Penny+Giles
A Curtiss-Wright Company

Penny + Giles announces a new variant of the popular contactless rotary position sensor range, which uses a factory programmable non-contact Hall effect sensor system.

TPS280DP is designed as the modern alternative to rotary potentiometers fitted on high performance race car and motorcycle induction systems.

Replacing a potentiometer with the **TPS280DP** will eliminate premature failure due to electrical noise – caused by potentiometer wear. **TPS280DP** is life tested to 30 million cycles (60 million operations), more than NINE TIMES that of a potentiometer in this application.

TPS280DP is mechanically interchangeable with most existing throttle potentiometers using 32mm mounting centers and is designed to interface with most common throttle body D type spindles. The sensor has a choice of 200 or 500mm cable lengths, with or without an MSS4P Mini Sure Seal connector fitted to the FDR-25 sheathed spec 55A cable. With sealing to IP69K, it is also able to withstand high pressure wash-downs.

The **TPS280DP** operates from 5Vdc (and 9-30Vdc) and is factory programmed to allow a wide range of configurations.

- **Electrically interchangeable with potentiometers**
- **More than 9x the life of a potentiometer**
- **Extremely low signal noise, for the life of the sensor**
- **Will operate from -40 to +140°C, with excursions to +170°C**
- **Sealed to withstand high pressure wash-downs (IP69K)**
- **Mechanically interchangeable with potentiometers on 32mm mountings**
- **Standard output is dual channel**
- **Configurable output direction, for left or right fitment**
- **Measurement range from 20 to 360° in 1° increments**
- **12 bit resolution (0.025%) over the angular range**
- **Analogue (0.5 - 4.5 or 0.1 - 4.9Vdc) or PWM outputs**
- **2.5 or 0.15mS input/output delay**

TPS280DP DUAL OUTPUT THROTTLE POSITION SENSOR

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1	2	3	4	5	6

METRIC
IF IN DOUBT ASK

ISS	DATE	DRAWN	ECR No.	CHK	APP
3B	06/01/10	D.R.	10582/7	MWB	MWB

TPS280DP Performance

Electrical Data

Measurement range	20° - 360° in 1° Increments
Supply voltage	9V to 30Vdc Unregulated **or** 5Vdc ± 0.5Vdc Regulated
Supply current	≤25mA (12.5mA Per Channel)
Supply reverse polarity protection	Yes
Short circuit protection output to GND	Yes
Short circuit protection output to supply	In 5V regulated mode only
Over voltage protection	Up to 40V (-40 to +60°C)
Power on settlement	<1s
Resolution	12 Bit (0.025% of measurement range)
Non-linearity	<±0.4%
Temperature coefficient	<±30ppm/°C in 5V regulated supply mode <±90ppm/°C in 9-30V supply mode

Output (See Fig 2)

Options	Ratiometric analogue, PWM or Absolute analogue
Direction	Factory programmed to increase or decrease with CW shaft rotation

Analogue Output Option (0.5V – 4.5V)

Voltage output range (9-30V Supply)	Absolute voltage from 0.5V to 4.5V over measurement range (±3%)
Voltage output range (5V Supply)	Ratiometric output voltage from 10% to 90% (±1%) of VSupply over measurement range
Monotonic range	0.25V (5%) and 4.75V (95%) nominal

Analogue Output Option (0.1V – 4.9V)

Voltage output range (9-30V Supply)	Absolute voltage from 0.1V to 4.9V over measurement range (±3%)
Voltage output range (5V Supply)	Ratiometric output voltage from 2% to 98% (±1%) of VSupply over measurement range
Monotonic range	0.05V (1%) and 4.95V (99%) nominal
Load resistance	10KΩ minimum (resistive to GND)
Output noise	≤1 mVrms
Input/Output Delay	2.5ms Typ 0.15ms (See Ordering Code)

PWM Output Option

PWM frequency	244Hz (STD) ±20% over temperature range. For 500Hz & 1000Hz see ordering code
PWM levels (9-30V Supply)	0V and 5V Nominal (±3%)
PWM levels (5V Supply)	0V and VSupply (±1%)
Duty cycle	10% to 90% over measurement range
Monotonic range	5% 95% nominal
Load resistance	10KΩ minimum (resistive to GND)
Rise/Fall time (244Hz, 500Hz & 1000Hz)	<15µs typical

