

MICRO-MINI HYdraulics, Inc.

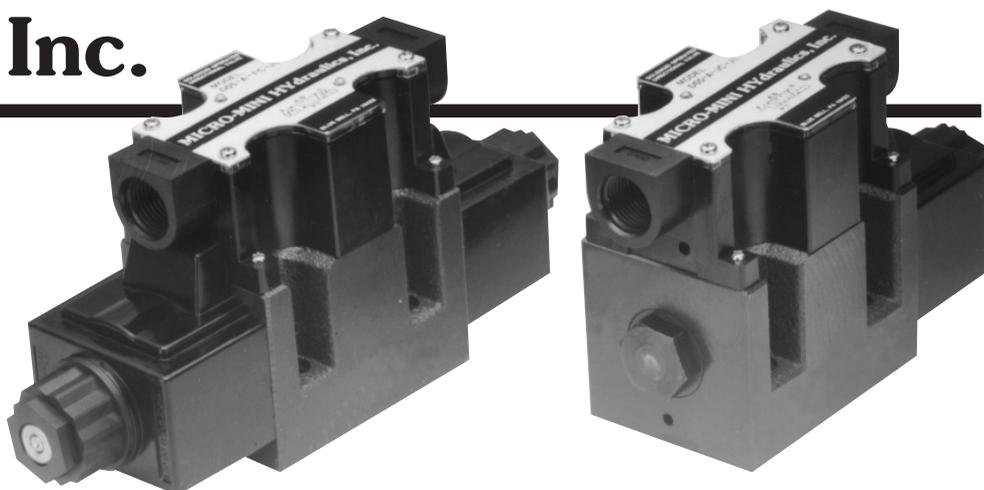
D05 DIRECTIONAL VALVES

QUICK REFERENCE

Mounting Interface

NFPA-D05

- Nominal Flow – 15 GPM
Maximum Flow – 32 GPM
(See chart for typical flow and pressure limits.)
- Maximum Frequency of operation - 240 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 – 2350 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

D05 - 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.

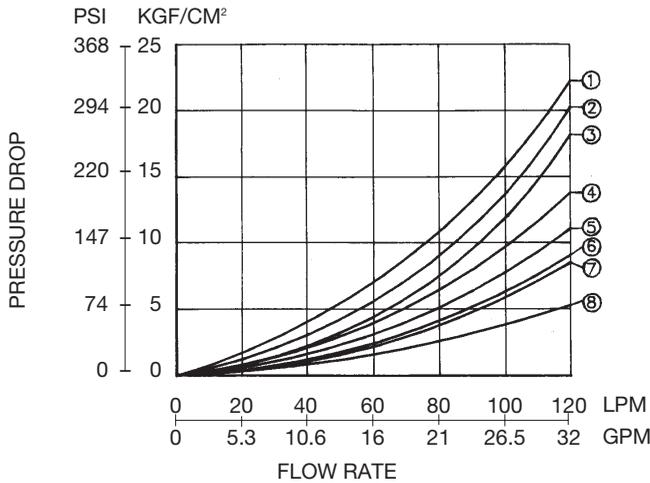
MICRO-MINI HYdraulics, Inc.
Blue Bell, Pennsylvania 19422

D05
DIRECTIONAL
VALVES



PRESSURE DROP CURVES

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 |
| 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').

