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# Proportional Directional Control Valves

**Series D*FH and D*FM**

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General Description

Parker Series D*FH is a high response, proportional servovalve with an on-board drive amplifier. The D*FM is a high response, direct actuated servovalve with high resolution around low command inputs. The D*FM is designed for more precise control of position loops, force loops, and machine tool feed rates.

Series D*FH and D*FM incorporate the use of state-of-the-art drive electronics with an LVDT for continuous monitoring of the spool position. Zero lap spools are standard for closed loop applications with two different ‘power down’ configurations. The valves feature frequency response levels greater than 100 Hz for D1FH and D1FM, and 45 Hz for D3FH and D3FM, along with low hysteresis and excellent repeatability.

Operation

Series D*FH

Series D*FH valve uses a precision lapped spool and sleeve configured with four control positions. During normal operation, the valve will shift from the center position to either side providing flow out the ‘A’ or ‘B’ port. When the drive amplifier is disabled by either removing the enable or loss of electrical power, the valve will shift through P→B in less than 10ms to a fourth position. The fourth position will block all four ports in one version. A second version that is available will block the ‘P’ port and allow the ‘A’ and ‘B’ ports to bleed to the ‘T’ (tank line). (Refer to the “Flow With No Enable” in Troubleshooting section)

Series D*FM

The high resolution Series D*FM adds hydraulic and electronic control compensation to the standard D*FH valve. This feature enhances the tuning and accuracy of systems utilizing high resolution feedback transducers and control compensation available in high performance motion controllers. The D*FM valve uses a precision lapped spool and sleeve configured with four control positions. The fourth position (disabled) is available in an all ports blocked configuration or ‘A’ and ‘B’ ports bleed to tank configuration.

Features

- **On-Board Electronic Drive Amplifier** — The unit is shipped as a factory preset and tested unit. (No adjustment is necessary)
- **High Frequency Response** — The valve has a very high frequency response which is necessary for many closed loop applications.
- **Four Position Spool Capability** — The four position spool provides predictable flow in the event of a power failure to the drive electronics, within the limits of the power curve.
- **315 Bar Pressure Capability** — The maximum operating pressure rating for the D*FH and D*FM is 315 Bar or 4500 PSI (Port P, A, B).
- **Spool Position Feedback** — The LVDT continuous feedback monitoring circuit provides low hysteresis and excellent repeatability.
- **Drive Enable Feature** — Output to the coil is shut down when the enable signal (10 to 30 VDC) is not present. The valve will then shift to the fourth position flow path selected by the user. (E50 or E80 spool) (Caution: Read “Flow With No Enable” in Troubleshooting section)
- **High Resolution Around Null** — For precise control of critical position, force, or feed rates (D*FM Version only)
- **Cylinder Ratio Adjust** — To match following error on extend and retract. (D*FM Version only)

Note:
The tank line of either style valve must have a minimum pressure of 1.4 Bar (20 PSI). Maximum tank line pressure is 35 Bar (500 PSI).
### Specifications

**D1FH, D1FM**

<table>
<thead>
<tr>
<th>Interface</th>
<th>315 Bar (4500 PSI)</th>
<th>35 Bar (500 PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rating At 35 Bar △P (500 PSI) per metering edge</td>
<td>1) B spool 5 LPM (1.3 GPM)</td>
<td>1) P spool 50 LPM (13.2 GPM)</td>
</tr>
<tr>
<td></td>
<td>1) D spool 10 LPM (2.6 GPM)</td>
<td>1,2) Y spool 100 LPM (26.4 GPM)</td>
</tr>
<tr>
<td></td>
<td>1) H spool 20 LPM (5.3 GPM)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,2) M spool 40 LPM (10.6 GPM)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) F spool 12 LPM (3.2 GPM)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency Response</th>
<th>&gt; 100 Hz (-3 dB at 5% signal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Response</td>
<td>&lt; 12 ms at 100% signal</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>40 VA max (See voltage supply)</td>
</tr>
</tbody>
</table>

