Proportional Load Sensing Valve

VDP08 SERIES
Pressure Pre-Compensated Load Sensing Proportional Directional Control Valve

Proportional Load Sensing Valve

Closed and Open Loop Electro Proportional, Hydraulic Pilot, Pneumatic and Manual Control, fixed and variable displacement pump, for mobile and industrial applications

Cross Hydraulics
VD08 SERIES
PRESSURE PRE – COMPENSATED LOAD SENSING PROPORTIONAL DIRECTIONAL CONTROL VALVE

MAIN CHARACTERISTICS
• MAX. PUMP FLOW PORT P: 130 l/min
• MAX. SERVICE PORTS A&B FLOW: 95 l/min WITH FIXED DISPLACEMENT PUMP
• MAX. SERVICE PORTS A&B FLOW: 95-105 l/min WITH VARIABLE DISPLACEMENT PUMP DEPENDING ON ΔP STAND-BY PRESSURE
• MAX. PRESSURE PORT P: 315 bar
• MAX. PRESSURE PORT A&B: 350 bar
• P PORT: ¾” BSPP
• T PORT: 1” BSPP
• A&B PORTS: ½” BSPP
• LSA & LSB PORTS: 1/8” BSPP
• PG (PRESSURE GAGE PORT) & LS PORT: ¼” BSPP
• INLET MODULE FOR FIXED AND VARIABLE DISPLACEMENT PUMP
• INLET MODULE and END PLATE AVAILABLE FOR PARALLEL CONNECTION (ONE PUMP AND TWO VALVE BANKS)
• INDIVIDUAL A&B LS ADJUSTABLE PRESSURE RELIEF VALVES
• A&B FIXED PRESSURE SETTING PORT RELIEF + ANTI CAVITATION FUNCTION
• SINGLE ACTING PORT A&B SHUTTLE VALVE CARTRIDGES
• LS PUMP UNLOADING SOLENOID VALVE
• PILOT LINE UNLOADING SOLENOID VALVE
• PILOT LINE PROTECTED BY BUILT IN FILTER ELEMENT
• EXTERNAL PILOT LINE PORT
• PILOT LINE MANUAL BY-PASS VALVE
SPOOL FLOW RATE:
8.16.25.45,63,95 l/min

SPOOL CONTROLS

MANUAL CONTROL
NL – STANDARD WITH SPOOL STROKE ADJUSTMENT
SPS – W/O LEVER MECHANISM AND WITH SPOOL STROKE ADJUSTMENT
FL – WITH FRICTION DETENT AND SPOOL STROKE ADJUSTMENT

PNEUMATIC PROPORTIONAL CONTROL PP

HYDRAULIC PILOT PROPORTIONAL CONTROL IP
**LSA & LSB PORTS**
External Pressure Adjustment for each actuator port A&B located underneath the body element 1/8” BSPP
The LS pressure as per actuator port can be adjusted internally via the LS pressure relief valves or externally via the LS ports.

**FLOW LIMITATION**
The maximum flow can be set mechanically and individually via spool stroke limitation
ELECTROHYDRAULICS

- KE1/2 Open loop proportional
- KM Closed loop proportional with Hall effect spool position transducer and on-board electronics
OPEN LOOP PROPORTIONAL or ON-OFF CONTROL KE1&KE2 (12 & 24 VDC)

![Diagram of the valve with coils C1 and C2 labeled.]

**C1 & C2 COILS DE-ENERGIZED → SPOOL IN NEUTRAL POSITION**

**C1 COIL ENERGIZED → POS. 2**
SPOOL IN FLOW TO PORT B

**C2 COIL ENERGIZED → POS.1**
SPOOL OUT FLOW TO PORT A

**Electrical Data**

<table>
<thead>
<tr>
<th></th>
<th>12V</th>
<th>24V</th>
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<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td>1500 mA</td>
<td>750 mA</td>
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<tr>
<td><strong>Resistance</strong></td>
<td>4.72 Ω ± 5%</td>
<td>20.8 Ω ± 5%</td>
</tr>
<tr>
<td><strong>Type of Control</strong></td>
<td>Current Control PWM 100 Hz Recommended</td>
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**Features**

<table>
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<tr>
<th>Feature</th>
<th>Benefit</th>
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<tr>
<td>Pressure reducing proportional valve with integrated relief function</td>
<td>Protection against pressure spikes</td>
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<tr>
<td>Low leakage</td>
<td>Lower energy loss</td>
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<tr>
<td>Excellent repeatability</td>
<td>No calibration required over the valve lifetime</td>
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December 18, 2014

