

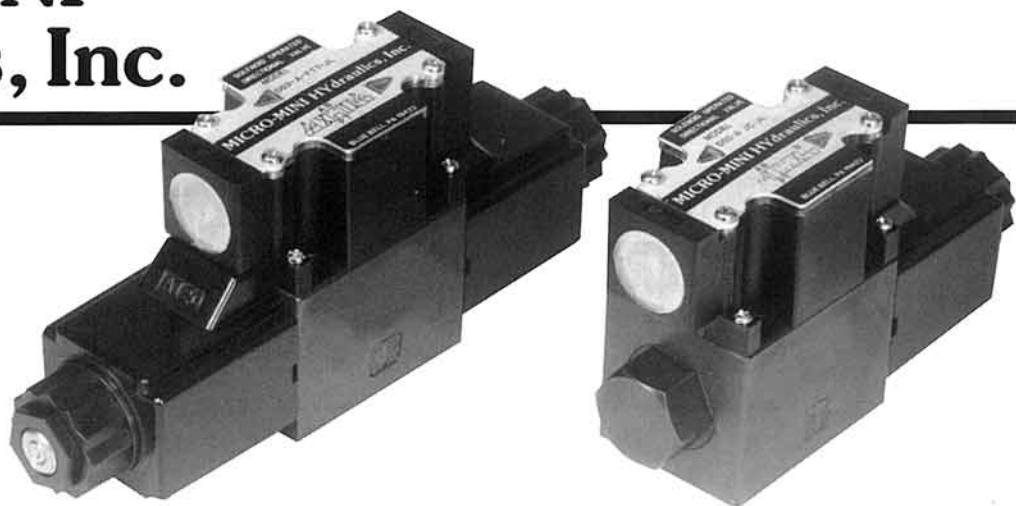
# MICRO-MINI HYdraulics, Inc.

## D03 DIRECTIONAL VALVES

### QUICK REFERENCE

#### Mounting Interface NFPA-D03

- Nominal Flow – 8 GPM  
Maximum Flow – 16.8 GPM  
(See chart for typical flow and pressure limits.)
- Maximum Frequency of operation - 300 CPM
- Temperature Range  
Recommended 100° - 140° F  
Maximum -5° - 190° F
- Wet Armature Solenoids  
Plug-in-Coils
- Maximum Pressure Ports  
P-A-B – 4500 PSI  
T – 2000 PSI
- Filtration Requirements  
up to 3000 PSI  
ISO 4406 20/6  
above 3000 PSI  
ISO 4406 18/14
- Viscosity Range  
Recommended 77 - 245 SUS  
Maximum 60 - 4000 SUS
- Manual Solenoid Override



## ORDERING INFORMATION

**D03 - A - FFF - JL - A120 - SC - V**

MOUNTING  
INTERFACE

DESIGN

SPOOL FUNCTION AND TYPE  
(see Chart on next page)

WIRING CONNECTION

JL = Junction Box with indicating Light  
DN = Hirschmann Type (DIN) with indicating light

INTERFACE SEALS

Omit = Buna N  
V = Viton

SURGE CONTROL OPTION  
for DC voltage coils

COIL VOLTAGE

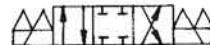
A120 = AC120V, 60 Hz; AC 110V/50Hz  
A240 = AC240V, 60 Hz; AC 220V/50Hz  
R120\* = AC120V, 60 Hz; AC 110V/50Hz  
R240\* = AC240V, 60 Hz; AC 220V/50Hz  
D12 = DC12; D24 = DC24

\*Note: R120 & R240 coils contain  
rectifier to operate valve on DC voltage.

Contact factory for other voltages.