Mechanical Data

Mechanical angle	360° continuous
Torque	10 gm cm
Max. Operating speed	3600°/s
Weight	<30g
Mounting	2 x M4 screws
Cable exit	4-core cable FDR-25 Sheathed 55A Spec Wire (Black = GND, Red = V+ Supply, Yellow = Output 1, White = Output 2)
Phasing	Sensor is at mid electrical angle when shaft and cable exit are aligned as shown in Fig 1

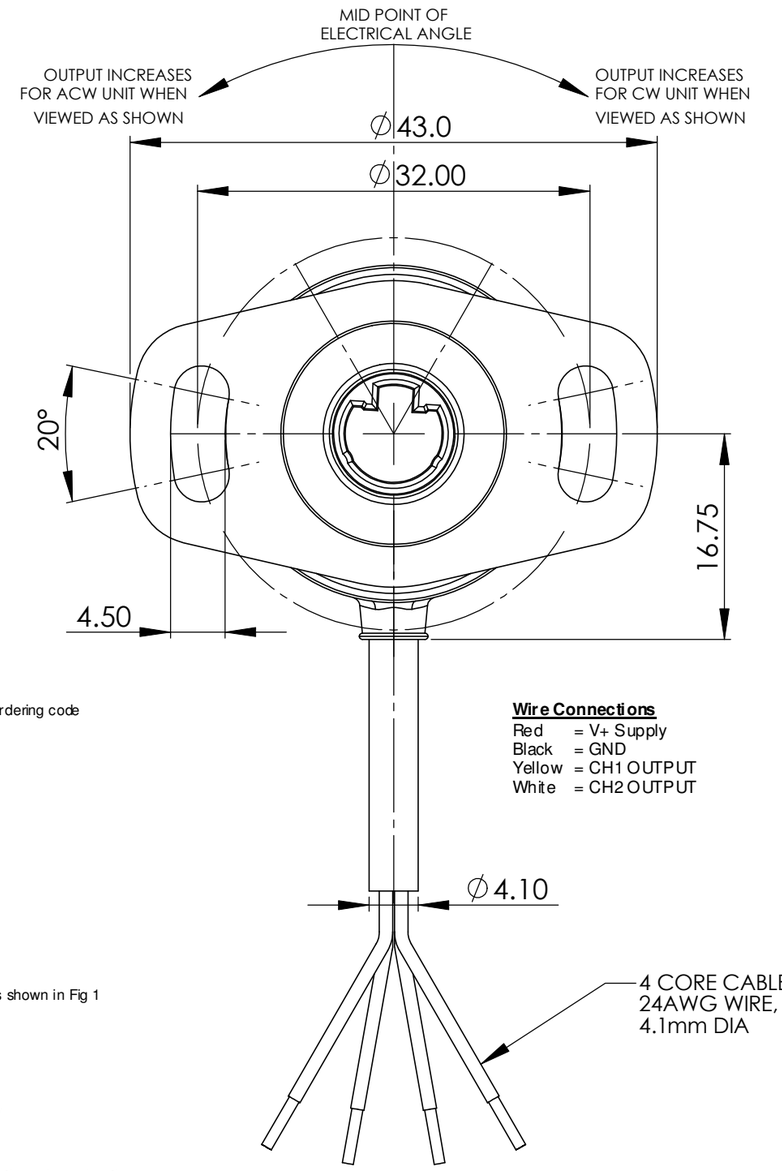
Environmental

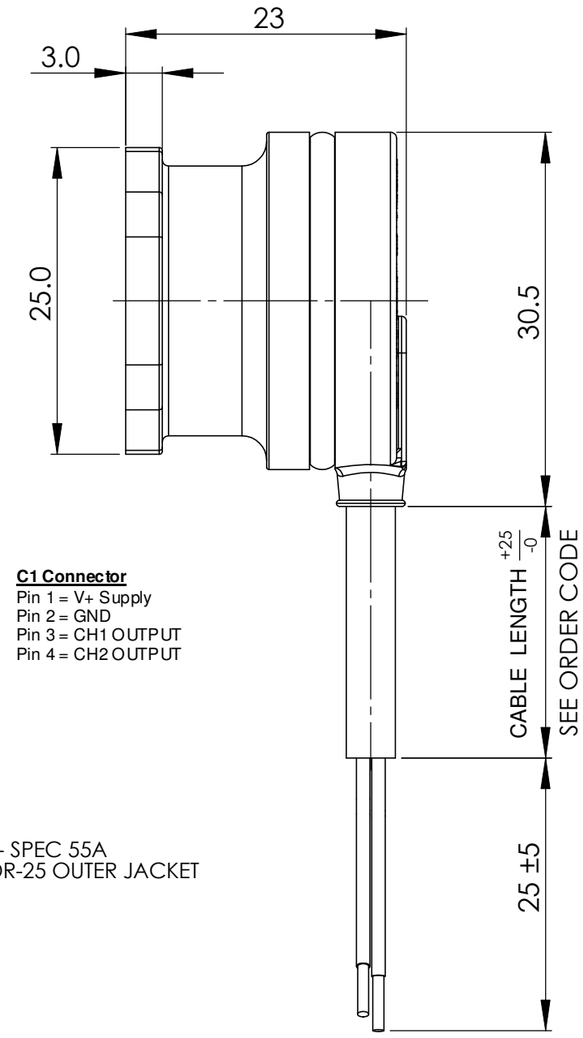
Operational temperature range (5V Version)	-40 to +140°C Continuous (See Fig 3), Tested to 170°C for 72 hours
Operational temperature range (9-30V Version)	-40 to +135.7°C with Vsupply = 9Vdc Derate upper temperature limit by 1.7°C for each 1V increase in Vsupply e.g. -40 to 100°C with Vsupply = 30Vdc (see note below)
Sealing	IP68 and IP69K

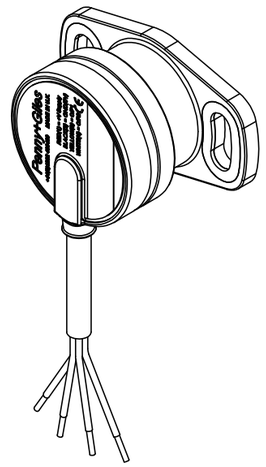
Note: Excessive temperature will cause the internal voltage regulator to shut down to protect the circuit from damage through overheating.

Tested to:

Storage temperature	-55 to +140°C
Vibration	BS EN 60068-2-64; 1995 Sec 8.4 (31.4grms) 20 to 2000Hz random
Shock	3m Drop onto concrete and 2500g
Life	30 Million Cycles
Electromagnetic Interference	BS EN 61000-4-3 to (100V/m), 80MHz to 1GHz and 1.4GHz to 2.7GHz 2004/108/EC
