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.
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### CONFIGURATION & ORDERING CODES

**STTXXX-XX-XX**

<table>
<thead>
<tr>
<th>Type</th>
<th>Measurement Range</th>
<th>Cable Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>STT280</td>
<td>XXX</td>
<td>XX</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>P2</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>P5</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>02</td>
</tr>
<tr>
<td>STT500</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>A00</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>B01</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>B05</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>B10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C01</td>
</tr>
</tbody>
</table>

#### MEASUREMENT RANGE

**STTXXX-XX-XX**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>±60° full range angular measurement</td>
</tr>
<tr>
<td>30</td>
<td>±30° full range angular measurement</td>
</tr>
<tr>
<td>20</td>
<td>±20° full range angular measurement</td>
</tr>
<tr>
<td>10</td>
<td>±10° full range angular measurement</td>
</tr>
</tbody>
</table>

#### CABLE/CONNECTIONS

**STTXXX-XX-XX**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2</td>
<td>0.2m flying lead (STT280 only)</td>
</tr>
<tr>
<td>P5</td>
<td>0.5m flying lead (STT280 only)</td>
</tr>
<tr>
<td>02</td>
<td>2.0m flying lead (STT280 only)</td>
</tr>
<tr>
<td>A00</td>
<td>No cable (STT500 only)</td>
</tr>
<tr>
<td>B01</td>
<td>1m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)</td>
</tr>
<tr>
<td>B05</td>
<td>5m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)</td>
</tr>
<tr>
<td>B10</td>
<td>10m polyolefine copolymer inner sheath and outer jacket cable (STT500 only)</td>
</tr>
<tr>
<td>C01</td>
<td>Hirschmann M12 integrated connector (STT500 only)</td>
</tr>
</tbody>
</table>
INSTALLATION

STT280

Dimensions in mm
STT500

Mechanical

AXIS OF ORIENTATION

CABLE EXIT

6.5 WIDE TYP

20° TYP

3 HOLE DRILL AND TAP M5 x 1 OR 1/4 UNC

120° (TYP)

120°

120°

37.5

50.2 REF

68.75

7.0

19.75

Dimensions in mm

Mounting Detail
Electrical

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

CABLE GLAND WILL SUIT CABLE BETWEEN Ø4-8mm

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

CABLE LENGTH IN 1M INCREMENTS
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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY VOLTAGE</td>
<td>5Vdc ± 0.25Vdc (regulated) or 8-30Vdc (unregulated)</td>
</tr>
<tr>
<td>SUPPLY CURRENT</td>
<td>&lt; 6.5mA</td>
</tr>
<tr>
<td>OVER VOLTAGE</td>
<td>Up to 40Vdc</td>
</tr>
<tr>
<td>REVERSE POLARITY PROTECTED</td>
<td>Yes</td>
</tr>
<tr>
<td>POWER-ON TIME</td>
<td>&lt; 1s to within 1% of final output</td>
</tr>
</tbody>
</table>

### OUTPUTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEASUREMENT RANGE</td>
<td>±10°, ±20°, ±30° and ±60°</td>
</tr>
<tr>
<td>OUTPUT LAW</td>
<td>5V supply: ((k*sin θ) + 0.5)</td>
</tr>
<tr>
<td></td>
<td>8-30V supply: ((5<em>k</em>sin θ) + 2.5)</td>
</tr>
<tr>
<td></td>
<td>k = 2.3035 for ±10°</td>
</tr>
<tr>
<td></td>
<td>k = 1.1695 for ±20°</td>
</tr>
<tr>
<td></td>
<td>k = 0.8000 for ±30°</td>
</tr>
<tr>
<td></td>
<td>k = 0.4619 for ±60°</td>
</tr>
</tbody>
</table>
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 to 123°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

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