Penny & Giles

Technical Information

STT280 & STT500

- **MEMS technology – Maintenance free**
- **Absolute measurement**
- **Measuring ranges ±10°, ±20°, ±30° and ±60°**
- **High resolution (±0.07°) Analog output – 0.5-4.5V**
- **5V or 8-30V supply**
- **Over-voltage protection**
- **Reverse polarity protection**
- **Compact or ruggedized housing designs**
- **Sealing up to IP69K**

The STT series uses Solid-state 3D-MEMS (Micro-Electro-Mechanical-Systems) technology to measure the sensor's inclination relative to the gravity of the earth, providing reliable, fit-and-forget tilt measurement for even the most arduous of operating environments.

The use of MEMS technology also provides distinct advantages in terms of response rate, reliability, stability and compactness over fluid based, electrolytic and pendulum operated devices, reducing the risk of late detection of unsafe tilt conditions.

With a choice of measurement angles up to ±60°, the STT series provides absolute measurement data to ensure there is no loss of tilt position on power down.

Outputs from the STT series are analog with a 0.5-4.5Vdc range across the angular span and a resolution of ±0.07° for maximum sensitivity in all applications.

Units may be powered from a 5Vdc regulated supply or an unregulated source, such as a battery, to suit available supply options. Reverse polarity and over-voltage protection is included.

The compact design of the STT280, with crush-proof inserts in the mounting flange, is ideal for applications with limited installation space. The larger STT500 is perfectly suited to applications where strength and robustness are paramount.

Both designs are corrosion resistant with protection ratings up to IP69K for operation in hostile environments.

Extensive design validation and qualification, such as EMC immunity of 100V/m, provides designers with confidence in achieving compliance to applicable national and international directives such as those required for CE marking.

Typical applications include: construction equipment, cranes and booms, scissor lifts, agricultural vehicles, container handling, and hydraulic lift systems.

CONTENTS

CONFIGURATION & ORDERING CODES

STTXXX-XX-XX

Type	Measurement Range	Cable Length
STT280	XXX	XX
	60	**P2**
	30	**P5**
	20	**02**
	10	

Type	Measurement Range	Connections
STT500	XXX	XXX
	60	**A00**
	30	**B01**
	20	**B05**
	10	**B10**
		C01

MEASUREMENT RANGE

STTXXX-**XX**-XX

Code	Description
60	±60° full range angular measurement
30	±30° full range angular measurement
20	±20° full range angular measurement
10	±10° full range angular measurement

