TRANSMISSION AND PILOT CONTROL VALVES
Slip-in configuration

STD CAVITY RANGE
Proportional Pressure Reducing-Relieving Valves
Direct Acting

MID RANGE
Proportional Pressure Reducing-Relieving Valves
Direct Acting High Performance Design

HIGH RANGE
Proportional Pressure Reducing & ON-OFF Valves
Pilot Operated

Manufacturers of Hydraulics and Electronic Management Systems
DESCRIPTION
Proportional Pressure Reducing Valves are used to generate a variable pressure in response to a PWM (Pulse Width Modulated) current signal.

PRINCIPLE OF OPERATION
QUICK FILL-UP: a high current peak fed to the proportional solenoid of the PPRV, generates a quick shifting of the valve spool to fill up the gap between clutch discs in the shortest possible time. Clutch discs enter in touch with each other to begin to transfer torque and speed (= power) from the INPUT to the OUTPUT shaft.

SOFT ENGAGEMENT: the PWM current signal is quickly reduced to a minimum value in order to let pressure start from the “kiss point” (2 bar) and then ramp up smoothly to a “high end” (16-18 bar) during which the torque is gradually transmitted to the driven shaft.

Typical clutch cycle
• Preliminary “quick fill-up” phase at top current until pressure begins to raise within the clutch piston chamber.
• Modulated current ramp to generate a “soft engagement” of clutch discs.

TYPICAL LAY-OUT OF POWERTRAIN CONTROL HYDRAULICS FOR AGRICULTURAL TRACTORS
**PROPORTIONAL PRESSURE REDUCING VALVES MODELS**

Proportional Pressure Reducing Valves are designed to generate a variable pressure in response to a PWM (Pulse Width Modulated) Current Input signal.

### Hydraulic Symbol

![Hydraulic Symbol](image)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>STD CAVITY Slip-in Direct acting</th>
<th>STD CAVITY Slip-in Direct acting</th>
<th>MID-RANGE Slip-in Direct Acting High Performance</th>
<th>HIGH-RANGE Slip-in Pilot Operated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Control Range</td>
<td>0-20 bar (std) / 0-25 bar (std) 0-32 bar (std)</td>
<td>0-20 bar (std) / 0-25 bar (std) 0-32 bar (std)</td>
<td>0-30 bar (std) / 0-45 bar (opt) 0-60 bar (opt)</td>
<td>0-30 bar</td>
</tr>
<tr>
<td>Nominal Flow Rate (Press Drop &lt;4 bar)</td>
<td>4 lpm</td>
<td>4 lpm</td>
<td>30 lpm</td>
<td>35 lpm</td>
</tr>
<tr>
<td>Leakage at rest</td>
<td>15 cc/min</td>
<td>15 cc/min</td>
<td>15 cc/min</td>
<td>450 cc/min</td>
</tr>
<tr>
<td>PWM Current Control Range @ 12 VDC</td>
<td>300-1400 mA</td>
<td>300-1400 mA</td>
<td>300-1200 mA</td>
<td>100-750 mA</td>
</tr>
<tr>
<td>Ohmic Resistance @ 12 VDC</td>
<td>4.8 Ohm</td>
<td>5.4 Ohm</td>
<td>5.4 Ohm</td>
<td>9.9 Ohm</td>
</tr>
<tr>
<td>Coil Termination</td>
<td>Amp Junior Timer Deutsch DT04</td>
<td>Amp Junior Timer Deutsch DT04</td>
<td>Metripack MP 150 Deutsch DT04</td>
<td>Metripack MP 150</td>
</tr>
</tbody>
</table>

**APPLICATIONS**
- Microprocessor-controlled Powershift transmissions for off-highway equipment and agricultural tractors
- CVT transmissions (Continuously Variable Transmission)
- DCT transmissions (Dual Clutch Transmission)
- Anti-Block and Anti-Slip traction systems
- Hi-Lo transmission stages
- Marine inverters

