## Proportional Valves

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>FLOW</th>
<th>CAVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDFC-4M</td>
<td>4/3 PROPORTIONAL DIRECTIONAL VALVE</td>
<td>8 GPM</td>
<td>C1040</td>
</tr>
<tr>
<td>PDFC-4L</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EPRR-10</td>
<td>PROPORTIONAL PRESS. REDUCING/RELIEVING</td>
<td>1 GPM</td>
<td>C1030</td>
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<tr>
<td>EPRT-08</td>
<td>PROPORTIONAL PRESS. REDUCING/RELIEVING</td>
<td>7 GPM</td>
<td>C0830/AM</td>
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<tr>
<td>EPRS-10</td>
<td>PROP. P.O. PRESSURE REDUCING/RELIEVING</td>
<td>12 GPM</td>
<td>C1030</td>
</tr>
<tr>
<td>EPRS-12</td>
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<td>24 GPM</td>
<td>C1230</td>
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<tr>
<td>ERVP-10</td>
<td>PROPORTIONAL P.O. PRESSURE RELIEF</td>
<td>25 GPM</td>
<td>C1020</td>
</tr>
<tr>
<td>ERVP-12</td>
<td></td>
<td>60 GPM</td>
<td>C1220</td>
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<tr>
<td>ERVD-10</td>
<td>PROPORTIONAL PRESS. RELIEF, LOW FLOW</td>
<td>1 GPM</td>
<td>C1020</td>
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<tr>
<td>EPFI-10</td>
<td>PROPORTIONAL PRESS. COMP. FLOW CONTROL</td>
<td>8 GPM</td>
<td>C1020</td>
</tr>
<tr>
<td>EPFI-12</td>
<td></td>
<td>15 GPM</td>
<td>C1220</td>
</tr>
<tr>
<td>EPFC-16</td>
<td></td>
<td>20 GPM</td>
<td>C1620</td>
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<tr>
<td>EPFB-10</td>
<td>PROP. PRIORITY PRESS. COMP. FLOW CONTROL</td>
<td>8 GPM</td>
<td>C1030</td>
</tr>
<tr>
<td>EPFB-12</td>
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<td>15 GPM</td>
<td>C1230</td>
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<tr>
<td>EPFD-16</td>
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<td>20 GPM</td>
<td>C1630</td>
</tr>
<tr>
<td>PFCV-10</td>
<td>PROPORTIONAL NON-COMP. FLOW CONTROL</td>
<td>16 GPM</td>
<td>C1020</td>
</tr>
<tr>
<td>PFCV-12</td>
<td></td>
<td>24 GPM</td>
<td>C1220</td>
</tr>
<tr>
<td>PFCV-16</td>
<td></td>
<td>36 GPM</td>
<td>C1620</td>
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# Proportional Valves

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>FLOW</th>
<th>CAVITY</th>
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<tbody>
<tr>
<td>MDR32GN</td>
<td>PROPORTIONAL 3/2 THROTTLE CARTRIDGE</td>
<td>8 GPM</td>
<td>AM</td>
</tr>
<tr>
<td>MDR42A</td>
<td>PROPORTIONAL 4/2 THROTTLE CARTRIDGE</td>
<td>8 GPM</td>
<td>AN</td>
</tr>
<tr>
<td>MVRPSBA-2G</td>
<td>PROPORTIONAL THROTTLE CARTRIDGE</td>
<td>13 GPM</td>
<td>C0820/AL</td>
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<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>FLOW</th>
<th>CAVITY</th>
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<tbody>
<tr>
<td>PIFC-10</td>
<td>PROP. FLOW CONTROL WITH COMPENSATOR</td>
<td>16 GPM</td>
<td>C1020</td>
</tr>
<tr>
<td>PIFC-12</td>
<td></td>
<td>24 GPM</td>
<td>C1220</td>
</tr>
<tr>
<td>PIFC-16</td>
<td></td>
<td>36 GPM</td>
<td>C1620</td>
</tr>
<tr>
<td>PBFC-10</td>
<td>PROP. PRIORITY FLOW CONTROL WITH COMP.</td>
<td>16 GPM</td>
<td>C1030</td>
</tr>
<tr>
<td>PBFC-12</td>
<td></td>
<td>24 GPM</td>
<td>C1230</td>
</tr>
<tr>
<td>PBFC-16</td>
<td></td>
<td>36 GPM</td>
<td>C1630</td>
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</table>

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>FLOW</th>
<th>CAVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWM-1400</td>
<td>PWM MICRO PROPORTIONAL VALVE DRIVER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWM-1401</td>
<td>PWM PROPORTIONAL DRIVER, COIL MOUNTED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWM-1404</td>
<td>PWM PROPORTIONAL DRIVER CONTROL BOX</td>
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</tbody>
</table>

**4/3 Proportional Directional Valve, Size SAE 10**

Q\(_{\text{max}}\) = 8.0 gpm [30 l/min], \(p_{\text{max}}\) = 4000 psi [280 bar]

Direct acting, sliding-spool design, with solenoid operation

Series PDFC-10...

- Compact construction for cavity type C1040 – 7/8-14 UNF
- Operated by a proportional high pressure wet-armature solenoid
- Minimum current threshold/ dead band (position b) is factory set for better consistency
- Manual over-ride optionally available, detented in neutral position
- Excellent reproducibility and repeatability, and low hysteresis
- All exposed parts with zinc-nickel plating
- The slip-on coil can be rotated, and it can be replaced without opening the hydraulic envelope
- Various plug-connector systems and voltages are available
- Can be fitted in a line-mounting body

1 Description

Series PDFC-10... proportional directional valves are direct acting screw-in cartridges with a sliding spool design and a 7/8-14 UNF mounting thread. In the neutral position, port 3 is closed and depending on the spool type, ports 2 and 4 are connected to tank (1) (spool configuration M) or ports 1, 2 and 4 are all blocked (spool configuration L). The version with the M spool is used in motor control circuits where free-wheeling in the neutral position is required. The L configuration is the version to use for cylinder applications. These cartridges are particularly suitable for precise and controlled lifting and lowering movements and can also be used for reliable operation in mobile and industrial applications. Best controllability is achieved when using the valve with a bypass pressure compensator to control pressure drop through the valve. Using the valve without pressure compensator is not recommended because higher pressure drops cause the flow to be more restricted (see performance graph). The proportional directional valves is optionally equipped with a manual over-ride which is detented in the neutral position. To unlatch the detent mechanism, the button on the back can be pushed. That allows shifting the valve in both directions. Pushing the knob shifts the valve to position (a) \((3 \rightarrow 2 \text{ and } 4 \rightarrow 1)\) and pulling shifts it to position (b) \((3 \rightarrow 4 \text{ and } 2 \rightarrow 1)\). All external parts of the cartridge are zinc plated and chromited (CrVI-free). The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section "Related data sheets".

2 Symbol

![Diagram of Series PDFC-10...](image)

- PDFC-10-...-4M-M...
- PDFC-10-...-4L-M...
- PDFC-10-...-4M-0...
- PDFC-10-...-4L-0...

Reference: 520-P-113020-EN-01

Issue: 10.2015
## 3 Technical data

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Description, value, unit</th>
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</thead>
<tbody>
<tr>
<td>Designation</td>
<td>4/3 proportional directional valve</td>
</tr>
<tr>
<td>Design</td>
<td>sliding-spool design, direct acting, with solenoid operation</td>
</tr>
<tr>
<td>Mounting method</td>
<td>screw-in cartridge 7/8-14 UNF</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>40…45 ft-lbs [54…61 Nm]</td>
</tr>
<tr>
<td>Size</td>
<td>size SAE 10, cavity type C1040</td>
</tr>
<tr>
<td>Weight</td>
<td>1.65 lbs [0.75 kg]</td>
</tr>
<tr>
<td>Mounting attitude</td>
<td>unrestricted (preferably vertical, coil down)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-15 °F … +125 °F [-25 °C … +50 °C]</td>
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<table>
<thead>
<tr>
<th>Hydraulic characteristics</th>
<th>Description, value, unit</th>
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<tbody>
<tr>
<td>Maximum operating pressure</td>
<td>- ports 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td>- port 1</td>
</tr>
<tr>
<td></td>
<td>4000 psi</td>
</tr>
<tr>
<td></td>
<td>2000 psi</td>
</tr>
<tr>
<td></td>
<td>higher pressure, please consult BUCHER</td>
</tr>
<tr>
<td>Maximum flow rate</td>
<td>- port 3 → 4 and 2 → 1</td>
</tr>
<tr>
<td></td>
<td>7.0 gpm at Δp 140 psi</td>
</tr>
<tr>
<td></td>
<td>6.2 gpm at Δp 140 psi</td>
</tr>
<tr>
<td></td>
<td>at 100% duty cycle</td>
</tr>
<tr>
<td>Leakage flow rate</td>
<td>(port to port)</td>
</tr>
<tr>
<td></td>
<td>15 inch³ at 3000 psi</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER</td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>-15 °F … +160 °F [-25 °C … +70 °C]</td>
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<tr>
<td>Viscosity range</td>
<td>15…380 mm²/s (cSt), recommended 20…130 mm²/s (cSt)</td>
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<tr>
<td>Minimum fluid cleanliness</td>
<td>class 18/16/13</td>
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<td>Cleanliness class to ISO 4406 : 1999</td>
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<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>Description, value, unit</th>
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<tbody>
<tr>
<td>Supply voltage</td>
<td>12 V DC, 24 V DC</td>
</tr>
<tr>
<td>Control current</td>
<td>12 V = 0…1400 mA, 24 V = 0…750 mA (100% duty cycle)</td>
</tr>
<tr>
<td></td>
<td>12 V = 0…1600 mA, 24 V = 0…880 mA (50% duty cycle)</td>
</tr>
<tr>
<td>Power consumption at max. control current</td>
<td>max. 19 W</td>
</tr>
<tr>
<td>Coil resistance R</td>
<td>- cold value at 20 °C</td>
</tr>
<tr>
<td></td>
<td>max. warm value</td>
</tr>
<tr>
<td></td>
<td>12 V = 5.8 Ω / 24 V = 20.9 Ω</td>
</tr>
<tr>
<td></td>
<td>12 V = 9.1 Ω / 24 V = 32.7 Ω</td>
</tr>
<tr>
<td>Recommended PWM frequency (dither)</td>
<td>200 Hz</td>
</tr>
<tr>
<td>Hysteresis with PWM</td>
<td>2…5 % ( I_N )</td>
</tr>
<tr>
<td>Reversal error with PWM</td>
<td>2…5 % ( I_N )</td>
</tr>
<tr>
<td>Sensitivity with PWM</td>
<td>&lt; 1.5 % ( I_N )</td>
</tr>
<tr>
<td>Reproducibility with PWM</td>
<td>&lt; 3 % ( P_N )</td>
</tr>
<tr>
<td>Relative duty cycle</td>
<td>100 % / 50 %</td>
</tr>
<tr>
<td>Protection class to ISO 20 653 / EN 60 529</td>
<td>IP 65 / IP 67 / IP 69K, see “Ordering code” (with appropriate mating connector and proper fitting and sealing)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3-pin square plug to ISO 4400 / DIN 43 650 (standard) for other connectors, see “Ordering code”</td>
</tr>
</tbody>
</table>
4 Performance graphs

\[ Q = f(I; \Delta p) \] Flow rate adjustment characteristic 4M

- Coil b, connections 3 → 2 ; 4 → 1
- Coil a, connections 3 → 2 ; 4 → 1

**A)** 100% duty cycle
**B)** 50% duty cycle

--- depending on coil temperature, solenoid may draw a voltage higher than the nominal voltage

\[ \Delta p = f(Q) \] Pressure drop - Flow rate characteristic 4L

- Coil b, connections 3 → 4 ; 2 → 1
- Coil a, connections 3 → 2 ; 4 → 1

**A)** 100% duty cycle
**B)** 50% duty cycle

--- depending on coil temperature, solenoid may draw a voltage higher than the nominal voltage
5 Dimensions & sectional view

4/3 proportional directional valve

1. Push button to unlatch manual over-ride
2. Push or pull on whole handle to shift valve to position a or b

Seal kit

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>O-ring 16 x 2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>O-ring no. 910 0.755 x 0.097 [19.18 x 2.46]</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>O-ring no. 016 0.614 x 0.070 [15.60 x 1.78]</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>O-ring no. 015 0.581 x 0.070 [14.00 x 1.78]</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>O-ring no. 014 0.489 x 0.070 [12.42 x 1.78]</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Backup ring 0.634 x 0.052 x 0.47 [16.10 x 1.32 x 1.19]</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Backup ring 0.572 x 0.052 x 0.47 [14.53 x 1.32 x 1.19]</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Backup ring 0.510 x 0.052 x 0.47 [12.95 x 1.32 x 1.19]</td>
</tr>
</tbody>
</table>

* overall length without manual over-ride

6 Installation information

ATTENTION!
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

IMPORTANT!
When fitting the valves, use the specified tightening torque for the mounting bolts. No adjustments are necessary, since the cartridges are set in the factory.
7 Ordering code

PDFC = proportional directional valve
10 = nominal size SAE 10
N = NBR (Nitrile) seals (standard)
V = FKM (Viton) seals (special seals - please consult BUCHER)
4L = cylinder spool, all ports closed in neutral
4M = motor spool, 2 and 4 connected to tank in neutral
A = factory set min current threshold at position b
M = with manual over-ride
0 = without manual over-ride
0 = cartridge only
02BA = line-mounting body G1/4 BSPP aluminum
02BS = line-mounting body G1/4 BSPP steel
03BA = line-mounting body G3/8 BSPP aluminum
03BS = line-mounting body G3/8 BSPP steel
06TA = line-mounting body SAE-#6 aluminum
06TS = line-mounting body SAE-#6 steel
08TA = line-mounting body SAE-#8 aluminum
08TS = line-mounting body SAE-#8 steel
... = voltage e.g. 24 (24 V)
D = current DC
(blank) = ISO 4400 / DIN 43 650 mating plug (standard, IP 65)
M100 = without mating DIN plug
C = Kostal plug connection (IP 65)
JT = Junior Timer radial plug connection (with protection diode, IP65)
IT = Junior Timer axial plug connection (with protection diode, IP65)
D = Deutsch plug connection DT04-2P (IP 67/69K)
DT = Deutsch plug connection DT04-2P (with protection diode, IP 67/69K)
S = AMP Superseal 1.5 (IP 67) / Metri-Pack 150 (IP 65)
F = flying leads (500 mm)

8 Related data sheets

<table>
<thead>
<tr>
<th>Reference</th>
<th>(Old no.)</th>
<th>Description</th>
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<tr>
<td>520-P-000050</td>
<td></td>
<td>The form-tool hire programme</td>
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<tr>
<td>520-P-000420</td>
<td>(0-042.0)</td>
<td>Cavity Type C1040</td>
</tr>
<tr>
<td>520-P-000421</td>
<td>(0-042.1)</td>
<td>Line-mounting body, 10 Series – 4-way</td>
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</tbody>
</table>
PROPORTIONAL PRESSURE REDUCING/RELIEVING. DIRECT ACTING, SPOOL TYPE.

NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-032.1
2. SOLENOIDS AVAILABLE WITH DIODES - CONSULT FACTORY.

EPRR-10-X-XX-X-X-XXX X

BASIC
SIZE
10 = 7/8”-14UNF
SEALS
N = BUNA "N"
V = VITON
REGULATED PRESSURE
02 = 0 TO 200 PSI
03 = 0 TO 300 PSI
04 = 0 TO 400 PSI
05 = 0 TO 500 PSI
06 = 0 TO 600 PSI
07 = 0 TO 700 PSI
08 = 0 TO 800 PSI
10 = 0 TO 1000 PSI

TERMINALS
L = 18GA. 24” LEADS
T = SPADE TERM.
B = BOLT TERM.
G = DIN43650
W = WEATHER-PAK
D = DEUTSCH-DT04-2P
M = METRI-PACK CONN.

VOLTAGE AMPS
12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
M = MANUAL OVERRIDE

REGULATED PRESSURE
AMPERAGE (AMPS) @ 24 VDC
0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20
69.0 55.2 41.4 27.6 13.8

AMPERAGE (AMPS) @ 12 VDC
0.30 0.60 0.90 1.20 1.50 1.80 2.10 2.40
69,0 55,2 41,4 27,6 13,8

TORQUE:
Steel = 55/60 Ft-Lb. [74/81 Nm]
Aluminum = 35/40 Ft-Lb. [47/54 Nm]

MANUAL OVERRIDE (SCREW TYPE)

TYPE "L" COIL
SEE PAGE 10-001.2

EPRR-10
### Description

This unit is a electro–hydraulic, proportional, screw in cartridge style, direct acting, spool type, pressure reducing/relieving flow pressure control valve.

### Operations

When the coil is de–energized, this valve allows no flow or pressure from port 2 to 1 and port 1 is open to (tank) port 3. When the coil is energized, the spool in this valve shifts and allows flow and pressure between ports 2 and 1 and blocks port 3 (tank). When the coil is energized the armature moves a precision bias spring against the metering spool thus varying the pressure at port 1 (Reg.) proportional to the current input. When the current is increased to the coil the pressure will increase and when decreased it will decrease.