PRESSURE DROP CURVE REFERENCE

| SPOOL TYPE | P→A | B→T | P→B | A→T | P→T |
|------------|-----|-----|-----|-----|-----|
| FC | 6 | 6 | 6 | 6 | - |
| FO | 7 | 7 | 7 | 7 | 5 |
| FFF | 6 | 7 | 6 | 7 | - |
| FFFX | 6 | 7 | 6 | 7 | - |
| FFO1 | 5 | 2 | 2 | 5 | 8 |
| FTTO | 2 | 2 | 2 | 2 | 5 |
| FTTC | 1 | 1 | 1 | 1 | 4 |
| FOP | 7 | 6 | 7 | 6 | - |
| FF1 | 6 | 6 | 6 | 7 | - |
| FOP1 | 7 | 6 | 6 | 6 | - |
| JC | 2 | 2 | 6 | 6 | - |
| JO | 3 | 3 | 6 | 6 | - |
| JP | 5 | - | 5 | - | - |
| GC | 6 | 6 | 2 | 2 | - |
| GO | 6 | 6 | 3 | 3 | - |
| GP | 5 | - | 5 | - | - |

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 | |

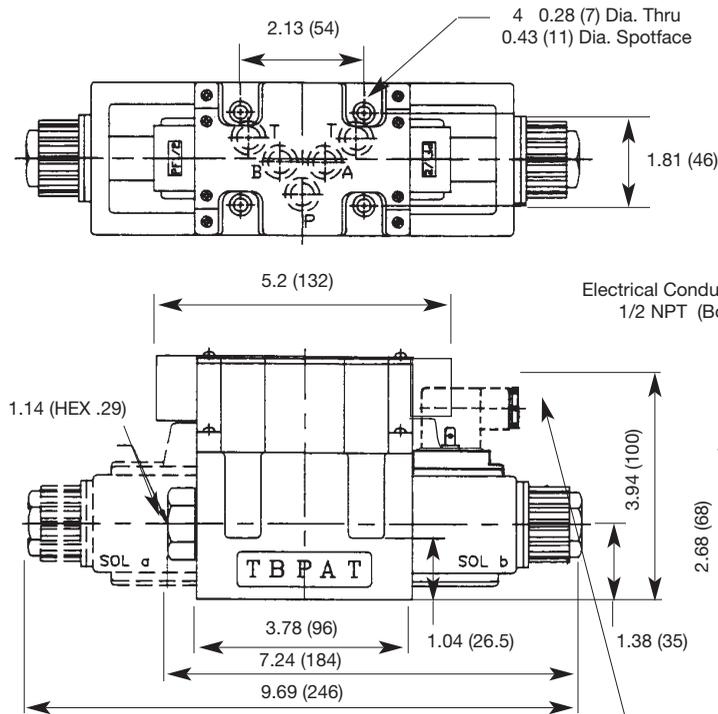
PORT INTERCONNECTION:

- With solenoid "a" energized P → A B → T
- With solenoid "b" energized P → B A → T
- Both port interconnections are reversed for FF01, FF02, FTTO, and FTTC type.

