

Penny + Giles announces a new **dual output, no-contact** rotary position sensor with the slimmest low profile housing, which uses a factory programmable Hall effect sensor system.

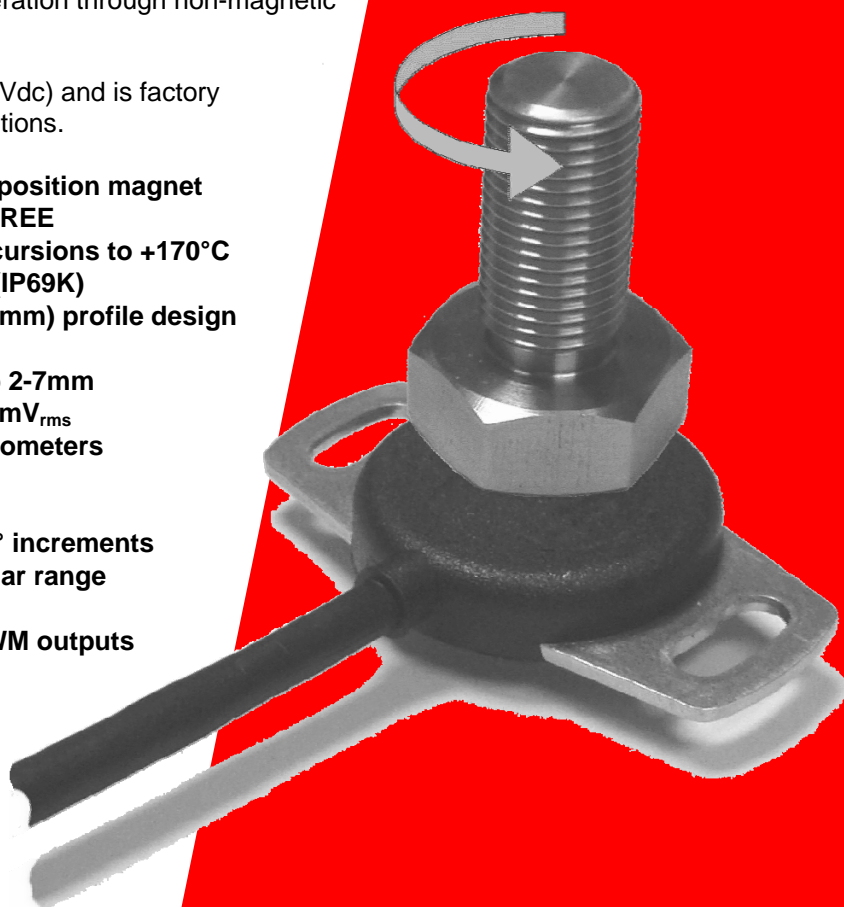
NRH280DP has a co-moulded fully encapsulated sensor system that can withstand high shock and vibration as well as operate up to 170°C, and endure high pressure wash-downs (IP69K). The sensor is activated by a separate magnet with a choice of two carrier designs.

NRH280DP is designed for applications in extreme environments where space is limited. It also allows up to ± 2 mm radial offset, with a permissible gap of 2-7mm between the sensor and magnet. The transmissive properties between the magnet and sensor also allow operation through non-magnetic materials.

The **NRH280DP** operates from 5Vdc (and 9-30Vdc) and is factory programmed to allow a wide range of configurations.

- **NO-CONTACT** technology with external position magnet
- **Unlimited mechanical lifetime – WEAR FREE**
- **Will operate from -40 to +140°C, with excursions to +170°C**
- **Withstands high pressure wash-downs (IP69K)**
- **Simple mounting and extremely low (6.5mm) profile design**
- **Minimal weight**
- **Magnet radial offset up to ± 2 mm, air gap 2-7mm**
- **Extremely low signal noise – less than 1mV_{rms}**
- **Electrically interchangeable with potentiometers**
- **Standard output is dual channel**
- **Configurable output direction**
- **Measurement range from 20 to 360° in 1° increments**
- **12 bit resolution (0.025%) over the angular range**
- **Independent linearity $\pm 0.4\%$**
- **Analogue (0.5 - 4.5 or 0.1 - 4.9Vdc) or PWM outputs**
- **2.5 or 0.15mS input/output delay**