**In the event of power failure the valve will reduce regulated pressure at port 1 to zero.**

### Features and Benefits

Continuous–duty, very low heat rise & waterproof solenoid coil.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All cartridge valves are 100% functionally tested.
Industry common cavity.
ELECTRO–HYDRAULIC, PROPORTIONAL, PRESSURE REDUCING/RELIEVING VALVE.

### SPECIFICATIONS

<table>
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<tr>
<th>Specification</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Operating Pressure</td>
<td>5,000 PSI [350 Bar]</td>
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<tr>
<td>Proof Pressure</td>
<td>10,000 PSI [700 Bar]</td>
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<tr>
<td>Regulated Pressure</td>
<td>0 to 1,000 PSI [0 to 69,0 Bar] See performance chart</td>
</tr>
<tr>
<td>Flow</td>
<td>1.0 GPM (3.8 l/m) nominal</td>
</tr>
<tr>
<td>Internal Leakage</td>
<td>10 cu.in/min [164 cc/m] @ 5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40° to +250° F. [-40° to +120° C.]</td>
</tr>
<tr>
<td>Operating Media</td>
<td>All general purpose hydraulic fluids such as MIL–H–5606, SAE–#10, SAE–#20, etc.</td>
</tr>
<tr>
<td>Response</td>
<td>The most efficient method to control this valve is with current control and a 50 Hz dither.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>12 VDC, Operating current 0.2 to 2.4 AMPS. 24 VDC, Operating current 0.1 to 1.2 AMPS.</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>SKN–1031 Buna “N” SKV–1031 Viton</td>
</tr>
<tr>
<td>Installation</td>
<td>No restrictions.</td>
</tr>
<tr>
<td>Weight</td>
<td>1.95 lb [.88 kg] cartridge with coil only.</td>
</tr>
<tr>
<td>Valve Cavity</td>
<td>#C1030, See Page 0–032.0</td>
</tr>
</tbody>
</table>
Prop. Pressure-Reducing/Relieving Cartridge, Size SAE 08

\[ Q_{max} = 7.0 \text{ gpm} \ [26 \text{ l/min}], \quad p_{max} = 3400 \text{ psi} \ [240 \text{ bar}] \]

Seated pilot, spool-type main stage

Series EPRT-08...

1 Description

Series EPRT-08... proportional pressure-reducing / relieving valves are size SAE 08 / NG 5, high performance screw-in cartridges with a 3/4-16 UNF mounting thread. Using the leak-free seat-type pilot cartridge, the secondary pressure in port 1 is dependent on the electrical control signal and it can be continuously varied and set at any desired level. In control mode, the connection 2 → 1 opens until the pressure in port 1 reaches the preset level. If the pressure rises above the preset level, the control spool opens the 1 → 3 connection until balance is attained. These pressure-reducing / relieving cartridges function as full-flow pressure relief valves from port 1 → 3 as soon as the reduced pressure rises above the valve pressure setting. A high degree of functional stability is reached even if the back pressure in the tank line fluctuates. Three pressure ranges are available in order to obtain precise pressure settings over the whole pressure range. These pressure-reducing / relieving cartridges are predominantly used in mobile and industrial applications for reducing a system pressure. All external parts of the cartridge are zinc-nickel plated to DIN 50/C8201979 and are thus suitable for use in the harshest operating environments. The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section “Related data sheets”.

2 Symbol

3 Technical data

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Description, value, unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>proportional pressure-reducing / relieving cartridge</td>
</tr>
<tr>
<td>Design</td>
<td>seated pilot, spool-type main stage</td>
</tr>
<tr>
<td>Mounting method</td>
<td>screw-in cartridge 3/4-16 UNF</td>
</tr>
</tbody>
</table>
### General characteristics

<table>
<thead>
<tr>
<th>Description, value, unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tightening torque</td>
<td>30 ft-lbs ± 10 % [40 Nm ± 10 %]</td>
</tr>
<tr>
<td>Size</td>
<td>size SAE 08 for cavity type C0830 NG 5 for cavity type AM</td>
</tr>
<tr>
<td>Weight</td>
<td>0.93 lbs [0.42 kg]</td>
</tr>
<tr>
<td>Mounting attitude</td>
<td>unrestricted (preferably vertical, coil down)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-13 °F … +122 °F [-25 °C … +50 °C]</td>
</tr>
</tbody>
</table>

### Hydraulic characteristics

<table>
<thead>
<tr>
<th>Description, value, unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating pressure - ports 1, 2</td>
<td>3400 psi [240 bar]</td>
</tr>
<tr>
<td>- port 3</td>
<td>3000 psi [210 bar] 1)</td>
</tr>
<tr>
<td>Maximum flow rate</td>
<td>7 gpm [26 l/min]</td>
</tr>
<tr>
<td>Nominal pressure ranges</td>
<td>1500, 2500, 3000 psi [100, 175, 210 bar]</td>
</tr>
<tr>
<td>Pilot-oil consumption</td>
<td>0.05…0.08 gpm [0,2…0,3 l/min]</td>
</tr>
<tr>
<td>Flow direction</td>
<td>2 → 1 pressure reducing</td>
</tr>
<tr>
<td></td>
<td>1 → 3 pressure relieving</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER</td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>-13 °F … +158 °F [-25 °C … +70 °C]</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>15…380 mm²/s (cSt), recommended 20…130 mm²/s (cSt)</td>
</tr>
<tr>
<td>Minimum fluid cleanliness</td>
<td>class 18/16/13</td>
</tr>
</tbody>
</table>

**ATTENTION!**

1) To prevent any pressure surges, port 3 must be routed to tank with the least possible back-pressure.

### Electrical characteristics

<table>
<thead>
<tr>
<th>Description, value, unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>12 V DC, 24 V DC</td>
</tr>
<tr>
<td>Supply voltage tolerance</td>
<td>± 10 %</td>
</tr>
<tr>
<td>Control current</td>
<td>12 V = 0…1400 mA, 24 V = 0…750 mA</td>
</tr>
<tr>
<td>Power consumption at max. control current</td>
<td>max. 19 W</td>
</tr>
<tr>
<td>Coil resistance R - cold value at 20 °C</td>
<td>12 V = 5.8 Ω / 24 V = 21 Ω</td>
</tr>
<tr>
<td>- max. warm value</td>
<td>12 V = 8.6 Ω / 24 V = 32 Ω</td>
</tr>
<tr>
<td>Recommended PWM frequency (dither)</td>
<td>200 Hz</td>
</tr>
<tr>
<td>Hysteresis with PWM</td>
<td>2…4 % I_N</td>
</tr>
<tr>
<td>Reversal error with PWM</td>
<td>1…3 % I_N</td>
</tr>
<tr>
<td>Sensitivity with PWM</td>
<td>≤ 1 % I_N</td>
</tr>
<tr>
<td>Reproducibility with PWM</td>
<td>&lt; 2 % p_N</td>
</tr>
</tbody>
</table>
### Electrical characteristics

<table>
<thead>
<tr>
<th>Description, value, unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switching time</strong></td>
</tr>
<tr>
<td>38 … 45 ms (solenoid ON)</td>
</tr>
<tr>
<td>8 … 12 ms (solenoid OFF)</td>
</tr>
<tr>
<td><strong>Pressure-reducing function:</strong></td>
</tr>
<tr>
<td>41 … 51 ms (solenoid ON)</td>
</tr>
<tr>
<td>6 … 12 ms (solenoid OFF)</td>
</tr>
<tr>
<td>The switching times are strongly influenced by flow rate, pressure, viscosity and the dwell period under pressure.</td>
</tr>
<tr>
<td><strong>Relative duty cycle</strong></td>
</tr>
<tr>
<td>100 %</td>
</tr>
<tr>
<td><strong>Protection class to ISO 20 653 / EN 60 529</strong></td>
</tr>
<tr>
<td>IP 65 / IP 67 / IP 69K, see &quot;Ordering code&quot; (with appropriate mating connector and proper fitting and sealing)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
</tr>
<tr>
<td>DIN EN 175301-803, 3-pin 2 P+E (standard) for other connectors, see &quot;Ordering code&quot;</td>
</tr>
</tbody>
</table>

### 4 Performance graphs measured with oil viscosity 33 mm²/s (cSt)

\[ p = f(I) \] Pressure adjustment characteristic

\[ p_1 [\text{psi}] \]

\[ p_1 [\text{bar}] \]

\[ p_1 = 3000 \text{ psi} \]

\[ p_1 = 2500 \text{ psi} \]

\[ p_1 = 1500 \text{ psi} \]

\[ I [\text{mA}] \]

\[ I [\text{mA}] \]
p = f (Q) Pressure - Flow rate characteristic  \[p_N = 3000 \text{ psi}\]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\hline
p_1 [\text{bar}] & 26 & 30 & 35 & 40 & 45 & 50 & 55 & 60 & 65 & 70 \\
\hline
Q [\text{l/min}] & 26 & 52 & 78 & 104 & 130 & 156 & 182 & 208 & 234 & 260 \\
\hline
\end{array}
\]

\[p = f (Q) \text{ Pressure - Flow rate characteristic } \]  \[p_N = 2500 \text{ psi}\]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\hline
p_1 [\text{bar}] & 26 & 30 & 35 & 40 & 45 & 50 & 55 & 60 & 65 & 70 \\
\hline
Q [\text{l/min}] & 26 & 52 & 78 & 104 & 130 & 156 & 182 & 208 & 234 & 260 \\
\hline
\end{array}
\]

\[p = f (Q) \text{ Pressure - Flow rate characteristic } \]  \[p_N = 1500 \text{ psi}\]

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
\hline
p_1 [\text{bar}] & 26 & 30 & 35 & 40 & 45 & 50 & 55 & 60 & 65 & 70 \\
\hline
Q [\text{l/min}] & 26 & 52 & 78 & 104 & 130 & 156 & 182 & 208 & 234 & 260 \\
\hline
\end{array}
\]
5 Dimensions & sectional view

6 Installation information

IMPORTANT!
To achieve the proportional pressure-reducing cartridge's maximum performance rating, fit the solenoid coil as shown (with the plug pins at the bottom). When fitting the cartridges, note the mounting attitude (preferably vertical, with coil down → automatic air bleed) and use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.

ATTENTION!
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

Seal kit NBR no. SKN-0832-12-S1 ¹)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>O-ring</td>
<td>16.00 x 2.00 FKM</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>O-ring</td>
<td>18.00 x 2.00 FKM</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>O-ring no. 908</td>
<td>0.644 x 0.087 N70</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>O-ring no. 014</td>
<td>0.489 x 0.070 N70</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>O-ring no. 013</td>
<td>0.426 x 0.070 N70</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Backup ring</td>
<td>FI0751</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Backup ring</td>
<td>FI0751</td>
</tr>
</tbody>
</table>

¹) Seal kit with FKM (Viton) seals, no. SKV-0832-12-S1

²) vent screw to vent valve when mounted coil up screw torqued hand tight.
7 Ordering code

**EPRT** = prop. pressure-reducing / relieving valve, two stage

08 = nominal size SAE 08

N = NBR (Nitrile) seals (standard)

V = FKM (Viton) seals (special seals - please contact BUCHER)

30 = Pressure option 3000 psi

25 = Pressure option 2500 psi

15 = Pressure option 1500 psi

0 = cartridge only

02BA = line-mounting body G1/4 BSPP aluminum

02BS = line-mounting body G1/4 BSPP steel

03BA = line-mounting body G3/8 BSPP aluminum

03BS = line-mounting body G3/8 BSPP steel

06TA = line-mounting body SAE-6 aluminum

06TS = line-mounting body SAE-6 steel

... = voltage e.g. 24 (24 V)

D = current DC

(blank) = DIN EN 175301-803 connection with mating plug (standard, IP 65)

M100 = DIN EN 175301-803 connection without mating plug

C = Kostal plug connection (IP 65)

JT = Junior Timer radial plug connection (with protection diode, IP65)

IT = Junior Timer axial plug connection (with protection diode, IP65)

D = Deutsch plug connection 45° DT04-2P (IP67/69K)

DT = Deutsch plug connection 45° DT04-2P (with protection diode, IP67/69K)

S = AMP Superseal 1.5 (IP67) / Metri-Pack 150 (IP65) plug connection

F = flying leads (500 mm)

8 Related data sheets

<table>
<thead>
<tr>
<th>Reference</th>
<th>(Old no.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>520-P-000050</td>
<td></td>
<td>The form-tool loan program</td>
</tr>
<tr>
<td>520-P-000310</td>
<td>(0-031.0)</td>
<td>Cavity type C0830</td>
</tr>
<tr>
<td>400-P-040181</td>
<td></td>
<td>Cavity type AM</td>
</tr>
<tr>
<td>400-P-120110</td>
<td>(W-2.141)</td>
<td>Coils for screw-in cartridge valves</td>
</tr>
<tr>
<td>400-P-510101</td>
<td></td>
<td>Amplifier unit for proportional valves (1-channel) PBS - 3A</td>
</tr>
<tr>
<td>400-P-511101</td>
<td>(P-3)</td>
<td>Amplifier card, 1-channel for valves with one solenoid, type SAN-535…</td>
</tr>
<tr>
<td>520-P-000311</td>
<td>(0-031.1)</td>
<td>Line-mounting body, 8 Series -3-way</td>
</tr>
<tr>
<td>400-P-720111</td>
<td>(G-4.20)</td>
<td>Line-mounting body, type GAMA (G 3/8&quot;)</td>
</tr>
</tbody>
</table>
EPRS-10

PROPORTIONAL PRESSURE REDUCING/RELIEVING. PILOT OPERATED, SLIDING SPOOL

TERMINALS

L = 18GA. 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
G = D IN43650
W = WEATHER - PACK
D = DEUTSCH - DTO4 - 2P
M = METRI - PACK CONN.

VOLTAGE AMPS
12V = 12 VDC 3.00
24V = 24 VDC 1.50

ADJUSTMENT OPTIONS
M = MANUAL OVERRIDE

PORTS
C = CARTRIDGE ONLY
G = 1/4" BSPP
H = 3/8" BSPP
S = SAE - #6
8 = SAE - #8
A = ALUM. HOUSING
S = STEEL HOUSING

REGULATED PRESSURE
15 = 50 TO 1500 PSI
30 = 50 TO 3000 PSI
50 = 50 TO 5000 PSI

Steel = 55/60 Ft-Lb. [74/81 Nm]
Aluminum = 35/40 Ft-Lb. [47/54 Nm]

TORQUE:

Aluminum = 35/40 Ft-Lb. [47/54 Nm]
Steel = 55/60 Ft-Lb. [74/81 Nm]

Reference: 520-P-110220-EN-00/09.2015
## DESCRIPTION
This unit is an electro-hydraulic, proportional, screw in cartridge style, pilot operated, sliding spool type, high pressure reducing and relieving control valve.

## OPERATIONS
When the coil is de-energized, this valve will allow flow from port 2 to port 1 until pressure in port 1 exceeds the spring bias then the spool will shift and block flow from port 2 to port 1 relieving pressure to port 3. When the coil is energized, the armature moves a precision bias spring against the pilot orifice thus varying the pressure at port 1 (reg.) proportional to the current input regardless of the pressure at port 2. Excess pressure at port 1 is relieved to port 3. When the coil current is increased the pressure will increase and when decreased it will decrease. IN THE EVENT OF POWER FAILURE THE VALVE WILL REDUCE REGULATED PRESSURE AT PORT 1 TO 50 PSI.

## FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Pressure in tank port (3) will add to the bias spring setting, and is limited to 2000 PSI. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. A unique self aligning (floating) cage provides very low hysteresis and reliable operation. Very efficient wet - armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested. Industry common cavity.

---

**ELECTRO–HYDRAULIC, PROPORTIONAL, PRESSURE REDUCING/RELIEVING VALVE.**

Reference: 520-P-110220-EN-00/09.2015
# Specifications

**Operating Pressure:** 5,000 PSI [350 Bar]

**Proof Pressure:** 10,000 PSI [700 Bar]

**Regulated Pressure:** 50 to 5000 PSI [3,5 to 345] See performance chart.

**Flow:** 12.0 GPM [46.0 L/M] nominal.

**Internal Pilot Flow:** 20 cu.in/min [0,50 l/m] @ 5,000 PSI [350 Bar]

**Valve housings:** 2500 PSI [175 Bar] = Aluminum – Anodized.
5000 PSI [350 Bar] = Steel – Unplated.

**Operating Temperature:** −40° to +250° F. [−40° to +120° C.]

**Operating media:** All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.

**Response:** The most efficient method to control this valve is with current control and a 50 Hz dither.

**Power Requirements:** 12 VDC, Operating current 0.2 to 2.4 AMPS.
24 VDC, Operating current 0.1 to 1.2 AMPS.

**Seal Kit:** SKN-1031 Buna “N”
SKV-1031 Viton

**Installation:** No restrictions.

**Weight:** 1.95 lb [.88 kg] cartridge with coil only.

**Valve Cavity:** #C1030, See Page 0–032.0.
PROPORTIONAL PRESSURE REDUCING/RELIEVING PILOT OPERATED, SLIDING SPOOL

NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-033.1
2. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.

