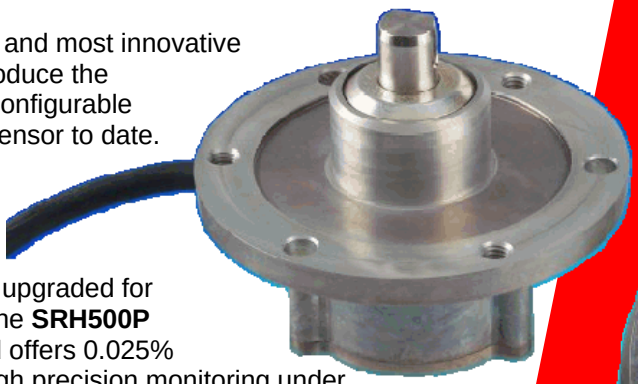
Penny+Giles
A Curtiss-Wright Company

Penny + Giles uses the latest and most innovative mechatronics disciplines to produce the **SRH500P** - it's most rugged, configurable contactless Hall effect rotary sensor to date.



This hugely robust new sensor, designed for use in harsh environments, sits within the all new SRH series, upgraded for more extreme performance. The **SRH500P** features a 12bit processor and offers 0.025% measurement resolution for high precision monitoring under conditions of extreme temperature, humidity, vibration, shock and immersion.

Where the most accurate measurement is demanded for steering, suspension and position sensing, **SRH500P** is the solution, particularly 'on-vehicle' for municipal, agricultural and construction applications.

- **Single (SRH501P)/dual (SRH502P) redundant analogue or digital (PWM) outputs**
- **Total sensor measurement range from 20° up to 360°**
- **12 bit resolution over selected measuring range**
- **Low, low noise level (1mV rms) on output signal**
- **Environmental protection to IP69K**
- **Operating temperature range -40° to +140° C**
- **Enhanced OEM measurement options – non-linear and switched outputs, clamp voltage levels**

SRH500P

CONTACTLESS ROTARY SENSOR

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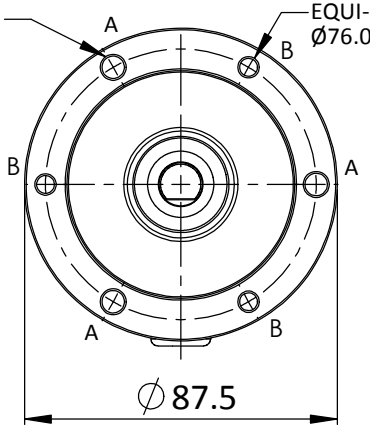
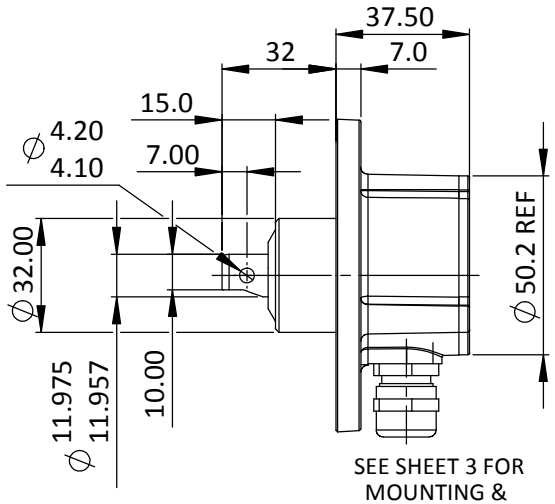
Innovation In Motion