**D3FH, D3FM**

<table>
<thead>
<tr>
<th>Interface</th>
<th>0 to 60° C (32 to 140° F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temp. Range (Ambient)</td>
<td>ISO Class 15/12/10 (For longer life)</td>
</tr>
<tr>
<td>Fluid Cleanliness Level</td>
<td>ISO Class 16/14/11 (For normal operation)</td>
</tr>
<tr>
<td>Voltage Supply</td>
<td>24 VDC (21 VDC Min., 30 VDC Max.)</td>
</tr>
<tr>
<td>Command Signals</td>
<td>± 10 VDC at 100 K ohm input impedance</td>
</tr>
<tr>
<td></td>
<td>± 20 mA at 499 ohm input impedance</td>
</tr>
</tbody>
</table>

| Max. Operating Press. Port P, A, B | 315 Bar (4500 PSI) | 35 Bar (500 PSI) |
| Port T                             | 1.4 Bar (20 PSI)   |

| Typical Spool Overlap            | Zero Lap          |
| Pressure Gain % of Change/1%     | 1) Typical 40%    |
| Change in Command                | 1) Minimum 25%    |
|                                  | 2) Typical 90%    |
| Hysteresis                       | < 0.5%            |
| Repeatability                    | < 0.5%            |
| Viscosity Range                  | 17 to 65 cSt (75 to 300 SSU) |
| Fluids                            | Mineral base hydraulic fluid |

| Protection Class                | IP65, NEMA 4      |
|                                 | (As factory sealed) |

**Note:** 1) D*FH only  2) D*FM only

### Maximum Flow and Pressure Differential

<table>
<thead>
<tr>
<th>Spool Code</th>
<th>Flow Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Max △P Per Land</td>
</tr>
<tr>
<td>E50</td>
<td>Max Flow</td>
</tr>
<tr>
<td></td>
<td>Max △P Per Land</td>
</tr>
<tr>
<td>E80</td>
<td>Max Flow</td>
</tr>
</tbody>
</table>
Valve Type

Series D*FH and D*FM

This valve operates using a 24 VDC supply, accepts a ± voltage or current command, and interfaces to the system through a 7 pin I/O connector located on the conduit box.

This view has cover removed.

![D1FH Diagram]

![D3FH Diagram](Air Bleed (See step 5 bullet 3 on page 4))

![D1FM Diagram]

![D3FM Diagram](Air Bleed (See step 5 bullet 3 on page 4))

Figure 1 – Configurations

Installation

Refer to the back of the manual for fluid recommendations, mounting restrictions and other general installation instructions.

Refer to Catalog HY14-2550/US for the performance curves and valve dimensions for the D*FH and D*FM.

| Power Supply | 24 VDC Nominal 2.0 Amps 4.0 Amps Peak (<10 ms) + to Pin A - to Pin B |
| Enable       | 10 to 30 VDC at Pin C. The purpose of the enable is to center the spool for the single solenoid valve when energized. It provides a time delay for electronics stabilization on power up. When disabled or with loss of power, the valve returns to a defined position. This input is not meant to be part of normal cycle operation. |
| Command Input| ±10 VDC between Pin D and Pin E OR ±20 mA with JP1 inserted. If D is more positive than E, flow is from P→A. Note: If command source is not differential, tie the unused input to the command source common. |
| Spool Position Output (connection optional) | ±10 VDC at Pin F Positive voltage is P→A. Negative voltage is P→B. -11.5V when disabled |
| Chassis Ground | Pin G internally wired to the valve body. |

EHC158GE Cable Wiring

<table>
<thead>
<tr>
<th>PIN</th>
<th>FUNCTION</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+Pwr Sup</td>
<td>Red</td>
</tr>
<tr>
<td>B</td>
<td>Pwr Sup Com</td>
<td>Black</td>
</tr>
<tr>
<td>C</td>
<td>Enable</td>
<td>Red/Black</td>
</tr>
<tr>
<td>D</td>
<td>+Cmd</td>
<td>Blue</td>
</tr>
<tr>
<td>E</td>
<td>-Cmd</td>
<td>Orange</td>
</tr>
<tr>
<td>F</td>
<td>Spool</td>
<td>White</td>
</tr>
<tr>
<td>G</td>
<td>Chassis Gnd</td>
<td>Green</td>
</tr>
</tbody>
</table>

Warning:

For 'X' number see note 4 on page 8 before wiring pin "C".