*Please discuss your application with our sales engineers – in addition to this model, we also offer a dual redundant (separate input/output) version (**NRH280DR**) and custom engineered designs for OEMs.*



NRH280DP DUAL OUTPUT NO CONTACT POSITION SENSOR

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METRIC
IF IN DOUBT ASK

NRH280DP Performance

ISS	DATE	DRAWN	ECR No.	CHK	APP
1B	08/03/10	DR	10583/6	MWB	MWB

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% (See Fig 1)
 Temperature coefficient <±30ppm/°C in 5V regulated supply mode
 <±90ppm/°C in 9-30V supply mode

Output Options

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

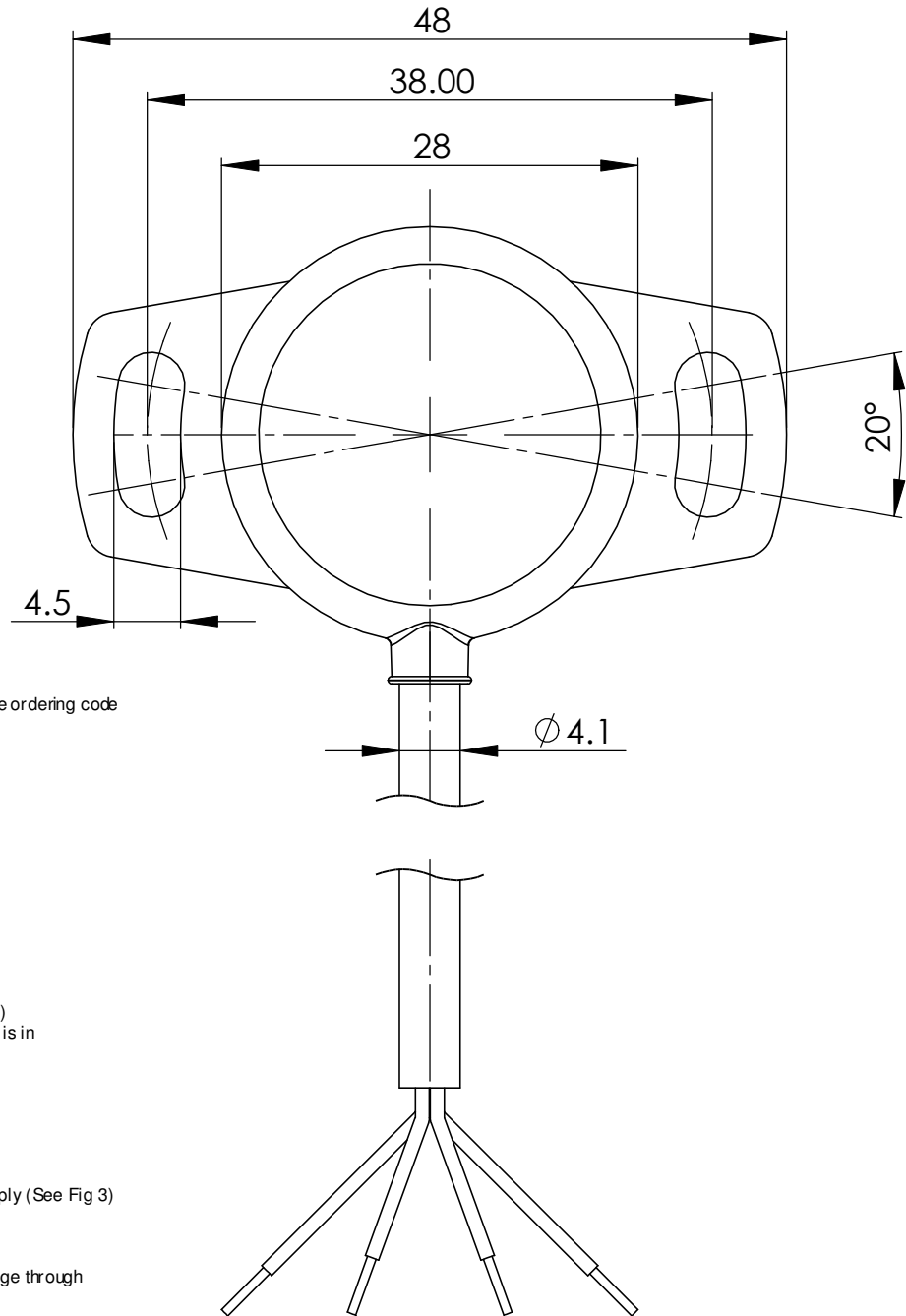
PWM Output Option
 PWM frequency 244Hz (STD) ±20% over temperature range. For 500Hz & 1000Hz see ordering code
 PWM levels (9-30V Supply) 0V and 5V Nominal (±3%)
 PWM levels (5V Supply) 0V and VSupply (±1%)
 Duty cycle 10% to 90% over measurement range
 Monotonic range 5% 95% nominal
 Load resistance 10KΩ minimum (resistive to GND)
 Output noise ≤1 mVrms
 Input/Output Delay 2.5ms Typ
 0.15ms (See Ordering Code)