**REFERENCES**
- CNH AG Worldwide
- CNH CE Worldwide
- JOHN DEERE TRACTORS USA
- CARRARO TRANSMISSIONS Worldwide
- ZF Germany, Italy
- LUK Germany
- OERLIKON GRAZIANO Italy
- CONTINENTAL HYDRAULICS USA
- HY-PRO HYDRAULICS USA
- FUJI UNIVANCE Japan
- XUANGONG China
- TURK TRACTOR Turkey
- TÜMOSAN Turkey
- SAI HYDRAULIC MOTORS Italy
- HEMA INDUSTRIES Turkey
- LOVOL ARBOS GROUP China
- HIDROMEK Turkey

**NEW HOLLAND T8 SERIES**

![New Holland T8 Series](image)

**CASE IH MAXXUM**

![Case IH Maxxum](image)

**STEIGER & QUADTRACK SERIES**

![Steiger & Quadtrack Series](image)

**JD DF5000 TRANSMISSION**

![JD DF5000 Transmission](image)
**IP-DAR-250**

**Hydraulic Specifications**
- Configuration: Direct acting / Slip-in type
- Max. Input Pressure: 50 bar (Std)
- Max. Output Flow: 4 l/min @ 6 bar Delta-P
- Control Pressure Range: See Graph
- Typical Internal Leakage at Rest: 15 cc/min
- Max. Back Pressure at T Port: 50 bar
- Media Operating Temp. Range: -30°C / +115°C
- Oil Viscosity Range: 3 cSt / 400 cSt
- Max. Contamination Level: 18/15 (ISO 4406)
- Cavity Tool: TCN T250

**Electrical Specifications**
- Coil Resistance: 4.8 Ohm (12 VDC)
- Current Supply Characteristics: 20 Ohm (24 VDC)
- Superimposed Dither Frequency: 100 / 150 Hz
- Coil Terminations: Amp Junior Timer
- Duty Cycle: 100% EDI
- Environmental Protection Rating: up to IP69K

**Pressure (bar) vs. Current (mA) Characteristic**
12 VDC coil / 4.8 Ohm / 46cSt @ 45°C / PWM100Hz

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**IP-DAR-043**

**Hydraulic Specifications**
- Configuration: Direct acting / Slip-in type
- Max. Input Pressure: 50 bar (Std) / 350 bar (Opt)
- Max. Output Flow: 4 l/min @ 6 bar Delta-P
- Control Pressure Range: See Graph
- Typical Internal Leakage at Rest: 15 cc/min
- Max. Back Pressure at T Port: 50 bar
- Media Operating Temp. Range: -30°C / +115°C
- Oil Viscosity Range: 3 cSt / 400 cSt
- Max. Contamination Level: 18/15 (ISO 4406)
- Cavity Tool: TCN T043

**Electrical Specifications**
- Coil Resistance: 5.4 Ohm (12 VDC)
- Current Supply Characteristics: 22 Ohm (24 VDC)
- Superimposed Dither Frequency: 100 / 150 Hz
- Coil Terminations: Amp Junior Timer
- Duty Cycle: 100% EDI
- Environmental Protection Rating: up to IP69K

**Pressure (bar) vs. Current (mA) Characteristic**
12 VDC coil / 5.4 Ohm / 46cSt @ 45°C / PWM100Hz

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**Deutsch DT04 Connector**

**AMP Junior Timer Connector**

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**Hydraulic Schematic**

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**IP-RDS-216/222**

**Hydraulic Specifications**
- **Configuration** .......................................................... Direct acting High Performance
- **Max. Input Pressure** .................................................. 60 bar
- **Max. Output Flow** .................................................... 30 l/min @ 4 bar Delta-P
- **Control Pressure Range** ............................................ See Graph
- **Typical Internal Leakage at Rest** .............................. 15 cc/min
- **Max. Back Pressure at T Port** ................................. 25 bar (Std)
- **Media Operating Temp. Range** ................................. -30°C / +115°C
- **Oil Viscosity Range** .............................................. 3 cSt / 647 cSt
- **Max. Contamination Level** ....................................... 18/15 (ISO 4406)
- **Cavity Tool** .............................................................. TCN T216 / T222

