HOW TO INTERPRETE THE ORDERING REFERENCES

ACCELERATION SENSORS

Acceleration is a physical quantity related to any event of motion, rotation, vibration and inclination. Monitoring accelerations is an optimal way to gather reliable information on working process. Generally these information cannot be easily obtained by other sensor systems.

This kind of information is useful to make reliable automatic control diagnostic and supervision systems.

Accelerometers are inertial sensors that supply proportional electrical signal to accelerations applied to the device in specific directions.

Signal analysis and calculations are performed internally by the sensor, not requiring then external additional modules or software. The application is therefore very simple.
2 AXIS INCLINATION SENSORS (-60° ÷ +60°) •
Analog linear output •
Cable output •

General Features:
These sensors give two output signals from 0,7 to 4,3 V proportional to the inclination of the X and Y axis respect the earth axis. An inclination of 0° gives on the outputs + 2,5 V respect to the negative of power supply (blue wire) or 0 V respect to the OUT zero.
Other outputs such as temperature and ON/OFF alarms, which are factory presetted at specified thresholds, are available upon request.

Applications:
• Inclination control on lifting systems
• Vehicles inclination monitoring
• Feedback sensor on self-levelling systems

Technical data:
• Measuring range: - 60° ÷ + 60°
• Resolution: 0,2°
• Supply voltage: 8 ÷ 30 Vdc
• Power consumption: ≤ 10 mA
• Output voltage range:
  - respect to - V: 0,7 ÷ 4,3 V
  - respect to Out zero: - 1,8 ÷ + 1,8 V
• Sensitivity: 0,03 V/°
• Max thermal drift: 4,5 mV/°C
• Output resistance: 100 Ω
• Response time: 0,1 sec
• Linearity: < 1% full scale
• Hysteresis: < 0,2% full scale
• Cross axis sensitivity: < ± 2%
• Maximum survival shock: 1000 g
• Working temperature: 0 ÷ 70° C
• Storage temperature: - 20° ÷ +100° C
• Degree of protection: IP67
• Cable conductor cross section 0,22 mm² + shield
• LED indication: green = supply voltage
• Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
• Electromagnetic compatibility (EMC) according to EN61000-6-2/4

ORDERING REFERENCES

<table>
<thead>
<tr>
<th>Type</th>
<th>Cable diameter</th>
<th>ORDERING REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biaxial</td>
<td>5</td>
<td>ISX/2660S</td>
</tr>
</tbody>
</table>

Materials:
• Cable: 2 m PVC CEI 20 - 22 II; 90°C plastic

Connection diagram

Materials:
• Cable:
• Housing:

Biaxial

ISX/2660S
ACCELERATION SENSORS

- 2 AXIS VIBRATION SENSORS
- Average value output
- Cable output

**General Features:**
These sensors give an analog signal proportional to the vibrations on both the X and Y axis. Since the measurement is made from a very low frequency, the gravity acceleration is not detected, so the measurement is not affected by the mounting position. The output voltage from 0 to 5 V is proportional to the average value of the sum of the accelerations measured on the X and Y axis. Other outputs such as temperature and ON/OFF alarms, which are factory presetted at specific thresholds, are available upon request.

**Applications:**
- Alarm or feedback on the control for excessive vibrations
- Shock and collision amplitude indication
- Harmful unbalancing detection of the tool and tool holder in milling and grinding machines.

**Technical data:**
- Measuring range: \( \pm 2; \pm 5; \pm 18 \text{ g} \)
- Supply voltage: \( 8 \div 30 \text{ Vdc} \)
- Power consumption: \( \leq 12 \text{ mA} \)
- Output voltage range: \( 0 \div 5 \text{ V} \)
- Sensitivity:
  - 2 g full scale: \( 2.5 \text{ V/g} \)
  - 5 g full scale: \( 1 \text{ V/g} \)
  - 18 g full scale: \( 0.27 \text{ V/g} \)
- Output resistance: \( 100 \Omega \)
- Frequency range: \( 2 \div 500 \text{ Hz} \)
- Cross axis sensitivity: \( \leq \pm 2 \% \)
- Maximum survival shock: \( 1000 \text{ g} \)
- Working temperature: \( -20^\circ + 70^\circ \text{ C} \)
- Storage temperature: \( -40^\circ + 100^\circ \text{ C} \)
- Degree of protection: IP67
- Cable conductor cross section: \( 0.35 \text{ mm}^2 + \text{shield} \)
- LED indication:
  - green = power supply
  - yellow = vibration level \( >1\% \text{ full scale} \)
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