Mechanical Data
 Mechanical angle 360° continuous
 Max. operating speed 3600rpm
 Weight <55g (With Bolt Type magnet carrier)
 Mounting 2 x M4 screws
 Cable exit 500mm 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 the ident on the magnet carrier is in line and cable exit are aligned shown in Fig 5

Environmental

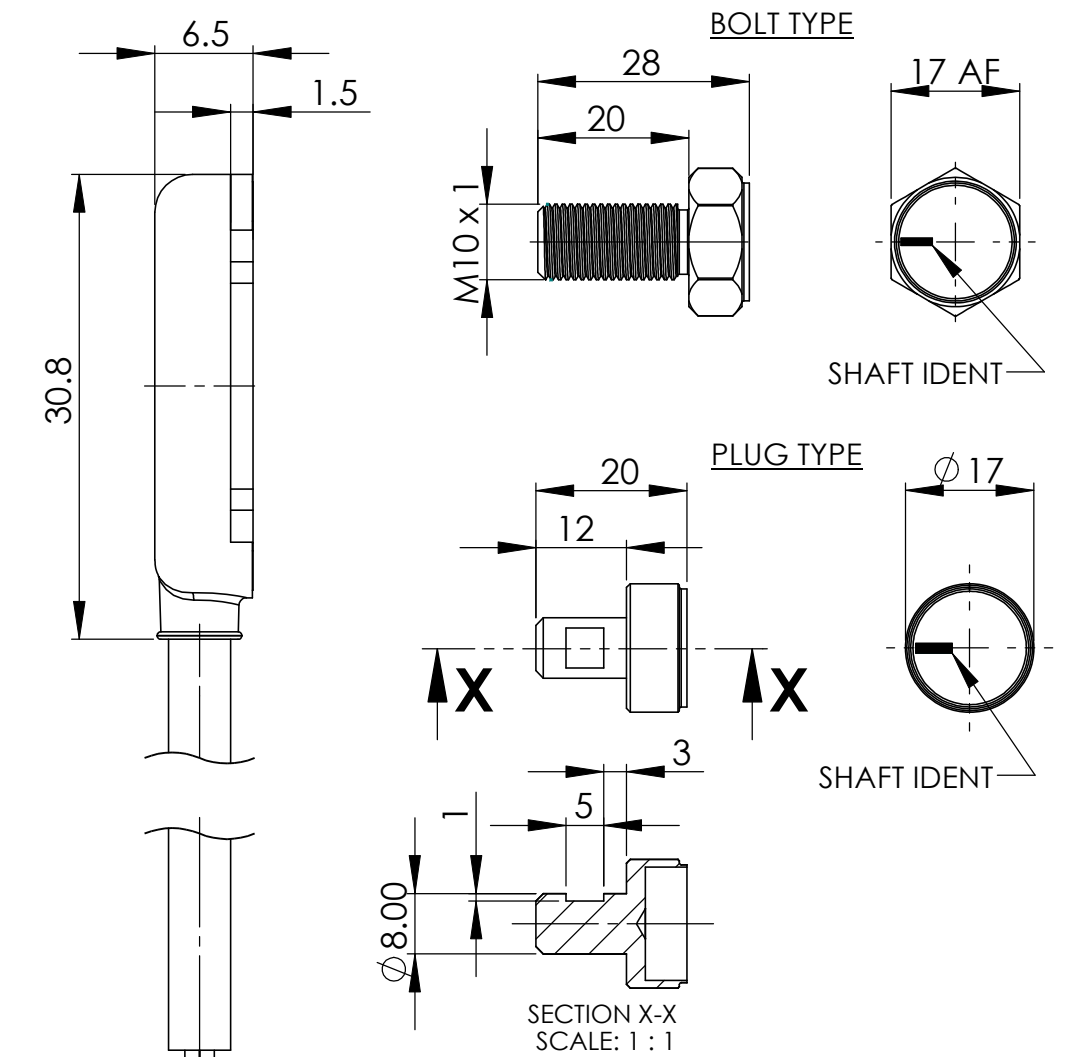
Operational temperature range (5V Version) -40 to +140°C (See Fig 3), 170°C for 72 Hours
 Operational temperature range (9-30V Version) -40 to +135.2°C with Vsupply = 9Vdc
 Derate upper temperature limit by 1.7°C for each 1V increase in Vsupply (See Fig 3)
 e.g. -40 to 100°C with Vsupply = 30Vdc (see note below)
 Sealing IP68, 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 (31.4gn rms) 20 to 2000Hz random
 Shock 3m drop onto concrete and 2500g
 Life MTBF = 12.83 years, Failure Rate = 0.077922 per year TBC
 Electromagnetic Interference BS EN 61000-4-3 (1999) 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



