

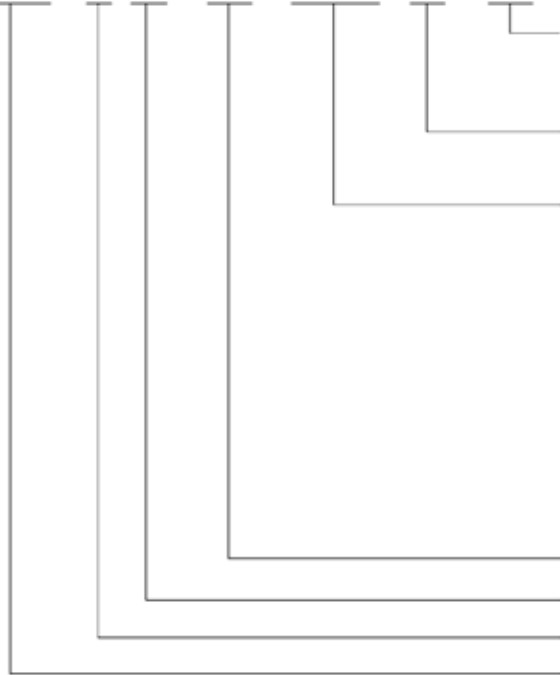


## FEATURES

- Indicating lights and bolt kits are standard.
- Coil screws are especially designed to prevent shocks.
- Electrical connections are joint box type or hirschmann 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.

## HOW TO ORDER

**SWH - G 03 - C2 - A220 -10 - LS**



**ELECTRICAL SURGE CONTROL OPTION : STANDARD  
NO CODE : STANDARD**

**LS : LOW SURGE VOLTAGE (PLEASE SEE PAGE 8)**

**10 : JOINT BOX WITH INDICATING LIGHT**

**20 : HIRSCHMANN TYPE WITH INDICATING LIGHT (DIN TYPE)**

**COIL VOLTAGE :**

**A110: AC110V, 60Hz; AC100V, 50Hz**

**A120: AC120V, 60Hz; AC110V, 50Hz**

**A220: AC220V, 60Hz; AC200V, 50Hz**

**A240: AC240V, 60Hz; AC220V, 50Hz**

**R110: AC110V 60,50Hz**

**R120: AC120V 60,50Hz**

**R220: AC220V 60,50Hz**

**R240: AC240V 60,50Hz**

**D12: DC12V**

**D24: DC24V**

(CONTACT NORTHMAN FOR ADDITIONAL COIL VOLTAGE.)

**SPOOL TYPE: (PLEASE SEE PAGE 2)**

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

**SUBPLATE MOUNTED**

**HIGH PRESSURE HIGH FLOW SOLENOID DIRECTIONAL VALVE**

## SOLENOID DIRECTIONAL OPERATED 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, recommended temp 50 ±5°C (122 ±9°F) Max.temperature-25°C~+90°C(-13°F~194°F)Viscosity10~400cSt

### SOLENOID RATINGS

ELECTRIC SOURCE	COIL TYPE	VOLTAGE (V)			CURRENT & POWER AT RATED VOLTAGE		
		Hz	SOURCE RATED	RANGE (±10%)	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	WATTAGE
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 100MΩ.

#### 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.

## PRESSURE DROP AND PERFORMANCE CURVES

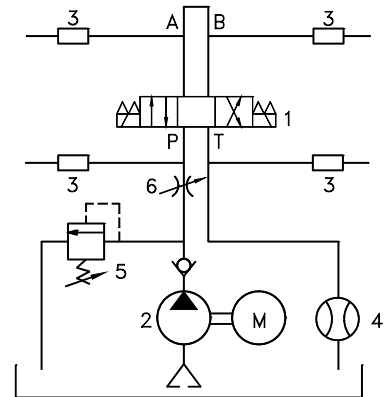
### TEST SYSTEM

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

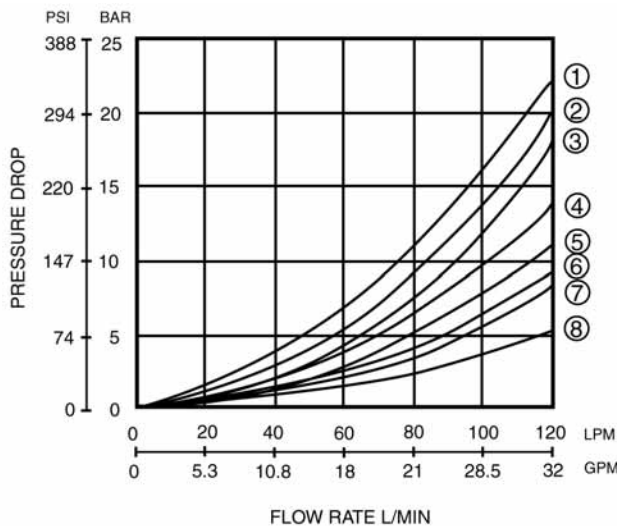
### TEST CONDITIONS

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

### TEST CIRCUIT



### PERFORMANCE CURVES



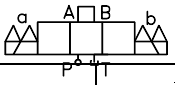








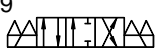
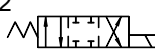
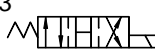
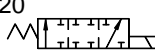


