

SRH 501P SINGLE OUTPUT AND SRH 502P DUAL OUTPUT

rugged contactless rotary sensors

PERFORMANCE

Output options

A1 | A4 | P1 | P2 | P3
0.5-4.5 or 0.1-4.9Vdc | PWM

A2
0-10Vdc

A3
4-20mA

ELECTRICAL

Measurement range

° 20 to 360 in 1° increments

20 to 360 in 1° increments

Supply voltage

unregulated

Vdc

9 to 30

13.5 to 30

9 to 30

regulated

Vdc

5 ±0.5

No

No

Over voltage protection

Vdc

Up to 40 (-40 to +60°C)

Up to 40 (-40 to +60°C)

Maximum supply current

mA

< 25

< 30

< 25 + total output current

Reverse polarity protection

Yes

Yes

Yes

Short circuit protection

Output to GND

Yes

Yes

Yes

Output to supply

In 5V regulated mode only

Yes

Yes

Power-on settlement time

S

< 1

< 1

< 1

Resolution

%

0.025 of measurement range (12 bit)

0.025 of measurement range (12 bit)

Non-linearity*

%

< ±0.4

< ±0.4

< ±0.4

Temperature coefficient ppm/°C

< ±30 in 5V supply mode

< ±90 in 9-30V supply mode

< ±50

N/A

< ±200 typical

< ±200 maximum**

*Non-linearity is measured using the Least-Squares method on a computerised calibration system

**Temperature compensation possible by using graph shown on page 30

Analog Voltage Output - (order code A1, A4) see typical graph on page 31

Voltage output range

9-30V supply

Vdc

Absolute voltage, 0.5 to 4.5 (A1) or 0.1 to 4.9 (A4) over measurement range (±3%)

5V supply

Vdc

Ratiometric output voltage - 10 to 90% (A1) or 2 to 98% (A4) of Vs over measurement range (±1%)

Monotonic range

Vdc

0.25 (5%) and 4.75 (95%) nominal (A1)

Vdc

0.05 (1%) and 4.95 (99%) nominal (A4)

Load resistance

Ω

10k minimum (resistive to GND)

Output noise

mVrms

< 1

Input/output delay

mS

< 2

Analog Voltage Output - (order code A2) see typical graph on page 31

Voltage output range

Vdc

Absolute voltage, nominally 0.2 to 9.8 (±0.2V)

Load resistance

Ω

10k minimum (resistive to GND)

Output noise

mVrms

< 1

Input/output delay

mS

3.5

Analog Current Output - (order code A3) see typical graph on page 31

Current output range

mA

Absolute current, nominally 4 to 20 (±2% span)

Load resistance

Ω

400 maximum (resistive to GND)

Output noise

μArms

< 10

Input/output delay

mS

3.75

PWM Output options (order code Pn) see output characteristics on page 31

PWM frequency	Hz	244 (P1); 500 (P2); or 1000 (P3) $\pm 20\%$ over temperature range
PWM levels	9-30V supply Vdc	0 and 5 nominal ($\pm 3\%$)
	5V supply Vdc	0 and Vs ($\pm 1\%$)
Duty cycle	%	10 to 90 over measurement range
Monotonic range	%	5 and 95 nominal
Load resistance	Ω	10k minimum (resistive to GND)
Rise/fall time	μS	<20

MECHANICAL

Mechanical angle	°	360, continuous
Operating torque - max	g-cm	1000
Shaft velocity maximum	°/sec	3600
Weight	g	265 (without cable)
Mounting		Use 3 x M6 threaded holes in front face or 3 x M6 (or 1/4 UNC) clearance holes through the flange – See dimensions for details
Phasing		When the shaft flat is facing towards the cable exit, sensor output is at mid electrical angle ($\pm 5^\circ$)

ENVIRONMENTAL

Protection class		IP69K with cable codes Bxx and Sxx IP68 or IP69K with cable code C01 when mating connectors (see page 26) are attached and fully engaged)
Life		20 million operations (10×10^6 cycles) of $\pm 75^\circ$ Sensing element life is essentially infinite (contactless), and the SRH501P/502P life figures refer to the operating shaft seal. Mechanical load (axial and radial) on the shaft should also be considered.
Dither life		Contactless - no degradation due to shaft dither
Shaft side load		2Kg mounted on sensor shaft - tested 3 million cycles
Operational temperature[†]	°C	
	Output A1, A4, P1-3	-40 to +140 (5V supply) -40 to +135.7 (9V supply) Derate upper temperature limit by 1.7°C for every 1V increase in supply: e.g. -40 to +100 @30V
	Output A2	-40 to +115 (13.5V supply) Derate upper temperature limit by 0.91°C for every 1V increase in supply: e.g. -40 to +100 @30V
	Output A3	-40 to +120 (9V supply) Derate upper temperature limit by 1.05°C for every 1V increase in supply: e.g. -40 to +98 @30V
Storage temperature	°C	-55 to +140
Vibration		BS EN 60068-2-64:1995 Sec 8.4 (14gn rms) 20 to 2000Hz Random
Shock		3m drop onto concrete and 2500g – all axes
EMC Immunity level		BS EN 61000-4-3:1999, to 100V/m, 80MHz to 1GHz and 1.4GHz to 2.7GHz (35V/m 1.4GHz to 2.7GHz for output A3) (2004/108/EC)
Salt spray		BS EN 60068-2-52: 1996, Test Kb Severity 2 (48hr)
Humidity		BS EN 60068-2-30: 2005, Severity Db (55°C, 93%RH)