Salt spray	BS EN 60068-2-11; 1999 Severity 48 Hours
Fluid Susceptibility	Ethylene Glycol Brake Fluid Engine Oil (Mineral) Engine Oil (Synthetic) Engine Degreaser Screen Wash Petroleum Spirit Diesel







Wire Connections
Red = V+ Supply
Black = GND
Yellow = CH1 OUTPUT
White = CH2 OUTPUT

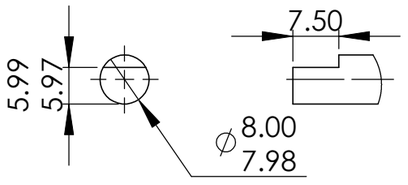
C1 Connector
Pin 1 = V+ Supply
Pin 2 = GND
Pin 3 = CH1 OUTPUT
Pin 4 = CH2 OUTPUT

Ordering Codes

TPS280DP/--- /--- /- /- /- /- --

- **Angle CH1** .....
- **Angle CH2** .....
- **Output –** .....
  - A1 = Analogue 0.5V – 4.5V
  - A4 = Analogue 0.1V – 4.9V
  - A6 = Analogue 0.5V – 4.5V With 0.15ms Input/Output Delay
  - A7 = Analogue 0.1V – 4.9V With 0.15ms Input/Output Delay
  - P1 = PWM – 244Hz
  - P2 = PWM – 500Hz
  - P3 = PWM – 1000Hz
- **Direction Code –** .....
  - 3. = Both Clockwise
  - 4. = Both Anticlockwise
  - 5. = CH1 Clockwise, CH2 Anticlockwise.
- **Cable Code –** .....
  - P2 = 0.2m
  - P5 = 0.5m
- **Connector Code –** .....
  - C0 = No Connector
  - C1 = Mini Sure Seal

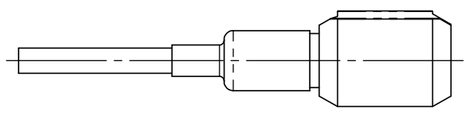
RECOMMENDED MATING DRIVE

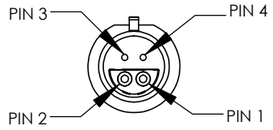


CONNECTOR OPTION DETAILS (Mini Sure Seal MSS4R)