**Current vs. Pressure**
Less than 2% Hysteresis

**p-I curve; 12V**

**p-I curve; 24V**

**Step Response**

(50°C Oil Temperature) \( t_1, t_2 < 50 \text{ ms} \)

- \( p_{A} (t_2) \)
- \( p_{A} (t_1) \) *90%*
- \( p_{A} (t_2) \) *10%*
- \( p_{A} (t = 0) \)

electrical signal
CLOSED LOOP ELECTRONIC PROPORTIONAL CONTROL KM

The KM closed loop position control makes the VDP08 spool achieve the desired position with accuracy levels approaching the performance of a servo valve by continuously comparing the set-point of a remote control device with the feed-back signal generated by a high-precision Hall effect position transducer.

Features

- Two independent proportional valves - flow rate: 0.2÷0.5 lt/min max. flow requirement under normal conditions
- Hall effect/contactless spool position sensor – excellent linear control on 10% of spool travel, no “cross talking” between adjacent work sections
- Built-in Electronics
  Analog Operating Mode: +5 Volts supply to external potentiometers or Joystick controllers
  CANBUS Operating Mode: the remote control set point is processed via CANbus according to ISO 11898 at 250 Kbit/s by means of address-based (SAE J1939) or message-based (CAN 2.05) protocols
SPOOL STROKE A

When the input voltage fed to the KM is maintained within 2.25 and 2.75 V, the VDP08 spool is at rest (neutral dead band).

When Vin = 2.75 V, the spool steps up from NEUTRAL to MINIMUM FLOW control position. A linear ramp from MIN. to MAX. spool stroke will follow by increasing Vin from 2.75 to 4.5 V.

By decreasing the input voltage from 4.5 to 2.75 V, the spool stroke is linearly reduced and after the oil flow is fully shut-off, a step down from MINIMUM FLOW to NEUTRAL position takes place.

ALARM/FAIL-SAFE MODE

An input voltage variation beyond the calibration range (≤0.25 V or ≥4.75 V) will bring the system into an ALARM mode, urging the spool to return to its NEUTRAL position until Vin is brought back to its nominal control range.
SPOOL STROKE B – Same as for STROKE A, by varying Vin from 2.25 to 0.5 V, the spool will go from NEUTRAL to MAX. STROKE in the opposite direction.

<table>
<thead>
<tr>
<th>Spool neutral position: 2.5 V</th>
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<tbody>
<tr>
<td>MAX. spool stroke A at 4.5 V</td>
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<tr>
<td>MAX. spool stroke B at 0.5 V</td>
</tr>
<tr>
<td>Neutral spool position dead band from 2.25 to 2.75 V</td>
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<td>Signal cut-off is triggered at ≤ 0.25 V and ≥ 4.75 V</td>
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**Hydraulic Specifications**
- Max. spool stroke: 8.5 mm
- Max. supply pressure: 35 bar
- Min. supply pressure: 12 bar
- Max. return line pressure: 5 bar
- Pilot flow requirement: 0.2 l/min
- Oil temperature range: -20 / +95°C
- Oil viscosity range: 3-650 cSt
- Filtration: 18/15 (ISO 4406)

**Electrical Specifications**
- Operating voltage: 8-30 VDC
- Max. current consumption: 750 mA/KM module
- Operating temperature: -20 / +95°C
- Analog Input impedance: ≥ 40 Kohm
- Control pot. Configuration: 3-pins
- Typical control pot. Resistance: 1-10 Kohm
- Analog input signal: 0-5V
- CAN bus interface: ISO 11898
- Environmental protection: IP 68
- EMC characteristics: ISO 7637

**Response time:**
- Neutral to max. ≤180 ms
- Max. to Neutral: ≤ 250 ms

**Resolution:** ± 0.06 mm

**Ramp time:** 0 to 5 sec.
ON BOARD ELECTRONICS

The microprocessor – based digital control of inherent functions such as response time, flow rate pre-setting and spool position recovery after cut-off, makes it possible to adjust relevant parameters like PWM dither frequency, feedback signals during motion and operational conditions through a continuous teach – in process that will then maintain said parameters at their optimum level.
See VDP08 technical catalogue for more details, dimensional data, hydraulic circuits, options, assembling & adjustment procedures, calibration, ordering code.

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