[†] See Maximum Operating Temperature – Derating graphs on page 30.

If the maximum operating temperature is exceeded, the voltage regulator will shut down to protect the device from overheating

OPTIONS

Measurement range (angle)	Select from 20° to 360° in 1° increments (factory programmed) for each output channel
Output	Analog voltage (A1, A2, A4) Analog current (A3) PWM (Pn)
<i>coming soon in 2012</i>	CANbus outputs: J1939 (J1); CANopen (O1)
Output direction	Both clockwise, both anticlockwise or one CW, one ACW
Electrical connections	No cable (A00, S00), 1m, 5m, 10m unscreened (Bxx) or screened (Sxx) cable or M12 receptacle (C01)
Cabled sockets	1.5, 2, 5 & 10m mating cabled sockets can be ordered separately. See details on page 26
Operating levers	Operating levers 155 or 230mm long can be ordered separately. See details on page 25
OEM options	Outputs can be programmed to provide: non linear laws; switch outputs; clamp voltages; different output phasing CH1/CH2; faster input/output delay; extended analog range; and output mapping for potentiometer replacements.

SRH501P AND SRH502P

AVAILABILITY

All standard configurations can be supplied rapidly from the factory – check with your local supplier for more details

ORDERING CODES

NOTE: When selecting output option A3 (4-20mA), cable codes Sxx are the only cable codes allowable.

SINGLE OUTPUT SRH501P

SRH501P/...../...../...../.....

Measurement range	= angle in °	
Output	A1 = Analog 0.5-4.5Vdc A2 = Analog 0-10Vdc A3 = Analog 4-20mA A4 = Analog 0.1-4.9Vdc P1 = PWM, 244 Hz P2 = PWM, 500 Hz P3 = PWM, 1000 Hz	
Direction	1 = Clockwise 2 = Anticlockwise	
Cable code	A00 = No cable, gland fitting S00 = No cable, screened cable gland (A3 output option – see note) B01 = 1m 3-core unscreened cable, IP69K B05 = 5m 3-core unscreened cable, IP69K B10 = 10m 3-core unscreened cable, IP69K S01 = 1m 3-core screened cable, IP69K (A3 output options – see note) S05 = 5m 3-core screened cable, IP69K S10 = 10m 3-core screened cable, IP69K C01 = M12 screw locking receptacle	

DUAL OUTPUT SRH502P

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Measurement range	CH1 = angle in °	
Measurement range	CH2 = angle in °	
Output	A1 = Analog 0.5-4.5Vdc A2 = Analog 0-10Vdc A3 = Analog 4-20mA A4 = Analog 0.1-4.9Vdc P1 = PWM, 244 Hz P2 = PWM, 500 Hz P3 = PWM, 1000 Hz	
Direction	3 = Both clockwise 4 = Both anticlockwise 5 = CH1 CW; CH2 ACW	
Cable code	A00 = No cable, gland fitting S00 = No cable, screened cable gland (A3 output option – see note) B01 = 1m 4-core unscreened cable, IP69K B05 = 5m 4-core unscreened cable, IP69K B10 = 10m 4-core unscreened cable, IP69K S01 = 1m 4-core screened cable, IP69K (A3 output options – see note) S05 = 5m 4-core screened cable, IP69K S10 = 10m 4-core screened cable, IP69K C01 = M12 screw locking receptacle	

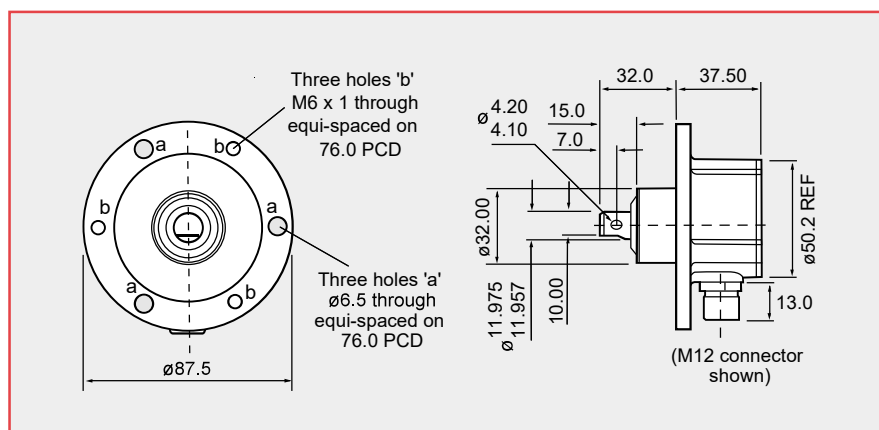
Accessories (order separately)