MATING CONNECTOR

Mini Sure Seal MSS4P. Order X61-227-102
PIN Contact (2 off Req'd).Order X61-227-201
SOCKET Contact (2 off Req'd). Order X61-227-202





SCALE 2:1 UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.		D No TPS280DP FIRST USED ON	MATERIAL BODY - POLYMER SHAFT INSERT - POLYMER	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (mm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H ANGULAR ± 1° / LINEAR 0, mm +/- 0,5 mm; 0,0 mm +/- 0,2 mm; 0,00mm +/- 0,1mm; 0,000mm +/- 0,01mm (MACHINING) BREAK EDGE 0.05 - 0.15mm FILLET RADS 0.1 - 0.3mm UNLESS OTHERWISE STATED	TITLE THROTTLE POSITION SENSOR	PENNY + GILES	A3
THIRD ANGLE PROJECTION TO BS 8888	MASS (g)	VOL. (mm^3)	REF.	FINISH		PART NUMBER: **TPS280DP**	SHT 1 OF 2 SHTS

1	2	3	4	5	6

METRIC
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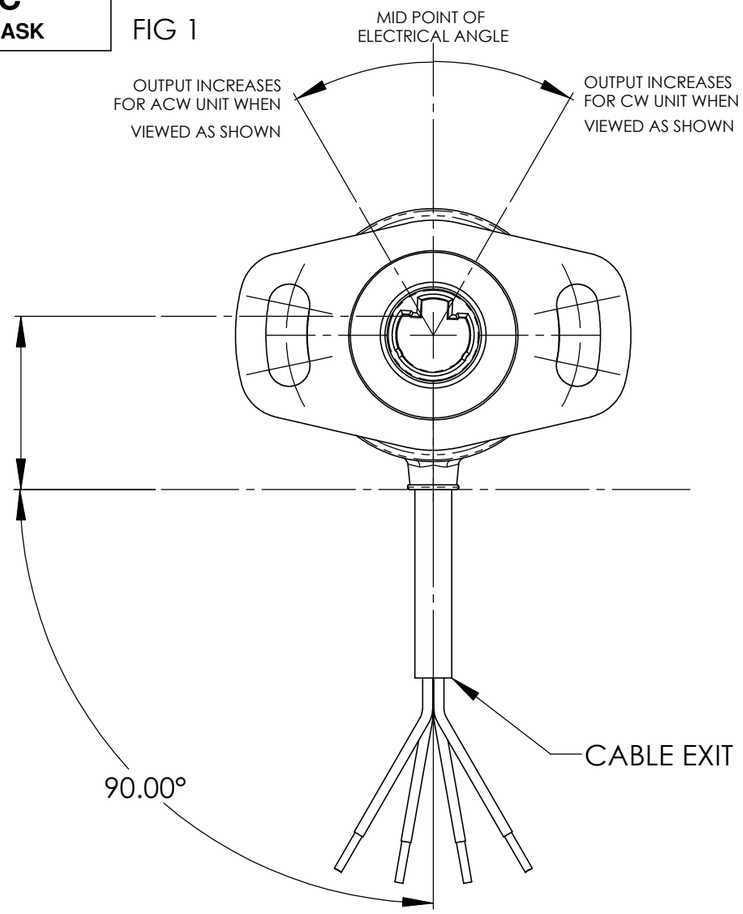
FIG 1



