### Applications
Accurate control of hydraulic and pneumatic proportional solenoid valves used in industrial and mobile equipment control system. The combination of proportional valve and this Programmable Proportional Valve Driver offers low cost solutions to many hydraulic and pneumatic applications with Power Level Output display for ease of troubleshooting and maintenance.

### Key Features & Benefits
- **Hydraulic**
- **Pneumatic**
- **Electronic**
- Systems

Accurate control of hydraulic and pneumatic proportional solenoid valves used in industrial and mobile equipment control system. The combination of proportional valve and this Programmable Dither Frequency 70 - 350 hz

Proportional Valve Driver offers low cost solutions to many hydraulic and pneumatic applications with Power Level Output

Programmable Deadband Compensation

Built-in Local Control for troubleshooting

Programmable via PDA

### Additional Benefits
One Size Fit All design approach where the input and output(s) are programmable to fit your application. No heat sink required, short circuit protected, and power level indicated (no guessing required). Transient Power and Reverse Polarity Protection.

### Control Mode
- **Local or Remote:**
  - Local for troubleshooting directly from the embedded potentiometer.
  - Remote for controlling the output from remote analog source.

### Hardware Features
- **Input Power:** Accept 10 - 30 Vdc
- **Output Power:** Level display 0 - 99%
- **Built in Command Power:** +/- 10 Vdc
- **Status LED Display:**
  - Enabled - Control Enabled
  - Cmd. V - Program to Voltage
  - Cmd. mA - Program to mA
  - Output - Auto Select Single Channel
- **Local/Remote Switch:**
  - Local - Local Pot to control output
  - Remote - Command Signal to control output
  - Pot - Potentiometer to control output locally
- **Analog Input:**
  - Programmable 0.5 - 2.5A
- **Digital Input Terminal 15 & 16:**
  - Softshift #1 (Term.15)
  - Softshift #2 (Term.16)
- **Digital Input Terminal 15 & 16:**
  - Softshift Output A (Term 15)
  - Softshift Output B (Term 16)
- **Analog Output:**
  - Programmable +/- 5vdc, +/- 10 vdc, 0-5 vdc, 1-5 vdc, 0-10 vdc, 0-20 mA, 4-20 mA
  - Joystick using built in CMD source
- **Built in Command Power:**
  - +/- 10 Vdc
  - +/- 5vdc, +/- 10 vdc

### Software Features
- **Program & Status LED Display:**
  - Enabled - Program Control Enabled
  - Cmd. V - Program to Voltage
  - Cmd. mA - Program to mA
  - Output - Auto Select Single Channel
- **Physical Dimension:**
  - 2"(W) x 4 1/4"(L) x 4 3/4"(H)

### Products
**PPVD1-O**
The PPVD1-O is a DIN rail mounted Single Output Programmable Proportional Valve Driver for open loop control systems. The ramp time could be disabled for maximum response time for closed loop applications.

**PPVD2-O**
The PPVD2-O is a DIN rail mounted Dual Output Programmable Proportional Valve Driver for open loop control systems, designed to drive any brand of hydraulic and pneumatic proportional valve up to 2.5A. A single input command will drive the output A and output B automatically and the ramp time could be disabled for maximum response time for closed loop applications.

**PPVD1-C & PPVD2-C**
The PPVD1-C & PPVD2-C is a DIN rail mounted Single and Dual Output Programmable Proportional Valve Driver for closed loop control systems. It utilizes a PID control algorithm with programmable digital gain settings. (Currently in development - to be released in January 2005)

### Accessory
**Power conversion, software and cable for Palm PDA and Windows operating systems.**
Proportional Pressure Control Valve

Many different proportional pressure relief valve is designed to works in different way. To achieve the same objective, this Single Driver PPVD1 is designed to give the engineer the flexibility to control the pressure setting at low cost. Engineer can set or reset the control features within the PPVD1 without actually changing the electronic amplifier. Pressure control can be set by an Analog Command signal or by Softshift Digital Input A1 or A2.

Proportional Flow Control Valve

This Single Driver PPVD1 can provide a proportional flow control to control the acceleration, speed, and the deceleration of wide range of applications.