Doc Ref: SRH500P 06/09

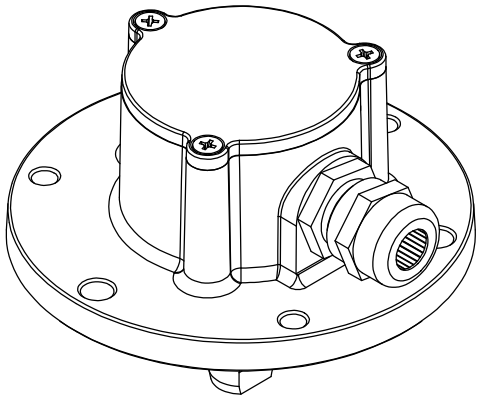
METRIC
IF IN DOUBT ASK

ISS	DATE	DRAWN	ECR No.	CHK	APP
5B	19/05/09	DR	10517/17	M.Bentley	M.Bentley





SEE SHEET 3 FOR MOUNTING & CABLE/CONNECTION DETAILS



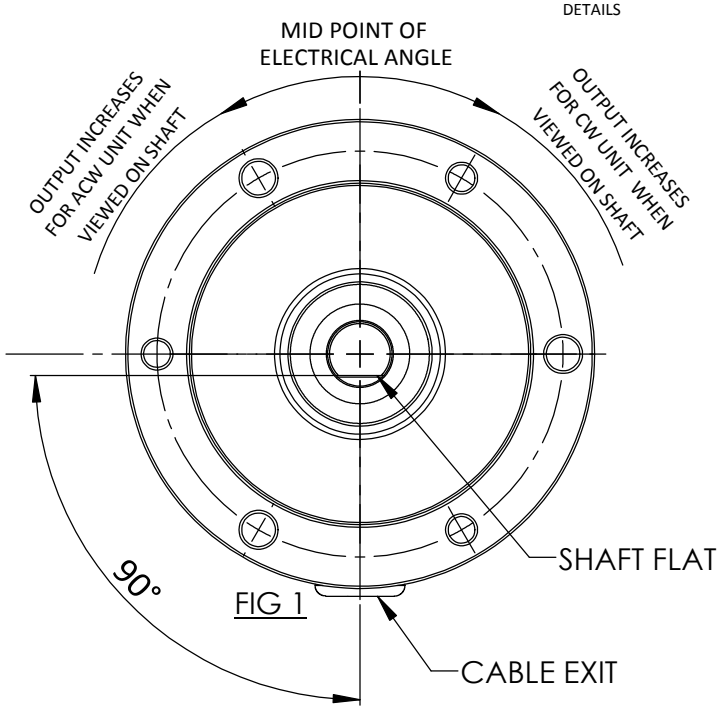


FIG 1

Single Channel Order Code

SRH501P /--- /- /- /-

Angle – .....

Output – .....
A = Analogue
P = PWM

Direction Code –.....
1. = Clockwise
2. = Anticlockwise

Cable Code – .....
A = No Cable
B01 = P&G Cable (1m) (IP69K)
B05 = P&G Cable (5m) (IP69K)
B10 = P&G Cable (10m) (IP69K)
C = Hirschmann M12 Fitted to Body
(IP67 & IP69K Only in locked position with mating connector. See sheet 3)

Dual Channel Order Code

SRH502P /--- /--- /- /- /-

Angle CH1.....

Angle CH2.....

Output – .....
A = Analogue
P = PWM

Direction Code –.....
3. = Both Clockwise
4. = Both Anticlockwise
5. = CH1 Clockwise, CH2 Anticlockwise

Cable Code – .....
A = No Cable
B01 = P&G Cable (1m) (IP69K)
B05 = P&G Cable (5m) (IP69K)
B10 = P&G Cable (10m) (IP69K)
C = Hirschmann M12 Fitted to Body
(IP67 & IP69K Only in locked position with mating connector. See sheet 3)

OEM OPTIONS

NON LINEAR LAW
SWITCH OUTPUTS
CLAMP VOLTAGES
LESS THAN 1ms INPUT/OUTPUT DELAY
ALTERNATIVE PWM FREQ
DIFFERENT OUTPUT PHASING CH1 AND CH2

FIG 1 IS MID ELECTRICAL ANGLE WHEN SHAFT FLAT IS FACING TOWARDS AND PERPENDICULAR TO THE CABLE EXIT. (AS SHOWN)

SCALE 1:1 UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No SRH500	MATERIAL BODY - LM6 ALLOY SHAFT - 316 SS	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 SEALED DUAL ROTARY HALL SENSOR	PENNY + GILES	A3
THIRD ANGLE PROJECTION TO BS 8888	MASS (g) / VOL. (mm³)	FIRST USED ON / REF.	FINISH BODY - ALOCHROM 407/47	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: SRH501/2P	SHT 1 OF 3 SHTS

METRIC IF IN DOUBT ASK						
ISS	DATE	DRAWN	ECR No.	CHK	APP	
5B	19/05/09	DR	10517/17	M.Bentley	M.Bentley	

SRH501P (Single Channel) & SRH502P (Dual Channel) PERFORMANCE SPECIFICATION

ELECTRICAL DATA

Measurement range	20° to 360° in 1° increments
Supply voltage	9-30Vdc unregulated **and** 5Vdc±0.5Vdc regulated
Supply current	≤25mA
Supply reverse polarity protection	Yes
Output short circuit protection to GND	Yes
Output short circuit protection to supply	In 5V Regulated Mode Only
Over Voltage Protection	Up to 40V (-40 to +60℃)
Power On Settlement	<1s
Resolution	12 bit (0.025% of measurement range)
Non-linearity	≤0.4% of range
Temperature coefficient	<±50ppm/℃