**Cable diameter:**

<table>
<thead>
<tr>
<th>Type</th>
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<th>Full scale measure</th>
<th>ORDERING REFERENCES</th>
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<td>2 g</td>
<td>VSX/2602S</td>
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<td>VSX/2605S</td>
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<td>18 g</td>
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**Materials:**
- Cable: 2 m PVC CEI 20 - 22 II; 90°C
- Housing: plastic

**Connection diagram:**

- brown, black, blue
- + Vdc, Vs0.5 V, - Vdc
- LED indication: green = power supply, yellow = vibration level >1% full scale
ACCELERATION SENSORS

3 AXES VIBRATION AND SHOCK SENSOR • 4÷20 mA Output • M12x1 connector output •

General features:
These new accelerometers give a single 4 ÷ 20 mA signal proportional to the vibrations applied to X, Y and Z axes. Since the measurement is made from a very low frequency, the acceleration due to gravity is not detected, so the measurement will not be affected by the mounting position.
Depending on the connection polarity (direct or reverse) it’s possible to perform the RMS measurement on the vectorial sum of the acceleration on the three axes X, Y and Z or the instantaneous value, simply reversing the two connection wires.
On the version VBS... (bump sensor) the highest instantaneous value is held on the output for one second, allowing analogue value measurement.
For a reliable connection it is recommended to use M12x1 connectors with the shield of the cable connected to the nut (see section H of the catalogue).

Applications:
• Collision detection on electrospindles, handles and robot arms
• Unbalancing detection of tools on milling and grinding machines
• Detection of wearing or abnormal working of ball bearings and rotating parts
• Detection of incorrect loading of drum in washing machines
• Out of balance loads on rotating machinery

Technical data:
• Measuring range: ± 6 g; ± 10 g
• Supply voltage: 8 ÷ 40 Vdc
• Output current : 4 ÷ 20 mA
• Output current variation: see the table
• Hold time of the peak value (version VBS...): 1 sec.
• Frequency range: 2 ÷ 300 Hz
• Max survival shock: 2000 g
• Working temperature: -20° ÷ +80° C
• Degree of ingress protection: IP68/IP69K
• Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
• Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

<table>
<thead>
<tr>
<th>Axes</th>
<th>Output</th>
<th>Output current variation</th>
<th>Full scale measure</th>
<th>Female connector (see section H)</th>
<th>ORDERING REFERENCES</th>
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<td>Direct/reverse wiring</td>
<td>mA/g</td>
<td>g</td>
<td>n°</td>
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<td>3 (X, Y, Z)</td>
<td>RMS/instantaneous value</td>
<td>2.66</td>
<td>6</td>
<td>8B - 10</td>
<td>VS12X/3306</td>
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<td>3 (X, Y, Z)</td>
<td>RMS/instantaneous value</td>
<td>1.60</td>
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<td>8B - 10</td>
<td>VS12X/3310</td>
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<tr>
<td>3 (X, Y, Z)</td>
<td>RMS/peak value</td>
<td>2.66</td>
<td>6</td>
<td>8B - 10</td>
<td>VBS12X/3306</td>
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<tr>
<td>3 (X, Y, Z)</td>
<td>RMS/peak value</td>
<td>1.60</td>
<td>10</td>
<td>8B - 10</td>
<td>VBS12X/3310</td>
</tr>
</tbody>
</table>

Materials:
• Housing: stainless steel
**ACCELERATION SENSORS**

**2 AXES INCLINATION SENSORS with analogue voltage output**
- Self teaching of zero position
- High thermal stability
- Insensitive to shock and vibrations
- Low power

**Axes position**

**Typical curve**

**Connection diagram**

**Materials:**
- Cable: PVC CEI 20 - 22 II; 90° C
- Housing: plastic
- Connector locking nut: nickel plated brass

**General features:**
These sensors give two output voltage signals proportional to the inclination of the X and Y axes with respect to the earth axis. An inclination of 0° gives on the outputs 50% of the maximum value full scale with respect to the negative of the power supply. The sensor is insensitive to shocks and vibrations and the absolute zero position is factory calibrated to ground level. For a reliable connection it is recommended to use M12x1 connectors with the shield of the cable connected to the nut (see section H of the catalogue).

**Self teaching of zero position:**
Even though the sensor is factory calibrated, the input “zero teach” allows the compensation of mounting tolerances up to ±10°. Self compensation is achieved by connecting the input “zero teach” to the negative of the power supply for between 2 and 10 seconds. The compensation process is indicated by the yellow LED. When the compensation is complete (after about 1 second) the yellow and green LEDs will flash. At this stage the connection between the zero-teach and the negative must be removed.