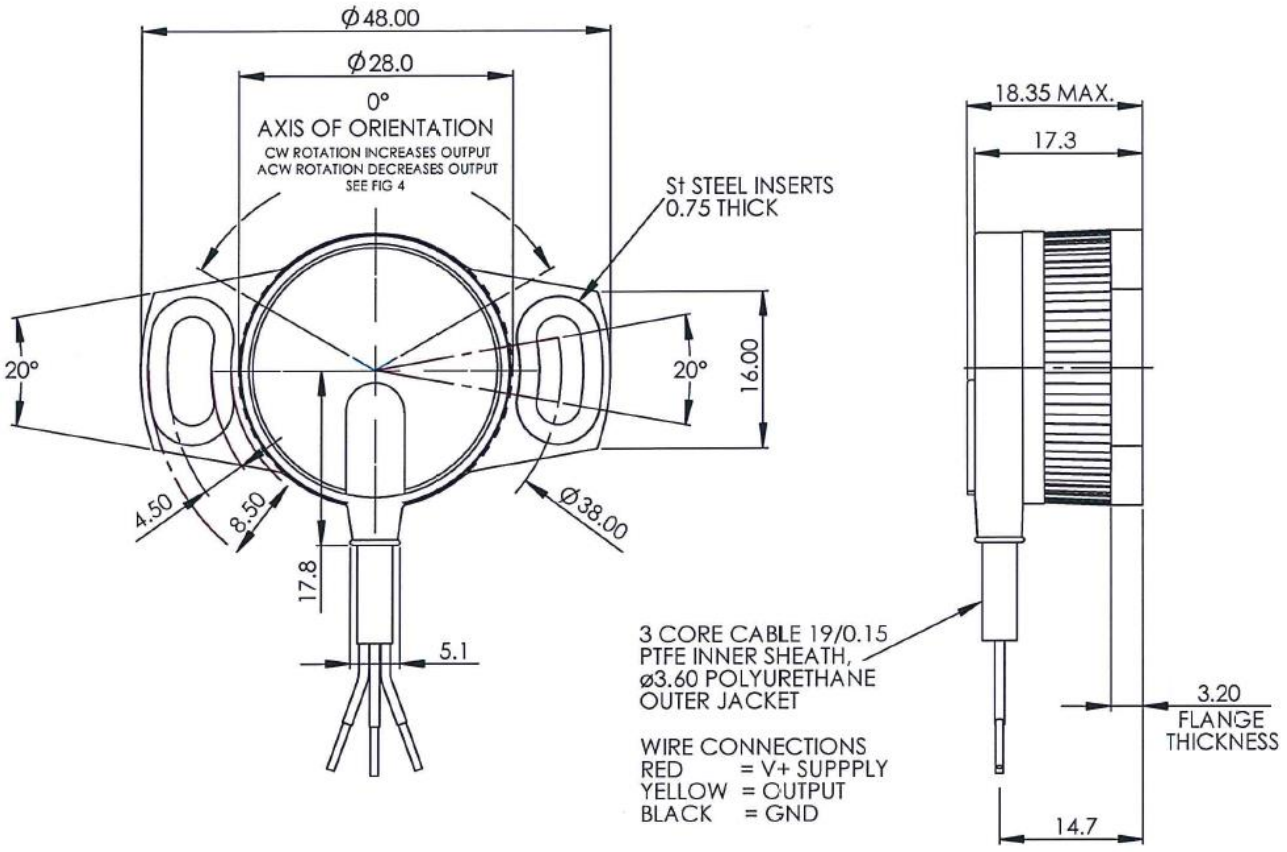
CABLE/CONNECTIONS

STTXXX-XX-**XX**

Code	Description
P2	0.2m flying lead (STT280 only)
P5	0.5m flying lead (STT280 only)
02	2.0m flying lead (STT280 only)
A00	No cable (STT500 only)
B01	1m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)
B05	5m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)
B10	10m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)
C01	Hirschmann M12 integrated connector (STT500 only)