MODEL NO.	PRESSURE DROP CURVE NUMBER				
	P A	B T	P B	A T	P T
C2	6	6	6	6	-
C3	7	7	7	7	5
C4	6	7	6	7	-
C40	6	7	6	7	-
C5	5	2	2	5	8
C6	2	2	2	2	5
C60	1	1	1	1	4
C7	7	6	7	6	-
C8	6	6	6	7	-
C9	7	6	6	6	-
B2	2	2	6	6	-
B3	3	3	6	6	-
B20	5	-	5	-	-
B2S	6	6	2	2	-
B3S	6	6	3	3	-
B20S	5	-	5	-	-

### 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
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 ( $\Delta P'$ ) can be obtained from the formula  
 $\Delta P' = \Delta P (G' / 0.85)$  for other specific gravity ( $G'$ ).

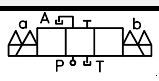
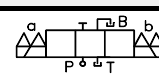
**SOLENOID DIRECTIONAL OPERATED VALVE  
SWH-G03 SERIES**

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 AC TYPE								
SPOOL TYPE NORMAL POSITION							P > B	
	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)			
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.

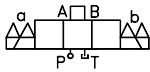








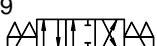
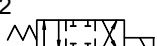

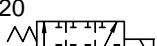
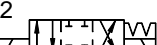
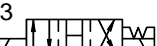


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

				P B 					
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)
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)
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)
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)
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)
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)	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)	
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)
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)
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)
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)
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)
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)
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)
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)

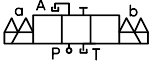
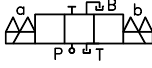
**SOLENOID DIRECTIONAL OPERATED VALVE  
SWH-G03 SERIES**

**LIST OF SPOOL FUNCTION**

THE MAXIMUM FLOW RATE LPM(GPM) UNDER DIFFERENT PRESSURE BAR (PSI) SWH G03 DC TYPE								
SPOOL TYPE NORMAL POSITION							P A	
	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 	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) 100(26.4)	97(25.6) 75(19.8)	78(20.6) 54(14.3)	60(15.9) 41(10.8)	120(31.7)	120(31.7) 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) 100(26.4)	97(25.6) 85(22.5)	78(20.6) 54(14.3)	66(17.4) 41(10.8)	120(31.7)	120(31.7)
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

				P-B 					
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)
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)
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)
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)
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)
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)	100(26.4)	–	100(26.4)	100(26.4)	100(26.4)	100(26.4)	100(26.4)	–
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)
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)
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)
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)
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)
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)
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)
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 DIRECTIONAL OPERATED VALVE SWH-G03 SERIES

## RESULT OF MEASUREMENTS

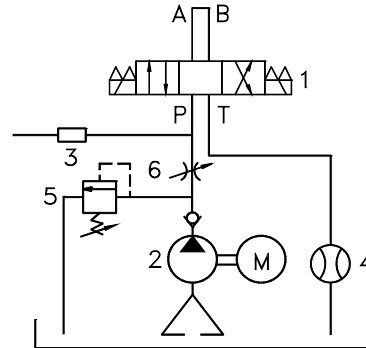
### TEST SYSTEMS

1. Testing valve
2. Pump
3. Pressure sensor
4. Flow meter
5. Relief valve
6. Throttle valve

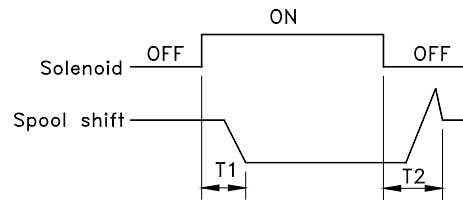
### TEST CONDITIONS

Pressure: 160 BAR (2350 PSI)  
 Flow Rate: 140 LPM (37 GPM)  
 Viscosity: 35 cSt (175 SSU)

### TEST CIRCUIT



MODEL	SHIFT OVER TIME (SEC)	
	T 1	T 2
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

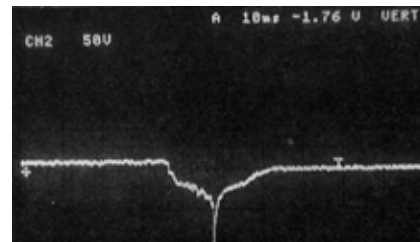
#### FEATURES

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

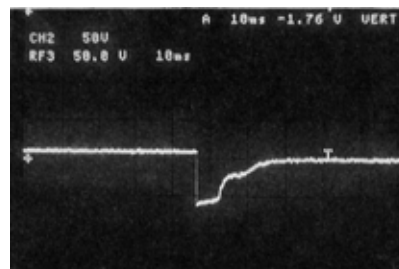
#### Effects

- 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 eliminate 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 controlled DC solenoid.