**Applications:**
- Inclination control on lifting systems
- Vehicle inclination monitoring
- Feedback sensor on self-levelling systems

**Technical data:**
- No load supply current: ≤10 mA
- Max zero position error: ±50 mV
- Max thermal drift: 4.5 mV/°C
- Max output current (source): 20 mA
- Response time: 0.1 sec
- Linearity: < 1% full scale
- Cross axis sensitivity: < ±2%
- Maximal survival shock: 1000 g
- Working temperature: -20 ÷ +70°C
- Storage temperature: -20 + 100°C
- Degree of ingress protection: IP67
- LED indications: Green = supply voltage, Yellow = zero-teach
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

**ORDERING REFERENCES**

<table>
<thead>
<tr>
<th>Axes</th>
<th>Measuring range α</th>
<th>Output (Uα)</th>
<th>Power supply (Uα)</th>
<th>Resolution</th>
<th>Sensitivity</th>
<th>Cable length [m]</th>
<th>Female connector [see section H]</th>
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<tbody>
<tr>
<td>2</td>
<td>±15</td>
<td>V</td>
<td>V</td>
<td>0.1</td>
<td>0.15</td>
<td>0.3</td>
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<td>2</td>
<td>±15</td>
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<td>15 ÷ 30</td>
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<td>0.30</td>
<td>0.3</td>
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<td>8 ÷ 30</td>
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<td>15 ÷ 30</td>
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<td>0.08</td>
<td>0.3</td>
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</table>
2 AXES INCLINATION SWITCH (± 60°) with 2 on/off static outputs

Insensitive to shock and vibrations • Self teaching of zero position and threshold • Low power • High thermal stability

**General features:**
These sensors give two NPN normally open outputs which connect to the negative power supply when the preset thresholds of the X and Y axes are exceeded. The sensor is insensitive to shocks and vibrations and the absolute zero is factory calibrated to ground level. The thresholds can be factory preset at specified values. If not otherwise specified both the thresholds are preset at ± 5° for both the axes. Both the thresholds and the zero position can be modified in the field.

**Applications:**
- Inclination control on lifting systems
- Vehicle inclination monitoring
- Feedback sensor on self-levelling systems

**Technical data:**
- Measuring range: ± 60°
- Resolution: 0.2°
- Supply voltage: 8 ÷ 40 Vcc
- No load supply current: ≤ 10 mA
- Output: NPN n.o. open collector
- Max thermal drift of switching point: 0.03° / °C
- Max output current: 200 mA
- Max response time: < ± 2%
- Maximum survival shock: 1000 g
- Working temperature: -20° + + 100°C
- Storage temperature: -20° + + 70°C
- Degree of ingress protection: IP67
- LED indications: Green = supply voltage, Yellow = threshold exceeding
- Shock and vibration resistance according to EN60068-2-27, EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

**Materials:**
- Cable: PVC CEI 20 - 22 II; 90° C
- Housing: plastic
- Connector locking nut: nickel plated brass

<table>
<thead>
<tr>
<th>Axes</th>
<th>Cable length (L)</th>
<th>Female connector (see section H)</th>
<th>ORDERING REFERENCES</th>
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<tbody>
<tr>
<td>2</td>
<td>0,3</td>
<td>88 - 10</td>
<td>ISX/2H60DS-0,3</td>
</tr>
</tbody>
</table>
ACCELERATION SENSORS

2 AXES INCLINATION SENSORS with analogue voltage output

- High thermal stability
- Low power
- Rugged anodized aluminum housing
- Insensitive to shock and vibrations

General features:
These sensors give two output voltage signals proportional to the inclination of the X and Y axes with respect to the earth axis. An inclination of 0° gives on the outputs 50% of the maximum value full scale with respect to the negative of the power supply. The anodized aluminum housing makes this sensor extremely robust, immune to UV rays and suitable for outdoor applications such as solar trackers and nautical installations. The sensor is insensitive to shocks and vibrations and the absolute zero position is factory calibrated to ground level. For a reliable connection it is recommended to use M12x1 connectors with the shield of the cable connected to the nut (see section H of the catalogue).

Self teaching of zero position:
Even though the sensor is factory calibrated, the input “zero-teach” allows the compensation of mounting tolerances up to ±10°. Self compensation is achieved by connecting the input “zero teach” to the negative of the power supply for between 2 and 10 seconds. The compensation process is indicated by the yellow LED. When the compensation is complete (after about 1 second) the yellow and green LEDs will flash. At this stage the connection between the zero-teach and the negative must be removed.