EPRS-12-X-XX-X-X-XXX X

TERMINALS
L = 18GA. 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
G = DIN 43650
W = WEATHER PACK
D = DEUTSCH-DT04-2P
M = METRI-PACK CONN.

VOLTAGE AMPS
12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
M = MANUAL OVERRIDE

PORTS
0 = CARTRIDGE
4BX = G 1/2" BSPP
6BX = G 3/4" BSPP
10TX = SAE - #10
12TX = SAE - #12

TORQUE:
Steel = 70/75 Ft-Lb. [95/102 Nm]
Aluminum = 55/60 Ft-Lb. [74/81 Nm]
DESCRIPTION
This unit is a electro–hydraulic, proportional, screw in cartridge style, pilot operated, sliding spool type, high pressure reducing and relieving control valve.

OPERATIONS
When the coil is de–energized, this valve will allow flow from port 2 to port 1 until pressure in port 1 exceeds the spring bias then the spool will shift and block flow from port 2 to port 1 relieving pressure to port 3. When the coil is energized, the armature moves a precision bias spring against the pilot orifice thus varying the pressure at port 1 (reg.) proportional to the current input regardless of the pressure at port 2. Excess pressure at port 1 is relieved to port 3. When the coil current is increased the pressure will increase and when decreased it will decrease. IN THE EVENT OF POWER FAILURE THE VALVE WILL REDUCE REGULATED PRESSURE AT PORT 1 TO 50 PSI.

FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil. Pressure in tank port (3) will add to the bias spring setting, and is limited to 2000 PSI. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. A unique self aligning (floating) cage provides very low hysteresis and reliable operation. Very efficient wet–armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.
# Specifications

**Operating Pressure:** 5,000 PSI [350 Bar]

**Proof Pressure:** 10,000 PSI [700 Bar]

**Regulated Pressure:** 50 to 5000 PSI [35 to 345] See performance chart.

**Flow:** 24.0 GPM [91.0 L/M] nominal.

**Internal Pilot Flow:** 60 cu.in/min [1.0 l/m] @ 5,000 PSI [350 Bar]

**Valve Housings:**
- 2500 PSI [175 Bar] = Aluminum - Anodized.
- 5000 PSI [350 Bar] = Steel - Unplated.

**Operating Temperature:** -40° to +250° F. [−40° to +120° C.]

**Response:** The most efficient method to control this valve is with current control and a 50 Hz dither.

**Power Requirements:**
- 12 VDC, Operating current 0.2 to 2.4 AMPS.
- 24 VDC, Operating current 0.1 to 1.2 AMPS.

**Seal Kit:** SKN-1231 Buna "N"
- SKV-1231 Viton

**Installation:** No restrictions.

**Weight:** 2.3 lb [1.2 kg] cartridge with coil only.

**Valve Cavity:** #C1230, See Page 0-033.0.
**PROPORTIONAL PRESSURE RELIEF VALVE.**
**PILOT OPERATED, SLIDING SPOOL TYPE.**

Pat.#5,546,980

Torque:
- Steel = 55/60 Ft-Lb. [74/81 Nm]
- Aluminum = 35/40 Ft-Lb. [47/54 Nm]

**ERVP-10**

- **TERMINALS**
  - L = 18GA. 24" LEADS
  - T = SPADE TERM.
  - B = BOLT TERM.
  - G = DIN43650
  - W = WEATHER-PACK
  - D = DEUTSCH-DT04-2P
  - M = METRI-PACK CONN.

- **VOLTAGE AMPS**
  - 12D = 12 VDC 3.00
  - 24D = 24 VDC 1.50

- **ADJUSTMENT OPTIONS**
  - M = MANUAL OVERRIDE

- **PORTS**
  - CARTRIDGE ONLY
  - 0 = G 1/4" BSPP
  - O2BX = G 3/8" BSPP
  - 06BX = SAE = #6
  - 06TX = SAE = #8
  - O8TX = "A" = ALUM. HOUSING
  - "S" = STEEL HOUSING

**NOTES:**
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-012.1
2. SOLENOIDS AVAILABLE WITH DIODES — CONSULT FACTORY.

Reference: 520-P-110320-EN-00/09.2015
# ELECTRO–HYDRAULIC, PROPORTIONAL, PRESSURE RELIEF VALVE.

## DESCRIPTION
This unit is a electro–hydraulic, proportional, screw in cartridge style, pilot operated, sliding spool type, high pressure relief valve.

## OPERATIONS
When the coil is de–energized, this valve allows flow and pressure from port 1 to port 2 if pressure exceeds the spring bias (50 psi). When the coil is energized the armature moves a precision bias spring against the pilot orifice thus varying the pressure setting at port 1 proportional to the current input. When the current is increased to the coil the relief pressure will increase and when decreased it will decrease. **IN THE EVENT OF POWER FAILURE THE VALVE RELIEF PRESSURE SETTING AT PORT 1 WILL BE THE SPRING BIAS.**

## FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil.
Pressure in tank port (2) will add to the bias spring setting, and is limited to 2000 PSI.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
A unique self aligning (floating) cage provides very low hysteresis and reliable operation.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All cartridge valves are 100% functionally tested.
Industry common cavity.

---

Reference: 520-P-110320-EN-00/09.2015
## Specifications

**Operating Pressure:** 5000 PSI [350 Bar]

**Proof Pressure:** 10,000 PSI [700 Bar]

**Regulated Pressure:** 50 to 5000 PSI [3,5 to 345] See performance chart.

**Flow:** 25.0 GPM [95,0 L/M] nominal.

**Internal Pilot Flow:** 60 cu.in/min [1,0 l/m] @ 3000 PSI [210 Bar]

**Valve Cavity:** #C1020, See Page 0-012.0

**Weight:** 1.95 lb [.88 kg] cartridge with coil only.

**Installation:** No restrictions.

**Seal Kit:** SKN-1022 Buna "N"

**SKV-1022 Viton**

**Response:** The most efficient method to control this valve is with current control and a 50 Hz dither.

**Power Requirements:**
- **12 VDC:** Operating current 0.2 to 2.4 AMPS.
- **24 VDC:** Operating current 0.1 to 1.2 AMPS.

**Seal Kit:**
- SKN-1022 Buna "N"
- SKV-1022 Viton

**Installation:** No restrictions.

**Weight:** 1.95 lb [.88 kg] cartridge with coil only.

**Valve Cavity:** #C1020, See Page 0-012.0.
**PROPORTIONAL PRESSURE RELIEF VALVE. PILOT OPERATED, SLIDING SPOOL TYPE.**

Pat.#5,546,980

---

### TERMINALS
- **L** = 18GA, 24" LEADS
- **T** = SPADE TERM.
- **B** = BOLT TERM.
- **G** = DIN43650
- **W** = WEATHER-PACK
- **D** = DEUTSCH-DT04-2P
- **M** = METRI-PACK CONN.

### VOLTAGE AMPS
- **12D** = 12 VDC 3.00
- **24D** = 24 VDC 1.50

### ADJUSTMENT OPTIONS
- **M** = MANUAL OVERRIDE

### REGULATED PRESSURE
- **15** = 50 TO 1500 PSI
- **30** = 50 TO 3000 PSI
- **50** = 50 TO 5000 PSI

### REGULATED PRESSURE AMPS @ 24 VDC

### REGULATED PRESSURE AMPS @ 12 VDC

### NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-013.1
2. SOLENOIDS AVAILABLE WITH DIODES — CONSULT FACTORY.

### ERVP-12-X-XX-X-X-XXX X
- **BASIC**
- **SIZE**
- **SEALS**
- **REGULATED PRESSURE**

### TORQUE:
- Steel = 70/75 Ft-Lb. [95/102 Nm]
- Aluminum = 55/60 Ft-Lb. [74/81 Nm]

Reference: S20-P-110330-EN-00/09.2015
Description
This unit is a electro-hydraulic, proportional, screw in cartridge style, pilot operated, sliding spool type, high pressure relief valve.

Operations
When the coil is de-energized, this valve allows flow and pressure from port 1 to port 2 if pressure exceeds the spring bias (50 psi). When the coil is energized the armature moves a precision bias spring against the pilot orifice thus varying the pressure setting at port 1 proportional to the current input. When the current is increased to the coil the relief pressure will increase and when decreased it will decrease.

In the event of power failure the valve relief pressure setting at port 1 will be the spring bias.

Features and Benefits
Continuous-duty, very low heat rise & waterproof solenoid coil. Pressure in tank port (2) will add to the bias spring setting, and is limited to 2000 PSI.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
A unique self aligning (floating) cage provides very low hysteresis and reliable operation.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All cartridge valves are 100% functionally tested.
ELECTRO–HYDRAULIC, PROPORTIONAL,
PRESSURE RELIEF VALVE.

SPECIFICATIONS
OPERATING PRESSURE: 5000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED PRESSURE: 50 to 5000 PSI [3.5 to 345] See performance chart.
FLOW: 60.0 GPM [227.0 L/M] nominal.
INTERNAL PILOT FLOW: 60 cu.in/min [1.0 l/m]. @ 3000 PSI [210 Bar]
5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: —40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.2 to 2.4 AMPS.
24 VDC, Operating current 0.1 to 1.2 AMPS.
SEAL KIT: SKN-1222 Buna "N"
SKV-1222 Viton
INSTALLATION: No restrictions.
WEIGHT: 2.25 lb [1.12 kg] cartridge with coil only.
VALVE CAVITY: #C1220, See Page 0–013.0.
# ERVD-10

## PROPORTIONAL PRESSURE RELIEF VALVE.
**DIRECT ACTING, LOW FLOW, POPPET TYPE.**

### NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-012.1
2. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.

### TERMINALS

<table>
<thead>
<tr>
<th>L</th>
<th>18GA. 24&quot; LEADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>SPADE TERM.</td>
</tr>
<tr>
<td>B</td>
<td>BOLT TERM.</td>
</tr>
<tr>
<td>C</td>
<td>DIN43650</td>
</tr>
<tr>
<td>W</td>
<td>WEATHER PACK</td>
</tr>
<tr>
<td>D</td>
<td>DEUTSCH-DT04-2P</td>
</tr>
<tr>
<td>M</td>
<td>METRI-PACK CONN.</td>
</tr>
</tbody>
</table>

### REGULATED PRESSURE

<table>
<thead>
<tr>
<th>Size</th>
<th>Regulated Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0 TO 1500 PSI</td>
</tr>
<tr>
<td>30</td>
<td>0 TO 3000 PSI</td>
</tr>
<tr>
<td>50</td>
<td>0 TO 5000 PSI</td>
</tr>
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</table>

### PORTS

<table>
<thead>
<tr>
<th>Ports</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02BX</td>
<td>G 3/8&quot; BSPP</td>
</tr>
<tr>
<td>06BX</td>
<td>SAE - #6</td>
</tr>
<tr>
<td>06TX</td>
<td>SAE - #8</td>
</tr>
<tr>
<td>08TX</td>
<td>&quot;A&quot; = ALUM. HOUSING</td>
</tr>
<tr>
<td></td>
<td>&quot;S&quot; = STEEL HOUSING</td>
</tr>
</tbody>
</table>

### TORQUE:

- Steel = 55/60 Ft-Lb. [74/81 Nm]
- Aluminum = 35/40 Ft-Lb. [47/54 Nm]

### AMPERAGE (AMPS) @ 24 VDC

<table>
<thead>
<tr>
<th>Pressure (PSI)</th>
<th>0.15</th>
<th>0.30</th>
<th>0.45</th>
<th>0.60</th>
<th>0.75</th>
<th>0.90</th>
<th>1.05</th>
<th>1.20</th>
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<td></td>
<td>0.15</td>
<td>0.30</td>
<td>0.45</td>
<td>0.60</td>
<td>0.75</td>
<td>0.90</td>
<td>1.05</td>
<td>1.20</td>
</tr>
</tbody>
</table>

### AMPERAGE (AMPS) @ 12 VDC

<table>
<thead>
<tr>
<th>Pressure (BAR)</th>
<th>0.30</th>
<th>0.60</th>
<th>0.90</th>
<th>1.20</th>
<th>1.50</th>
<th>1.80</th>
<th>2.10</th>
<th>2.40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.30</td>
<td>0.60</td>
<td>0.90</td>
<td>1.20</td>
<td>1.50</td>
<td>1.80</td>
<td>2.10</td>
<td>2.40</td>
</tr>
</tbody>
</table>

Reference: 520-P-110420-EN-00/09.2015
ELECTRO–HYDRAULIC, PROPORTIONAL, PRESSURE RELIEF VALVE.

DESCRIPTION
This unit is a electro–hydraulic, proportional, screw in cartridge style, direct acting, low flow, poppet type, high pressure relief valve.

OPERATIONS
When the coil is de–energized, this valve allows flow and pressure from port 1 to port 2 (tank).
When the coil is energized the armature moves a precision bias spring against the metering poppet thus varying the pressure at port 1 proportional to the curent input. When the current is increased to the coil the pressure will increase and when decreased it will decrease.
IN THE EVENT OF POWER FAILURE THE VALVE WILL REDUCE REGULATED PRESSURE AT PORT 1 TO 0 PSI.

FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil. Pressure in tank port (2) will add to the bias spring setting, and is limited to 2000 PSI.
Interchangeable solenoid coils & terminations options available.
Hardened precision poppet & pilot seat provides reliable, long life.
A unique self aligning (floating) cage provides very low hysteresis and reliable operation.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All cartridge valves are 100% functionally tested.
Industry common cavity.
## SPECIFICATIONS

**Operating Pressure:** 5000 PSI [350 Bar]  
**Proof Pressure:** 10,000 PSI [700 Bar]  
**Regulated Pressure:** 0 to 5000 PSI [0 to 350] See performance chart.  
**Flow:** 1.0 GPM [3.8 L/M] nominal.  
**Valve Cavities:** #C1020, See Page 0-012.0.  
**Weight:** 1.95 lb [.88 kg] cartridge with coil only.  
**Installation:** No restrictions.  
**Seal Kit:** SKN-1022 Buna "N"  
SKV-1022 Viton  
**Power Requirements:** 24 VDC, Operating current 0.1 to 1.2 AMPS.  
**Operating Media:** All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.  
**Operating Temperature:** -40° to +250° F. [−40° to +120° C.]  
**Response:** The most efficient method to control this valve is with current control and a 50 Hz dither.  
**Proof Pressure:** 10,000 PSI [700 Bar]  
**Operating Pressure:** 5000 PSI [350 Bar]  
**Operating Media:** All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.  
**Operating Temperature:** -40° to +250° F. [−40° to +120° C.]  
**Response:** The most efficient method to control this valve is with current control and a 50 Hz dither.  
**Seal Kit:** SKN-1022 Buna "N"  
SKV-1022 Viton  
**Installation:** No restrictions.  
**Weight:** 1.95 lb [.88 kg] cartridge with coil only.  
**Valve Cavities:** #C1020, See Page 0-012.0.
ELECTRO–HYDRAULIC, PROPORTIONAL, PRESSURE COMP, FLOW CONTROL VALVE.

NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0–012.1
2. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.

TORQUE:
Steel = 55/60 Ft–Lb. [74/81 Nm]
Aluminum = 35/40 Ft–Lb. [47/54 Nm]
DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, in-line (RESTRICTIVE) type, pressure compensated, hydraulic flow control. Regulated flow 8.0 GPM [30.2 L/M] max. is proportional to the current input regardless of load or system pressure.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated flow control valve. When the coil is energized the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensatory spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. For the normally closed product when the current is increased to the coil the flow will increase. For the normally open product as the current is increased to the coil the flow will decrease. IN THE EVENT OF POWER FAILURE THE NORMALLY CLOSED VALVE WILL CLOSE AND THE NORMALLY OPEN VALVE WILL OPEN.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & termination options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.

Reference: 520-P-111020-EN-00/09.2015
SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
INTERNAL LEAKAGE: 20/40 in³/min [328/655 cc/min] @ 3/5K PSI [175/350 Bar]
                                    5000 PSI [350 Bar] = Steel - Unplated.
OPERATING TEMPERATURE: -40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.2 to 2.2 AMPS.
                                    24 VDC, Operating current 0.1 to 1.1 AMPS.
SEAL KIT: SKN-1022 Buna "N"
                                    SKY-1022 Viton
INSTALLATION: No restrictions.
WEIGHT: 1.9 lb [0.86 kg] cartridge with coil only.
VALVE CAVITY: #C1020, See Page 0-012.0.
ELECTRO-HYDRAULIC, PROPORTIONAL,
PRESSURE COMP, FLOW CONTROL VALVE.

NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-013.1
2. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.