Drive lever kit – SA202195/MK - see page 25

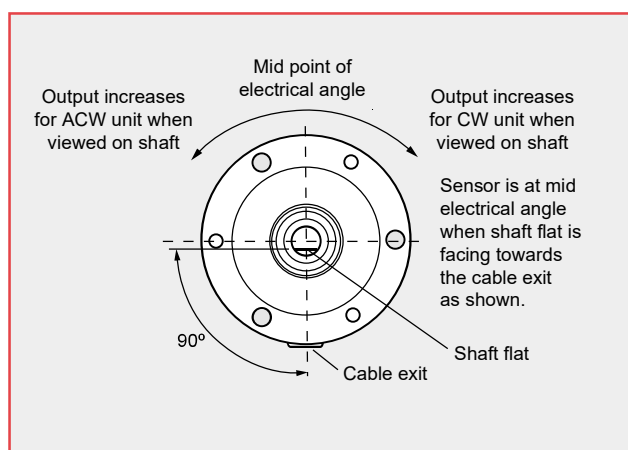
Mating connectors - see details on page 26

DIMENSIONS

Note: drawings not to scale

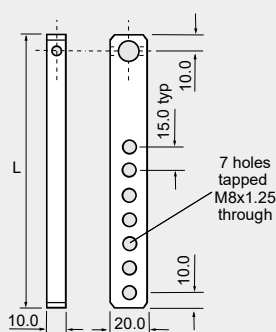


PHASING OF SHAFT TO HOUSING



LEVER OPTIONS (order separately)

Lever SA202195/MK1 L = 155
Lever SA202195/MK2 L = 230



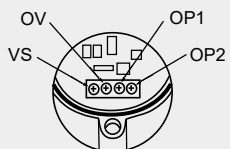
SRH501P AND SRH502P

ELECTRICAL CONNECTIONS

- Option A00** – No cable supplied
- Option S00** – No cable supplied (Fitted gland to suit screened cable)
- Option Bxx** – Cable supplied (1m, 5m or 10m)
- Option Sxx** – Screened cable supplied (1m, 5m or 10m)
- Option C01** – Series M12 screw locking receptacle to IEC 61076-2-101 (Ed.1) / IEC 60947-5-2 fitted to sensor body. Mating cabled sockets to be ordered separately.

CONNECTING CABLE OPTIONS

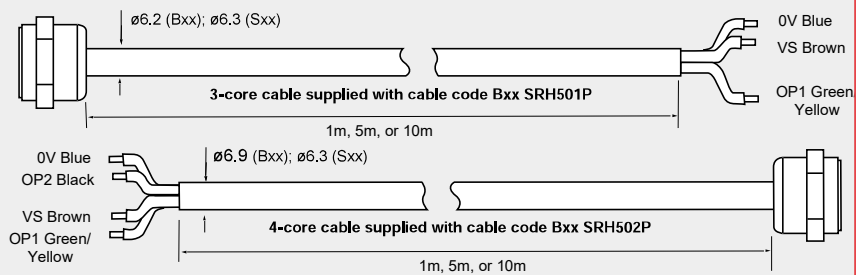
Connection details for no cable option A00 S00



Cable gland for cable between $\varnothing 4$ -8mm

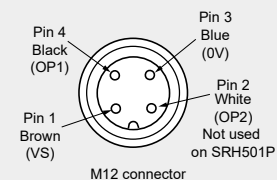
Connection capacity - AWG 26-16 or 0.14-1.5mm²

Connection details for cable option Bxx and Sxx



Note: Sxx option includes a cable screen required for output option A3

Connection details for option C01 - M12 connector (not available for output A3)



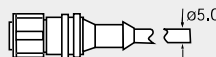
Pin No.	Cable colour	Description
1	Brown	+V Supply
2	White	Output 2 (not used on SRH501P)
3	Blue	OV Supply (GND)
4	Black	Output 1

Output increases with CW or ACW rotation viewed on shaft - depending on selected order code

M12 mating connectors for cable option C01 (order separately)

Connector IP68

2 metre	X61-220-101
5 metre	X61-220-102
10 metre	X61-220-103



Steel connector IP69K

1.5 metre	X61-222-001
5 metre	X61-222-003
10 metre	X61-222-005

When connecting the sensor, care should be taken with the correct connections.

The sensor is provided with indefinite reverse polarity protection and short circuit protection between output to GND, **but if the outputs are connected to the supply this will result in device failure.**