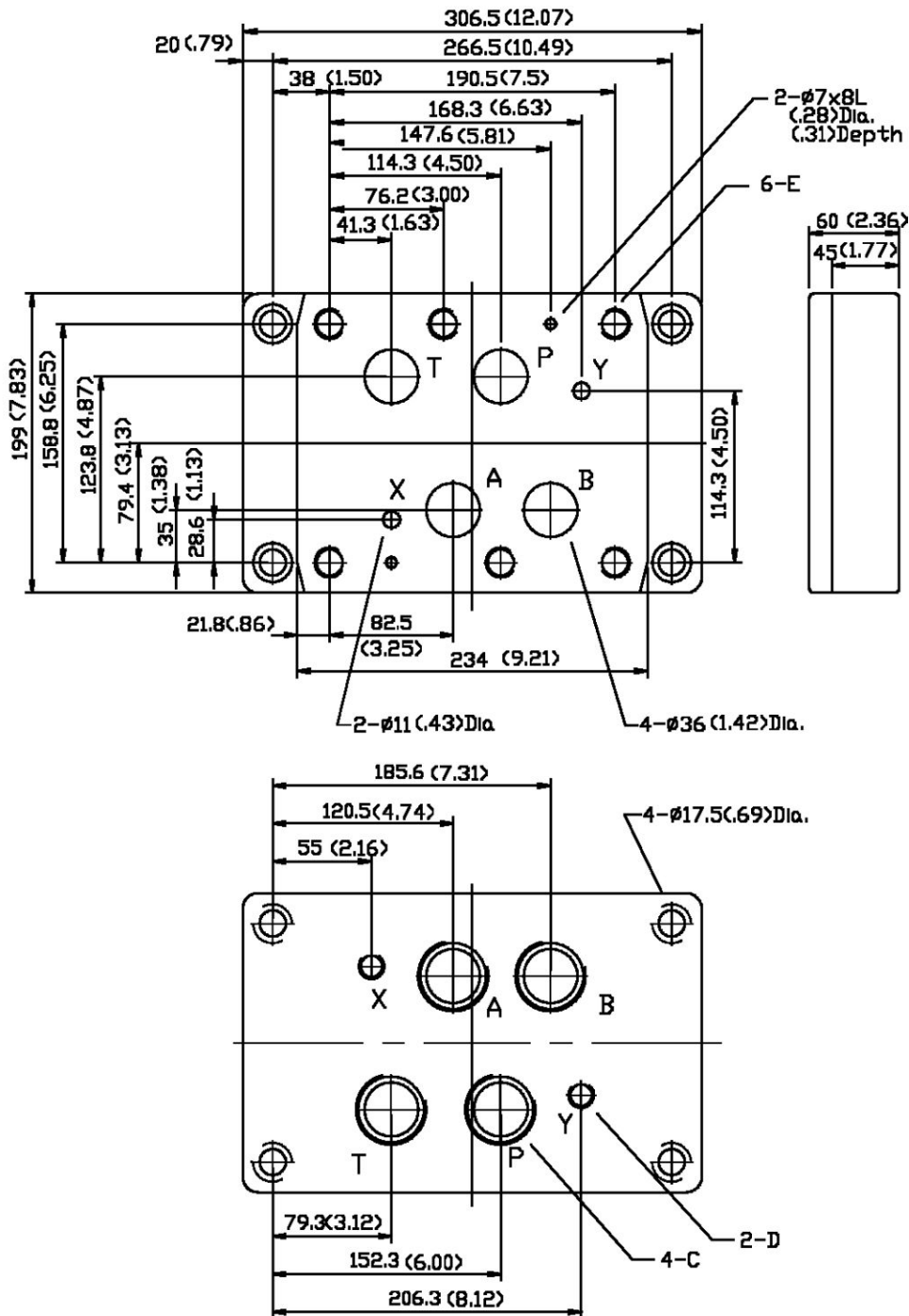
SOLENOID OPERATED DIRECTIONAL VALVE  
M10 SUBPLATE

Dimensions

M10 - \*\* - B - \*

MOUNTING SURFACE: ISO 4401-AB-03-4-A

UNIT: mm( inch)



MODEL	C	D	E
M10-10-B	-2	3/8" NPT	3/4"-10 UNC



# ***Northman***

**Solenoid Directional Valve**

**Modular Valve**

**Pressure Control Valve**

**Flow Control Valve**

**Variable Vane Pump**

**High Pressure Vane Pump**



## **Our Commitment**

We are committed to excellent customer care, quality products and a very timely delivery.

Northman's reputation for reliability is built on high quality products, engineering and manufacturing systems.

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