OUTPUT (Fig 2)

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

ANALOGUE OUTPUT OPTION

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
Load resistance	10kΩ minimum (resistive to GND)
Output noise	≤1 mVrms
Input/Output Delay	2.5ms

PWM OUTPUT OPTION

PWM frequency	244Hz ±20% over temperature range
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% and 95% nominal
Load resistance	10kΩ minimum (resistive to GND)
Rise/fall time	<20µs

MECHANICAL DATA

Weight	265gm without cable
Mounting	Tapped 3 x M6 screws, Through Holes 3 x M6 or ¼ UNC
Cable	SRH501P 3 Core or SRH502P 4 Core Cable
Phasing	Sensor is at Mid Electrical Angle when shaft flat is facing towards and perpendicular to the cable exit ±5°

ENVIRONMENTAL

Operational temperature range (5V version)	-40 to 140℃
Operational temperature range (8-30V version)	-40 to 135.2℃ with Vsupply = 9Vdcf Derate upper temperature limit by 1.7℃ for each 1V increase in Vsupply e.g. -40 to 100℃ with Vsupply = 30Vdc (see Note 2 below)
Sealing	IP67 with Cable code C (IP69K Only in locked position with its proper counterpart) IP69K with Cable code B

Note 2: 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℃
Vibration	BS EN 60068-2-64; 1995 Sec 8.4 (14gn rms) 20 to 2000Hz Random
Shock	3m drop onto concrete.
EMC	Complies to Directive 2004/108/EC
Electromagnetic interference	BS EN 61000-4-3(1999) to 100V/M, 80Mhz to 1Ghz and 1.4Ghz to 2.7Ghz
Side Load	2Kg Mounted on sensor shaft Tested 3 million cycles
Life	$20x10^6$ operations, tested over 150° sweeps
Salt Spray	BS EN 60068-2-52; 1996 Test Kb Severity 2 (48hrs)
Humidity	BS EN 60068-2-30; 2005 Severity Db (55℃, 93%RH)