EPFI-12-N-X-XX-X-X-XXX-X

BASIC
SIZE
12=1.062”-12UNF
SEALS
N = BUNA "N"
V = VITON
TYPE
C = NORMALLY CLOSED
O = NORMALLY OPEN

REGULATED FLOW
05 = 0 TO 5.0 GPM
10 = 0 TO 10.0 GPM
15 = 0 TO 15.0 GPM

"A" = ALUM. HOUSING
"S" = STEEL HOUSING

TERMINALS
L=8GA, 24 LEADS
T=SPADE TERM.
B=BOLT TERM.
G=DIN43650
W=WEATHER-PACK
D=DEUTSCH-DT04-2P
M=METRI-PACK CONN.

ADJUSTMENT OPTIONS
O = NONE
M = MANUAL OVERRIDE

AMPERAGE (AMPS) @ 24 VDC

Reference: 520-P-111030-EN-00/09.2015
DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, in-line (RESTRICTIVE) type, pressure compensated, hydraulic flow control. Regulated flow 15.0 GPM [56.8 l/m] max. is proportional to the current input regardless of load or system pressure.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated flow control valve. When the coil is energized, the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. For the normally closed product when the current is increased to the coil, the flow will increase. For the normally open product as the current is increased to the coil the flow will decrease. IN THE EVENT OF POWER FAILURE, THE NORMALLY CLOSED VALVE WILL CLOSE AND THE NORMALLY OPEN VALVE WILL OPEN.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & termination options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure</td>
<td>5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Proof Pressure</td>
<td>10,000 PSI [700 Bar]</td>
</tr>
<tr>
<td>Regulated Flow</td>
<td>15.0 GPM [56.8 l/m] Max. See performance chart.</td>
</tr>
<tr>
<td>Internal Leakage</td>
<td>20/40 in³/min [328/655 cc/m] @ 3/5K PSI [175/350 Bar]</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40° to +250° F. [-40° to +120° C.]</td>
</tr>
<tr>
<td>Operating Media</td>
<td>All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.</td>
</tr>
<tr>
<td>Response</td>
<td>The most efficient method to control this valve is with current control and a 50 Hz dither.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>12 VDC, Operating current 0.2 to 2.2 AMPS. 24 VDC, Operating current 0.1 to 1.1 AMPS.</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>SKN-1222 Buna &quot;N&quot;</td>
</tr>
<tr>
<td></td>
<td>SKV-1222 Viton</td>
</tr>
<tr>
<td>Installation</td>
<td>No restrictions.</td>
</tr>
<tr>
<td>Weight</td>
<td>2.27 lb [1.03 kg] cartridge with coil only.</td>
</tr>
<tr>
<td>Valve Cavity</td>
<td>#C1220, See Page 0–013.0.</td>
</tr>
</tbody>
</table>

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The technical information in this catalog may contain calculated figures (for reference only) and not actual performance data for this product. Data is provided for the purpose of product description only, and must not be construed as warranted characteristics in the legal sense. The information does not relieve users from the duty of conducting their own evaluations and tests. Because the products are subject to continual improvement, we reserve the right to amend the product specifications contained in this catalogue.
EPFC-16

ELECTRO-HYDRAULIC, PROPORTIONAL, IN-LINE, PRESSURE COMP, FLOW CONTROL VALVE.

TORQUE:

Steel = 95/100 Ft-lb. [129/136 Nm]
Aluminum = 70/75 Ft-lb. [95/102 Nm]

EPFC-16—X—XX—X—X—XXX—X

BASIC

SIZE 16 = 1.312"-12UNF

SEALS N = BUNA "N"
V = VITON

REGULATED FLOW 05 = 0 TO 5.0 GPM
10 = 0 TO 10.0 GPM
15 = 0 TO 15.0 GPM
20 = 0 TO 20.0 GPM

TERMINALS
L = 18GA. 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
G = DIN43650
W = WEATHER—PACK
D = DEUTSCH—DT04—2P
M = METRI—PACK CONN.

VOLTAGE AMPS
12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
M = MANUAL OVERRIDE

PORTS = CARTRIDGE ONLY
0 = G 3/4" BSPP
06BX = G 1" BSPP
08BX = SAE — #12
12TX = SAE — #16
16TX "A" = ALUM. HOUSING
"S" = STEEL HOUSING

Reference: 520-P-111040-EN-00/09.2015
PROPORTIONAL, IN-LINE TYPE, FLOW CONTROL VALVE.

DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, in-line (RESTRICTIVE) type, pressure compensated, hydraulic flow control. Regulated flow 20.0 GPM [76.0 L/M] max. is proportional to the current input regardless of load or system pressure.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. When current is increased to the coil the flow will increase, as the current is decreased the flow will decrease proportionally.
IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested. Industry common cavity.
PROPORTIONAL, IN—LINE TYPE, FLOW CONTROL VALVE.

SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 20.0 GPM [76.0 l/m] Max. See performance chart.
INTERNAL LEAKAGE: 20 cu.in/min [330 cc/m] @ 5,000 PSI [350 Bar]
5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: -40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL—H—5606, SAE—#10, SAE—#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.2 to 2.2 AMPS.
24 VDC, Operating current 0.1 to 1.1 AMPS.
SEAL KIT: SKN—1622 Buna "N"
SKV—1622 Viton
INSTALLATION: No restrictions.
WEIGHT: 2.58 lb [1.17 kg] cartridge with coil only.
VALVE CAVITY: #C1620, See Page 0–014.0.
ELECTRO-HYDRAULIC, PROPORTIONAL, PRIORITY, PRESSURE COMP, FLOW CONTROL VALVE.

PRESSURE COMP, FLOW CONTROL VALVE.

ELECTRO-HYDRAULIC, PROPORTIONAL, PRIORITY,

MANUAL OVERRIDE (SCREW TYPE)

TYPE "L" COIL
SEE PAGE 10-001.2

TORQUE:
Steel = 55/60 Ft-Lb. [74/81 Nm]
Aluminum = 35/40 Ft-Lb. [47/54 Nm]

AMPERAGE (AMPS) @ 24 VDC

0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20
30.3 26.5 22.7 18.9 15.1 11.4 7.6 3.8

AMPERAGE (AMPS) @ 12 VDC

0.0 1 2 3 4 5 6 7 8
30.3 26.5 22.7 18.9 15.1 11.4 7.6 3.8 1.0 L/M

Reference: S20-P-111520-EN-00/09.2015
PROPORTIONAL, PRIORITY TYPE, PRESSURE COMP, FLOW CONTROL VALVE.

DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, priority (BY-PASS) type, pressure compensated, hydraulic flow control. Regulated flow 8.0 GPM [30.3 L/M] max. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 10.0 GPM [37.9 L/M].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated flow control valve. When the coil is energized, the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta “P” providing the valve with a constant regulated flow regardless of load or system pressure. For the normally closed product when the current is increased to the coil, the flow will increase. For the normally open product as the current is increased to the coil the flow will decrease. IN THE EVENT OF POWER FAILURE, THE NORMALLY CLOSED VALVE WILL CLOSE AND THE NORMALLY OPEN VALVE WILL OPEN.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & termination options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external parts are zinc plated for longer life against elements. All cartridge valves are 100% functionally tested.
SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 8.0 GPM [30,3 l/m] Max. See performance chart.
INTERNAL LEAKAGE: 20 cu.in/min [328 cc/m] @ 5,000 PSI [350 Bar]
                  5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: −40° to +250° F. [−40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL–H–5606, SAE–#10, SAE–#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.2 to 2.2 AMPS.
                  24 VDC, Operating current 0.1 to 1.1 AMPS.
SEAL KIT: SKN–1032 Buna “N”
          SKV–1032 Viton
INSTALLATION: No restrictions.
WEIGHT: 1.93 lb [0.90 kg] cartridge with coil only.
VALVE CAVITY: #C1030, See Page 0–032.0.
ELECTRO–HYDRAULIC, PROPORTIONAL, PRIORITY
PRESSURE COMP, FLOW CONTROL VALVE.

1.31" [33,3] Hex.
TORQUE to 80/90 Ft-Lb.
[100/120 N·m].

3.50" [88,9]
1.78" [45,2]
4.68" [118,9]
2.65" [67,3]

1.31" [33,3] Hex.
TORQUE to 80/90 Ft-Lb.
[100/120 N·m].

3.50" [88,9]
4.00" [101,6]

FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0–033.1


BASIC
SIZE
12 = 1.062"–12UNF
SEALS
N = BUNA "N"
V = VITON
STYLE
C = NORMALLY CLOSED
O = NORMALLY OPEN
REGULATED FLOW
05 = 0 TO 5.0 GPM
10 = 0 TO 10.0 GPM
15 = 0 TO 15.0 GPM

TERMINALS
L = 18GA. 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
G = DIN43650
W = WEATHER–PACK
D = DEUTSCH–DT04–2P
M = METRI–PACK CONN.

VOLTAGE AMPS
12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
0 = NONE
M = MANUAL OVERRIDE

PORTS
0 = CARTRIDGE ONLY
04BX = G 1/2"–14 BSPP
06BX = G 3/4"–14 BSPP
10TX = SAE – #10
12TX = SAE – #12

"A" = ALUM. HOUSING
"S" = STEEL HOUSING

Reference: 520-P-111530-EN-01/06.2017
PROPORTIONAL, PRIORITY TYPE, PRESSURE COMP, FLOW CONTROL VALVE.

DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, priority (BY-PASS) type, pressure compensated, hydraulic flow control. Regulated flow 15.0 GPM [56.8 L/M] max. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 26.0 GPM [98.4 L/M].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. When current is increased to the coil the flow will increase, as the current is decreased the flow will decrease proportionally. IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & termination options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet - armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.
**SPECIFICATIONS**

**OPERATING PRESSURE:** 5,000 PSI [350 Bar]
**PROOF PRESSURE:** 10,000 PSI [700 Bar]
**REGULATED FLOW:** 15.0 GPM [56.7 l/m] Max. See performance chart.
**INTERNAL LEAKAGE:** 20 cu.in/min [330 cc/m] @ 5,000 PSI [350 Bar]
**VALVE HOUSINGS:** 2500 PSI [175 Bar] = Aluminum – Anodized.
                       5000 PSI [350 Bar] = Steel – Unplated.
**OPERATING TEMPERATURE:** −40° to +250° F. [−40° to +120° C.]
**OPERATING MEDIA:** All general purpose hydraulic fluids such as
                       MIL–H–5606, SAE–#10, SAE–#20, etc.
**RESPONSE:** The most efficient method to control this valve is with
               current control and a 50 Hz dither.
**POWER REQUIREMENTS:** 12 VDC, Operating current 0.2 to 2.2 AMPS.
                         24 VDC, Operating current 0.1 to 1.1 AMPS.
**SEAL KIT:**  SKN–1232 Buna "N"
              SKV–1232 Viton
**INSTALLATION:** No restrictions.
**WEIGHT:** 2.66 lb [1.20 kg] cartridge with coil only.
**VALVE CAVITY:** #C′1230, See Page 0–033.0.
## EPFD-16

### ELECTRO-HYDRAULIC, PROPORTIONAL, PRIORITY, PRESSURE COMP, FLOW CONTROL VALVE.

![Diagram of the EPFD-16 valve](image)

### Specifications

**Terminal Designations:**
- **L:** 18GA, 24" leads
- **T:** SPADE TERM.
- **B:** BOLT TERM.
- **G:** DIN43650
- **W:** WEATHER-PACK
- **D:** DEUTSCH-DT04-2P
- **M:** METRI-PACK CONN.

**Voltage and Amps:**
- **12D:** 12 VDC 3.00
- **24D:** 24 VDC 1.50

**Torque:**
- Steel = 95/100 Ft-Lb. [129/136 Nm]
- Aluminum = 70/75 Ft-Lb. [95/102 Nm]

**Regulated Flow Options:**
- 05 = 0 TO 5.0 GPM
- 10 = 0 TO 10.0 GPM
- 15 = 0 TO 15.0 GPM
- 20 = 0 TO 20.0 GPM

**Adjustment Options:**
- **M:** MANUAL OVERRIDE
- **0:** CARTRIDGE ONLY
- **06BX:** G 3/4” BSPP
- **08BX:** SAE - #12
- **12TX:** SAE - #16
- **16TX:** "S" = ALUM. HOUSING
- **"A"** = STEEL HOUSING

**Pressure Comp, Flow Control Valve:**

Reference: 520-P-111540-EN-00/09.2015

---

EPFD-16
Basic: 
- **16** = 1.312"-12UNF

Seals: 
- **N** = BUNA "N"
- **V** = VITON

Regulated Flow: 
- 05 = 0 TO 5.0 GPM
- 10 = 0 TO 10.0 GPM
- 15 = 0 TO 15.0 GPM
- 20 = 0 TO 20.0 GPM

Adjustment Options: 
- **M** = MANUAL OVERRIDE
- **0** = CARTRIDGE ONLY
- **06BX** = G 3/4” BSPP
- **08BX** = SAE-12
- **12TX** = SAE-16
- **16TX** = "S" = ALUM. HOUSING

**Reference:** 520-P-111540-EN-00/09.2015
DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, priority (BY-PASS) type, pressure compensated, hydraulic flow control. Regulated flow 20.0 GPM [76.0 L/M] max. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 35.0 GPM [130.0 L/M].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 100 PSI/6.9 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. When current is increased to the coil the flow will increase, as the current is decreased the flow will decrease proportionally. IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.
## SPECIFICATIONS

**OPERATING PRESSURE:** 5,000 PSI [350 Bar]
**PROOF PRESSURE:** 10,000 PSI [700 Bar]
**REGULATED FLOW:** 20.0 GPM [76.0 l/m] Max. See performance chart.
**INTERNAL LEAKAGE:** 20 cu.in/min [330 cc/m] @ 5,000 PSI [350 Bar]
**VALVE HOUSINGS:**
- 2500 PSI [175 Bar] = Aluminum - Anodized.
- 5000 PSI [350 Bar] = Steel - Unplated.
**OPERATING TEMPERATURE:** -40° to +250° F. [-40° to +120° C.]
**OPERATING MEDIA:** All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.
**RESPONSE:** The most efficient method to control this valve is with current control and a 50 Hz dither.
**POWER REQUIREMENTS:**
- 12 VDC, Operating current 0.2 to 2.2 AMPS.
- 24 VDC, Operating current 0.1 to 1.1 AMPS.
**SEAL KIT:**
- SKN-1632 Buna "N"
- SKV-1632 Viton
**INSTALLATION:** No restrictions.
**WEIGHT:** 2.66 lb [1.20 kg] cartridge with coil only.
**VALVE CAVITY:** #C1630, See Page 0-034.0.
PFCV-10

PROPORTIONAL, NORMALLY CLOSED OR NORMALLY OPEN,
IN-LINE, NON-COMPENSATED FLOW CONTROL VALVE.

UL approved coil, IP68 and IP69K rated
when used with waterproof connector.

NOTES:
1. FOR ALUMINUM OR STEEL VALVE HOUSING CONFIGURATIONS SEE PAGE 0-012.1
2. SOLENOIDS AVAILABLE WITH DIODES — CONSULT FACTORY.

TORQUE:
Steel = 55/60 Ft-Lb. [74/81 Nm]
Aluminum = 35/40 Ft-Lb. [47/54 Nm]

Reference: 520-P-112020-EN-00/09.2015
PROPORTIONAL, IN–LINE TYPE, FLOW CONTROL VALVE.

DESCRIPTION
This valve is a cartridge style, electro–hydraulic, proportional, in–line (RESTRICTIVE) type, hydraulic non–compensated flow control. Regulated flow Normally Closed 0 to 16.0 GPM [0 to 61,0 L/m] max. Normally Open 16.0 to 0 GPM [61,0 to 0 L/m] @ 160 PSI DELTA P. Flow is proportional to the current input.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro hydraulic, proportional, non–compensated, flow control valve. When the coil is energized the armature moves the metering orifice to open or to closed position against a precision bias spring varying the flow. When current is increased or decreased to the coil, the flow will increase or decrease proportionally.
IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN DEPENDING ON THE VALVE VERSION.

FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & termination options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested. Industry common cavity.
PROPORTIONAL, IN–LINE TYPE, FLOW CONTROL VALVE.

SPECIFICATIONS
OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 16.0 GPM [61.0 L/m] Max. See performance chart.
INTERNAL LEAKAGE: 20 cu.in/min [330 cc/m] @ 160 PSI DELTA P [11 Bar]
5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: −40° to +250° F. [−40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as
MIL–H–5606, SAE–#10, SAE–#20, etc.
RESPONSE: The most efficient method to control this valve is with
current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: SKN–1022 Buna "N"
SKV–1022 Viton
INSTALLATION: Flow 1–2 preferred, Max Flow 2–1 lower than shown on
graph. Use undercuts in cavity to obtain max rated flow when using a
pressure compensator in series. Pressure drop across valve must not
exceed 300 PSI [21] bar.
WEIGHT: 0.74 lbs [0.34 kg] cartridge only.
1.09 lbs [0.50 kg] coil & housing.
0.35 lbs [0.16 kg] aluminum body.
1.20 lbs [0.54 kg] steel body.
VALVE CAVITY: #C1020, See Page 0–012.0.

info.el@bucherhydraulics.com www.bucherhydraulics.com/commoncavity

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The technical information in this catalog may contain calculated figures (for reference only) and not actual performance data for this product.
Data is provided for the purpose of product description only, and must not be construed as warranted characteristics in the legal sense.
The information does not relieve users from the duty of conducting their own evaluations and tests. Because the products are subject to
continual improvement, we reserve the right to amend the product specifications contained in this catalogue.
PFCV-12

PROPORTIONAL, NORMALLY CLOSED OR NORMALLY OPEN, IN-LINE, NON-COMPENSATED FLOW CONTROL VALVE.