4 CORE - SPEC 55A
 24AWG. DR25 OUTER JACKET

MAGNET CARRIERS



Ordering Codes

NRH280DP/--- /--- /- /- /- /- /-

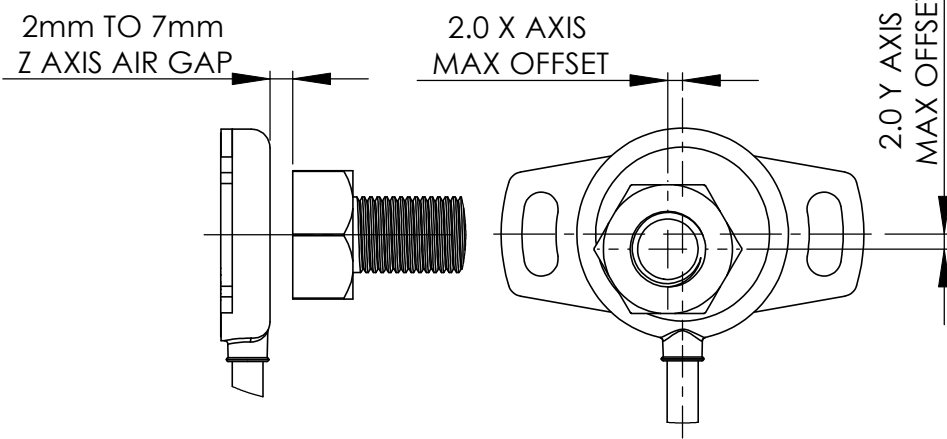
Angle CH1
Angle CH2
Output -
 A1 = Analogue 0.5V - 4.5V
 A4 = Analogue 0.1V - 4.9V
 A6 = Analogue 0.5V - 4.5V With 0.15ms Input/Output Delay
 A7 = Analogue 0.1V - 4.9V With 0.15ms Input/Output Delay
 P1 = PWM - 244Hz
 P2 = PWM - 500Hz
 P3 = PWM - 1000Hz
Direction Code -
 3. = Both Clockwise
 4. = Both Anticlockwise
 5. = CH1 Clockwise, CH2 Anticlockwise
Magnet Holder Code -
 B = Bolt Type
 P = Plug Type
Cable Code -
 P5 = 0.5m

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	MATERIAL MTG PLATE - 316 ST/STEEL BODY - POLYMER MAGNET HOLDER - 316 ST/STEEL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H	TITLE NON CONTACT ROTARY HALL SENSOR	PENNY + GILES	A3		
THIRD ANGLE PROJECTION TO BS 8888	MASS (g)	VOL. (mm ³)	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	PART NUMBER: NRH280DP	SHT 1 OF 2 SHTS