INSTALLATION DIMENSIONS

DO5-A-F *** - *** - **** - *** - *

Models with AC solenoids

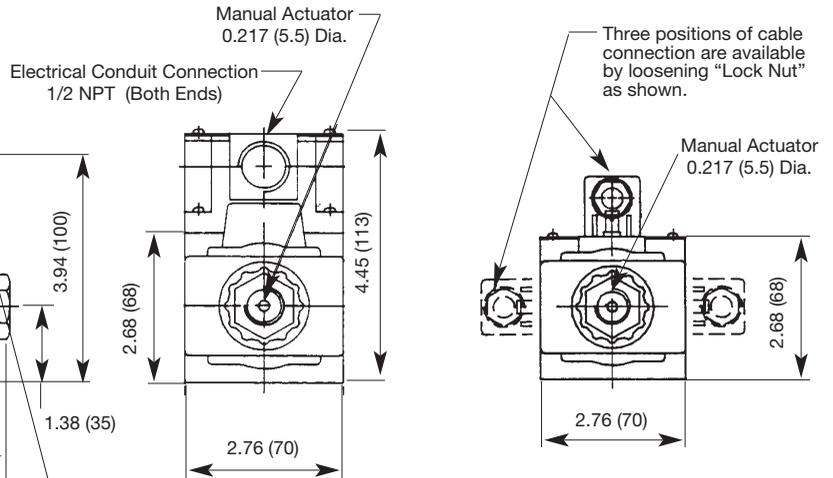


ACCESSORIES

BOLT KITS

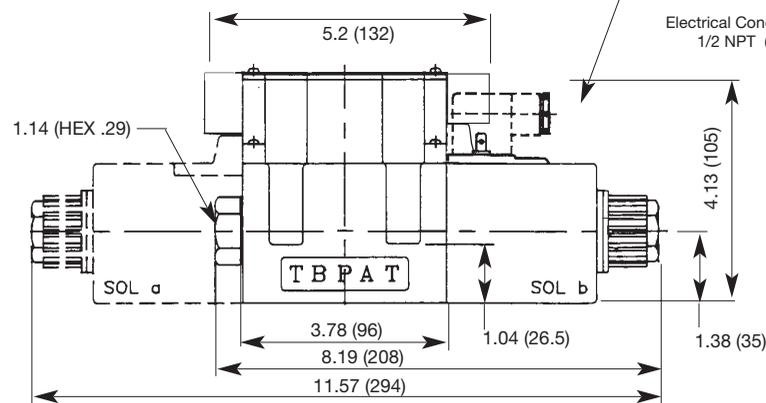
| MODEL CODES | SIZES | THREAD |
|---------------------|-------------------|--------|
| MMBK-SH4025-20-1.37 | ¼"-20UNC x1½" Lg. | INCH |
| MMBK-SHM4006-1-35 | M6 x 35 Lg. | METRIC |

Bolt Kits include (4) Socket Head Cap Screws.
Tightening Torque 104 - 130 Lb-ins. (120-150 Kgf-cm)

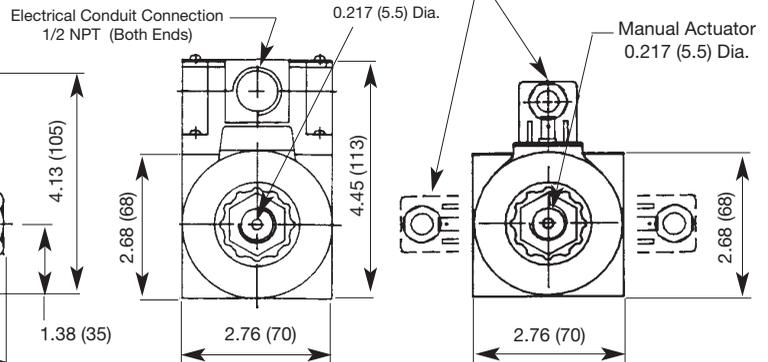


DO5 - A - J *** - *** - **** - *** - *

Models with DC, RF solenoids



Cable connection
Cable Applicable:
Outside Dia. : 0.394(10)
Conductor Area: Not exceeding
1.5 mm² (0.048 in²)



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 | 4.29 | 0.78 | 30 |
| | | 60 | 120 | 108 -138 | 3.99 | 0.70 | 32 |
| | A240 | 50 | 220 | 198 -242 | 2.04 | 0.37 | 29 |
| | | 60 | 240 | 216 -274 | 1.88 | 0.33 | 32 |
| | R110 | 50 | 100 | 90 -115 | 0.47 | 0.47 | 46 |
| | | 60 | 110 | 99 -126 | 0.47 | 0.47 | 46 |
| R220 | 50 | 200 | 180 -220 | 0.24 | 0.24 | 46 | |
| | 60 | 220 | 198 -253 | 0.24 | 0.24 | 46 | |
| D.C. | D12 | 12 | | 10.8-13.2 | 2.58 | 2.58 | 32 |
| | D24 | 24 | | 21.6-26.4 | 1.33 | 1.33 | |

LIST OF SPOOL FUNCTION

THE MAXIMUM FLOW RATE GPM (LPM) UNDER DIFFERENT PRESSURE PSI (KGF/CM²)