Figure 2 – Interface Wiring Diagram (7 Pin)
Series D*FH

The following procedure is suggested for start up only. Once the valve is in the system and operating, this will not be required.

1) Thoroughly flush system by using lever operated directional control in place of the proportional valve.

2) Mount valve, keeping contamination to a minimum. We suggest you install a 1.4 Bar (20 PSI) check valve in the T port line. (Solenoid up not recommended)

3) Always start with the system gain at minimum — this is the external closed loop gain of your computer or PLC. If the system gain is too high, the valve will oscillate and could pull in air.

4) Apply DC power and 0V command. Enable the valve, followed by hydraulics. The enable signal has 10 ms (D1FH) or 30-50 ms (D3FH) time delay to allow the electronics to stabilize. During the transition with a 0V or 0mA command signal, the valve will go through the P→B, A→T position while traveling to the functional center position of the valve. Then allow the valve to warm up to oil temperature – approximately 5 minutes.

5) If the valve oscillates:
   - Verify the system closed loop gain is at minimum.
   - If possible in the application, cycle open loop or simply remove the command signal and short pins D & E together.
   - For NG10 (D05) size valves, turn off hydraulic pressure, remove the air bleed plug, fill the chamber with oil and reinstall the plug.
   - Refer to Troubleshooting section.

6) Run valve through a series of repeat cycles, in and out for 5 minutes to tune your controller gain. Adjust the system gain as required for system performance. If the response is better in one direction, for extend and retract, it probably means different gains need to be set in your controller for extend and retract.

Jumpers

<table>
<thead>
<tr>
<th>Jumper Selection</th>
<th>Command Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1 IN</td>
<td>+/- 20 mA Command Input</td>
</tr>
<tr>
<td>JP1 OUT</td>
<td>+/- 10 VDC Command Input</td>
</tr>
<tr>
<td>JP2 OUT</td>
<td>Factory setup only, do not insert</td>
</tr>
</tbody>
</table>

Test Points

<table>
<thead>
<tr>
<th>Test Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Spool Position</td>
</tr>
<tr>
<td>TP3</td>
<td>Common</td>
</tr>
</tbody>
</table>

Figure 3 – Board Setup

Figure 4 – Functional Block Diagram
Proportional Directional Control Valves
Series D*FH and D*FM

Initial Startup

Series D*FM
1) Perform steps 1-6 on page 4.
2) The flow will be linear with command position; however, the spool position will not be linear with command.
3) Cylinder Ratio Adjustment (R3) – flow versus command can be reduced in one direction to compensate for cylinder area ratio (up to 2:1).

Jumpers

<table>
<thead>
<tr>
<th>Jumper Selection</th>
<th>Command Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1 IN</td>
<td>+/- 20 mA Command Input</td>
</tr>
<tr>
<td>JP1 OUT</td>
<td>+/- 10 VDC Command Input</td>
</tr>
<tr>
<td>JP2 OUT</td>
<td>Factory setup only, do not insert</td>
</tr>
</tbody>
</table>

Test Points

<table>
<thead>
<tr>
<th>Test Point</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Spool Position</td>
</tr>
<tr>
<td>TP3</td>
<td>Common</td>
</tr>
</tbody>
</table>

R3 is set for a ratio of 75%. CW reduces flow.