FIG 2

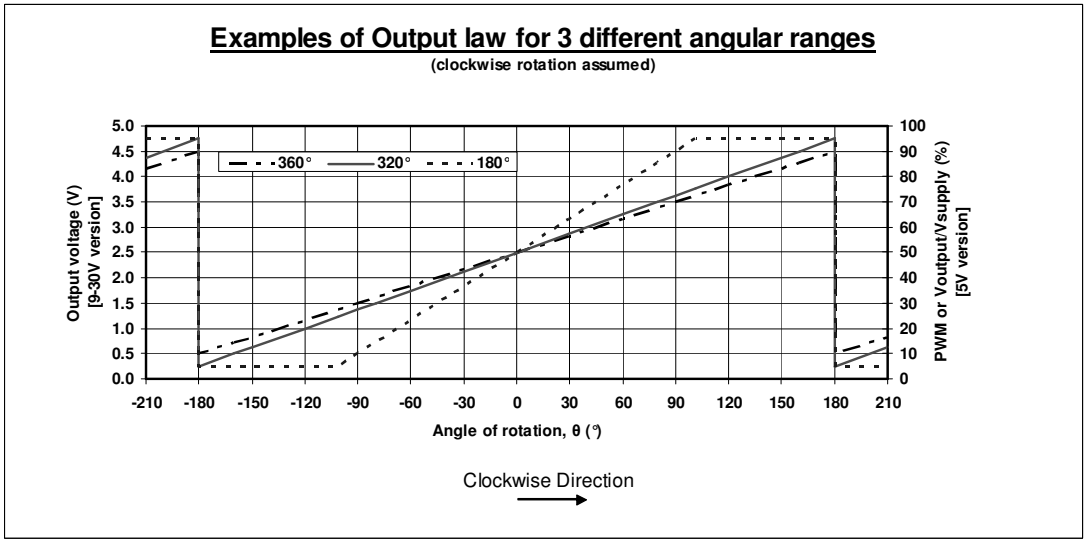


FIG 3 MAX OPERATING TEMPERATURE DERATING

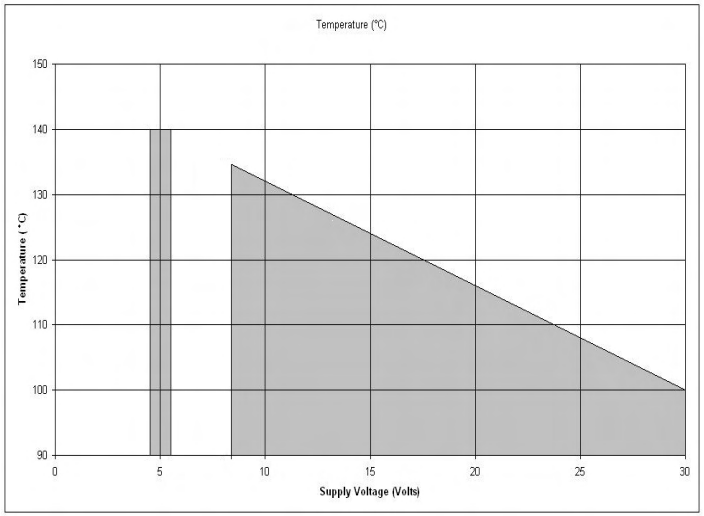
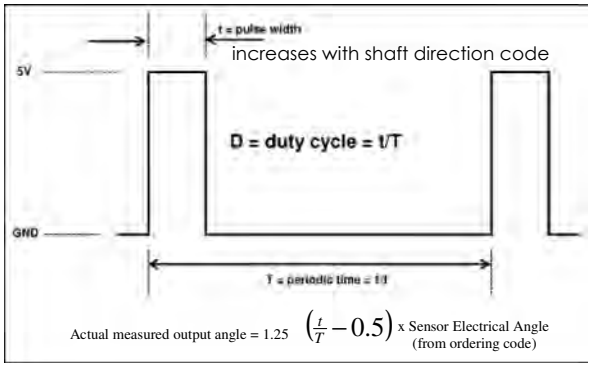


FIG 4 PWM OUTPUT CHARACTERISTICS



Actual measured output angle = 1.25 $\left(\frac{t}{T}-0.5\right)$ x Sensor Electrical Angle (from ordering code)

SCALE 1:1 UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No SRH500	MATERIAL	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 V 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 SEALED DUAL ROTARY HALL SENSOR	PENNY + GILES	A3
THIRD ANGLE PROJECTION TO BS 8888	MASS (g)	VOL. (mm^3)	REF.	FINISH		PART NUMBER: SRH501/2P	SHT 2 OF 3 SHTS

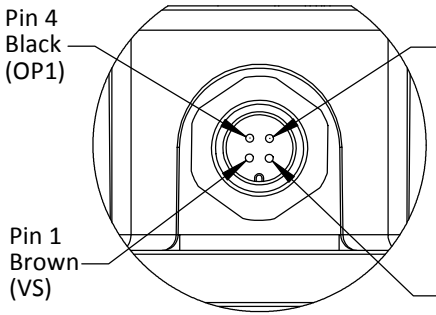
METRIC
IF IN DOUBT ASK

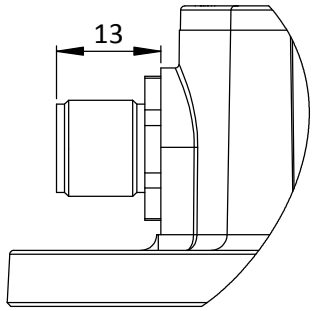
MOUNTING, CONNECTION & CABLE OPTIONS

M12 CONNECTOR (CABLE CODE C)

(IP67 & IP69K Only in locked position with its proper counterpart)

ISS	DATE	DRAWN	ECR No.	CHK	APP
5B	19/05/09	DR	10517/17	M.Bentley	M.Bentley





M12 MATING CONNECTORS FOR OPTION C

(ORDER SEPARATELY)

MATING CONNECTOR IP68
2 metre long No X61-169-102
(Hirshmann No. 934-401-203 2m)

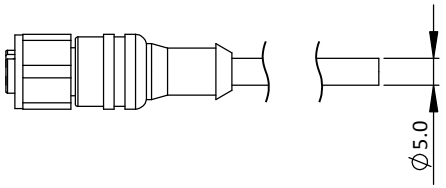
5 metre long No X61-169-105
(Hirshmann No. 934-401-202 5m)

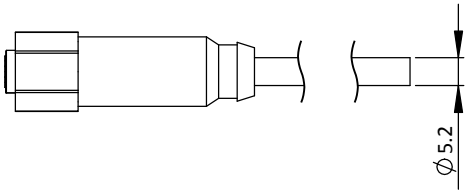
10 metre long No X61-226-002
(Lumberg PRST 4-07/10M)

MATING STEEL CONNECTOR IP69K
1.5 metre long No X61-222-001
(Murr No.7044-12221-336-0150 1.5m)

5 metre long No X61-222-003
(Murr No.7044-12221-336-0500 5m)

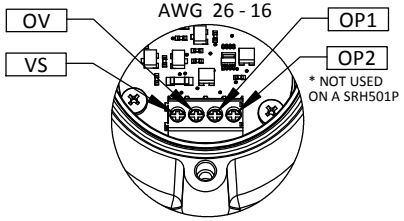
10 metre long No X61-222-005
(Murr No.7044-12221-336-1000 10m)