MICRO-MINI HYdraulics, Inc.  
Blue Bell, Pennsylvania 19422

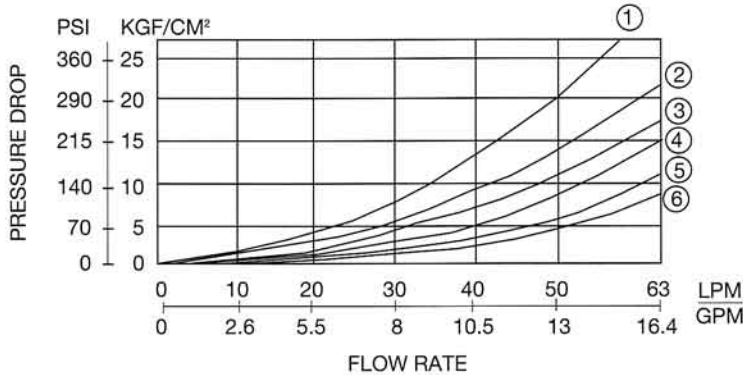
D03  
DIRECTIONAL  
VALVES



# PRESSURE DROP CURVES

# PRESSURE DROP CURVE REFERENCE

Fluid Viscosity: 35cst (175 ssu)



## VISCOSITY FACTORS

Viscosity	CST	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
Factor		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 ( $G'$ ).

SPOOL TYPE	P→A	B→T	P→B	A→T	P→T
FC	5	5	5	5	-
FO	6	6	6	6	4
FFF	5	6	5	6	-
FFFX	5	5	5	5	-
FFO1	2	2	2	2	4
FTTO	1	1	1	1	4
FTTC	1	1	1	1	3
FOP	6	5	6	5	-
FF1	5	5	5	6	-
FOP1	6	5	5	5	-
MC	5	5	5	5	-
MO	5	3	5	3	-
JC	4	5	4	5	-
JO	3	3	5	5	-
JP	2	-	5	-	-
GC	4	5	4	5	-
GO	5	5	3	3	-
GP	5	-	2	-	-

## SPOOL FUNCTIONS

Double solenoid valves, 3 position, spring centered

APPLICATION	TYPE	GRAPHIC SYMBOLS
THREE POSITION SPRING CENTERED	FC	
	FO	
	FFF	
	FFFX	
	FFO1	
	FTTO	
	FTTC	
	FOP	
	FF1	
	FOP1	
	FFO2	
	FF2	
	FOP2	

Single solenoid valves, 2 position, solenoid B

APPLICATION	TYPE	GRAPHIC SYMBOLS
TWO POSITION SPRING OFFSET	JC	
	JO	
	JP	
TWO POSITION SPRING CENTERED	JFC	
	JFO	
	JFFF	
	JFFFX	
	JFFO1	
	JFTTO	
	JFTTC	
	JFOP	
	JFF1	
	JFOP1	

Single solenoid valves, 2 position, solenoid A

APPLICATION	TYPE	GRAPHIC SYMBOLS
TWO POSITION SPRING OFFSET	GC	
	GO	
	GP	
TWO POSITION SPRING CENTERED	GFC	
	GFO	
	GFFF	
	GFFFX	
	GFFO1	
	GFTTO	
	GFTTC	
	GFOP	
GFF1		
GFOP1		