![Board Setup Diagram](image)

Figure 5 – Board Setup

![Functional Block Diagram](image)

Figure 6 – Functional Block Diagram
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instability</td>
<td>Power Supply?</td>
<td>Select a power supply not current limited below 4.0 Amps. Use a separate power supply for each valve. The power supply must be chassis grounded.</td>
</tr>
<tr>
<td></td>
<td>Noise on inputs?</td>
<td>To verify, remove input signals and short +CMD to -CMD. The command inputs (Pins D &amp; E) should never “float” or be left unconnected. There may not be problems with a one wire command referenced to common, but for best noise immunity, connect the differential input signals directly to the command source. This is a high bandwidth valve so 60 Hz noise at the inputs could be amplified.</td>
</tr>
<tr>
<td></td>
<td>System Gain?</td>
<td>Initial startup should be with the external feedback loop gain at a minimum value and lower pressure. Oscillation may be a result of high loop gain. (Note: with motion controllers minimum gain may be less than one).</td>
</tr>
<tr>
<td></td>
<td>Oil Temperature?</td>
<td>The oil temperature should be within the 38°C to 60°C (100°F to 140°F) range. (Viscosity range = 17 to 65 cSt or 75 to 300 SSU).</td>
</tr>
<tr>
<td></td>
<td>Air in valve?</td>
<td>High frequency operation with low tank line pressure could result in air in the valve. The suggested tank line pressure is a minimum of 20PSI. To eliminate air, apply a low pressure and cycle the valve at a low frequency with a command of approximately ±10 VDC (or ±20 mA).</td>
</tr>
<tr>
<td></td>
<td>Air Bleed?</td>
<td>For NG10 (D05) size valves, turn off hydraulic pressure, remove the air bleed plug, fill the chamber with oil, and reinstall the plug.</td>
</tr>
<tr>
<td>Null</td>
<td>System Variations?</td>
<td>The valve was nulled for a double rod cylinder. The external closed loop system gain compensates for load variations and provides the error signal required for null. With closed loop control removed, the actuator will drift. Circuit may require a fault effect mode manifold. For optimum performance the null should NOT be adjusted.</td>
</tr>
<tr>
<td>Low Flow</td>
<td>Floating Input?</td>
<td>Both input terminals must be connected. If only one terminal is used, tie the other terminal to command source common. System pressure? Verify that the system pressure is set as required and there are no other flow paths.</td>
</tr>
<tr>
<td>No Flow</td>
<td>Power?</td>
<td>Verify there is power to the valve wired with the correct polarity. Verify that the ENABLE signal is present. If the ENABLE signal is powered up by an external power source, common MUST be referenced to valve common. Verify that the connections to the valve subplate are correct.</td>
</tr>
<tr>
<td>Full Flow</td>
<td>Phasing?</td>
<td>If connected to an external feedback system, verify open loop operation of valve with a potentiometer. Improper system phasing would result in maximum command input to the valve.</td>
</tr>
<tr>
<td>Cylinder Extended/</td>
<td>Phasing?</td>
<td>System phasing is incorrect. Try reversing the valve cmd and fdbk inputs.</td>
</tr>
<tr>
<td>Retracted and Won’t</td>
<td></td>
<td>Return Flow With No Enable System Dynamics? The spool will return to the fourth position only if the system dynamic flows and pressures are within the power capacity envelope. The fourth position is subject to all Bernouilli flow forces, radial hydraulic lock forces and other forces that affect all directional control valves. The system designer must determine if the dynamic flows and pressures in the system will prevent the spool from returning to the fourth position. This would have to be verified with full load testing. (Refer to Maximum Flow and Pressure Differential table on page 2) As with any blocked center four-way spool valve, the user should not rely on the valve to hold loads in place. The leakage rate through the fourth position blocked center spool (80 spool) will allow an unloaded single rod cylinder to extend.</td>
</tr>
</tbody>
</table>
Proportional Directional Control Valves
Series D*FH and D*FM

FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION

Fluid Recommendations
Premium quality hydraulic oil with a viscosity range between 32-54 cSt (150-250 SSU) at 38°C (100°F) is recommended. The absolute operation viscosity range is from 17-65 cSt (75-300 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

Filtration
For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid. (ISO Code 16/14/11.) Flushing the system prior to valve installation is recommended on new installations. (For Best Performance system should be cleaned to ISO Class 15/12/10 before installing valve)

Sitting
Sitting can cause any sliding spool valve to stick, and not spring return, if held shifted under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Special Installations
Consult your Parker representative for any application requiring the following:
- Pressure above rated.
- Fluid other than those specified.
- Synthetic or fire-resistant fluids.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.
- Non-standard power supply grounding.

