CAN OUTPUT
CONTACTLESS ROTARY
POSITION SENSORS

Innovation In Motion
INNOVATION IN MOTION

The SRH520CN contactless rotary sensor is a development of the Penny + Giles SRH501/2P model, with additional integrated electronics to provide a CAN bus interface according to ISO/DIS 11898.

Model SRH520CN is designed to meet the harsh operating requirements in heavy duty industrial position sensing applications, including construction, agricultural, military and utility vehicles, as well as a variety of uses in steelworks, marine equipment and power generating plants.

The SRH520CN rotary sensor operates from a 9-30Vdc unregulated supply and has a choice of two configuration modes - J1939 or CANopen.

J1939 option
The J1939 option is factory set, with the following parameters:
- Direction
- Baud Rate
- Node ID
- Frame rate
selected from the order code on page 6.

CANopen option
The CANopen option is partially customer configurable (frame rate and output direction), with a protocol according to CIA standard DS 301, and supports the Device Profile for Encoders - DS 406.

Baud rate and Node ID are factory set and should be selected from the order code on page 6.

The SRH520CN incorporates a 14bit non-contact Hall effect sensor with microprocessor control - offering 0.022° resolution.

**Features**
- Contactless – Hall effect technology
- Integrated CAN interface
- J1939 or CANopen output - CAN 2.0B
- 14 bit resolution (0.022°/LSB)
- Rugged housing in marine grade aluminium
- Superior shaft strength with duplex bearings
- Shaft sealing to IP68 & IP69K; connector sealing to IP67
- M12 connector for easy installation
- Rapid despatch of any option

**Benefits**
- Long life and impervious to dither vibration
- Avoids cost intensive separate I/O modules
- Maximum baud rate of 1Mbit/sec
- Maximum sensitivity in all applications
- Suitable for extreme environments
- Optimum performance under vibration and shock
- Operation in hostile environments including pressure washing
- Industry standard connectivity
- Eliminates customer inventory

The products detailed in this document have been tested to the requirements of EN 61000-4-3 (Immunity).
Choice of mounting
The SRH520CN contactless rotary sensor can be mounted by three M6 (1/4in) clearance holes through the 87.5mm diameter mounting flange, or alternatively by three M6x1 threaded attachment holes in the front face. The sensor has a 12mm diameter stainless steel shaft with a machined flat on the surface, allowing it to be secured by a locking screw. An optional lever kit can be used to connect the sensor shaft to a moving surface via a selection of M8x1.25 threaded holes in the lever.

CANbus (CAN 2.0B)
Historically, position sensors have been connected indirectly to CAN networks via analog input/output (I/O) modules. More recently however, an increasing number of position sensors with integrated CAN interfaces have been developed which, like the Penny+Giles SRH520CN, avoid cost intensive I/O or gateway modules. Operating from 9-30Vdc supply the SRH520CN is a development of our existing SRH501/2P models and integrates additional electronics to provide either CAN SAE J1939 or CANopen options. Both versions feature a 14 bit non-contact Hall effect sensor system offering 0.022° resolution.

World leading availability
The SRH520CN has been 'designed for manufacture' enabling assembly in state-of-the-art manufacturing cells. This means that we can supply any of the configurations possible from the options offered, in a matter of days from ordering. This allows OEMs to reduce or eliminate their inventory and call on Penny + Giles to supply 'on demand'.

Innovative, rugged design - superior protection
The SRH520CN contactless rotary sensor with CAN output has been designed to meet the harsh operating environments in heavy duty industrial position sensing applications. Based on non-contact Hall effect sensor technology it can operate in high dither vibration conditions with no deterioration of the sensing element during its lifetime. It is also highly resistant to shock which makes it ideal for many position monitoring applications on off-highway vehicles. The sensor’s housing is sealed to meet an IP68 and IP69K protection level on the operating shaft, with IP67 protection for the electrical connections when mated and locked.

Performance assured
Penny+Giles' product development process includes exhaustive qualification testing to ensure that performance specifications published in our product brochures and technical data sheets are backed by real-life test evidence. This is our assurance to you that our designs have been tested at these parameters.
**SRH 520 CN CAN OUTPUT**

rugged contactless rotary sensors

### PERFORMANCE

#### ELECTRICAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range °</td>
<td>360</td>
</tr>
<tr>
<td>Supply voltage Vdc</td>
<td>9 to 30 unregulated</td>
</tr>
<tr>
<td>Over voltage protection Vdc</td>
<td>Up to 40</td>
</tr>
<tr>
<td>Maximum supply current mA</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Power-on settlement time S</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Resolution</td>
<td>14bit (0.022º/LSB)</td>
</tr>
<tr>
<td>Non-linearity* %</td>
<td>&lt;±0.2</td>
</tr>
<tr>
<td>Temperature coefficient ppm/°C</td>
<td>&lt;±25</td>
</tr>
</tbody>
</table>