Use Program to do the followings:
Select Digital Control. Set IN-A1 Output Current. Set IN-A2 Output Current. IN-A1 and IN-A2 will share the same parameter setup: Deadband; Ramp Time; Dither Freq. and Amplitude

Wiring

Typical Connection

Open Loop Control System, Output is ramped by Digital Softshift Command

Command Signal Digital Source IN-A1 or IN-A2

Proportional Valve

PPVD1

The proportional output ramps up and down according to the program acceleration and deceleration ramp time

Open Loop Control System, Output is proportional to the Input Command

Command Signal Analog Source or Joystick

Proportional Valve

PPVD1

Open Loop Control System, Output is ramped by Digital Softshift Command

Closed Loop Control System, closing the loop at PLC (Most Practical)

Analog Vdc Command

Built-in Signal Analog Source or Analog Input

Proportional Valve

PPVD1

Transducer

Closed Loop Control System, closing the loop at PPVD with Option Card

Command Signal Built-in Signal or Analog Source

Proportional Valve

Option Card

PPVD1

Transducer

Closed Loop Control System with Primary and Secondary Feedback

Applications

Using the programming tool, the engineer or technician has the option to program the following parameters:

Input (Select One)
+/- 5 vdc
+/- 10 vdc
+/- 20 mA
Joystick (5k Ohms)

Output (Enter Value)
Maximum Output Level 0.5A to 2.5A

Features
Accel Ramp Time 10 msec to 10 sec.
Decel Ramp Time 10 msec to 10 sec.
Deadband Comp: 0-10%
Dither Freq: 70-350 hz

Closed Loop Control System with Primary and Secondary Feedback

Setup for Open and Closed Loop Control System

Open Loop Control System, Output is proportional to the Input Command

Command Signal Analog Source or Joystick

Proportional Valve

PPVD1

Controlled Mechanism

Closed Loop Control System, closing the loop at PLC (Most Practical)

Plc Analog Output

Analog Input

PPVD1

Proportional Valve

Transducer

Feedback

Closed Loop Control System, closing the loop at PPVD with Option Card

Command Signal Analog Source or Joystick

Proportional Valve

PPVD1

Transducer

Feedback

Closed Loop Control System with Primary and Secondary Feedback

Plc Analog Output

Analog Input

PPVD1

Proportional Valve

Primary Feedback

Secondary Feedback

Controlled Mechanism

Rotating Equipment

Primary Feedback

Secondary Feedback

Controlled Mechanism

Rotating Equipment

By now, you may have used or heard about electro-hydraulic proportional solenoid driver. When ordering this driver, the engineers need to determine in advance what type of input signal, output signal, and processing features they might want to have in their design. With the technology available today, we offer a programmable integrated electro-hydraulic single or dual solenoid driver which gives the engineers the flexibility to set and reset what is required in their application. On top of that, we include the output display feature to eliminate any guess work on what the actual output power level is. This feature alone will save your technician and maintenance personnel troubleshooting time.

Proportional Directional Control Valve

Proportional direction control valves control both the direction and the amount of flow in response to an electrical signal. This Dual Driver PPVD is designed to respond to the electronic input command signal, controlling the electrical output to drive the proportional valve. Engineer and technician have a wide range of flexibility to set and reset the control features within the PPVD without actually changing the electronic amplifier.
Proportional Pressure Control Valve

Many different proportional pressure relief valve is designed to works in different way. To achieve the same objective, this Single Driver PPVD1 is designed to give the engineer the flexibility to control the pressure setting at low cost. Engineer can set or reset the control features within the PPVD1 without actually changing the electronic amplifier. Pressure control can be set by an Analog Command signal or by Softshift Digital Input A1 or A2.

Proportional Flow Control Valve

This Single Driver PPVD1 can provide a proportional flow control to control the acceleration, speed, and the deceleration of wide range of applications.