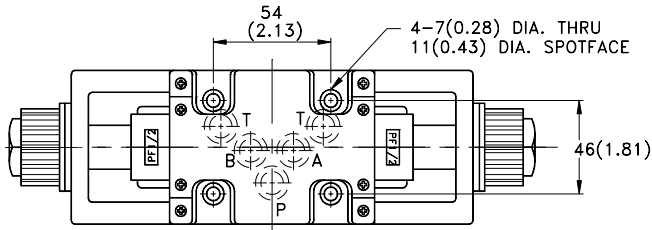


# SOLENOID OPERATED DIRECTIONAL VALVE SWH-G03 SERIES

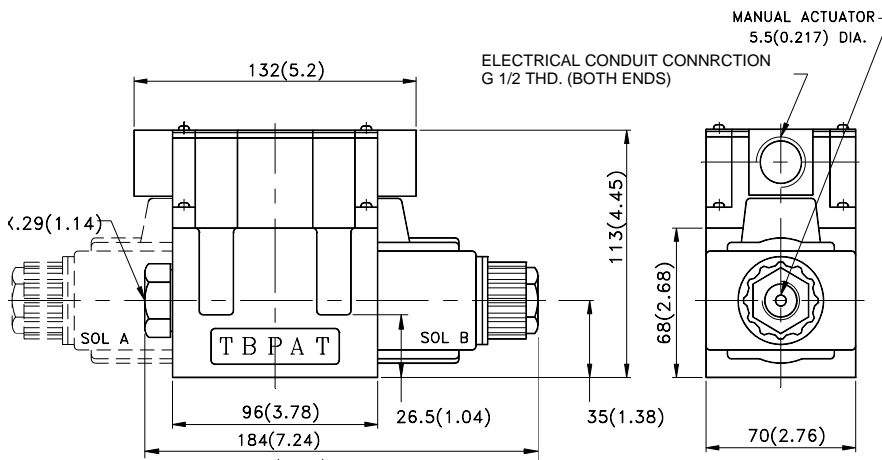
## INSTALLATION DIMENSIONS

Mounting Surface: ISO 4401-AC-05-4-A  
UNIT: mm (inch)

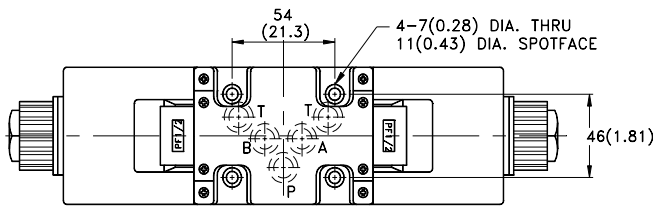
### SWH - G03 - \*\*\* - A\*\*\* - 10 - \*\* with AC solenoids



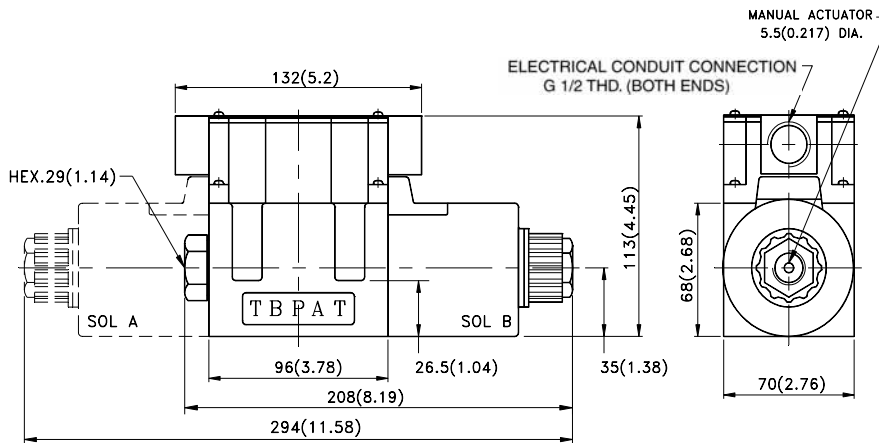
MODEL	WEIGHT KGS (LBS)
SWH-G03-C***-A***	4.1(9.02)
SWH-G03-B***-A***-	3.4(7.48)