Double solenoid valves, 2 position, detented

APPLICATION	TYPE	GRAPHIC SYMBOLS	APPLICATION	TYPE	GRAPHIC SYMBOLS
TWO POSITION DETENT	MC		TWO POSITION DETENT	MO	

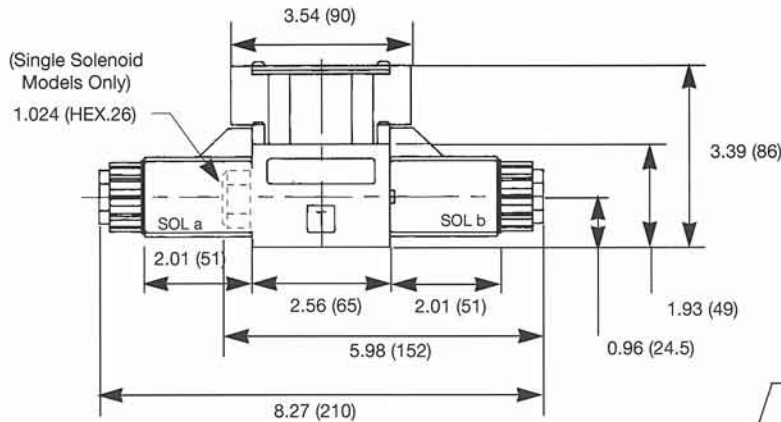
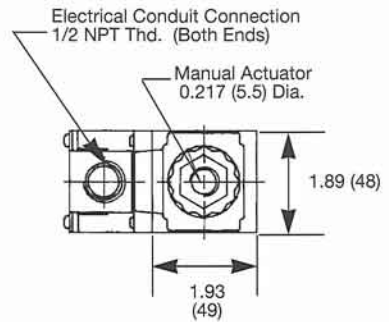
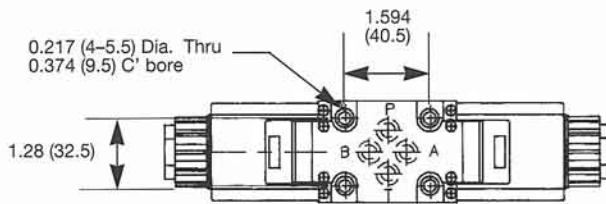
### PORT INTERCONNECTION:

- With solenoid "a" energized P→A B→T
- With solenoid "b" energized P→B A→T
- Both port interconnections are reversed for FFO1, FTTO, and FTTC type.

# INSTALLATION DIMENSIONS

## DO3-A-F \*\*\* - \*\*\* - \*\*\*\* - \* - \*

Models with AC, DC, RF solenoids



## ACCESSORIES

### BOLT KITS

MODEL CODES	SIZES	THREAD
MMBK-SH4019-24-1.75	#10-24UNC x 1-3/4" Lg.	INCH
MMBK-SHM4005-.8-45	M5 x 45 Lg.	METRIC

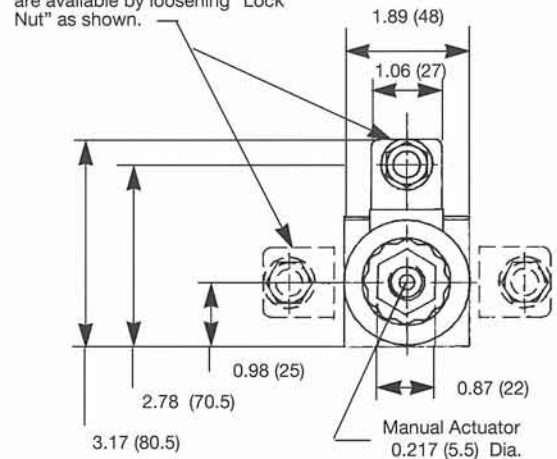
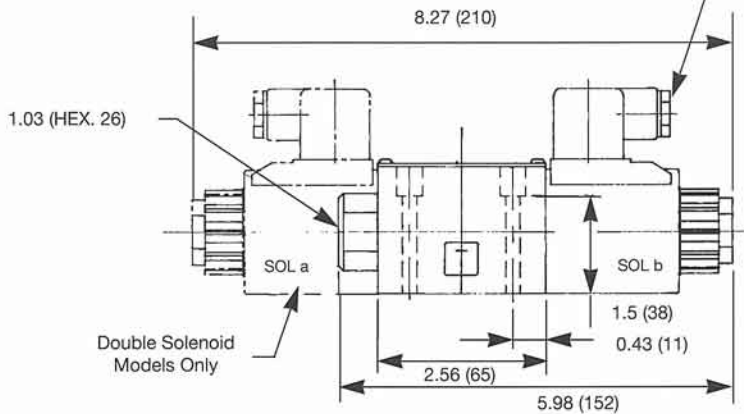
Bolt Kits include (4) Socket Head Cap Screws.  
Tightening Torque 43.3 - 60 Lb-ins. (50-70 Kg-cm)

Cable connection  
Cable Applicable:  
Outside Dia. : 0.394  
Conductor Area : Not Exceeding  
0.048 in<sup>2</sup>

Three positions of cable connection  
are available by loosening "Lock  
Nut" as shown.