Use Program to do the followings:
Select Digital Control. Set IN-A1 Output Current. Set IN-A2 Output Current. IN-A1 and IN-A2 will share the same parameter

Wiring

Typical Connection

<table>
<thead>
<tr>
<th>OUTPUTS</th>
<th>Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>CMD+</td>
</tr>
<tr>
<td>Out +</td>
<td>CMD-</td>
</tr>
<tr>
<td>Out -</td>
<td>GND</td>
</tr>
</tbody>
</table>

Joystick Connection

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD-</td>
<td>CMD+</td>
</tr>
<tr>
<td>IN-A1</td>
<td>IN-A2</td>
</tr>
</tbody>
</table>

Softshift Connection

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD-</td>
<td>CMD+</td>
</tr>
<tr>
<td>GND</td>
<td>Enabled</td>
</tr>
<tr>
<td>GND</td>
<td>Enabled</td>
</tr>
<tr>
<td>GND</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

Analog Vdc Command

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5 Vdc</td>
<td>CMD+</td>
</tr>
<tr>
<td>0 - 10 Vdc</td>
<td>CMD-</td>
</tr>
<tr>
<td>GND</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

Analog mA Command

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 20 mA</td>
<td>CMD+</td>
</tr>
<tr>
<td>4 - 20 mA</td>
<td>CMD-</td>
</tr>
<tr>
<td>GND</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

Open Loop Control System, Output is ramped by Digital Softshift Command

Command Signal
Digital Source
IN-A1 or IN-A2
PPVD1
Proportional Valve
Controlled Mechanism

The proportional output ramps up and down according to the program acceleration and deceleration ramp time.

Open Loop Control System, Output is proportional to the Input Command

Command Signal
Joystick
PPVD1
Proportional Valve
Controlled Mechanism

Closed Loop Control System, closing the loop at PLC (Most Practical)

Analog Input
PPVD1
Proportional Valve
Controlled Mechanism

Closed Loop Control System with Primary and Secondary Feedback

Plc Analog Output
PPVD1
Proportional Valve
Flow Transducer
RPM Transducer
Controlled Mechanism
Primary Feedback
Secondary Feedback

Application

Using the programming tool, the engineer or technician has the option to program the following parameters:

Input (Select One)
+/- 5 vdc
+/- 10 vdc
+/- 20 mA
Joystick (5 Ohms)

Output (Enter Value)
Maximum Output Level 0.5A to 2.5A

Features
Accel Ramp Time 10 msec to 10 sec.
Decel Ramp Time 10 msec to 10 sec.
Deadband Comp: 0-10%**
Dither Amp: 0-10%**
Dither Freq: 70-350 hz
Control Enabled ON/Bypass

* To disable Ramp Time, set Ramp Time to 0. Minimum Ramp Time is 10 msec.

** Deadband Compensation and Dither Amplitude % setup is equal to percent from rated output Amperes

Setup for Open and Closed Loop Control System

Open Loop Control System, Output is proportional to the Input Command

Command Signal
Analogue Source
Joystick
PPVD1
Proportional Valve
Controlled Mechanism

Closed Loop Control System, closing the loop at PPCVD with Option Card

Analog Vdc Command
PPVD1
Proportional Valve
Controlled Mechanism

Closed Loop Control System with Primary and Secondary Feedback

Plc Analog Output
PPVD1
Proportional Valve
Flow Transducer
RPM Transducer
Controlled Mechanism
Primary Feedback
Secondary Feedback

Proportional Directional Control Valve

Proportional direction control valves control both the direction and the amount of flow in response to an electrical signal. This Dual Driver PPVD is designed to respond to the electronic input command signal, controlling the electrical output to drive the proportional valve. Engineer and technician have a wide range of flexibility to set and reset the control features within the PPVD without actually changing the electronic amplifier.

By now, you may have used or heard about electro-hydraulic proportional solenoid driver. When ordering this driver, the engineers need to determine in advance what type of input signal, output signal, and processing features they might want to have in their design. With the technology available today, we offer a programmable integrated electro-hydraulic single or dual solenoid driver which gives the engineers the flexibility to set and reset what is required in their application. On top of that, we include the output display feature to eliminate any guess work on what the actual output power level is. This feature alone will save your technician and maintenance personnel troubleshooting time.
Hydraulic
Pneumatic
Electronic
Systems

Products:
Single and Dual Output
Programmable Proportional Solenoid
Driver PPVD1-O & PPVD2-O