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MAGNET MISALIGNMENT



NRH280 Magnet Misalignment Vs Linearity

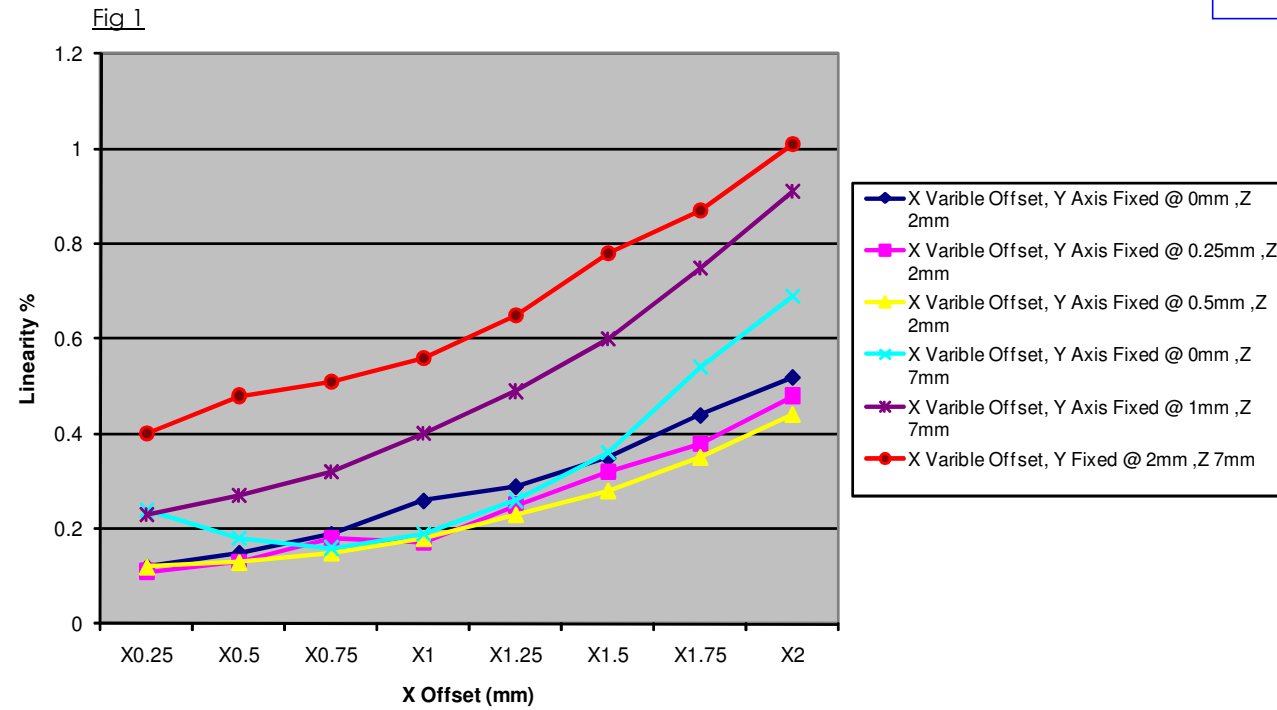
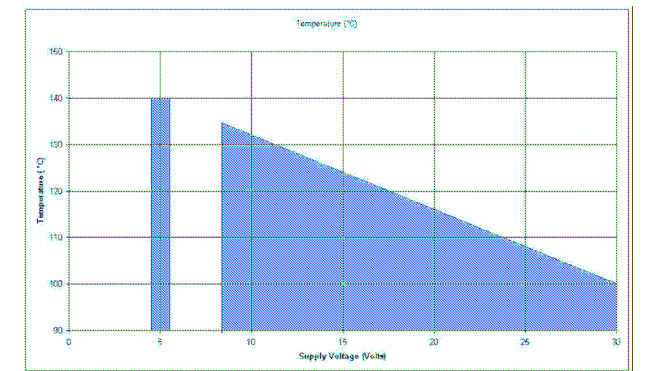
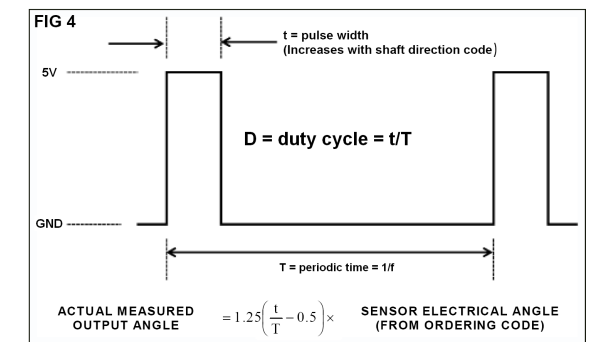