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

TERMINALS
L = 18GA, 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
C = DIN43650
W = WEATHER-PACK
D = DEUTSCH-DT04-2P
M = METRI-PACK CONN.

VOLTAGE AMPS
120 = 12 VDC 3.00
240 = 24 VDC 1.50

REGULATED FLOW
06 = 0 TO 6.0 GPM
12 = 0 TO 12.0 GPM
18 = 0 TO 18.0 GPM
24 = 0 TO 24.0 GPM

PORTS
0 = CARTRIDGE ONLY
04BX = G 1/2" BSPP
06BX = G 3/4" BSPP
10TX = SAE - #10
12TX = SAE - #12

"A" = ALUM. HOUSING
"S" = STEEL HOUSING

TORQUE:
Steel = 70/75 Ft-Lb. [95/102 Nm]
Aluminum = 55/60 Ft-Lb. [74/81 Nm]

Regulated Flow (1-2) @ 160 PSI

Reference: 520-P-112030-EN-00/09.2015
# Description

This valve is a cartridge style, electro-hydraulic, proportional, in-line (RESTRICTIVE) type, hydraulic non-compensated flow control. Regulated flow Normally Closed 0 to 24.0 GPM [0 to 91.2 L/M] max. Normally Open 24.0 to 0 GPM [91.2 to 0 L/M] @ 160 PSI DELTA P. Flow is proportional to the current input.

## Operations

This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, proportional, non-compensated, flow control valve. When the coil is energized the armature moves the metering orifice to open or to closed position against a precision bias spring varying the flow. When current is increased or decreased to the coil the flow will increase or decrease proportionally. In the event of power failure the valve will close or open depending on the valve version.

## Features and Benefits

Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested.

---

**Reference:** S20-P-112030-EN-00/09.2015  
**Model:** PFCV-12
PROPORTIONAL, IN-LINE TYPE, FLOW CONTROL VALVE.

**SPECIFICATIONS**

**OPERATING PRESSURE:** 5,000 PSI [350 Bar]

**PROOF PRESSURE:** 10,000 PSI [700 Bar]

**REGULATED FLOW:** 25.0 GPM [94.5 l/m] Max. See performance chart.

**INTERNAL LEAKAGE:** 30 cu.in/min [495 cc/m] \( @ \) 160 PSI DELTA P [11 Bar]

**VALVE HOUSINGS:** 2500 PSI [175 Bar] = Aluminum – Anodized.

5000 PSI [350 Bar] = Steel – Unplated.

**OPERATING TEMPERATURE:** −40° to +250° F. [−40° to +120° C.]

**OPERATING MEDIA:** All general purpose hydraulic fluids such as MIL-H-5606, SAE−#10, SAE−#20, etc.

**RESPONSE:** The most efficient method to control this valve is with current control and a 50 Hz dither.

**POWER REQUIREMENTS:** 12 VDC, Operating current 0.4 to 2.4 AMPS.

24 VDC, Operating current 0.2 to 1.2 AMPS.

**SEAL KIT:** SKN−1222 Buna "N"

SKV−1222 Viton

**INSTALLATION:** Flow 1−2 preferred, Max Flow 2−1 lower than shown on graph. Use undercuts in cavity to obtain max rated flow when using a pressure compensator in series. Pressure drop across valve must not exceed 300 PSI [21] bar.

**WEIGHT:**

- 0.84 lbs [0.38 kg] cartridge only.
- 1.09 lbs [0.50 kg] coil & housing.
- 1.10 lbs [0.50 kg] aluminum body.
- 4.20 lbs [1.90 kg] steel body.

**VALVE CAVITY:** #C1220, See Page 0−013.0.
**PROPORTIONAL, NORMALLY CLOSED OR NORMALLY OPEN, IN-LINE, NON-COMPENSATED FLOW CONTROL VALVE.**

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

**TORQUE:**

- Steel = 95/100 Ft-Lb. [129/136 Nm]
- Aluminum = 70/75 Ft-Lb. [95/102 Nm]

**Reference:** 520-P-112040-EN-01/10.2019
DESCRIPTION
This valve is a cartridge style, electro-hydraulic, proportional, in-line (RESTRICTIVE) type, hydraulic non-compensated flow control. Regulated flow Normally Closed 0 to 36.0 GPM [0 to 137.0 L/M] max. Normally Open 36.0 to 0 GPM [137.0 to 0 L/M] @ 160 PSI DELTA P. Flow is proportional to the current input.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, proportional, non-compensated, flow control valve. When the coil is energized the armature moves the metering orifice to open or to closed position against a precision bias spring varying the flow. When current is increased or decreased to the coil the flow will increase or decrease proportionally.

IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN DEPENDING ON THE VALVE VERSION.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All cartridge valves are 100% functionally tested. Industry common cavity.
PROPORTIONAL, IN-LINE TYPE, FLOW CONTROL VALVE.

SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 36.0 GPM [136,0 l/m] Max. See performance chart.
INTERNAL LEAKAGE: 40 cu.in/min [660 cc/m] @ 160 PSI DELTA P [11 Bar]
      5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: −40° to +250° F. [−40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL–H–5606, SAE–#10, SAE–#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
        24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: SKN–1622 Buna “N”
        SKV–1622 Viton
INSTALLATION: Flow 1–2 preferred, Max Flow 2–1 lower than shown on graph. Use undercuts in cavity to obtain max rated flow when using a pressure compensator in series. Pressure drop across valve must not exceed 300 PSI [21] bar.
WEIGHT: 0.95 lbs [0.42 kg] cartridge only.
        1.09 lbs [0.50 kg] coil & housing.
        1.25 lbs [0.57 kg] aluminum body.
        4.65 lbs [2.10 kg] steel body.
VALVE CAVITY: #C1620, See Page 0–014.0.
Proportional 3/2 Throttle Cartridge, Size 5

Q_{max} = 30 l/min, \ p_{max} = 250 bar
Sliding-spool design, direct acting
Series MDR32GN…-5…

1 Description

Series MDR32GN… direct acting proportional 3/2 throttle valves are size 5, high performance screw-in cartridges with a 3/4-16 UNF mounting thread. They are designed on the proven sliding-spool principle. The straightforward design delivers an outstanding price/performance ratio. In the initial position (de-energised), port 1 is closed and ports 2 \( \rightarrow \) 3 are connected with the full flow rating. In control mode, the flow through the connection 1 \( \rightarrow \) 2 is varied in proportionally to the control current. Three types are available: Type "A" - standard model, for general use with or without compensator. Type "Z" - special model, only approved for use with compensator (max. \( \Delta p \) 15 bar). Type "S600" - special model with optimised characteristic - \( Q = f (I) \), also only suitable for use with compensator. With this model, the connection 2 \( \rightarrow \) 3 is only used for unloading (see Performance Graphs). These cartridges are particularly suitable for precise and controlled lifting and lowering movements, but they can also be used for reliable operation in mobile and industrial applications featuring large pressure differences. All external parts of the cartridge are zinc-nickel plated to DIN 50 979 and are thus suitable for use in the harshest operating environments. The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section “Related data sheets”.

2 Symbol

![Symbol]

3 Technical data

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Description, value, unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>proportional 3/2 throttle cartridge</td>
</tr>
<tr>
<td>Design</td>
<td>sliding-spool design, direct acting</td>
</tr>
<tr>
<td>Mounting method</td>
<td>screw-in cartridge 3/4-16 UNF</td>
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<tr>
<td>Tightening torque</td>
<td>40 Nm ± 10 %</td>
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Reference: 400-P-618101-EN-03

Issue: 09.2015
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<th>General characteristics</th>
<th>Description, value, unit</th>
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<tr>
<td>Size</td>
<td>nominal size 5, cavity type AM</td>
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<tr>
<td>Weight</td>
<td>0.40 kg</td>
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<tr>
<td>Mounting attitude</td>
<td>unrestricted (preferably vertical, coil down)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-25 °C … +50 °C</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Hydraulic characteristics</th>
<th>Description, value, unit</th>
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<tr>
<td>Maximum operating pressure</td>
<td>250 bar</td>
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<tr>
<td>Maximum flow rate</td>
<td>30 l/min</td>
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<tr>
<td>Nominal flow rate 1 → 2</td>
<td>25 l/min at Δp = 10 bar</td>
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<tr>
<td>Leakage flow rate</td>
<td>&lt; 150 cm³/min (with pN 250 bar) with oil viscosity 33 mm²/s (cSt)</td>
</tr>
<tr>
<td>Flow direction</td>
<td>see symbols</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER</td>
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<tr>
<td>Hydraulic fluid temperature range</td>
<td>-25 °C … +70 °C</td>
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<tr>
<td>Viscosity range</td>
<td>15…380 mm²/s (cSt), recommended 20…130 mm²/s (cSt)</td>
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<tr>
<td>Minimum fluid cleanliness</td>
<td>class 18/16/13</td>
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<tr>
<td>Cleanliness class to ISO 4406 : 1999</td>
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</table>

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>Description, value, unit</th>
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</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>12 V DC, 24 V DC</td>
</tr>
<tr>
<td>Control current</td>
<td>12 V = 0…1400 mA, 24 V = 0…760 mA</td>
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<tr>
<td>Power consumption at max. control current</td>
<td>max. 19 W</td>
</tr>
<tr>
<td>Coil resistance R</td>
<td>cold value at 20 °C max. 19 W</td>
</tr>
<tr>
<td></td>
<td>warm value max. 19 W</td>
</tr>
<tr>
<td></td>
<td>12 V = 5.8 Ω / 24 V = 21 Ω</td>
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<tr>
<td></td>
<td>12 V = 8.6 Ω / 24 V = 32 Ω</td>
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<tr>
<td>Recommended PWM frequency (dither)</td>
<td>200 Hz</td>
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<tr>
<td>Hysteresis with PWM</td>
<td>2…4 % I_N</td>
</tr>
<tr>
<td>Reversal error with PWM</td>
<td>2…4 % I_N</td>
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<tr>
<td>Sensitivity with PWM</td>
<td>&lt; 1 % I_N</td>
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<tr>
<td>Reproducibility with PWM</td>
<td>&lt; 2 % p_N</td>
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<tr>
<td>Relative duty cycle</td>
<td>100 %</td>
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<tr>
<td>Protection class to ISO 20 653 / EN 60 529</td>
<td>IP 65 / IP 67 / IP 69K, see “Ordering code” (with appropriate mating connector and proper fitting and sealing)</td>
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<tr>
<td>Electrical connection</td>
<td>3-pin square plug to ISO 4400 / DIN 43 650 (standard) for other connectors, see “Ordering code”</td>
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</tbody>
</table>
4 Performance graphs measured with oil viscosity 33 mm²/s (cSt)

For general use with / without compensator – type “A”

\[ \Delta p = f(Q) \] Pressure drop - Flow rate characteristic

\[ Q = f(I; \Delta p) \] Flow rate adjustment characteristic

For use with compensator (max. \( \Delta p = 15 \) bar) – type “Z”

\[ \Delta p = f(Q) \] Pressure drop - Flow rate characteristic

\[ Q = f(I; \Delta p) \] Flow rate adjustment characteristic

\[ Q = f(\Delta p; I) \] Flow rate adjustment characteristic

IMPORTANT!
1) Performance graphs measured with compensator model DWDPA-5D-10-F06-2
With optimised characteristic - \( Q = f(I) \), type “S600” – with compensator (max. \( \Delta p = 15 \text{ bar} \))

\[ \Delta p = f(Q) \]

Pressure drop - Flow rate characteristic

\[ Q = f(I; \Delta p) \]

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

\( Q = f(I; \Delta p) \)

Flow rate adjustment characteristic

IMPORTANT!

1) Performance graphs measured with compensator model DWDPA-5D-10-F06-2

5 Installation information

IMPORTANT!

To achieve the proportional 3/2 throttle cartridge’s maximum performance rating, fit the solenoid coil as shown (with the plug pins at the bottom). When fitting the cartridges, note the mounting attitude (preferably vertical, with coil down → automatic air bleed) and use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.

ATTENTION!

Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.
6 Dimensions & sectional view

Without manual flow setting – standard

---

Seal kit NBR no. DS-247-N 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>O-ring 18.00 x 2.00 FKM</td>
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<tr>
<td>2</td>
<td>1</td>
<td>O-ring no. 017 17.17 x 1.78 N90</td>
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<tr>
<td>3</td>
<td>1</td>
<td>O-ring no. 014 12.42 x 1.78 N90</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>O-ring no. 013 10.82 x 1.78 N90</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>O-ring 16.00 x 2.00 FKM</td>
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<tr>
<td>6</td>
<td>2</td>
<td>Backup ring 10.70 x 1.45 x 1.40 FI0751</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Backup ring 09.40 x 1.45 x 1.00 FI0751</td>
</tr>
</tbody>
</table>

Air-bleeding

If necessary, air can be purged from these proportional throttle cartridges by using the cap nut (Item B). The procedure is as follows:

A Knurled nut
B Cap nut

Steps:
1. Slacken and remove the knurled nut.
2. Slacken the cap nut approx. 1.5 turns.
   Caution: Slackening the cap nut allows oil to spray out!
3. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
4. Tighten the cap nut.
5. Refit the knurled nut and tighten it.

---

400-P-618101-EN-03/09.2015
Series MDR32GN...-5...
With manual flow setting – Option “E”

Integral air-bleeding
If necessary, air can be purged from these proportional throttle cartridges by using the integral air-bleed screw (Item D). The procedure is as follows:

C  Protective cap
D  Air-bleed screw

Steps:
1. Remove the protective cap.
2. Slacken the air-bleed screw approx. 2 turns.
3. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
4. Tighten the air-bleed screw.
5. Fit the protective cap.
7 Manual flow setting

Optionally, the proportional throttle cartridges can be supplied with an integral manual flow setting. If a proportional solenoid is faulty, for example, this manual flow setting enables the required flow rate to be set mechanically. This manual flow setting is not designed for adjusting the flow in a dynamic control mode.

Setting the flow rate manually
Steps:
1. Remove the protective cap.
2. Slacken the lock nut (13 A/F).
3. Screw in (turn to right) the adjusting spindle (4 A/F) until the required flow rate is set.
4. Tighten the lock nut (13 A/F).
5. Fit the protective cap.

Restoring the factory settings
Steps:
1. Solenoid de-energised.
2. Remove the protective cap.
3. Slacken the lock nut (13 A/F).
4. Unscrew the adjusting spindle (4 A/F) to its end-stop, then screw it in 2 turns.
5. Tighten the lock nut (13 A/F).
6. Fit the protective cap.

8 Application examples

Standard type “A”

- Can be used without compensator (full Δp permissible)
- Full-flow connection 2 → 3
- Control is only available with connection 1 → 2
Special type “Z” – only to be used with compensator

- Only for use with compensator (max. $\Delta p = 15$ bar)
- Full-flow connection 2 $\rightarrow$ 3

- Control is only available with connection 1 $\rightarrow$ 2

Special type “S600” – only to be used with compensator

- Only for use with compensator (max. $\Delta p = 15$ bar)
- Connection 2 $\rightarrow$ 3 is not full flow (suitable for unloading)
- Control is only available with connection 1 $\rightarrow$ 2
9 Ordering code

Ex. M D R 32G N A 5 - - 1 24 D - -

M = flow-control valve  
D = direct acting  
R = proportional-solenoid operated  
32G = 3/2 function, de-energised closed  
N = electrically operated, V DC = 27 W  
A ... Q = can be used with or without compensator (standard)  
Z = type only for use with compensator  
Y ... R = special features - please consult BUCHER  
5 = nominal size 5  
(blank) = NBR (Nitrile) seals (standard)  
V = FKM (Viton) seals (special seals - please contact BUCHER)  
(blank) = no manual flow setting (standard)  
E = with manual flow setting  
1 ... 9 = design stage (omit when ordering new units)  
... = voltage e.g. 24 V (24 V)  
D = current DC  
(blank) = ISO 4400 / DIN 43 650 mating plug (standard, IP 65)  
M100 = without mating DIN plug  
C = Kostal plug connection (IP 65)  
JT = Junior Timer radial plug connection (with protection diode, IP65)  
IT = Junior Timer axial plug connection (with protection diode, IP65)  
D = Deutsch plug connection DT04-2P (IP 67/69K)  
DT = Deutsch plug connection DT04-2P (with protection diode, IP 67/69K)  
S = AMP Superseal 1.5 (IP 67) / Metri-Pack 150 (IP 65)  
F = flying leads (500 mm)  
Ohne = types ("A" or "Z")  
S600 = type with optimised characteristic - Q = f (I), only for use with compensator

10 Related data sheets

<table>
<thead>
<tr>
<th>Reference</th>
<th>(Old no.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400-P-040011</td>
<td>(i-32)</td>
<td>The form-tool hire programme</td>
</tr>
<tr>
<td>400-P-040181</td>
<td>(i-33.11)</td>
<td>Cavity type AM</td>
</tr>
<tr>
<td>400-P-120110</td>
<td>(W-2.141)</td>
<td>Coils for screw-in cartridge valves</td>
</tr>
<tr>
<td>400-P-510101</td>
<td></td>
<td>Amplifier unit for proportional valves (1-channel) PBS - 3A</td>
</tr>
<tr>
<td>400-P-511101</td>
<td></td>
<td>Amplifier card for proportional valves (1-channel) SAN-535...</td>
</tr>
<tr>
<td>400-P-720111</td>
<td>(G-4.20)</td>
<td>Line-mounting body, type GAMA, (G 3/8&quot;)</td>
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</tbody>
</table>

info.ch@bucherhydraulics.com

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Data is provided for the purpose of product description only, and must not be construed as warranted characteristics in the legal sense. The information does not relieve users from the duty of conducting their own evaluations and tests. Because the products are subject to continual improvement, we reserve the right to amend the product specifications contained in this catalogue.
Classification: 430.310.325.305.310.310
Proportional 4/2 Throttle Cartridge, Size 5

\[ Q_{\text{max}} = 30 \text{ l/min}, \quad p_{\text{max}} = 250 \text{ bar} \]
Sliding-spool design, direct acting
Series MDR42...-5...