Wiring Diagram

<table>
<thead>
<tr>
<th>Term</th>
<th>Name</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PWR+</td>
<td>Power Input: 10 - 30 Vdc</td>
</tr>
<tr>
<td>2</td>
<td>COM</td>
<td>Power Input 0 Vdc (COM)</td>
</tr>
<tr>
<td>3</td>
<td>+10 Vdc</td>
<td>+10 Vdc for Command Signal</td>
</tr>
<tr>
<td>4</td>
<td>0 Vdc</td>
<td>0 Vdc Reference</td>
</tr>
<tr>
<td>5</td>
<td>-10 Vdc</td>
<td>-10 Vdc for Command Signal</td>
</tr>
<tr>
<td>6</td>
<td>CMD V</td>
<td>Command Vdc+ Signal</td>
</tr>
<tr>
<td>7</td>
<td>CMD Vref</td>
<td>Command Vdc- Signal</td>
</tr>
<tr>
<td>8</td>
<td>CMD A</td>
<td>Command mA+ Signal</td>
</tr>
<tr>
<td>9</td>
<td>CMD Aref</td>
<td>Command mA- Signal</td>
</tr>
<tr>
<td>10</td>
<td>OUT A+</td>
<td>Output Signal A+</td>
</tr>
<tr>
<td>11</td>
<td>OUT A-</td>
<td>Output Signal A-</td>
</tr>
<tr>
<td>12</td>
<td>OUT B+</td>
<td>Output Signal B+ (Dual Channel)</td>
</tr>
<tr>
<td>13</td>
<td>OUT B-</td>
<td>Output Signal B- (Dual Channel)</td>
</tr>
<tr>
<td>14</td>
<td>Enabled</td>
<td>Digital Input (Enable Output)</td>
</tr>
<tr>
<td>15</td>
<td>IN-A/A1</td>
<td>Programmable Input A/A1</td>
</tr>
<tr>
<td>16</td>
<td>IN-B/A2</td>
<td>Programmable Input B/A2</td>
</tr>
</tbody>
</table>

Power Plug (Softshift)
This module can be used as Proportional Valve Power Plug as Flow Control valve or Pressure Control Valve.

Term-14: Enabled
Enable connection is for safety. This signal must remain high or energized to turn Output on and can not be bypassed by the program. This connection could be used for soft emergency stop signal.

Term-15: Digital Input IN-A
Digital Input IN-A could be programmed as Softshift for Output A (or Single Output PPVD1-O). When this input is energized, the Output A will be ramped to a preset current according to the programmed Ramp Time (10 msec to 10 sec).

Term-16: Digital Input IN-B
Digital Input IN-B could be programmed as Softshift for Output B (Dual Output PPVD2-O). When this input is energized, the Output B will be ramped to a preset current according to the programmed Ramp Time (10 msec to 10 sec).

Digital Inputs IN-A and IN-B Softshift Control
If both digital inputs are triggered (ON), only one output, based on first trigger first serve, will be executed. Both digital inputs must be disabled to utilize the analog command. All other programmed features, such as Dither Frequency, Dither Amplitude, Deadband Compensation will be executed accordingly.
**Applications**

Accurate control of hydraulic and pneumatic proportional solenoid valves used in industrial and mobile equipment control system. The combination of proportional valve and this Programmable Proportional Valve Driver offers low cost solutions to many hydraulic and pneumatic applications with Power Level Output display for ease of troubleshooting and maintenance.

**Key Features & Benefits**

- Broad range of DC Power Input: 10 - 30 vdc
- Programmable Gain Adjustment (output/input)
- Programmable Ramp Time 0, 100 msec - 10 sec
- Programmable Dither Frequency 70 - 350 hz
- Programmable Dither Amplitude 0-10% of output
- Programmable Deadband Compensation
- Output Power Level Indicator 0 - 99%
- Built-in Local Control for troubleshooting
- Programmable via PDA

**Applications**

The PPVD1-O and PPVD2-O can be used for closed loop applications. Loop closure could be done via micro processor based units, such as PC board, Programmable Logic Controller (PLC), and any other third party controller board which has the closed loop algorithm. Currently, we are developing PPVD1-C and PPVD2-C, which is a stand alone closed loop systems, utilizing the PID algorithm with digital gain adjustment.