### SWH - G03 - \*\*\* - \*\*\*\* - 10 - \*\* Models 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***	

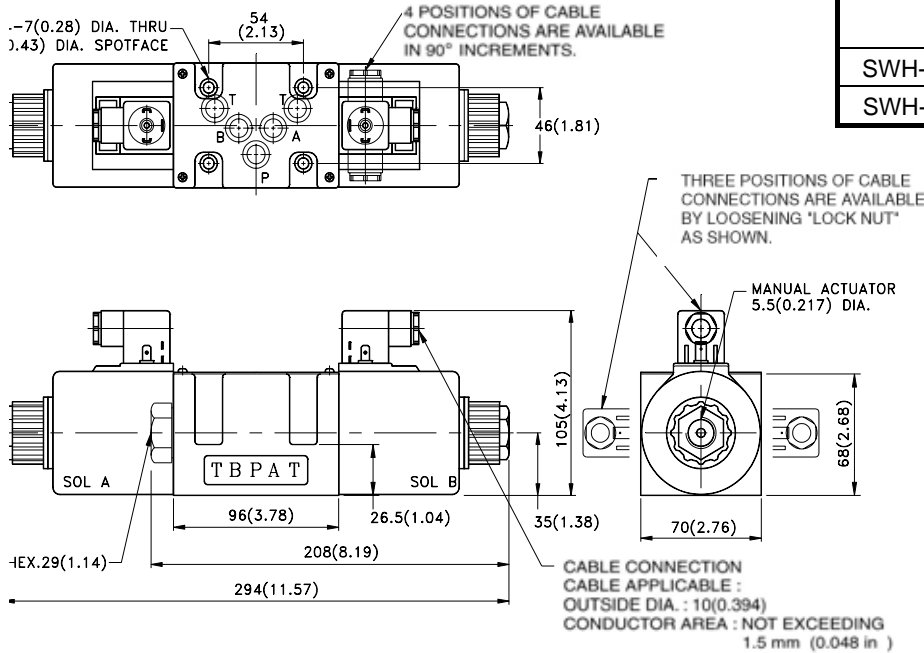


# SOLENOID DIRECTIONAL OPERATED VALVE SWH-G03 SERIES

## INSTALLATION DIMENSIONS

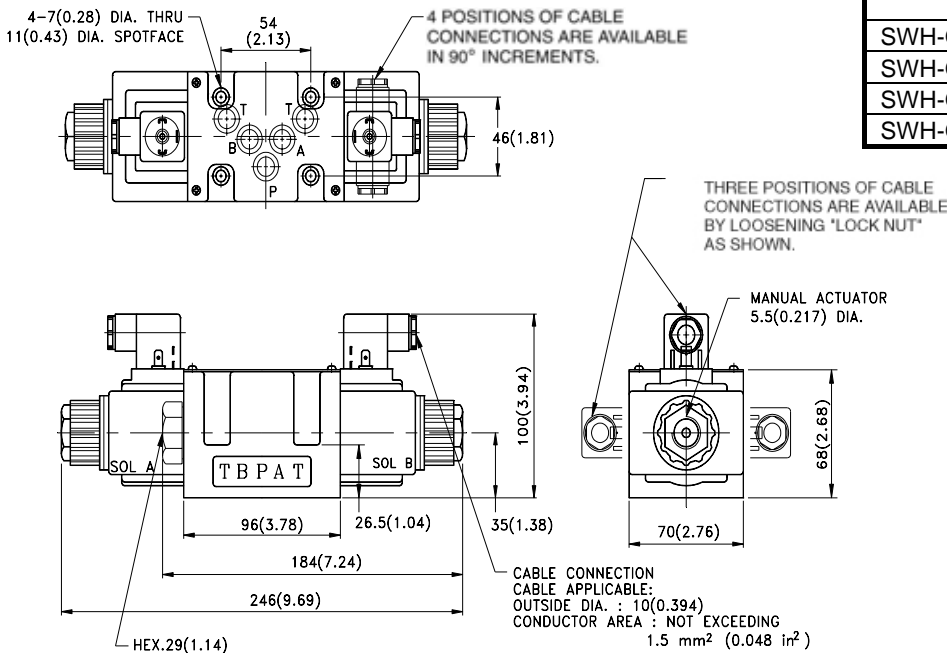
**SWH - G03 - \*\*\* - A\*\*\* - 20 - \*\***  
with AC solenoids

Mounting Surface: ISO 4401-AC-05-4-A  
UNIT: mm (inch)



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

**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 ***	