Fig 3



MAX OPERATING TEMPERATURE DERATING



PWM OUTPUT CHARACTERISTICS

Fig 5

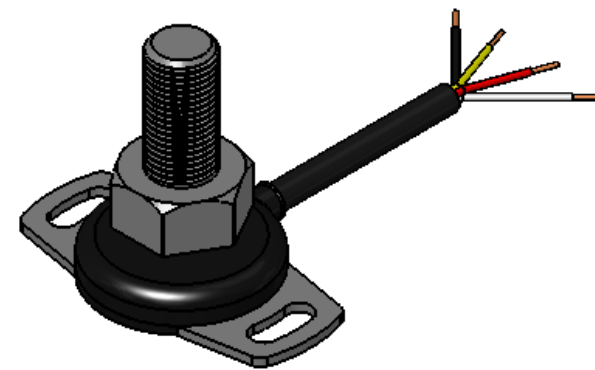
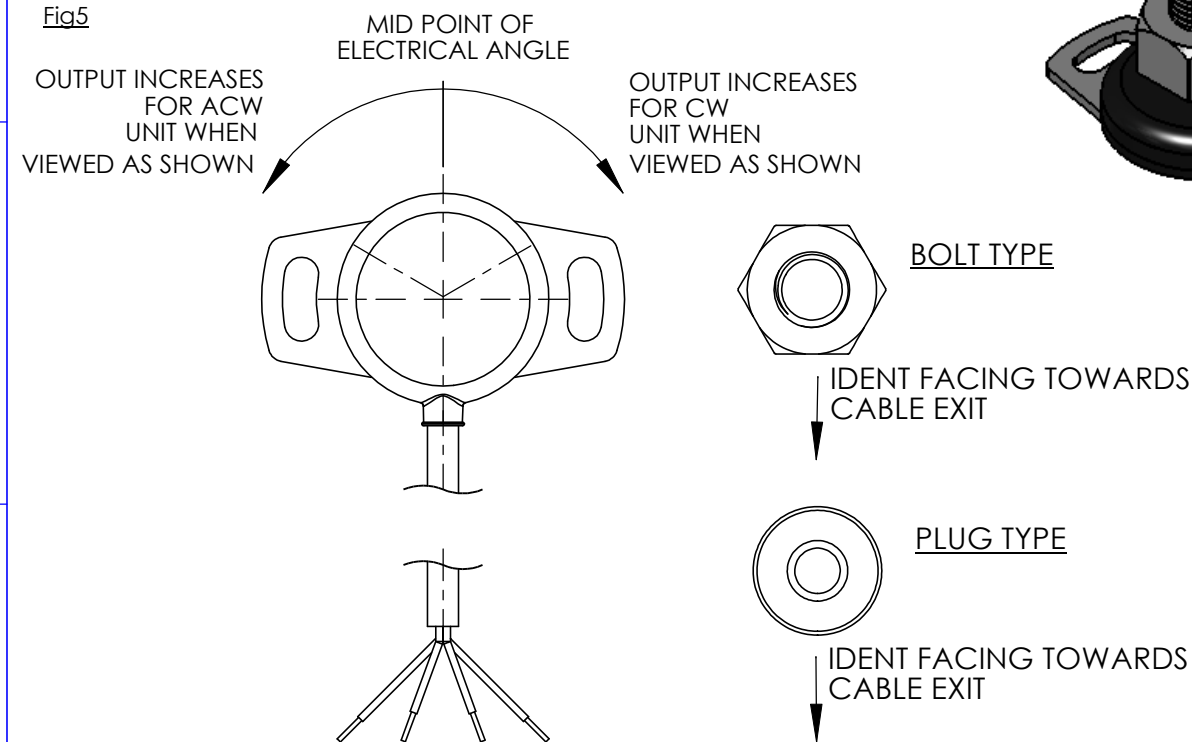
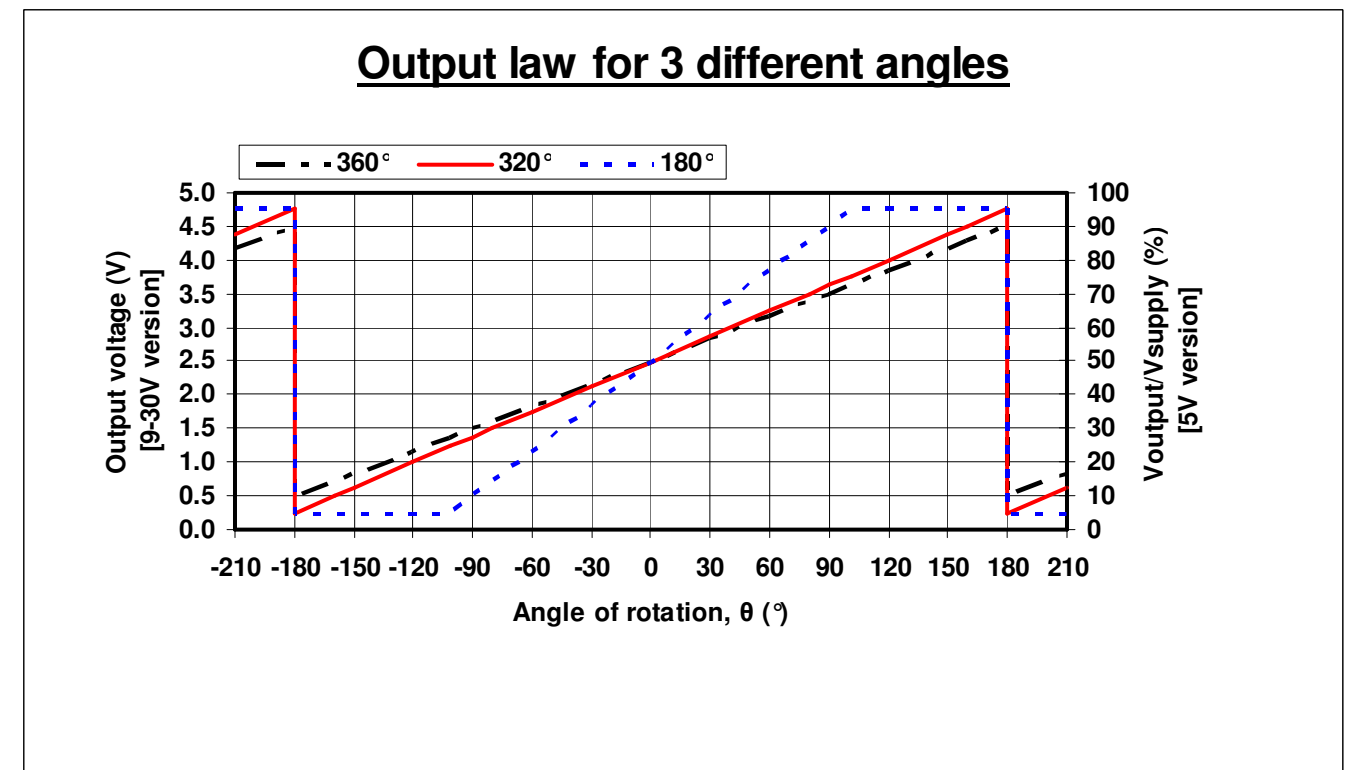


Fig 2

Output law for 3 different angles



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 -	MATERIAL MTG PLATE - 316 ST. STEEL BODY - POLYMER MAGNET HOLDER - 316 ST/STEEL	TOLERANCES: IN-LINE WITH PENNY & GILES STANDARDS 55-301 SURFACE TEXTURE VALUES IN MICROMETRES (µm) TO BS1134:PT2. ALL MACHINED SURFACES TO BE 1.6 ✓ ALL SCREW THREADS TO BS3643 PT.2: EXTERNAL CLASS: 6g INTERNAL CLASS: 6H	TITLE NON CONTACT ROTARY HALL SENSOR	PENNY + GILES	A3
THIRD ANGLE PROJECTION TO BS 8888	MASS (g)	VOL. (mm ³)	FINISH	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		PART NUMBER: NRH280DP	SHT 2 OF 2 SHTS