## DO3 - A - J \*\*\* - \*\*\* - \*\*\*\* - \* - \*

Models with AC, DC, RF solenoids



# SOLENOID RATING

ELECTRIC SOURCE	COIL TYPE	Hz	VOLTAGE (V)		CURRENT & POWER AT RATED VOLTAGE		
			SOURCE RATED	RANGE	IN-RUSH CURRENT (A)	HOLDING CURRENT (A)	WATTAGE
A.C.	A120	50	110	99 -121	1.3	0.38	
		60	120	108 -132	1.2	0.27	
	A240	50	220	198 -242	0.67	0.19	
		60	240	216 -264	0.59	0.13	
	R110	50	100	90 -110	0.3	0.44	
		60	110	99 -121	0.3	0.3	
R220	50	200	180 -220	0.15	0.19		
	60	220	198 -242	0.15	0.15		
D.C.	D12	12		10.8-13.2	2.2	2.2	26
	D24	24		21.6-26.4	1.1	1.1	

# LIST OF SPOOL FUNCTION

## THE MAXIMUM FLOW RATE GPM (LPM) UNDER DIFFERENT PRESSURE PSI (KGF/CM<sup>2</sup>)

Spool valves have flow forces acting on them based on flow and pressure that will cause them to malfunction when certain combinations are exceeded. The chart below lists maximum rates under various conditions beyond which these valves will malfunction. It must be noted that this data was obtained on a laboratory test stand under controlled conditions, and cannot replicate the condition in your application. Therefore, it is required that each customer qualify all valves for their actual application under all of the conditions that may effect the valves' performance in their particular application.

SPOOL TYPE	P -> A.B -> T P -> B.A -> T				P -> A				P -> B							
	735 PSI (50kgf/cm <sup>2</sup> )	1470 PSI (100kgf/cm <sup>2</sup> )	2200 PSI (150kgf/cm <sup>2</sup> )	4500 PSI (315kgf/cm <sup>2</sup> )	735 PSI (50kgf/cm <sup>2</sup> )	1470 PSI (100kgf/cm <sup>2</sup> )	2200 PSI (150kgf/cm <sup>2</sup> )	4500 PSI (315kgf/cm <sup>2</sup> )	735 PSI (50kgf/cm <sup>2</sup> )	1470 PSI (100kgf/cm <sup>2</sup> )	2200 PSI (150kgf/cm <sup>2</sup> )	4500 PSI (315kgf/cm <sup>2</sup> )	735 PSI (50kgf/cm <sup>2</sup> )	1470 PSI (100kgf/cm <sup>2</sup> )	2200 PSI (150kgf/cm <sup>2</sup> )	4500 PSI (315kgf/cm <sup>2</sup> )
NORMAL POSITION																
FC	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FO	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FFF	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FFFX	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FFO1	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)	13.3 (50)
FTTO	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 (40)	10.7 (40)	10.7 (40)	10.7 (40)	10.7 (40)
FOP	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FF1	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
FOP1	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
JC	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
JO	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
JP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MC	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)
MO	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 (63)	16.8 (63)	16.8 (63)	16.8 (63)

The upperside number in table describes the maximum flow under DC and RF. The lowerside number in table describes the maximum flow under AC.

### WARNING

Use of a directional valve with an incorrect flow path could result in machine malfunction which, in turn, could result in personal injury or death to the operator. Physical interchangeability or the ability of one directional valve to fit in place of another does not mean that the replacement has the same flow paths or will function the same. Use of the MICRO-MINI HYdraulics, Inc. catalog guidelines on interchange must be followed for interchange and replacement of directional valves.