System Design Consideration
The spool travels through P→B during enable to center position or disable to fourth position. Pressure spikes at port B must be taken into consideration during the design process.

Torque Specifications
The recommended torque values are for the bolts which mount the valve to the manifold or subplate as follows:

<table>
<thead>
<tr>
<th>NFPA Size</th>
<th>Bolt Thread Size</th>
<th>Metric</th>
<th>English</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>D03</td>
<td>M5 x 30</td>
<td></td>
<td>10-24 x 1.25&quot;</td>
<td>5.6 N.m. (4.6 ft-lbs or 50 in.-lbs)</td>
</tr>
<tr>
<td>D05</td>
<td>M6 x 40</td>
<td></td>
<td>1/4-20 x 1.625&quot;</td>
<td>16.1 N.m. (12 ft-lbs or 144 in.-lbs)</td>
</tr>
<tr>
<td>Air Bleed</td>
<td>–</td>
<td>5/16-24</td>
<td></td>
<td>3.9 N.m. (2.9 ft-lbs or 35 in.-lbs)</td>
</tr>
</tbody>
</table>

Mounting Restriction
In order to ensure proper operation, the D*FH and D*FM must be mounted horizontally. A check valve with a minimum rating of 1.4 Bar (20 PSI) should be placed in the tank line to maintain back pressure to the valve.

Tank Line Surges
If several valves are piped with a common tank line, flow surges in the line may cause an unexpected spool shift. Separate tank lines should be used when line surges are expected.

Subplate Specifications

<table>
<thead>
<tr>
<th>Subplate</th>
<th>Port Size</th>
<th>Location</th>
<th>Maximum Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1FH and D1FM</td>
<td>#6 SAE</td>
<td>Side</td>
<td>345 Bar (5,000 PSI)</td>
</tr>
<tr>
<td>SPD23SAS35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPD26SAS35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3FH and D3FM</td>
<td>#12 SAE</td>
<td>Side</td>
<td>345 Bar (5,000 PSI)</td>
</tr>
<tr>
<td>SPD3H6SAS35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Proportional Directional Control Valves
Series D*FH and D*FM

Directional Control Valve Nominal Flow Control Style Spool Type Flow Design Seal Electronic Variation Supply Voltage Electric Accessories Valve Accessory Design Series Product Variation

Code Description
D NG6/CETOP 3
F NG10/CETOP 5
C NG6/CETOP 3
F NG10/CETOP 5
B NG6/CETOP 3
H NG10/CETOP 5
M NG6/CETOP 3
H NG10/CETOP 5

Spool Type
Flow QA equal to flow QB

Code Symbol
E50 V
E80 V
E53 V
(60/40) V
E83 V
(60/40) V
E84 V
(40/60) V

1) D1FH and D3FH only
2) D1FM only
3) D3FM only

Power Supply: PS24
Use one Power Supply for each valve.

Connector: Part #5004072 (7 pin) CE Compliant

Mounting Bolt Kit:
NG06 – #BK209, 10-24 x 1.25" Std.
NG10 – #BK98, 1/4-20 x 1.625" Std.
#BK375, M5 x 30
#BK385, M6 x 40

Cables
Electrohydraulic Cable for D*FH and D*FM Valve

Code Description
EHC 15 Length

Code Description
15 15 feet long

Flow at Δp 35 Bar (500 PSI) per metering edge

Code Description
D1FH LPM (GPM) D1FM LPM (GPM) D3FH LPM (GPM) D3FM LPM (GPM)

B 5 (1.3) – – –
D 10 (2.6) – – –
F – 12 (3.2) – –
H 20 (5.3) – – –
M 40 (10.6) 40 (10.6) – –
P – – 50 (13.2) –
Y – – 100 (26.5) 100 (26.5)

Maximum supply pressure 315 Bar (4500 PSI), but maximum pressure drop per land is less. See maximum pressure drop table on page 2.