INSTALLATION

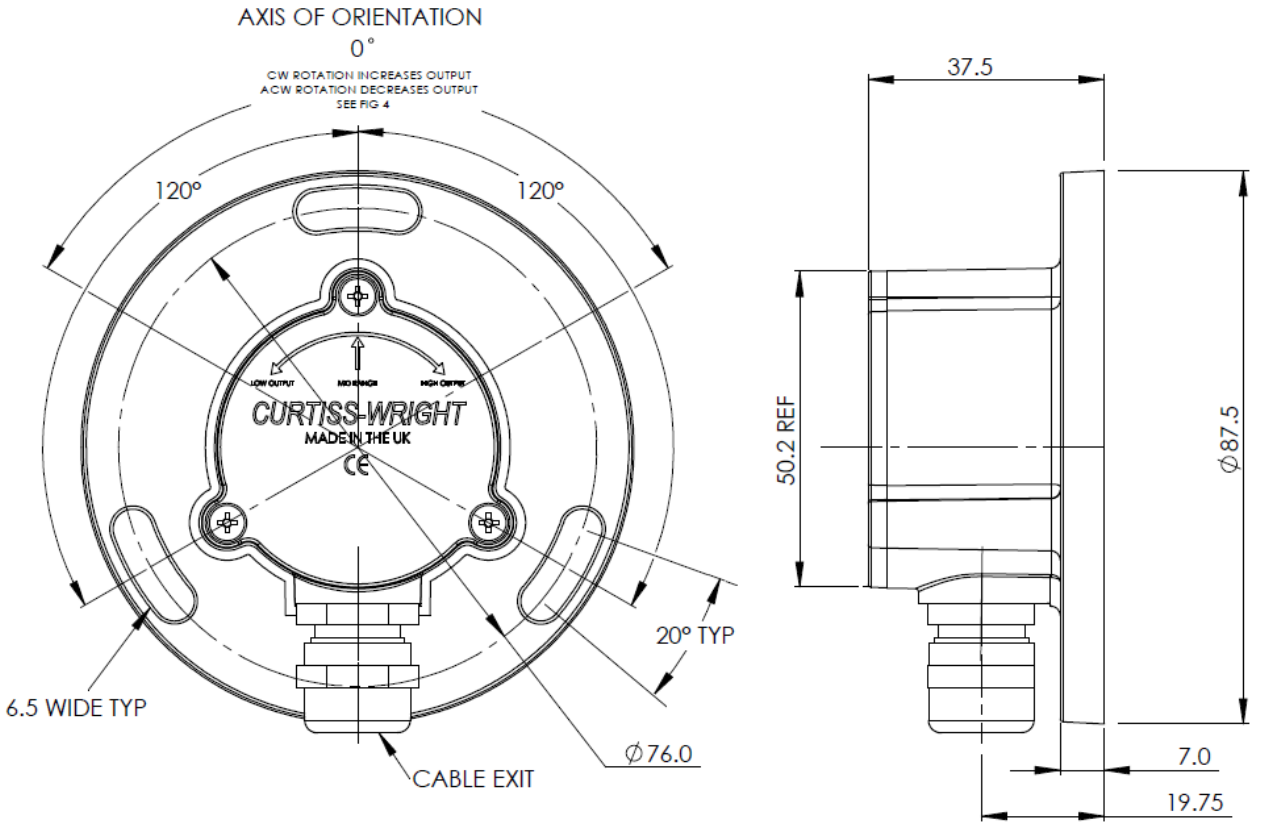
STT280



Dimensions in mm

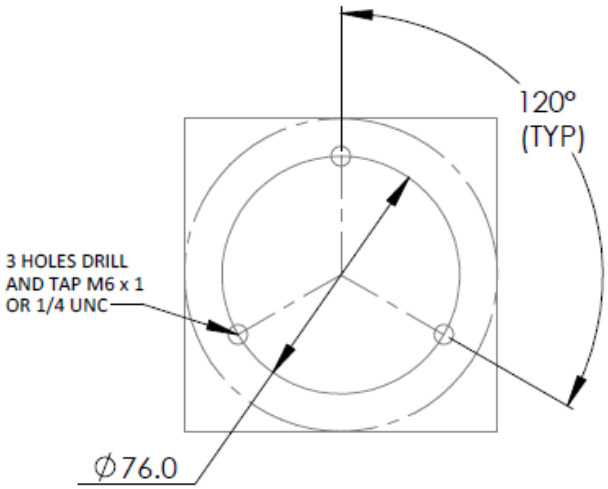
STT500

Mechanical



Dimensions in mm

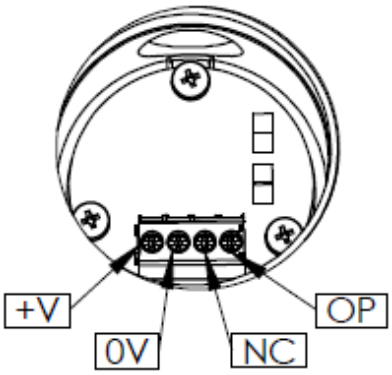
Mounting Detail



Electrical

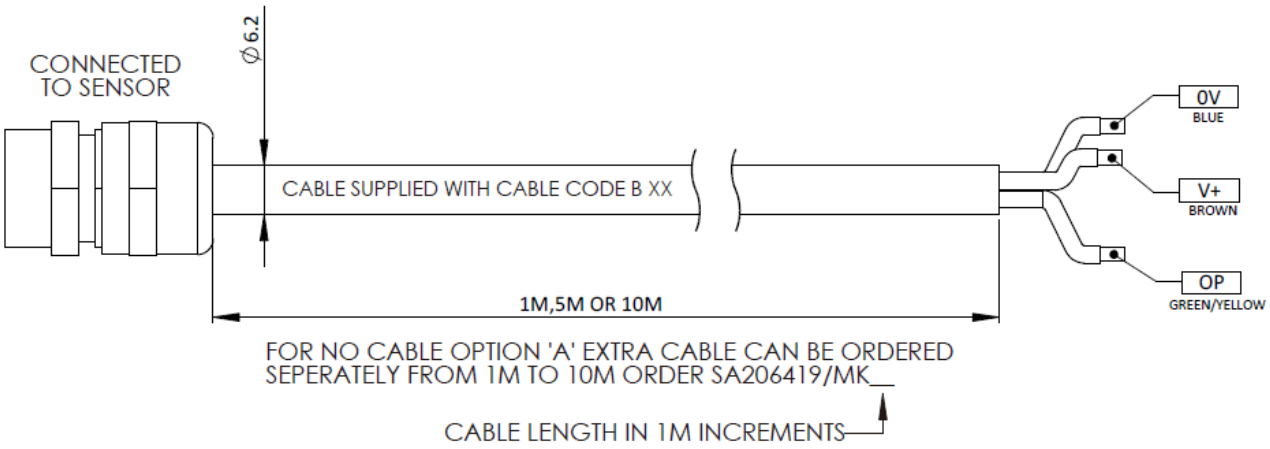
A00

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



CABLE GLAND WILL SUIT CABLE BETWEEN Ø4-8mm

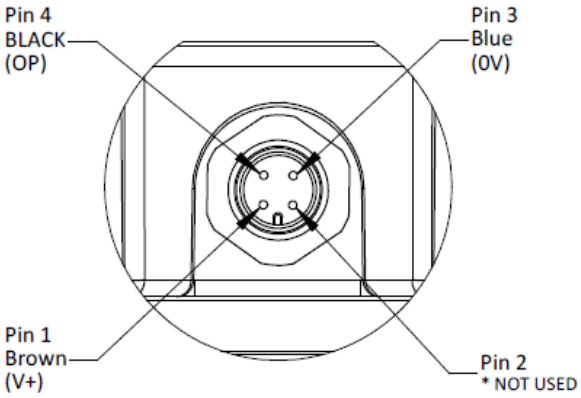
BXX

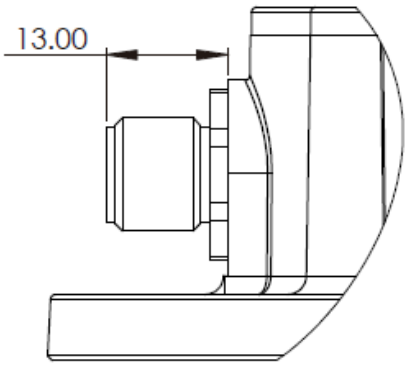


FOR NO CABLE OPTION 'A' EXTRA CABLE CAN BE ORDERED SEPERATELY FROM 1M TO 10M ORDER SA206419/MK__