- Compact construction
  for cavity type AN – 3/4-16 UNF
- Dual flow paths for higher flow rate
- Low headloss
- For use with inline or bypass pressure-compensator cartridges
- Reliable operation over the whole pressure and flow range
- With optional manual flow setting
- All exposed parts with zinc-nickel plating
- High pressure wet-armature solenoids
- The slip-on coil can be rotated, and it can be replaced without opening the hydraulic envelope
- Various plug-connector systems and voltages are available

1 Description

Series MDR42... direct acting proportional 4/2 throttle valves are size 5, high performance screw-in cartridges with a 3/4-16 UNF mounting thread. They are designed on the proven sliding-spool principle. The straightforward design delivers an outstanding price/performance ratio. “De-energised closed” and “de-energised open” functions are available. In control mode, the flow through the connections 1 \(\rightarrow\) 3 und 4 \(\rightarrow\) 2 is varied in proportion to the control current. Thanks to these dual flow paths, a higher flow rate is achieved with low headloss. It is essential that ports 1 + 4, and likewise 2 + 3, are joined together in the valve housing (manifold block). In combination with inline or bypass compensators, these 4/2 throttle cartridges are predominantly used in mobile and industrial applications to allow a flow in hydraulic installations to be controlled electro-proportionally. All external parts of the cartridge are zinc-nickel plated to DIN 50 979 and are thus suitable for use in the harshest operating environments. The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section “Related data sheets”.

2 Symbol

Dual flow paths

| MDR42AD...E | MDR42AD... | MDR42ANK... |

IMPORTANT!
To enable the dual flow-path function, ports 1 + 4 and 2 + 3 must be connected within the valve housing (manifold block).
# Technical data

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Description, value, unit</th>
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<tbody>
<tr>
<td>Designation</td>
<td>proportional 4/2 throttle cartridge</td>
</tr>
<tr>
<td>Design</td>
<td>sliding-spool design, direct acting</td>
</tr>
<tr>
<td>Mounting method</td>
<td>screw-in cartridge 3/4-16 UNF</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>40 Nm ± 10 %</td>
</tr>
<tr>
<td>Size</td>
<td>nominal size 5, cavity type AN</td>
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<tr>
<td>Weight</td>
<td>0.40 kg</td>
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<tr>
<td>Mounting attitude</td>
<td>unrestricted (preferably vertical, coil down)</td>
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<td>Ambient temperature range</td>
<td>-25 °C … +50 °C</td>
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<th>Hydraulic characteristics</th>
<th>Description, value, unit</th>
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<tr>
<td>Maximum operating pressure</td>
<td>250 bar</td>
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<tr>
<td>Maximum flow rate</td>
<td>30 l/min</td>
</tr>
<tr>
<td>Nominal flow rate 1 + 4 → 2 + 3</td>
<td>25 l/min at Δp = 4 bar</td>
</tr>
<tr>
<td>Leakage flow rate</td>
<td>&lt; 150 cm³/min (with pN 250 bar)</td>
</tr>
<tr>
<td></td>
<td>with oil viscosity 33 mm²/s (cSt)</td>
</tr>
<tr>
<td>Flow direction</td>
<td>see symbols</td>
</tr>
<tr>
<td>Hydraulic fluid</td>
<td>HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER</td>
</tr>
<tr>
<td>Hydraulic fluid temperature range</td>
<td>-25 °C … +70 °C</td>
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<tr>
<td>Viscosity range</td>
<td>15…380 mm²/s (cSt), recommended 20…130 mm²/s (cSt)</td>
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<tr>
<td>Minimum fluid cleanliness</td>
<td>class 18/16/13</td>
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<thead>
<tr>
<th>Electrical characteristics</th>
<th>Description, value, unit</th>
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</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>12 V DC, 24 V DC</td>
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<tr>
<td>Control current</td>
<td>12 V = 0…1400 mA, 24 V = 0…760 mA</td>
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<tr>
<td>Power consumption at max. control current</td>
<td>max. 19 W</td>
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<tr>
<td>Coefficient R</td>
<td>12 V = 5.8 Ω / 24 V = 21 Ω</td>
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<td></td>
<td>12 V = 8.6 Ω / 24 V = 32 Ω</td>
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<tr>
<td>Recommended PWM frequency (dither)</td>
<td>200 Hz</td>
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<tr>
<td>Hysteresis with PWM</td>
<td>2…4 % I_N</td>
</tr>
<tr>
<td>Reversal error with PWM</td>
<td>2…4 % I_N</td>
</tr>
<tr>
<td>Sensitivity with PWM</td>
<td>&lt; 1 % I_N</td>
</tr>
<tr>
<td>Reproducibility with PWM</td>
<td>&lt; 2 % P_N</td>
</tr>
<tr>
<td>Relative duty cycle</td>
<td>100 %</td>
</tr>
<tr>
<td>Protection class to ISO 20 653 / EN 60 529</td>
<td>IP 65 / IP 67 / IP 69K, see “Ordering code” (with appropriate mating connector and proper fitting and sealing)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3-pin square plug to ISO 4400 / DIN 43 650 (standard) for other connectors, see “Ordering code”</td>
</tr>
</tbody>
</table>
4 Performance graphs measured with oil viscosity 33 mm²/s (cSt)

For use with compensator (max. Δp = 15 bar)

\[ \Delta p = f(Q) \text{ Pressure drop - Flow rate characteristic} \]

\[ Q = f(I; \Delta p) \text{ Flow rate adjustment characteristic} \]

---

**IMPORTANT!**

1) Performance graphs measured with compensator model DWDPA-5D-10-F06-2

---

5 Installation information

**IMPORTANT!**

To achieve the proportional 4/2 throttle cartridge's maximum performance rating, fit the solenoid coil as shown (with the plug pins at the bottom). When fitting the cartridges, note the mounting attitude (preferably vertical, with coil down \(\rightarrow\) automatic air bleed) and use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.

**ATTENTION!**

Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.
6 Dimensions & sectional view

Without manual flow setting – standard

MDR42AD...

**Seal kit no. DS-248-N** 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
<th>Ø/C8201</th>
<th>Description</th>
<th>Ø/C8201</th>
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<td>O-ring</td>
<td>18,00 x 2,00</td>
<td>FKM</td>
<td></td>
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<tr>
<td>2</td>
<td>1</td>
<td>O-ring no. 017</td>
<td>17,17 x 1,78</td>
<td>N90</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>O-ring no. 014</td>
<td>12,42 x 1,78</td>
<td>N90</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>O-ring no. 013</td>
<td>10,82 x 1,78</td>
<td>N90</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>O-ring no. 012</td>
<td>09,25 x 1,78</td>
<td>N90</td>
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</tr>
<tr>
<td>6</td>
<td>2</td>
<td>O-ring</td>
<td>16,00 x 2,00</td>
<td>FKM</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Backup ring</td>
<td>10,70 x 1,45 x 1,40</td>
<td>FI0751</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Backup ring</td>
<td>09,40 x 1,45 x 1,00</td>
<td>FI0751</td>
<td></td>
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<tr>
<td>9</td>
<td>1</td>
<td>Backup ring</td>
<td>07,80 x 1,45 x 1,00</td>
<td>FI0751</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT!**

2) Seal kit with FKM (Viton) seals no. DS-248-V

Air-bleeding

If necessary, air can be purged from these proportional throttle cartridges by using the cap nut (Item B). The procedure is as follows:

A Knurled nut
B Cap nut

Steps:
1. Slacken and remove the knurled nut.
2. Slacken the cap nut approx. 1.5 turns. Caution: Slackening the cap nut allows oil to spray out!
3. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
4. Tighten the cap nut.
5. Refit the knurled nut and tighten it.
With manual flow setting – Option “E”

Integral air-bleeding
If necessary, air can be purged from these proportional throttle cartridges by using the integral air-bleed screw (Item D). The procedure is as follows:

C  Protective cap
D  Air-bleed screw

Steps:
1. Remove the protective cap.
2. Slacken the air-bleed screw approx. 2 turns.
3. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
4. Tighten the air-bleed screw.
5. Fit the protective cap.
7 Manual flow setting

Optionally, the proportional throttle cartridges can be supplied with an integral manual flow setting. If a proportional solenoid is faulty, for example, this manual flow setting enables the required flow rate to be set mechanically. This manual flow setting is not designed for adjusting the flow in a dynamic control mode.

---

8 Application examples

**Used with bypass pressure-compensator cartridge**

**Classic combination with inline and bypass pressure-compensator cartridges**

---

Setting the flow rate manually

Steps:
1. Remove the protective cap.
2. Slacken the lock nut (13 A/F).
3. Screw in (turn to right) the adjusting spindle (4 A/F) until the required flow rate is set.
4. Tighten the lock nut (13 A/F).
5. Fit the protective cap.

Restoring the factory settings

Steps:
1. Solenoid de-energised.
2. Remove the protective cap.
3. Slacken the lock nut (13 A/F).
4. Unscrew the adjusting spindle (4 A/F) to its end-stop, then screw it in 2 1/8 turns.
5. Tighten the lock nut (13 A/F).
6. Fit the protective cap.
9 Ordering code

Ex. M D R 42AD N A 5 - - 1 24 D -

M = flow-control valve
D = direct acting
R = proportional solenoid
42AD = 4/2 function (de-energised closed)
42ANK = 4/2 function (de-energised open)
N = electrically operated, V DC = 27 W
A ... Q = type only for use with compensator (standard)
Z ... R = special features - please consult BUCHER
5 = nominal size 5
(blank) = NBR (Nitrile) seals (standard)
V = FKM (Viton) seals (special seals - please contact BUCHER)
(blank) = no manual flow setting (standard)
E = with manual flow setting
1 ... 9 = design stage (omit when ordering new units)
... = voltage e.g. 24 (24 V)
D = current DC
(blank) = ISO 4400 / DIN 43 650 connection with mating plug (standard, IP 65)
M100 = ISO 4400 / DIN 43 650 connection without mating plug
C = Kostal plug connection (IP 65)
JT = Junior Timer radial plug connection (with protection diode, IP65)
IT = Junior Timer axial plug connection (with protection diode, IP65)
D = Deutsch plug connection DT04-2P (IP 67/69K)
DT = Deutsch plug connection DT04-2P (with protection diode, IP 67/69K)
S = AMP Superseal 1.5 (IP67) / Metri-Pack 150 (IP65) plug connection
F = flying leads (500 mm)

10 Related data sheets

<table>
<thead>
<tr>
<th>Reference</th>
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<td>(i-33.12)</td>
<td>Cavity type AN</td>
</tr>
<tr>
<td>400-P-120110</td>
<td>(W-2.141)</td>
<td>Coils for screw-in cartridge valves series D36</td>
</tr>
<tr>
<td>400-P-510101</td>
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<td>Amplifier unit for proportional valves (1-channel) PBS - 3A</td>
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<tr>
<td>400-P-511101</td>
<td></td>
<td>Amplifier card for proportional valves (1-channel) SAN-535…</td>
</tr>
</tbody>
</table>

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Classification: 430.310.325.305.310.310
Proportional Throttle Cartridges, Size 5 / SAE 08

\[ Q_{\text{max}} = 50 \text{ l/min (13 gpm)}, \quad p_{\text{max}} = 250 \text{ bar (3600 psi)} \]

Two-Stage, with Seat-Valve Shut-Off

Series MVRPSBA-…

1 Description

Series MVRPSBA-… two-stage proportional throttle cartridges are size 5 / SAE 08, high performance screw-in valves with a 3/4-16 UNF mounting thread. The main and pilot stages are designed on the poppet/seat principle and are therefore virtually leak-free in the flow direction (see symbol). With these proportional throttle cartridges, the flow rate is dependent on the electrical control current, and it can be varied continuously and responsively. When used with a pressure compensator, these cartridges are particularly suitable for precise and load-compensated lifting and lowering movements, but they can also be used on their own for reliable operation in mobile and industrial applications with large pressure differences. All external parts of the cartridge are zinc-nickel plated to DIN 50979 and are thus suitable for use in the harshest operating environments. The slip-on coil can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section “Related data sheets”.

2 Symbol

Cavity type AL

\[ \text{MVRPSBA-LG}… \text{ (size 5)} \]

Cavity type C0820

\[ \text{MVRPSBA-2G}… \text{ (SAE08)} \]

3 Technical data

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Description, value, unit</th>
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<tr>
<td>Designation</td>
<td>proportional-throttle cartridge</td>
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<tr>
<td>Design</td>
<td>seat-valve shut-off, two stage</td>
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<tr>
<td>Mounting method</td>
<td>screw-in cartridge 3/4-16 UNF</td>
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<tr>
<td>Tightening torque</td>
<td>40 Nm ± 10 % (30 ft-lbs ± 10 %)</td>
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Reference: 400-P-605101-EN-00
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<tbody>
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<td>Size</td>
<td>nominal size 5 for cavity type AL</td>
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<tr>
<td></td>
<td>size SAE 08 for cavity type C0820</td>
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<tr>
<td>Weight</td>
<td>0.40 kg (0.9 lbs)</td>
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<tr>
<td>Mounting attitude</td>
<td>unrestricted (preferably vertical, coil down)</td>
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<tr>
<td>Ambient temperature range</td>
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<tr>
<th>Hydraulic characteristics</th>
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<tbody>
<tr>
<td>Maximum operating pressure</td>
<td>250 bar (3600 psi)</td>
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<tr>
<td>Maximum flow rate</td>
<td>50 l/min (13 gpm)</td>
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<tr>
<td>Nominal flow rate</td>
<td>20 l/min at Δp = 10 bar (5.3 gpm at Δp = 140 psi)</td>
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<tr>
<td>Leakage flow rate</td>
<td>&lt; 0.2 cm³/min (max. 5 drops/min) with oil viscosity 33 mm²/s (cSt)</td>
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<tr>
<td>Flow direction</td>
<td>see symbol</td>
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<td>Hydraulic fluid</td>
<td>HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER</td>
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<tr>
<td>Hydraulics fluid temperature range</td>
<td>-25 °C … +70 °C (-13 °F … +158 °F)</td>
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<tr>
<td>Viscosity range</td>
<td>15…380 mm²/s (cSt), recommended 20…130 mm²/s (cSt)</td>
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<td>Minimum fluid cleanliness</td>
<td>class 18/16/13</td>
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<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>Description, value, unit</th>
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<tbody>
<tr>
<td>Supply voltage</td>
<td>12 V DC, 24 V DC</td>
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<tr>
<td>Control current</td>
<td>12 V = 0…1400 mA, 24 V = 0…760 mA</td>
</tr>
<tr>
<td>Coil resistance R</td>
<td>- cold value at 20 °C 12 V = 5.8 Ω / 24 V = 20.9 Ω</td>
</tr>
<tr>
<td></td>
<td>- max. warm value 12 V = 9.1 Ω / 24 V = 32.7 Ω</td>
</tr>
<tr>
<td>Recommended PWM frequency (dither)</td>
<td>200 Hz</td>
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<tr>
<td>Hysteresis with PWM</td>
<td>3…6 % I N</td>
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<tr>
<td>Reversal error with PWM</td>
<td>3…6 % I N</td>
</tr>
<tr>
<td>Sensitivity with PWM</td>
<td>&lt; 2 % I N</td>
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<tr>
<td>Reproducibility with PWM</td>
<td>&lt; 3 % I N</td>
</tr>
<tr>
<td>Switching time</td>
<td>see performance graphs</td>
</tr>
<tr>
<td>Relative duty cycle</td>
<td>100 %</td>
</tr>
<tr>
<td>Protection class to ISO 20 653 / EN 60 529</td>
<td>IP 65 / IP 67 / IP 69K, see “Ordering code” (with appropriate mating connector and proper fitting and sealing)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>3-pin square plug to ISO 4400 / DIN 43 650 (standard) for other connectors, see “Ordering code”</td>
</tr>
</tbody>
</table>
4 Performance graphs
measured with oil viscosity 33 mm²/s (cSt) – for cavity type AL and C0820

\[ \Delta p = f (Q) \] Pressure drop - Flow rate characteristic

**“energized”**

**“de-energized - through check valve”**

Attention:
When flow passes through the check valve and there is a large pressure difference, the poppet in the main stage can be damaged.

\[ Q = f (\Delta p; I) \] Flow rate adjustment characteristic

Switching time measured up to 80 % change in the pressure difference. Electrical operation with DC power supply.
5 Dimensions & sectional view
Dimensions in millimeters (inches)

5.1 Insertion in cavity type “AL”

5.2 Insertion in cavity type “C0820”

6 Installation information

Important:
When fitting the cartridges, note the mounting attitude (preferably vertical, with coil down → automatic air bleed) and use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.

