

# Penny & Giles Valve Position Sensor

## VPT351

- Accurate measurement of spool valve position
- Measurement range of 10-25mm
- Hall-effect, non-contacting sensing
- Working pressure up to 420bar (5880psi)
- Burst pressure up to 600bar (8400psi)
- Analog output – 0.5-4.5V or 0.2-4.8V
- 4-20mA output option
- PWM output option
- Supply voltage – 5Vdc and 9-32Vdc
- Choice of output polarities
- M18 mounting thread
- ISO6149 compliant
- Operating temperature -40°C to 85°C
- Sealed to IP69k
- AMP or Deutsch connector options
- Flying-lead option



Modern day safety directives for machines, including on- and off-highway vehicles, require that correct hydraulic valve operation is assured. This means that spool valves often need to be fitted with sensors that can measure the actual valve position and feed this information back to the machine's controlling electronics, which can then determine if the valve is in a safe position for the intended operation. Traditionally, these small-stroke linear sensors have been based around inductive technology but a more cost-effective approach is to use Hall-effect sensing, which is also non-contacting so can achieve equal levels of reliability.

The VPT351 can provide accurate, positional measurement over a span of 10-25mm and is designed specifically for the monitoring of hydraulic valves. The transducer can operate from either a 5V supply or an unregulated supply in the range of 9-32V, so making it suitable for vehicle applications.

A choice of output types is available: analog voltage in two spans, 0.5-4.5V or 0.2-4.8V; 4-20mA current loop; or one of three PWM frequencies. Each of the output types can have its full span set to correspond to the selected measurement range, while the polarity of the output is also configurable. The sensor and associated electronics are also shielded against electromagnetic disturbances.

Mounting to the valve block is via a standard M18 thread and an O-ring is fitted to ensure reliable sealing at operating pressures up to 420bar (5880psi), while being able to withstand periods of pressure as high as 600bar (8400psi).

Connection options are over-molded, industry-standard AMP Superseal or Deutsch DT04 series connectors, or simple flying leads for customer termination. Dependent on the type of connector used, sealing as high as IP69k can be achieved.

## SPECIFICATIONS

### ELECTRICAL

MEASUREMENT RANGE	10-25mm in 1mm increments
SUPPLY VOLTAGE	5Vdc $\pm$ 0.5Vdc and 9-32Vdc – auto-selects
SUPPLY CURRENT	Voltage and PWM output: <25mA, Current output: <50mA
SUPPLY REVERSE POLARITY PROTECTION	Voltage and PWM options only
SHORT-CIRCUIT PROTECTION TO GND	Yes
SHORT-CIRCUIT PROTECTION TO SUPPLY	Voltage and PWM output: 5Vdc only
OVER-VOLTAGE PROTECTION	up to 36Vdc (-40 to +60°C)
POWER-ON SETTLEMENT	<1s
RESOLUTION	12-bit (0.025% of measurement range)
LINEARITY (ABSOLUTE)	$\pm$ 1% FS max. ( $\pm$ 3mm), $\pm$ 2% FS max. ( $\pm$ 12.5mm)
TEMPERATURE COEFFICIENT	<300ppm/°C (-25° to +85°C)

### VOLTAGE OUTPUTS

0.5-4.5V OUTPUT OPTION (5V SUPPLY)	10-90% $\pm$ 1% of Vsupply over measurement range
0.5-4.5V OUTPUT OPTION (9-32V SUPPLY)	0.5-4.5V $\pm$ 3% absolute
0.2-4.8V OUTPUT OPTION (5V SUPPLY)	4-96% $\pm$ 1% of Vsupply over measurement range
0.2-4.8V OUTPUT OPTION (9-32V SUPPLY)	0.2-4.8V $\pm$ 3% absolute
LOAD RESISTANCE	10k $\Omega$ min. (resistive to GND)
OUTPUT NOISE	<0.05% FS max.

### PWM OUTPUTS

PWM FREQUENCY	244Hz, 500Hz or 1kHz $\pm$ 20%
PWM LEVELS (5V SUPPLY)	0V and Vsupply $\pm$ 1%
PWM LEVELS (9-32V SUPPLY)	0V and 5V $\pm$ 3% nominal
DUTY CYCLE	10-90% over measurement range
LOAD RESISTANCE	10k $\Omega$ min. (resistive to GND)
RISE/FALL TIME	<20 $\mu$ s typical

### CURRENT OUTPUTS

OUTPUT RANGE	4-20mA over measurement range $\pm$ 2%
OUTPUT NOISE	<0.15% FS max.
OUTPUT LOAD	20-500 $\Omega$
RESIDUAL RIPPLE SUPPLY VOLTAGE	<5%

### MECHANICAL

MECHANICAL RANGE (MIN)	25mm
WORKING PRESSURE (MAX)	420 Bar
BURST PRESSURE (MAX)	600 Bar
MOUNTING	M18x1.5, ISO6149

### ENVIRONMENTAL

OPERATING TEMPERATURE	-40°C to +85°C
SEALING	IP68, IP69K (manufacturer's ratings apply to connectors)
VIBRATION	BS EN 60068-2-64, 1995 sec. 8.4 (31.4grms), 20-2000Hz
SHOCK	1m drop onto concrete
LIFE	10 million cycles (spring life)
MTTFd	173 years
ELECTROMAGNETIC INTERFERENCE	EN 61000-4-3:1999 80-1000MHz & 1.4-2.7GHz Voltage/PWM output to 100V/m Current output to 75V/m
SALT SPRAY	BS EN 60068-2-52 test Kb severity 2



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