CABLE LENGTH IN 1M INCREMENTS

C01

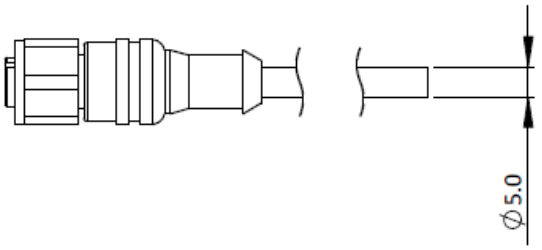




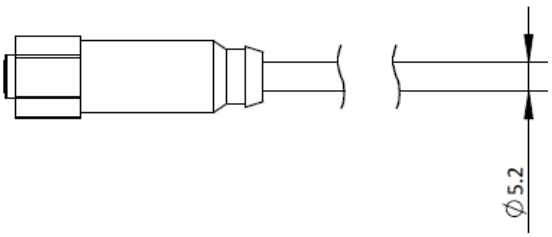
IP rating only in locked position with the proper counterpart

Mating Connector options

IP68
2 metre X61-169-102
(Hirschmann No. 934-401-203 2m)
5 metre X61-169-105
(Hirschmann No. 934-401-202 5m)
10 metre X61-226-002
(Lumberg PRST 4-07/10M)



IP69K
1.5 metre X61-222-001
(Murr No 7044-12221-336-0150 1.5m)
5 metre X61-222-003
(Murr No 7044-12221-336-0500 5m)
10 metre X61-222-005
(Murr No 7044-12221-336-1000 10m)