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 NORMAL POSITION | P → A, B → T P → B, A → T | | | | | | P → A | | | | | | P → B | | | | | | |
|-------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-------------------------|
| | 735 PSI (50kgf/cm ²) | 1470 PSI (100kgf/cm ²) | 2200 PSI (150kgf/cm ²) | 3000 PSI (210kgf/cm ²) | 3675 PSI (250kgf/cm ²) | 4500 PSI (315kgf/cm ²) | 735 PSI (50kgf/cm ²) | 1470 PSI (100kgf/cm ²) | 2200 PSI (150kgf/cm ²) | 3000 PSI (210kgf/cm ²) | 3675 PSI (250kgf/cm ²) | 4500 PSI (315kgf/cm ²) | 735 PSI (50kgf/cm ²) | 1470 PSI (100kgf/cm ²) | 2200 PSI (150kgf/cm ²) | 3000 PSI (210kgf/cm ²) | 3675 PSI (250kgf/cm ²) | 4500 PSI (315kgf/cm ²) | |
| FC | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 26.4 (100) 10.0 (38) | 14.5 (55) 7.1 (27) | 12.7 (48) 4.5 (17) | 10.0 (38) 3.4 (13) | 7.7 (29) 2.6 (10) | 31.7 (120) 26.4 (100) | 26.4 (100) 10.0 (38) | 14.5 (55) 7.1 (27) | 12.7 (48) 4.5 (17) | 10.0 (38) 3.4 (13) | 7.7 (29) 2.6 (10) | |
| FO | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | |
| FFF | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 26.4 (100) 11.1 (42) | 20.6 (78) 7.1 (27) | 16.9 (64) 4.2 (16) | 13.5 (51) 2.9 (11) | 10.3 (39) 2.1 (8) | 31.7 (120) 26.4 (100) | 26.4 (100) 11.1 (42) | 20.6 (78) 7.1 (27) | 16.9 (64) 4.2 (16) | 13.5 (51) 2.9 (11) | 10.3 (39) 2.1 (8) | |
| FFFX | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 26.4 (100) 26.4 (100) | 19.8 (75) 26.4 (100) | 14.3 (54) 26.4 (100) | 10.8 (41) 26.4 (100) | 31.7 (120) 26.4 (100) | 30.4 (115) 19.8 (75) | 13.2 (50) 6.1 (23) | 10.3 (39) 5.5 (21) | 7.9 (30) 4.0 (15) | 5.5 (21) 3.2 (12) | 31.7 (120) 26.4 (100) | 30.4 (115) 19.8 (75) | 13.2 (50) 6.1 (23) | 10.3 (39) 5.5 (21) | 7.9 (30) 4.0 (15) | 5.5 (21) 3.2 (12) | |
| FO1 | 26.4 (100) 21.7 (82) | 26.4 (100) 21.7 (82) | 26.4 (100) 21.7 (82) | 26.4 (100) 21.7 (82) | 26.4 (100) 21.7 (82) | 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 (100) | 26.4 (100) 26.4 (100) | 26.4 (100) 26.4 (100) | 26.4 (100) 26.4 (100) | — 26.4 (100) |
| FTTO | 26.4 (100) 19.8 (75) | 26.4 (100) 19.8 (75) | 26.4 (100) 19.8 (75) | 26.4 (100) 19.8 (75) | 26.4 (100) 19.8 (75) | 26.4 (100) — | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | — — | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) | 26.4 (100) 25.1 (95) |
| FOP | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) | 17.2 (65) 16.6 (63) |