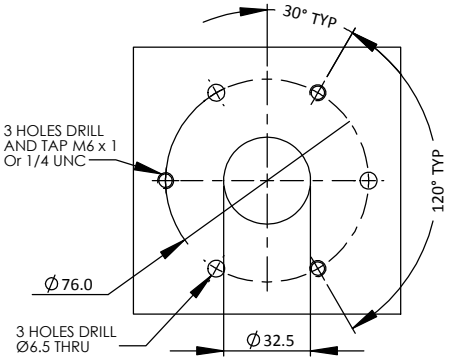
CONNECTION DETAILS

CONNECTOR CAPACITY
SOLID 0.14 - 1.5mm²
STANDARD 0.14 - 1.5mm²
AWG 26 - 16



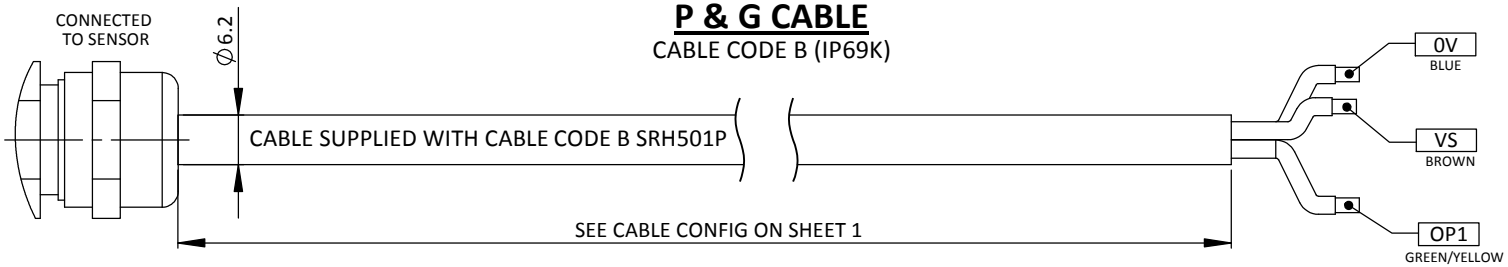
CABLE GLAND WILL SUIT CABLE BETWEEN Ø4-8mm

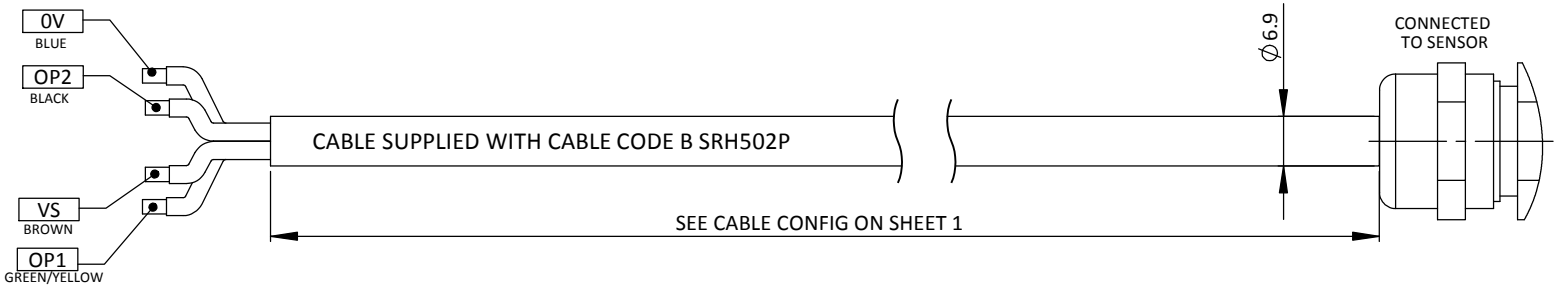
SENSOR MTG DETAILS



P & G CABLE

CABLE CODE B (IP69K)





SCALE 1.5:1 UNLESS STATED	IF CONTROL DIMENSIONS (Kc) ARE SPECIFIED THEY ARE TO BE SUBJECT TO 100% INSPECTION OR STATISTICAL PROCESS CONTROL.	D No SRH500	MATERIAL	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 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: SEALED DUAL ROTARY HALL SENSOR	PENNY + GILES	A3
THIRD ANGLE PROJECTION TO BS 8888	MASS (g)	VOL. (mm³)	REF.	FINISH		PART NUMBER: SRH501/2P	SHT 3 OF 3 SHTS