*Non-linearity is measured on a computerised calibration system

### MECHANICAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical angle</td>
<td>360, continuous</td>
</tr>
<tr>
<td>Operating torque - max g-cm</td>
<td>1000</td>
</tr>
<tr>
<td>Shaft velocity maximum °/sec</td>
<td>3600</td>
</tr>
<tr>
<td>Weight g</td>
<td>265 (without cable)</td>
</tr>
<tr>
<td>Mounting</td>
<td>Use 3 x M6x1 threaded holes in front face or 3 x M6 (or 1/4 UNC) clearance holes through the flange – See dimensions for details</td>
</tr>
<tr>
<td>Phasing</td>
<td>When the shaft flat is facing towards the M12 connector, sensor output is at mid electrical angle (±5°)</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP68 and IP69K for shaft seal side (and rear cap seal)</td>
</tr>
<tr>
<td>Life</td>
<td>20 million operations (10 x 10⁶ cycles) of ±75°</td>
</tr>
<tr>
<td>Dither life</td>
<td>Contactless - no degradation due to shaft dither</td>
</tr>
<tr>
<td>Shaft side load</td>
<td>2kg mounted on sensor shaft - tested 3 million cycles</td>
</tr>
<tr>
<td>Operational temperature† °C</td>
<td>-40 to +85 (9 to 27V supply)</td>
</tr>
<tr>
<td>Storage temperature °C</td>
<td>-55 to +125</td>
</tr>
<tr>
<td>Vibration</td>
<td>BS EN 60068-2-64:1995 Sec 8.4 (31.4gn rms) 20 to 2000Hz Random</td>
</tr>
<tr>
<td>Shock</td>
<td>3m drop onto concrete and 2500g – all axes</td>
</tr>
<tr>
<td>EMC Immunity level</td>
<td>BS EN 61000-4-3:1999, to 100V/m, 80MHz to 1GHz and 1.4GHz to 2.7GHz (2004/108/EC)</td>
</tr>
<tr>
<td>Salt spray</td>
<td>BS EN 60600-2-52: 1996, Test Kb Severity 2 (48Hrs)</td>
</tr>
<tr>
<td>Humidity</td>
<td>BS EN 60068-2-30: 2005, Severity Db (55°C, 93%RH)</td>
</tr>
</tbody>
</table>

*See Maximum Operating Temperature – Derating graph on page 6

If the maximum operating temperature is exceeded, the voltage regulator will shut down to protect the device from overheating
OPTIONS
SRH520CN/J
Output mode
Output direction
Baud rate
Node ID
Frame rate

SRH520CN/C
Output mode
Baud rate (factory set)
Node ID (factory set)
Output direction
Frame rate

SRH520CN/J and SRH520CN/C
Operating levers
Mating connectors

FACTORY SET
Mode J – CAN SAE J1939
Both clockwise, both anticlockwise or CH1 CW, CH2 ACW
50, 125, 250, 500 kbit/s or 1 Mbit/s
Hexadecimal value between 01 and 7F
25, 50 or 100mS

PARTIALLY CONFIGURABLE VIA CANopen INTERFACE
Mode C – CANopen CiA DS 301/DS406 (Class 1)
50, 125, 250, 500 kbit/s or 1 Mbit/s
Hexadecimal value between 01 and 7F
Can be customer configured
Can be customer configured

Operating levers 155 or 230mm long can be ordered separately. See details on page 7
Mating M12 straight connector and cable assembly must be ordered separately. See details on page 6 and below.

ELECTRICAL CONNECTIONS
Series M12 screw locking receptacle fitted to sensor body. Mating cabled sockets to be ordered separately.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Cable colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screen</td>
<td>Cable screen</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>+V supply</td>
</tr>
<tr>
<td>3</td>
<td>Black</td>
<td>0V Supply (GND)</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
<td>CAN-H</td>
</tr>
<tr>
<td>5</td>
<td>Blue</td>
<td>CAN-L</td>
</tr>
</tbody>
</table>

Recommended connector mating torque - 0.6Nm
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.
**SRH 520CN**

**MAXIMUM OPERATING TEMPERATURE DERATING CURVE**

**AVAILABILITY**

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

**ORDERING CODES**

**J1939 OUTPUT**

- Mode: J = J1939
- Direction: 1 = Both clockwise
  2 = Both anticlockwise
  3 = CH1 clockwise; CH2 anticlockwise
- Baud rate: 1 = 50 kbit/s
  2 = 125 kbit/s
  3 = 250 kbit/s
  4 = 500 kbit/s
  5 = 1 Mbit/s
- Node ID: Between 01 and 7F in Hexadecimal
- Frame rate: 1 = 25mS
  2 = 50mS
  3 = 100mS

The above options are factory set before despatch.

**CANopen OUTPUT**

- Mode: C = CANopen
- Output code: 1 = CANopen (DS406) Class 1
- Baud rate: 1 = 50 kbit/s
  2 = 125 kbit/s
  3 = 250 kbit/s
  4 = 500 kbit/s
  5 = 1 Mbit/s
- Node ID: Between 01 and 7F in Hexadecimal

Baud rate and Node ID are initially set at the factory before despatch.

Communication functionality and objects used in the CANopen encoder profile are described in the EDS file which can be downloaded from the SRH520CN product page at www.pennyandgiles.com

Some of these objects are customer configurable via the CANopen interface.

**Accessories** (ordered separately)

- Drive lever kit, including pin: SA202195/MK1 or 2 – see page 7
- Mating connector/cable assembly: 2 metre length X61-242-002 see details on page 5
  5 metre length X61-242-004
  10 metre length X61-242-006
**DIMENSIONS**

Note: drawings not to scale

Three holes 'b'
M6 x 1 through equi-spaced on 76.0 PCD

Three holes 'a'
ø6.5 through equi-spaced on 76.0 PCD

ø87.5

**PHASING OF SHAFT TO HOUSING**

Output increases for ACW unit when viewed on shaft
Mid point of electrical angle
Output increases for CW unit when viewed on shaft

Sensor is at mid electrical angle when shaft flat is facing towards the M12 connector as shown.

90°

M12 connector

Shaft flat

**LEVER OPTIONS** (order separately)

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

7 holes tapped M6x1.25 through
The information contained in this brochure on product applications should be used by customers for guidance only. Penny+Giles Controls Ltd makes no warranty or representation in respect of product fitness or suitability for any particular design application, environment, or otherwise, except as may subsequently be agreed in a contract for the sale and purchase of products. Customer’s should therefore satisfy themselves of the actual performance requirements and subsequently the products suitability for any particular design application and the environment in which the product is to be used.

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