Weight:
NG6 3.7 kg (8.2 lbs.)
NG10 7.7 kg (17.0 lbs.)
EG - KONFORMITÄTSPSRTKLÄRUNG
DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITÉ

Wir (Name des Anbieters)
We (Suppliers Name)
Nous (Nom du Fournisseur)

Anschrift
Address
Adresse

520 Ternes Avenue
Elyria, Ohio 44035
USA

erklären in alleiniger Verantwortung, daß das Produkt:
declare under sole responsibility, that the product:
déclarons sous notre seule responsabilité, que le produit:

Bezeichnung
Name
Nom

Proportionalventil
Proportional valve
Valve proportionelle

Type, Modell
Type, Model
Type, Modèle

D1FH Konstruktionsstand >12
D1FH Design series >12
D1FH Version de developpement >12

mit den Anforderungen der Normen
fulfills the requirements of the standards
satisfait aux exigences des normes

EN 50081-1 1994
EN 55011

EN 50082-2 1996
ENV 50140
ENV 50204
EN 61000-4-2
EN 61000-4-4
EN 61000-4-5
EN 61000-4-6

übereinstimmt und damit den Bestimmungen der EG-Richtlinie 89/336/EG entspricht.
and therefore corresponds to the regulations of the EU-Directive 89/336/EEC.
et, ainsi, correspond aux reglement de la Directive du Conseil 89/336/CCE.

Elyria, July 7, 1997

Ort und Datum der Ausstellung
Place and Date of Issue
Lieu et date d’établissement

Parker Hannifin Corporation

ppa. ____________________________

Name und Unterschrift des Befugten
Name and Signature of authorized Person
Nom et signature de la personne autorisée

Diese Erklärung entspricht EN45014
This Declaration corresponds to EN45014
Cette Déclaration correspond à EN45014

Power Supply

The power supply used with the valve must also comply with the EMC standards (CE mark and certificate of conformity). Parker offers the PS24 (24 VDC, 4.5 Amps).

Do not connect inductive loads such as relays and solenoids to the valve power supply. If it is necessary to use a common power supply, suppression diodes must be added to limit inductive voltage spikes.

Wiring Cable

The wiring cable from a control cabinet to the valve must be a shielded braided cable. Suggested cable is an 20 awg.-19/30 stranded shielded cable - 1000 Volt Mil-W-16878D Type C conductor. The capacitance between wires should not exceed 130 pF/m and the maximum cable length is 50 meters. The cable should not be located in parallel with main power cables. The cable shield is to be connected to earth ground at both the control cabinet and to the 7 pin connector of the valve. However, be aware of ground loops depending on how the rest of the system is connected to earth ground.

Connectors

The connector on the the valve is a 7 pin metal connector with the center pin for earth ground. The connector gasket is metallic to allow for magnetic shielding. The mating connector must also be metal to meet the EMC requirements. Parker supplies the mating connector separately. PN 5004072.

Parker also supplies a cable assembly with the EMC required components. Parker part number EHC**8GE. Note: The E stands for the EMC cable. The previously used EHC**8G cable assembly is a plastic connector and does not meet the EMC requirements.

Grounding

The mounting plate of the valve should be connected to the grounded metal machine frame. The earth ground wire of the 7 pin cable as well as the cable shield should be tied to Earth ground at the control cabinet. A low-ohmic potential compensation wire should be connected between the control cabinet and the machine frame (cable wire should be 7 awg. or lower) to prevent ground loops.
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7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller’s property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer’s Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer’s property, may be considered obsolete and may be destroyed by Seller at any time. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller’s acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer’s assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer’s offer. Acceptance of Seller’s products shall in all events constitute such assent.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any such sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller’s obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter ‘Events of Force Majeure’). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller’s control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any document, terms or condition hereof as expressed in this document, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

Parker Hannifin Corporation
Hydraulic Valve Division
Elyria, Ohio, USA

9/91-P

Bulletin HY14-2599-M1/US
Offer of Sale

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