SENSOR IS MID ELECTRICAL ANGLE WHEN SHAFT CONNECTION AND CABLE EXIT ARE ALIGNED AS SHOWN

FIG 2

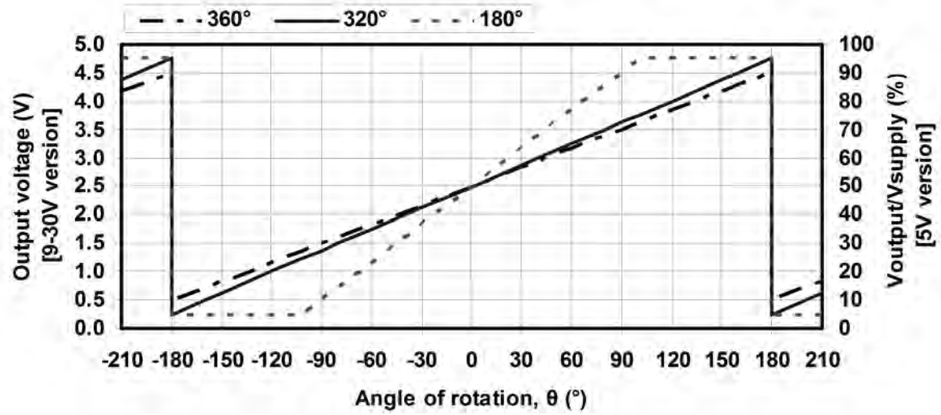
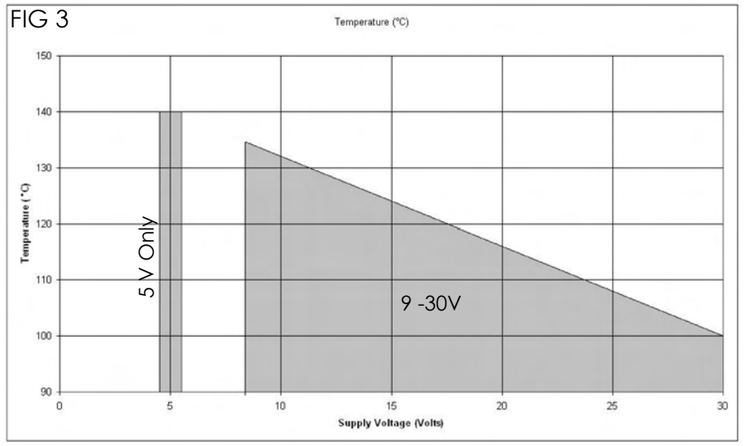
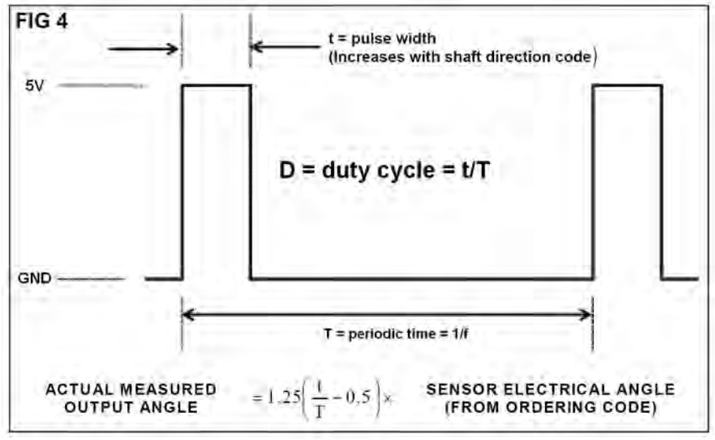


FIG 3

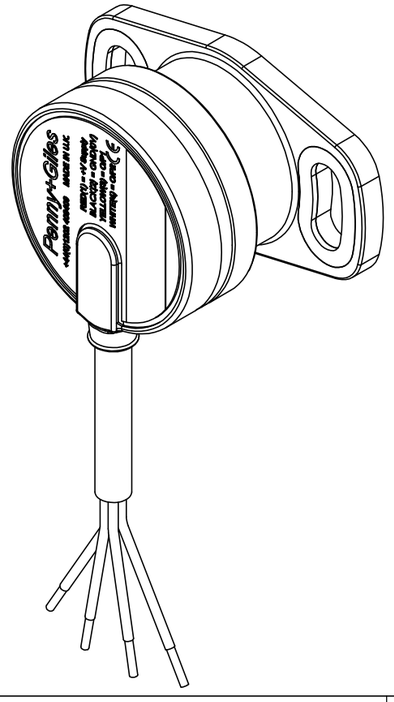


MAX OPERATING TEMPERATURE DERATING

FIG 4



PWM OUTPUT CHARACTERISTICS



SCALE 2:1 UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.		D No TPS280DP FIRST USED ON	MATERIAL BODY - POLYMER SHAFT INSERT - POLYMER	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (mm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H
THIRD ANGLE PROJECTION TO BS 8888	MASS (g) 12.83	VOL. (mm^3) 10779.75	REF.	FINISH	ANGULAR ± 1° · LINEAR 0, mm · 0,0 mm · 0,00mm · 0,000mm · (MACHINING) +/- 0,5 mm · +/- 0,2 mm · +/- 0,1mm · +/- 0,01mm · BREAK EDGE 0.05 - 0.15mm · FILLET RADS 0.1 - 0.3mm · UNLESS OTHERWISE STATED

TITLE

THROTTLE POSITION SENSOR

PENNY + GILES

PART NUMBER:

TPS280DP

A3

SHT 2 OF 2 SHTS