**Electrical Specifications**
- **Coil Resistance** ...................................................... 5.4 Ohm (12 VDC)
- **Current Supply Characteristics** ............................. 12.8 Ohm (24 VDC)
- **Superimposed Dither Frequency** .............................. 100 / 150 Hz
- **Coil Terminations** ................................................... Deutsch DT04
- **Environmental Protection Rating** ........................... IP69K
- **Duty Cycle** ............................................................ 100% EDI

**Deutsch DT04 Connector**
- **Cavity T222**

**Metrpack MP 150 Connector**
- **Cavity T216**

**Hydraulic Schematic**

**Pressure (bar) vs. Current (mA) Characteristic**
12 VDC coil / 5.4 Ohm / 46cSt @ 45°C / PWM100Hz

**Pressure Drop**
46cSt @ 45°C
HIGH RANGE - PILOT OPERATED PROPORTIONAL PRESSURE REDUCING VALVES

**IP-PRZ-59**

**Hydraulic Specifications**
- **Configuration**: Pilot Operated
- **Max. Input Pressure**: 50 bar
- **Max. Output Flow**: 40 l/min @ 4 bar Delta-P
- **Control Pressure Range**: See Graph
- **Typical Internal Leakage at Rest**: 450 cc/min
- **Max. Back Pressure at T Port**: 25 bar (Std) / 350 bar (Opt)
- **Media Operating Temp. Range**: -30°C / +115°C
- **Oil Viscosity Range**: 3 cSt / 647 cSt
- **Max Contamination Level**: 18/15 (ISO 4406)
- **Cavity Tool**: TCN T059

**Electrical Specifications**
- **Coil Resistance**: 9.9 Ohm (12 VDC)
- **Current Supply Characteristics**: PWM (See Graph)
- **Superimposed Dither Frequency**: 120 Hz ±15%
- **Coil Terminations**: Packard MP150 (Amp Superseal Compatible)
- **Environmental Protection Rating**: IP69K
- **Duty Cycle**: 100% EDI

**Hydraulic Schematic**

**Pressure (bar) vs. Current (mA) Characteristic**

12 VDC coil / 9.9 Ohm / 46cSt @ 45°C / PWM100hz

**HIGH RANGE ON-OFF Directional Control Valves**

- **IE-S2H-056**
  - 2way-2pos

- **IF-S3A-057**
  - 3way-2pos

- **IG-S4A-058**
  - 4way-2pos / Criss-Cross
Electrical Specifications

- **Coil Resistance**: 9.9 Ohm (12 VDC)
- **Current Supply Characteristics**: PWM (See Graph)
- **Superimposed Dither Frequency**: 120 Hz ±15%
- **Coil Terminations**: Packard MP150 (Amp Superseal Compatible)
- **Environmental Protection Rating**: IP69K
- **Duty Cycle**: 100% EDI
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COMPREHENSIVE PRODUCT LINE

SOLENOID OPERATED ON-OFF CARTRIDGE VALVES
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PROPORTIONAL CARTRIDGE VALVES
TRANSMISSIONS & BRAKE VALVES
HYDRAULIC INTEGRATED CIRCUITS (HIC)

PWM DRIVERS
MACHINE MANAGEMENT SYSTEMS (MMS)
CUSTOMIZED SOFTWARE
JOYSTICK CONTROLLERS AND GRIPS
CABLE REMOTE CONTROL BOX
RC-DBM RADIO REMOTE CONTROL
RC-TRL RADIO REMOTE CONTROL CANBUS

MULTIDROM PROPORTIONAL ACTUATORS
TDV 100 DIRECTIONAL VALVES

PRE-ENGINEERED SYSTEMS
ECOMATIC SYSTEM
ARM-REST CONTROL UNIT
AUTOMATIC LEVELLING SYSTEM