Seal kit NBR no. DS-447-N (cavity type AL) ¹)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Description</th>
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<tbody>
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<td>O-ring no. 017  Ø 17.17 x 1.78 N90</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>O-ring no. 014  Ø 12.42 x 1.78 N90</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>O-ring  Ø 16.00 x 2.00 FKM</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Backup ring  Ø 10.70 x 1.45 x 1.00 FI0751</td>
</tr>
</tbody>
</table>

IMPORTANT!
¹) Seal kit with FKM (Viton) seals, no. DS-447-V

ATTENTION!
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

Seal kit NBR no. DS-448-N (cavity type C0820) ²)

<table>
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<th>Item</th>
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<th>Description</th>
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<tbody>
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<td>O-ring no. 017  Ø 17.17 x 1.78 N90</td>
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<tr>
<td>2</td>
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<td>O-ring no. 012  Ø 9.25 x 1.78 N90</td>
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<td>3</td>
<td>2</td>
<td>O-ring  Ø 16.00 x 2.00 FKM</td>
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<tr>
<td>4</td>
<td>2</td>
<td>Backup ring  Ø 7.80 x 1.45 x 1.00 FI0751</td>
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</tbody>
</table>

IMPORTANT!
²) Seal kit with FKM (Viton) seals, no. DS-448-V
7 Application examples

Potential applications

- Lifting and lowering movements on industrial trucks
- In agricultural machines, e.g. proportional scraper-floor controls in self-loading trailers
- In all applications where a load-independent function is required, in combination with our in-line or bypass pressure compensators
8 Ordering code

MV = throttle valve, two-stage
R = proportional-solenoid operated
P = cartridge design
S = seat-valve design
B = pressurised oil enters at the side
A ... Q = standard model - see relevant data sheets
Z ... R = special features - please consult BUCHER
L = cavity type AL (only for nominal size 5)
2 = cavity type C0820 (only for size SAE 08)
G = normally closed
5 = nominal size 5 (only for cavity type AL)
8 = size SAE 08 (only for cavity type C0820)
20 = nominal flow rate 20 l/min at Δp = 10 bar (5.3 l/min bei Δp = 140 psi)
(blank) = NBR (Nitrile) seals (standard)
V = FKM (Viton) seals (special seals - please contact BUCHER)
1 ... 9 = design stage (omit when ordering new units)
... = voltage e.g. 24 (24 V)
D = current DC
(blank) = ISO 4400 / DIN 43 650 mating plug (standard, IP 65)
M100 = without mating DIN plug
C = Kostal plug connection (IP 65)
JT = Junior Timer radial plug connection (with protection diode, IP65)
IT = Junior Timer axial plug connection (with protection diode, IP65)
D = Deutsch plug connection DT04-2P (IP 67/69K)
DT = Deutsch plug connection DT04-2P (with protection diode, IP 67/69K)
S = AMP Superseal 1.5 (IP 67) / Metri-Pack 150 (IP 65)
F = flying leads (500 mm)

9 Related data sheets

<table>
<thead>
<tr>
<th>Reference</th>
<th>(Old no.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400-P-040011</td>
<td>(i-32)</td>
<td>The form-tool hire programme</td>
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<td>400-P-040171</td>
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<td>Cavity type AL</td>
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<td>520-P-000110</td>
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<td>400-P-120110</td>
<td>(W-2.141)</td>
<td>Coils for screw-in cartridge valves</td>
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<td>400-P-510101</td>
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<td>Amplifier unit for proportional valves (1-channel) PBS - 3A</td>
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<td>400-P-511101</td>
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<td>Amplifier card for proportional valves (1-channel) SAN-535...</td>
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<td>400-P-720101</td>
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<td>520-P-000111</td>
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<td>Line-mounting body, size SAE 08 (G 3/8&quot;)</td>
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PIFC-10

PRESSURE COMPENSATED, NORMALLY CLOSED OR NORMALLY OPEN PROPORTIONAL, IN-LINE FLOW CONTROL VALVE.

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

NOTES:
1. SOLENOIDS AVAILABLE WITH DIODES - CONSULT FACTORY.

PIFC-10-X-X-XX-X-X-XXX-XXX X

BASIC
SIZE 10 = 7/8"-14UNF
SEALS N = BUNA "N" V = VITON
STYLE C = NORMALLY CLOSED O = NORMALLY OPEN
REGULATED FLOW 04 = 0 TO 4.0 GPM 08 = 0 TO 8.0 GPM 12 = 0 TO 12.0 GPM 16 = 0 TO 16.0 GPM

TERMINALS
L =18GA. 24" LEADS T = SPADE TERM. B = BOLT TERM. G = DIN43650 W = WEATHER-PACK D = DEUTSCH-DT04-2P M = METRI-PACK CONN.
VOLTAGE AMPS 12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
0-F-100 = NONE M-F-100 = MANUAL OVERRIDE 0-S-160 = LIMITED RANGE ADJ. M-S-160 = BOTH MO/LTD ADJ

AMPERAGE (AMPS) @ 24 VDC
0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20

AMPERAGE (AMPS) @ 12 VDC
0.30 0.60 0.90 1.20 1.50 1.80 2.10 2.40

Reference: 520-P-112120-EN-00/09.2015
# PRESSURE COMPENSATED, PROPORTIONAL, IN-LINE, FLOW CONTROL VALVE.

## DESCRIPTION

This valve is an electro-hydraulic, proportional, in-line (Restrictive) type, pressure compensated, hydraulic flow control. Regulated flow

Normally Closed 0 to 16.0 GPM, [0 to 61.0 L/m] max. Normally Open 16.0 to 0 GPM [61.0 to 0 L/m] is proportional to the current input, regardless of load or system pressure.

## OPERATIONS

This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open or close against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 160 PSI/11,0 Bar delta "P" providing the valve with a constant regulated flow regardless of load or system pressure. When current is increased or decreased to the coil; the flow will increase or decrease proportionally.

IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

## FEATURES AND BENEFITS

Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All valves are 100% functionally tested.
**SPECIFICATIONS**

**OPERATING PRESSURE**: 5,000 PSI [350 Bar]
**PROOF PRESSURE**: 10,000 PSI [700 Bar]
**REGULATED FLOW**: 16.0 GPM [61.0 L/m]" Max. See performance chart.
**INTERNAL LEAKAGE**: 15 cu.in/min [245 cc/m] @ 5,000 PSI [350 Bar]
**VALVE HOUSINGS**: 2500 PSI [175 Bar] = Aluminum – Anodized.
                  5000 PSI [350 Bar] = Steel – Unplated.
**OPERATING TEMPERATURE**: -40° to +250° F. [-40° to +120° C.]
**OPERATING MEDIA**: All general purpose hydraulic fluids such as
                     MIL-H-5606, SAE-#10, SAE-#20, etc.
**RESPONSE**: The most efficient method to control this valve is with
               current control and a 50 Hz dither.
**POWER REQUIREMENTS**: 12 VDC, Operating current 0.4 to 2.4 AMPS.
                        24 VDC, Operating current 0.2 to 1.2 AMPS.
**SEAL KIT**: Buna "N": SKN-1022, SKN-1032
              VITON: SKV-1022, SKV-1032
**INSTALLATION**: No restrictions.
**WEIGHT**: 4.58 lbs [2.09 kg]. aluminum body.
           7.65 lbs [3.48 kg]. steel body.
PIFC-12

PRESSURE COMPENSATED, NORMALLY CLOSED OR NORMALLY OPEN PROPORTIONAL, IN-LINE FLOW CONTROL VALVE.

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

NOTES:
1. SOLENOIDS AVAILABLE WITH DIODES - CONSULT FACTORY.

PIFC-12-X-X-XX-X-X-XXX-XXX X

BASIC
SIZE
12=1.062"=12UNF
SEALS
N = BUNA "N"
V = VITON
STYLE
C = NORMALLY CLOSED
O = NORMALLY OPEN
REGULATED FLOW
06 = 0 TO 6.0 GPM
12 = 0 TO 12.0 GPM
18 = 0 TO 18.0 GPM
24 = 0 TO 24.0 GPM

TERMINALS
L = 180A, 24" LEADS
T = SPACED TERM.
B = BOLT TERM.
G = DIN43650
W = WEATHER-PACK
D = DEUTSCH-DT04-2P
M = METRI-PACK CONN.
VOLTAGE AMPS
12D = 12 VDC 3.00
24D = 24 VDC 1.50

ADJUSTMENT OPTIONS
O-F-100 = NONE
M-F-100 = MANUAL OVERRIDE
O-S-160 = LIMITED RANGE ADJ
M-S-160 = BOTH MG/LTD ADJ

PORTS
12TX = SAE - #12
"A" = ALUM. HOUSING
"S" = STEEL HOUSING

AMPERAGE (AMPS) @ 24 VDC
0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20

NORMALLY OPEN
NORMALLY CLOSED

REGULATED FLOW @ 160 PSI
0.30 0.60 0.90 1.20 1.50 1.80 2.10 2.40

AMPERAGE (AMPS) @ 12 VDC
0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20

 Reference: 520-P-112130-EN-00/09.2015
DESCRIPTION
This valve is an electro–hydraulic, proportional, in–line (Restrictive) type, pressure compensated, hydraulic flow control. Regulated flow Normally Closed 0 to 24.0 GPM, [0 to 91,2 L/M] max. Normally Open 24.0 to 0 GPM [91,2 to 0 L/M] is proportional to the current input, regardless of load or system pressure.

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro–hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open or close against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 160 PSI/11,0 Bar delta ”P” providing the valve with a constant regulated flow regardless of load or system pressure. When current is increased or decreased to the coil; the flow will increase or decrease proportionally.
IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All valves are 100% functionally tested.
SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 24.0 GPM [90.7 L/M] Max. See performance chart.
INTERNAL LEAKAGE: 30 cu.in/min [495 cc/m] @ 5,000 PSI [350 Bar]
15.52 lbs [2,51 kg] = Steel – Unplated.
OPERATING TEMPERATURE: -40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: Buna "N": SKN-1222, SKN-1232
VITON: SKV-1222, SKV-1232
INSTALLATION: No restrictions.
WEIGHT: 5.52 lbs [2,51 kg]. aluminum body.
15.60 lbs [7,10 kg]. steel body.

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The technical information in this catalog, may contain calculated figures (for reference only) and not actual performance data for this product. Data is provided for the purpose of product description only, and must not be construed as warranted characteristics in the legal sense. The information does not relieve users from the duty of conducting their own evaluations and tests. Because the products are subject to continual improvement, we reserve the right to amend the product specifications contained in this catalogue.
PIFC-16

PRESSURE COMPENSATED, NORMALLY CLOSED OR NORMALLY OPEN PROPORTIONAL, IN-LINE FLOW CONTROL VALVE.

NOTES:
1. SOLENOIDS AVAILABLE WITH DIODES - CONSULT FACTORY.

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

LIMITED RANGE ADJUSTMENT
(SCREW TYPE)

TERMINALS:
L = 18GA. 24" LEADS
T = SPADE TERM.
B = BOLT TERM.
C = DIN43650
M = WEATHER-PACK
W = METRI-PACK CONN.

VOLTAGE AMPS
12V = 12 VDC 3.00
24V = 24 VDC 1.50

PORTS
16TX = SAE - #16
"A" = ALUM. HOUSING
"S" = STEEL HOUSING

ADJUSTMENT OPTIONS
O-F-100 = NONE
M-F-100 = MANUAL OVERRIDE
O-S-180 = LIMITED RANGE ADJ.
M-S-180 = BOTH MO/LTD ADJ.

REGULATED FLOW
06 = 0 TO 6.0 GPM
12 = 0 TO 12.0 GPM
18 = 0 TO 18.0 GPM
24 = 0 TO 24.0 GPM
30 = 0 TO 30.0 GPM
36 = 0 TO 36.0 GPM

AMPERAGE (AMPS) @ 24 VDC
0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20

AMPERAGE (AMPS) @ 12 VDC
0.30 0.60 0.90 1.20 1.50 1.80 2.10 2.40

REGULATED FLOW @ 160 PSI

06 12 18 24 30 36

NORMALLY OPEN
NORMALLY CLOSED

GPM

Reference: 520-P-112140-EN-00/09.2015
This valve is an electro-hydraulic, proportional, in-line (Restrictive) type, pressure compensated, hydraulic flow control. Regulated flow
Normally Closed 0 to 36.0 GPM, [0 to 137.0 L/M] max. Normally Open 36.0 to 0 GPM [137.0 to 0 L/M] is proportional to the current input,
regardless of load or system pressure.

This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, pro-
portional, pressure compensated, flow control valve. When the coil is
energized the armature moves the metering orifice open or close against
a precision bias spring varying the flow. A pressure compensator spool
(HYDROSTAT) modulates the flow at 160 PSI/11,0 Bar delta "P" providing
the valve with a constant regulated flow regardless of load or system
pressure. When current is increased or decreased to the coil; the flow
will increase or decrease proportionally.
IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

Continuous-duty, very low heat rise & waterproof solenoid coil.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All valves are 100% functionally tested.
PRESSURE COMPENSATED, PROPORTIONAL, IN–LINE, FLOW CONTROL VALVE.

SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 36.0 GPM [136.0 L/M] Max. See performance chart.
INTERNAL LEAKAGE: 40 cu.in/min [660 cc/m] @ 5,000 PSI [350 Bar]
      5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: −40° to +250° F. [−40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as
      MIL–H–5606, SAE–#10, SAE–#20, etc.
RESPONSE: The most efficient method to control this valve is with
      current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
      24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: Buna “N”: SKN–1622, SKN–1632
      VITON: SKV–1622, SKV–1632
INSTALLATION: No restrictions.
      21.70 lbs [9.86 kg]. steel body.

Reference: S20-P-112140-EN-00/09.2015
PBFC-10

**PRESSURE COMPENSATED, NORMALLY CLOSED OR NORMALLY OPEN PROPORTIONAL, PRIORITY FLOW CONTROL VALVE.**

UL approved coil, IP68 and IP69K rated when used with waterproof connector.

**TERMINALS:****

- **L** = 18GA, 24" LEADS
- **T** = SPADE TERM.
- **B** = BOLT TERM.
- **G** = DIN43650
- **W** = WEATHER-PACK
- **D** = DEUTSCH-DT04-2P
- **M** = METRI-PACK CONN.

**VOLTAGE AMPS:**

- 12D = 12 VDC 3.00
- 24D = 24 VDC 1.50

**ADJUSTMENT OPTIONS:**

- 0-F-100 = NONE
- M-F-100 = MANUAL OVERRIDE
- 0-S-160 = LIMITED RANGE ADJ.
- M-S-160 = BOTH MO/LTD ADJ.

**TERMS:**

- **C** = NORMALLY CLOSED
- **O** = NORMALLY OPEN

**REGULATED FLOW:**

- 04 = 0 TO 4.0 GPM
- 08 = 0 TO 8.0 GPM
- 12 = 0 TO 12.0 GPM
- 16 = 0 TO 16.0 GPM

- **AMPERAGE (AMPS) @ 12 VDC:**
  - 0.15 0.30 0.45 0.60 0.75 0.90 1.05 1.20

- **AMPERAGE (AMPS) @ 24 VDC:**
  - 0.08 0.12 0.15 0.18 0.21 0.24

**NOTES:**

1. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.