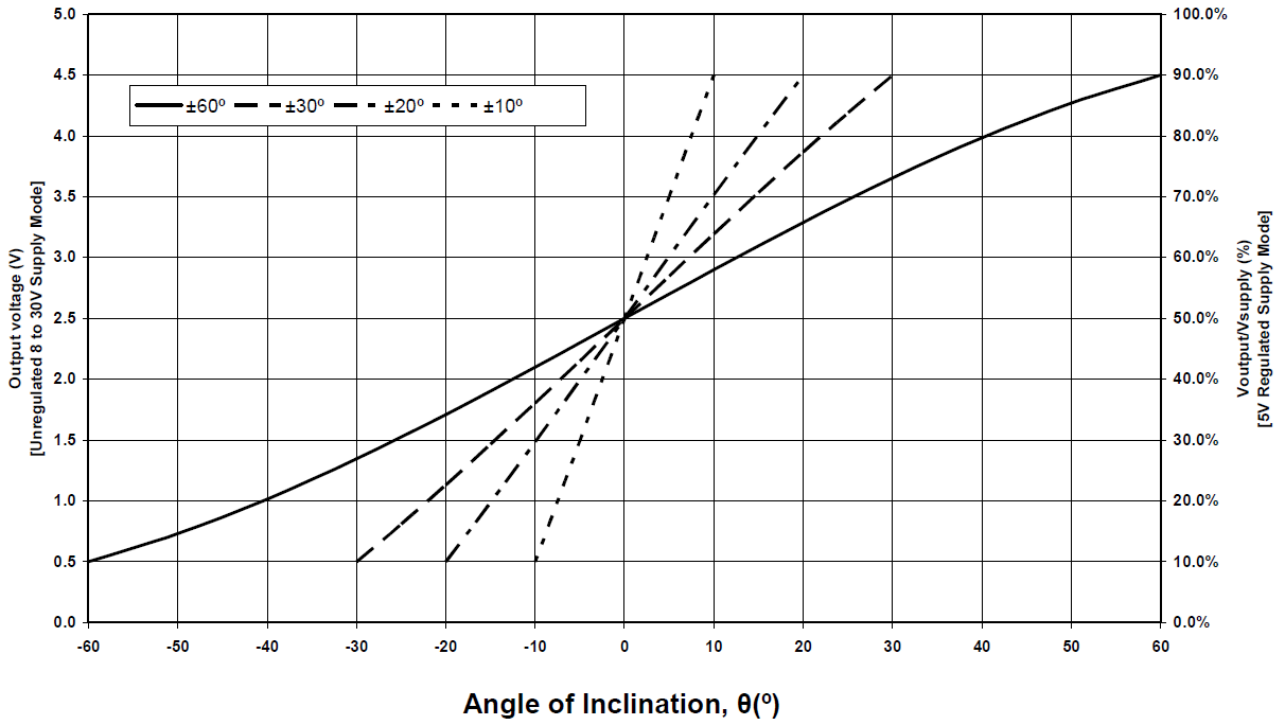
SPECIFICATIONS

SUPPLY

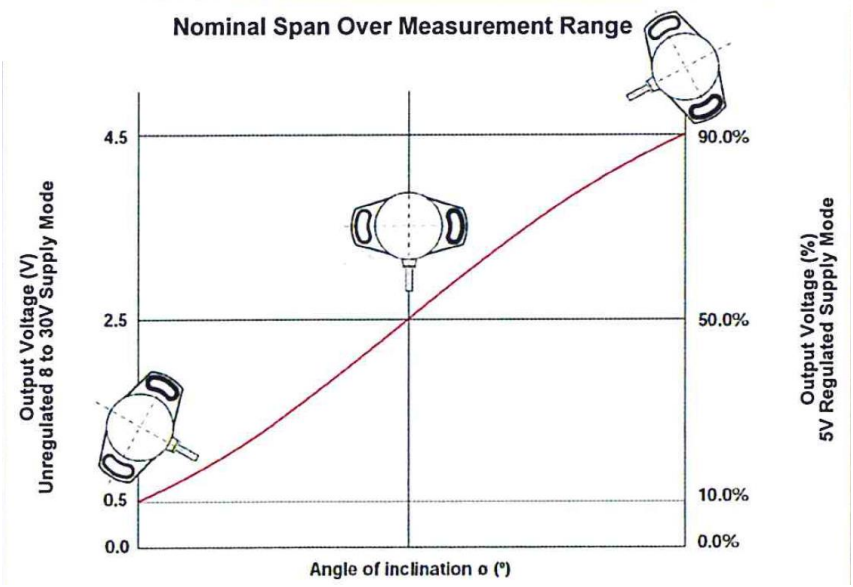
SUPPLY VOLTAGE	5Vdc ± 0.25Vdc (regulated) or 8-30Vdc (unregulated)
SUPPLY CURRENT	< 6.5mA
OVER VOLTAGE	Up to 40Vdc
REVERSE POLARITY PROTECTED	Yes
POWER-ON TIME	< 1s to within 1% of final output

OUTPUTS

MEASUREMENT RANGE	±10°, ±20°, ±30° and ±60°
OUTPUT LAW	5V supply: ((k*sin Θ) + 0.5) 8-30V supply: ((5*k*sin Θ) + 2.5) k = 2.3035 for ±10° k = 1.1695 for ±20° k = 0.8000 for ±30° k = 0.4619 for ±60°



OUTPUT VOLTAGE (5V SUPPLY)	10-90% of Vsupply, 50% of Vsupply for 0° tilt
OUTPUT VOLTAGE (8-30V SUPPLY)	0.5-4.5V, 2.5V for 0° tilt



DEVIATION FROM OUTPUT LAW	< ±1.75% of output voltage span
RESOLUTION	±0.07°
OUTPUT NOISE	<1mV rms
ZERO TEMP. COEFFICIENT (Ø = 0)	<0.01°/°C
SENSITIVITY TEMP. COEFFICIENT	<0.015% of measured angle/°C
FREQUENCY RESPONSE	1.5Hz (-3dB) nominal
SETTLING TIME	<500ms to within 1% of final output
HYSTERESIS & REPEATABILITY	±0.07°
CROSS-AXIS SENSITIVITY†	<4.0% of normal axis sensitivity
LOAD RESISTANCE	10kΩ min. to GND
SHORT CIRCUIT PROTECTION	Output to GND and Output to 5V max.

MECHANICAL

WEIGHT	STT280: 26g STT500: 200g (excluding cable options)
FIXING	STT280: 2 x 4.50mm slots with ±10° adjustment. Max. tightening 2Nm STT500: 3 x 6.50mm slots with ±10° adjustment. Max. tightening 6Nm
PHASING (ORIENTATION)	0° when cable is vertically down

ENVIRONMENTAL