| FF1 | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 26.4 (100) 20.1 (76) | 22.5 (85) 7.4 (28) | 14.3 (54) 5.5 (21) | 10.8 (41) 3.7 (14) | 31.7 (120) 26.4 (100) | 31.7 (120) 14.0 (53) | 13.7 (52) 8.5 (32) | 10.3 (39) 7.4 (28) | 7.4 (28) 5.5 (21) | 4.8 (18) 4.0 (15) | 31.7 (120) 26.4 (100) | 17.2 (65) 12.7 (48) | 10.6 (40) 7.1 (27) | 7.4 (28) 5.5 (21) | 4.0 (15) 4.0 (15) | 3.2 (12) 2.4 (9) | |
| FOP1 | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 17.2 (65) 15.1 (57) | 17.2 (65) 15.1 (57) | 17.2 (65) 15.1 (57) | 17.2 (65) 15.1 (57) | 17.2 (65) 15.1 (57) | 17.2 (65) 15.1 (57) | 31.7 (120) 26.4 (100) | 22.5 (85) 10.6 (40) | 21.1 (80) 9.8 (37) | 19.6 (74) 9.0 (34) | 14.3 (54) 7.7 (29) | 12.9 (49) 6.6 (25) | |
| JC | 25.1 (95) 19.0 (72) | 25.1 (95) 19.0 (72) | 25.1 (95) 19.0 (72) | 25.1 (95) 19.0 (72) | 25.1 (95) 19.0 (72) | 25.1 (95) 19.0 (72) | 18.2 (69) 16.6 (63) | 18.2 (69) 16.6 (63) | 18.2 (69) 16.6 (63) | 18.2 (69) 16.6 (63) | 18.2 (69) 16.6 (63) | 18.2 (69) 16.6 (63) | 31.7 (120) 26.4 (100) | 31.7 (120) 19.6 (74) | 17.4 (66) 10.0 (38) | 14.5 (55) 9.5 (36) | 11.6 (44) 8.2 (31) | 10.0 (38) 7.1 (27) | |
| JO | 23.5 (89) 21.4 (81) | 23.5 (89) 21.4 (81) | 23.5 (89) 21.4 (81) | 23.5 (89) 21.4 (81) | 23.5 (89) 21.4 (81) | 23.5 (89) 21.4 (81) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 26.4 (100) 26.4 (100) | 23.5 (89) 23.5 (89) | 22.2 (84) 22.2 (84) | 20.3 (77) 20.3 (77) | 18.5 (70) 18.5 (70) | 16.4 (62) 16.4 (62) | |
| JP | — | — | — | — | — | — | 22.5 (85) 21.4 (81) | 9.2 (35) 7.7 (29) | 7.4 (28) 5.0 (19) | 5.0 (19) 3.2 (12) | 4.0 (15) 2.4 (9) | 2.6 (10) 1.8 (7) | 31.7 (120) 26.4 (100) | 25.1 (95) 11.1 (42) | 22.2 (84) 7.4 (28) | 16.6 (63) 5.8 (22) | 13.2 (50) 4.5 (17) | 9.0 (34) 3.2 (12) | |
| MC | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 15.9 (60) 15.9 (60) | 10.6 (40) 10.6 (40) | 10.6 (40) 10.6 (40) | 10.6 (40) 10.6 (40) | 7.9 (30) 7.9 (30) | 7.4 (28) 7.4 (28) | 15.9 (60) 15.9 (60) | 10.6 (40) 10.6 (40) | 10.6 (40) 10.6 (40) | 10.6 (40) 10.6 (40) | 7.9 (30) 7.9 (30) | 7.4 (28) 7.4 (28) | |
| MO | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 31.7 (120) 26.4 (100) | 18.5 (70) 18.5 (70) | 15.9 (60) 15.9 (60) | 15.9 (60) 15.9 (60) | 15.9 (60) 15.9 (60) | 11.1 (42) 11.1 (42) | 9.5 (36) 9.5 (36) | 18.5 (70) 18.5 (70) | 15.9 (60) 15.9 (60) | 15.9 (60) 15.9 (60) | 15.9 (60) 15.9 (60) | 11.1 (42) 11.1 (42) | 9.5 (36) 9.5 (36) | |

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.