**PBFC-10-X-X-XX-X-X-X-XXX-XXX-X**

**SIZE:**

10 = 7/8"-14UNF

**SEALS:**

- N = BUNA "N"
- V = VITON

**STYLE:**

- C = NORMALLY CLOSED
- O = NORMALLY OPEN

**REGULATED FLOW:**

- 04 = 0 TO 4.0 GPM
- 08 = 0 TO 8.0 GPM
- 12 = 0 TO 12.0 GPM
- 16 = 0 TO 16.0 GPM

**REGULATED FLOW @ 160 PSI:**

- 0.30 0.60 0.90 1.20 1.50 1.80 2.10 2.40

**AMPERAGE (AMPS) @ 12 VDC:**

- 0.30 1.50 2.10 2.40

**AMPERAGE (AMPS) @ 24 VDC:**

- 0.08 0.12 0.15 0.18 0.21 0.24

Reference: 520-P-112220-EN-00/09.2015
DESCRIPTION
This valve is an electro-hydraulic, proportional, priority (By-Pass) type, pressure compensated, hydraulic flow control. Regulated flow normally closed 0 to 16.0 GPM [0 to 61.0 L/m] or normally open 16.0 to 0 GPM [61.0 to 0 L/m] @ 160 PSI DELTA P. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 25.0 GPM [95.0 L/m].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open or closed against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 160 PSI/11.0 Bar delta "P" providing pressure. When current is increased or decreased to the coil; the flow will increase or decrease proportionally.
IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil. Interchangeable solenoid coils & terminations options available. Hardened precision fitted spool & sleeve provides reliable, long life. Very efficient wet – armature solenoid core tube construction. All external carbon steel parts are plated for longer life against the elements. All valves are 100% functionally tested.
PBFC-10

PRESSURE COMPENSATED, PROPORTIONAL, PRIORITY FLOW CONTROL VALVE.

SPECIFICATIONS
OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 16.0 GPM [61,0 L/m] Max. See performance chart.
INTERNAL LEAKAGE: 20 cu.in/min [330 cc/m] @ 5,000 PSI [350 Bar]
5000 PSI [350 Bar] = Steel - Unplated.
OPERATING TEMPERATURE: -40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.
RESPONSE: The most efficient method to control this valve is with current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: Buna "N": SKN-1022, SKN-1042
VITON: SKV-1022, SKV-1042
INSTALLATION: No restrictions.
WEIGHT: 4.58 lbs [2,09 kg]. aluminum body.
7.65 lbs [3,48 kg]. steel body.
UL approved coil, IP68 and IP69K rated when used with waterproof connector.

LIMITED RANGE ADJUSTMENT (SCREW TYPE)

NOTES:
1. SOLENOIDS AVAILABLE WITH DIODES — CONSULT FACTORY.
DESCRIPTION
This valve is an electro–hydraulic, proportional, priority (By–Pass) type, pressure compensated, hydraulic flow control. Regulated flow normally closed 0 to 24.0 GPM [0 to 91,2 L/M] or normally open 24.0 to 0 GPM [91,2 to 0 L/M] @ 160 PSI DELTA P. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 35.0 GPM [130,0 L/M].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro–hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open or closed against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 160 PSI/11,0 Bar delta ”P” providing pressure. When current is increased or decreased to the coil; the flow will increase or decrease proportionally.

IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

FEATURES AND BENEFITS
Continuous–duty, very low heat rise & waterproof solenoid coil.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All valves are 100% functionally tested.
SPECIFICATIONS

OPERATING PRESSURE: 5,000 PSI [350 Bar]
PROOF PRESSURE: 10,000 PSI [700 Bar]
REGULATED FLOW: 24.0 GPM [91.2 l/m] Max. See performance chart.
INTERNAL LEAKAGE: 30 cu.in/min [495 cc/m] @ 5,000 PSI [350 Bar]
5000 PSI [350 Bar] = Steel – Unplated.
OPERATING TEMPERATURE: -40° to +250° F. [-40° to +120° C.]
OPERATING MEDIA: All general purpose hydraulic fluids such as
MIL-H-5606, SAE-#10, SAE-#20, etc.
RESPONSE: The most efficient method to control this valve is with
current control and a 50 Hz dither.
POWER REQUIREMENTS: 12 VDC, Operating current 0.4 to 2.4 AMPS.
24 VDC, Operating current 0.2 to 1.2 AMPS.
SEAL KIT: Buna "N": SKN-1222, SKN-1242
VITON: SKV-1222, SKV-1242
INSTALLATION: No restrictions.
WEIGHT: 5.58 lbs [2.54 kg], aluminum body.
9.65 lbs [4.38 kg], steel body.
UL approved coil, IP68 and IP69K rated when used with waterproof connector.

**NOTES:**
1. SOLENOIDS AVAILABLE WITH DIODES – CONSULT FACTORY.
DESCRIPTION
This valve is an electro-hydraulic, proportional, priority (By-Pass) type, pressure compensated, hydraulic flow control. Regulated flow normally closed 0 to 36.0 GPM [0 to 136,8 L/M] or normally open 36.0 to 0 GPM [136,8 to 0 L/M] @ 160 PSI DELTA P. is proportional to the current input regardless of load or system pressure. After the priority flow is satisfied the excess flow is diverted to a secondary circuit or to tank. Maximum inlet flow is 50.0 GPM [190,0 L/M].

OPERATIONS
This unit is a direct acting (NO PILOT FLOW), electro-hydraulic, proportional, pressure compensated, flow control valve. When the coil is energized the armature moves the metering orifice open or closed against a precision bias spring varying the flow. A pressure compensator spool (HYDROSTAT) modulates the flow at 160 PSI/11,0 Bar delta "P" providing pressure. When current is increased or decreased to the coil; the flow will increase or decrease proportionally.

IN THE EVENT OF POWER FAILURE THE VALVE WILL CLOSE OR OPEN RESPECTIVELY.

FEATURES AND BENEFITS
Continuous-duty, very low heat rise & waterproof solenoid coil.
Interchangeable solenoid coils & terminations options available.
Hardened precision fitted spool & sleeve provides reliable, long life.
Very efficient wet – armature solenoid core tube construction.
All external carbon steel parts are plated for longer life against the elements.
All valves are 100% functionally tested.
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Operating Pressure</td>
<td>5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Proof Pressure</td>
<td>10,000 PSI [700 Bar]</td>
</tr>
<tr>
<td>Regulated Flow</td>
<td>36.0 GPM [136.8 l/m] Max. See performance chart.</td>
</tr>
<tr>
<td>Internal Leakage</td>
<td>40 cu.in/min [660 cc/m] @ 5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Valve Housings</td>
<td>2500 PSI [175 Bar] = Aluminum – Anodized.</td>
</tr>
<tr>
<td></td>
<td>5000 PSI [350 Bar] = Steel – Unplated.</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>–40° to +250° F. [–40° to +120° C.]</td>
</tr>
<tr>
<td>Operating Media</td>
<td>All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.</td>
</tr>
<tr>
<td>Response</td>
<td>The most efficient method to control this valve is with current control and a 50 Hz dither.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>12 VDC, Operating current 0.4 to 2.4 AMPS.</td>
</tr>
<tr>
<td></td>
<td>24 VDC, Operating current 0.2 to 1.2 AMPS.</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>Buna &quot;N&quot;: SKN-1622, SKN-1642</td>
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<tr>
<td></td>
<td>VITON: SKV-1622, SKV-1642</td>
</tr>
<tr>
<td>Installation</td>
<td>No restrictions.</td>
</tr>
<tr>
<td>Weight</td>
<td>6.78 lbs [2.54 kg] aluminum body.</td>
</tr>
<tr>
<td></td>
<td>9.89 lbs [4.50 kg] steel body.</td>
</tr>
<tr>
<td>Internal Leakage</td>
<td>40 cu.in/min [660 cc/m]        @ 5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Regulated Flow</td>
<td>36.0 GPM [136.8 l/m] Max. See performance chart.</td>
</tr>
<tr>
<td>Proof Pressure</td>
<td>10,000 PSI [700 Bar]</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>5,000 PSI [350 Bar]</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>–40° to +250° F. [–40° to +120° C.]</td>
</tr>
<tr>
<td>Operating Media</td>
<td>All general purpose hydraulic fluids such as MIL-H-5606, SAE-#10, SAE-#20, etc.</td>
</tr>
<tr>
<td>Response</td>
<td>The most efficient method to control this valve is with current control and a 50 Hz dither.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>12 VDC, Operating current 0.4 to 2.4 AMPS.</td>
</tr>
<tr>
<td></td>
<td>24 VDC, Operating current 0.2 to 1.2 AMPS.</td>
</tr>
<tr>
<td>Seal Kit</td>
<td>Buna &quot;N&quot;: SKN-1622, SKN-1642</td>
</tr>
<tr>
<td></td>
<td>VITON: SKV-1622, SKV-1642</td>
</tr>
<tr>
<td>Installation</td>
<td>No restrictions.</td>
</tr>
<tr>
<td>Weight</td>
<td>6.78 lbs [2.54 kg] aluminum body.</td>
</tr>
<tr>
<td></td>
<td>9.89 lbs [4.50 kg] steel body.</td>
</tr>
</tbody>
</table>

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The technical information in this catalog may contain calculated figures (for reference only) and not actual performance data for this product. Data is provided for the purpose of product description only, and must not be construed as warranted characteristics in the legal sense. The information does not relieve users from the duty of conducting their own evaluations and tests. Because the products are subject to continual improvement, we reserve the right to amend the product specifications contained in this catalogue.

Reference: S20-P-112240-EN-00/09.2015
PWM MICRO PROPORTIONAL VALVE DRIVER

PWM-1400-12.......... for use with 12 V.D.C.
PWM-1400-24.......... for use with 24 V.D.C.
PWM MICRO PROPORTIONAL VALVE DRIVER

DESCRIPTION:

The Block Micro Proportional Driver is an electrical circuit built into an epoxy potted enclosure designed to proportionally control the flow of our solenoid valves.

The BMPD provides a Ø0.25 [6.4] mounting hole that is built in the body. Assembly of the unit is accomplished by connecting stranded or solid #10 AWG [Ø3,0] wire, up to the miniature header that is provided on the top surface of the block. Adjustments made to the unit are made by turning the adjustment screws located on the top surface of the block. The block also includes a red power indicator LED and a variable intensity yellow LED, to indicate output level, for onboard diagnostics.

TECHNICAL DATA:

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>ALL VERSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY VOLTAGE</td>
<td>9.0 V DC min. –32 VDC max.</td>
</tr>
<tr>
<td>SUPPLY CURRENT</td>
<td>45 mA max. (no load)</td>
</tr>
<tr>
<td>INPUT CONTROL SIGNAL Voltage or</td>
<td>0 – 5 VDC (300 K ohm impedance)</td>
</tr>
<tr>
<td>CURRENT</td>
<td>0–20 mA (100 ohm impedance)</td>
</tr>
<tr>
<td>RAMPING UP/DOWN TIME</td>
<td>0.1 – 20 sec. linear (+/- 0.1%/°C)</td>
</tr>
<tr>
<td>PWM FREQUENCY</td>
<td>1.2 KHz fixed</td>
</tr>
<tr>
<td>OUTPUT LEAP TO I MIN</td>
<td>@ 0.1 V or 0.4 mA control (+/- 15%)</td>
</tr>
<tr>
<td>DITHERING FREQUENCY</td>
<td>30 – 150 Hz</td>
</tr>
<tr>
<td>DITHERING AMPLITUDE</td>
<td>0 – 500 mA peak to peak</td>
</tr>
<tr>
<td>VOLTAGE REFERENCE</td>
<td>5.0V +/- 5% regulated</td>
</tr>
<tr>
<td>OPERATING TEMP.</td>
<td>-25 to 85 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>PWM–1400–12</th>
<th>PWM–1400–24</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT CURRENT @ 25 °C Ta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTINUOUS</td>
<td>3.0 Amps max.</td>
<td>1.5 Amps max.</td>
</tr>
<tr>
<td>PEAK PULSED (16ms)</td>
<td>17.0A max.</td>
<td>4.7A max.</td>
</tr>
<tr>
<td>1 MIN. (+/- 20%)</td>
<td>0 – 1.0A max.</td>
<td>0 – 0.5A max.</td>
</tr>
<tr>
<td>1 MAX. (+/- 20%)</td>
<td>Imin. + 2.0A max.</td>
<td>Imin. + 1.0A max.</td>
</tr>
<tr>
<td>REGULATION DV</td>
<td>+/- 0.2% / V</td>
<td></td>
</tr>
<tr>
<td>REGULATION DT</td>
<td>+/- 0.1% / °C</td>
<td></td>
</tr>
</tbody>
</table>

Reference: 520-P-110020-EN-00/09.2015
PWM MICRO PROPORTIONAL VALVE DRIVER

PWM-1401-12........... for use with 12 V.D.C.
PWM-1401-24........... for use with 24 V.D.C.

DIN 43650/ISO 4400 FORM "A" CONNECTOR

POWER SUPPLY 12 - 30 VDC

Reference: 520-P-110030-EN-00/09.2015
PWM MICRO PROPORTIONAL VALVE DRIVER

DESCRIPTION:
The Micro Proportional Driver is a coil mounted driver unit used to proportionally control the flow of our solenoid valves.

The electronic circuit for the Micro Proportional Driver is built into an environment resistant miniature enclosure. It incorporates a DIN 43650/ISO 4400 form "A" connector male and female interface, and it is mounted on our coils using a mounting screw.

The case for the driver is made from engineered polymers to resist harsh chemicals, foreign substances, and moisture.

The unit meets NEMA 4 environment standards.

TECHNICAL DATA:

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>ALL VERSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY VOLTAGE</td>
<td>12 V DC min. – 30 VDC max.</td>
</tr>
<tr>
<td>SUPPLY CURRENT</td>
<td>45 mA max. (no load)</td>
</tr>
<tr>
<td>INPUT CONTROL SIGNAL</td>
<td>0 – 10 VDC (500 K ohm impedance)</td>
</tr>
<tr>
<td>RAMPING UP/DOWN TIME</td>
<td>0.1 – 20 sec. linear (+/- 0.1% / °C)</td>
</tr>
<tr>
<td>PWM FREQUENCY</td>
<td>95 – 225 Hz</td>
</tr>
<tr>
<td>OUTPUT LEAP TO I MIN</td>
<td>@ 0.2 V or 0.4 mA control (+/- 15%)</td>
</tr>
<tr>
<td>OPERATING TEMP.</td>
<td>-25 to 85 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>PWM-1401-12</th>
<th>PWM-1401-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT CURRENT @ 25°C Ta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTINUOUS</td>
<td>3.0 Amps max.</td>
<td>1.5 Amps max.</td>
</tr>
<tr>
<td>PEAK PULSED (16ms)</td>
<td>17.0A max.</td>
<td>4.7A max.</td>
</tr>
<tr>
<td>I MIN. (+/- 20%)</td>
<td>0 - 1.0A max.</td>
<td>0 - 0.5A max.</td>
</tr>
<tr>
<td>I MAX. (+/- 20%)</td>
<td>Imin. + 2.0A max.</td>
<td>Imin. + 1.0A max.</td>
</tr>
<tr>
<td>REGULATION DV</td>
<td>+/- 0.2% / V</td>
<td></td>
</tr>
<tr>
<td>REGULATION DT</td>
<td>+/- 0.1% / °C</td>
<td></td>
</tr>
</tbody>
</table>
PWM-1404-12........... for use with 12 V.D.C.

PWM-1404-24........... for use with 24 V.D.C.
PWM PROPORTIONAL DRIVER CONTROL BOX

DESCRIPTION:

THE PWM PROPORTIONAL DRIVER CONTROL BOX IS A COMPACT DEVICE, USED TO MANUALLY CONTROL PROPORTIONAL VALVES. IT USES A MICRO PROPORTIONAL DRIVER AND A POTENTIOMETER TO CONTROL THE VOLTAGE OR CURRENT TO THE SOLENOID COIL.

FEATURES INCLUDE A RED AND YELLOW INDICATOR LIGHT FOR ONBOARD DIAGNOSTICS AND A PLASTIC KNOB TO MANUALLY OPERATE THE VALVE.

THE PROPORTIONAL DRIVER CONTROL BOX ALSO INCLUDES A MOUNTING BRACKET WITH FOUR Ø .190 MOUNTING HOLES, FOR EASY MOUNTING.

TECHNICAL DATA:

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>PWM-1404-12</th>
<th>PWM-1404-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>POTENTIOMETER</td>
<td>10K SINGLE TURN TRIMMING POT.</td>
<td>10K SINGLE TURN TRIMMING POT.</td>
</tr>
<tr>
<td>LIGHT BULB</td>
<td>28 V INCANDESCENT BULB</td>
<td>28 V INCANDESCENT BULB</td>
</tr>
<tr>
<td>TOGGLE SWITCH</td>
<td>SPDT AC RATED GENERAL PURPOSE</td>
<td>SPDT AC RATED GENERAL PURPOSE</td>
</tr>
<tr>
<td>PWM DRIVER</td>
<td>PWM-1400-12</td>
<td>PWM-1400-24</td>
</tr>
<tr>
<td>RECEPTACLE</td>
<td>4 PIN PLASTIC CONNECTOR</td>
<td>4 PIN PLASTIC CONNECTOR</td>
</tr>
</tbody>
</table>

Reference: 520-P-110040-EN-00/09.2015