OPERATING TEMPERATURE‡	5V supply: -40°C to 125°C 8-30V supply: -40°C to123°C at 8V reducing linearly to 112°C @ 30V
STORAGE TEMPERATURE	-55°C to 125°C
VIBRATION	EN 60068-2-64:1995 Sec 8.4 (14gn rms) 20-2000Hz random
SHOCK	3m drop onto concrete (absolute maximum 20,000g)
EMC	EN 61000-4-3:1999 100v/M 80M-1GHz & 1.4-2.7GHz (2004/108/EC)
SEALING	STT280: IP68 to 2m for 24h duration STT500: IP69K with cable code Bxx, IP rating for C01 dependent on mating cable (refer to page 7 for details)

† Cross-axis sensitivity determines how much inclination perpendicular to the measuring axis couples to the output.
‡ If the maximum operating temperature is exceeded, the voltage regulator will shut down to protect the device from overheating.
Data based on maximum supply current.

IMPORTANT INFORMATION
Whilst Curtiss-Wright Industrial Group - Penny & Giles has designed this sensor to meet a range of applications it is the responsibility of the customer to ensure it meets their specific requirement.

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 contract for the sale and purchase of products. Customers should therefore satisfy themselves of the actual performance requirements and subsequently the product's suitability for any particular design application and the environment in which the product is to be used.

Continual research and development may require change to products and specification without prior notification.

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