**Control Mode**

<table>
<thead>
<tr>
<th>Local or Remote:</th>
<th>Hardware Features</th>
<th>Software Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local/Remote</td>
<td>Input Power: Accept 10 -30 Vdc</td>
<td>Program &amp; Status LED Display:</td>
</tr>
<tr>
<td>Remote</td>
<td>Output Power: Level display 0 -99%</td>
<td>Enabled - Program Control Enabled</td>
</tr>
<tr>
<td></td>
<td>Status LED Display:</td>
<td>Cmd. V - Program to Voltage Cmd.</td>
</tr>
<tr>
<td></td>
<td>Enabled - Control Enabled</td>
<td>Cmd. mA - Program to mA Cmd.</td>
</tr>
<tr>
<td></td>
<td>Status LED Display:</td>
<td>Output - Auto Select Single Channel</td>
</tr>
<tr>
<td></td>
<td>Enabled - Control Enabled</td>
<td>Programmable:</td>
</tr>
<tr>
<td></td>
<td>Cmd. V - Voltage Command</td>
<td>Output Power: up to 2.5A</td>
</tr>
<tr>
<td></td>
<td>Cmd. mA - mA Command</td>
<td>Ramp Time: 100 msec to 10 sec.</td>
</tr>
<tr>
<td></td>
<td>Output - to Channel A</td>
<td>Dither Frequency: 70 - 350 hz.</td>
</tr>
<tr>
<td></td>
<td>Status LED Display:</td>
<td>Dither Amplitude: 0 -10% of Output</td>
</tr>
<tr>
<td></td>
<td>Enabled - Program Control Enabled</td>
<td>Deadband Compensation</td>
</tr>
<tr>
<td></td>
<td>Cmd. V - Program to Voltage Cmd.</td>
<td>Digital Input Terminal 15 &amp; 16:</td>
</tr>
<tr>
<td></td>
<td>Cmd. mA - Program to mA Cmd.</td>
<td>Softshift #1 (Term 15)</td>
</tr>
<tr>
<td></td>
<td>Output - Auto Select Single Channel</td>
<td>Softshift #2 (Term 16)</td>
</tr>
</tbody>
</table>

**Hardware Features**

- Analog Input: 0-5 vdc, 1-5 vdc, 0-10 vdc, 0-20 mA, 4-20 mA
- Digital Input Terminal 15 & 16:
  - Softshift #1 (Term.15)
  - Softshift #2 (Term.16)
- Analog Output: Programmable 0.5-2.5A
- Digital Input Terminal 15 & 16:
  - Softshift Output A (Term 15)
  - Softshift Output B (Term 16)
- USB Port: PDA Programming (option)
- RS232 Port: Windows 98, NT, and 2000
- Wiring Terminal: Up to 16 AWG
- Softshift Inputs: Term. 15 & 16

**Software Features**

- Program & Status LED Display: |
  - Enabled - Program Control Enabled |
  - Cmd. V - Program to Voltage Cmd. |
  - Cmd. mA - Program to mA Cmd. |
  - Output - Auto Select Single Channel |

**Product Information**

**PPVD1-O**

The PPVD1-O is a DIN rail mounted Single Output Programmable Proportional Valve Driver for open loop control systems. The ramp time could be disabled for maximum response time for closed loop applications.

**PPVD2-O**

The PPVD2-O is a DIN rail mounted Dual Output Programmable Proportional Valve Driver for open loop control systems, designed to drive any brand of hydraulic and pneumatic proportional valve up to 2.5A. A single input command will drive the output A and output B automatically and the ramp time could be disabled for maximum response time for closed loop applications.

**PPVD1-C & PPVD2-C**

The PPVD1-C & PPVD2-C is a DIN rail mounted Single and Dual Output Programmable Proportional Valve Driver for closed loop control systems. It utilize a PID control algorithm with programmable digital gain settings. (Currently in development - to be released in January 2005)

**Accessories**

Power conversion, software and cable for Palm PDA and Windows operating systems.