Applications:
- Solar trackers
- Inclination control on lifting systems
- Vehicle inclination monitoring
- Feedback sensor on self-levelling systems

Technical data:
- No load supply current: ≤ 10 mA
- Max zero position error: ± 50 mV
- Max thermal drift: 4,5 m V/°C
- Max output current (source): 20 mA
- Response time: 0,1 sec
- Linearity: < 1% full scale
- Cross axis sensitivity: < ± 2%
- Maximum survival shock: 1000 g
- Working temperature: -40 ÷ + 85° C
- Storage temperature: -40 ÷ + 100° C
- Degree of ingress protection: IP68/IP69K
- LED indications: Green = supply voltage
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4

<table>
<thead>
<tr>
<th>Axes</th>
<th>Measuring range α</th>
<th>Output (Uo)</th>
<th>Power supply (Us)</th>
<th>Resolution</th>
<th>Sensitivity</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>± 15</td>
<td>0 ÷ 5</td>
<td>8 ÷ 30</td>
<td>0,05</td>
<td>0,15</td>
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<td>± 15</td>
<td>0 ÷ 10</td>
<td>15 ÷ 30</td>
<td>0,05</td>
<td>0,30</td>
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<tr>
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<td>± 60</td>
<td>0 ÷ 5</td>
<td>8 ÷ 30</td>
<td>0,1</td>
<td>0,04</td>
<td>ISG/2360AS</td>
</tr>
<tr>
<td>2</td>
<td>± 60</td>
<td>0 ÷ 10</td>
<td>15 ÷ 30</td>
<td>0,1</td>
<td>0,08</td>
<td>ISG/2360BS</td>
</tr>
</tbody>
</table>

Materials:
- Housing: anodized aluminum
- Connector: nickel plated brass

Connection diagram

<table>
<thead>
<tr>
<th>Axes position</th>
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<tbody>
<tr>
<td>α_x</td>
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<tr>
<td>α_y</td>
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<tr>
<td>+α_x</td>
</tr>
<tr>
<td>+α_y</td>
</tr>
<tr>
<td>-α_x</td>
</tr>
<tr>
<td>-α_y</td>
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</table>

Typical curve

<table>
<thead>
<tr>
<th>Axes position</th>
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<tbody>
<tr>
<td>α_x</td>
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<td>+α_x</td>
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<tr>
<td>+α_y</td>
</tr>
<tr>
<td>-α_x</td>
</tr>
<tr>
<td>-α_y</td>
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Connection diagram

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<tbody>
<tr>
<td>α_x</td>
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<td>α_y</td>
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<tr>
<td>+α_x</td>
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<tr>
<td>+α_y</td>
</tr>
<tr>
<td>-α_x</td>
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<tr>
<td>-α_y</td>
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</table>

Materials:
- Housing: anodized aluminum
- Connector: nickel plated brass

Technical data:
- No load supply current: ≤ 10 mA
- Max zero position error: ± 50 mV
- Max thermal drift: 4,5 m V/°C
- Max output current (source): 20 mA
- Response time: 0,1 sec
- Linearity: < 1% full scale
- Cross axis sensitivity: < ± 2%
- Maximum survival shock: 1000 g
- Working temperature: -40 ÷ + 85° C
- Storage temperature: -40 ÷ + 100° C
- Degree of ingress protection: IP68/IP69K
- LED indications: Green = supply voltage
- Shock and vibration resistance according to EN60068-2-27 EN60068-2-6
- Electromagnetic compatibility (EMC) according to EN61000-6-2/-4
ACCELERATION SENSORS

2 AXES INCLINATION SWITCH (± 60°) with 2 on/off static outputs

**General features:**
These sensors give two NPN normally open outputs which connect to the negative power supply when the preset thresholds of the X and Y axes are exceeded. The anodized aluminum housing makes this sensor extremely robust, immune to UV rays and suitable for outdoor applications such as solar trackers and nautical installations. The sensor is insensitive to shocks and vibrations and the absolute zero is factory calibrated to ground level. The thresholds can be factory preset at specified values. If not otherwise specified both the thresholds are preset at ± 5° for both the axes. Both the thresholds and the zero position can be modified in the field.

**Applications:**
- Solar trackers
- Inclination control on lifting systems
- Vehicle inclination monitoring
- Feedback sensor on self-levelling systems

**Technical data:**
- Measuring range: ± 60°
- Resolution: 0,1°
- Supply voltage: 8 ÷ 40 Vcc
- No load supply current: ≤ 10 mA
- Output: NPN n.o. open collector
- Max thermal drift of switching point: 0,02° / °C
- Max output current: 200 mA
- Max response time: 0,1 sec
- Cross axis sensitivity: < ± 2%
- Maximum survival shock: 1000 g
- Working temperature: - 40 ÷ + 85° C
- Storage temperature: - 40 ÷ + 100° C
- Degree of ingress protection: IP68/IP69K
- Electromagnetic compatibility (EMC) according to EN61000-6-2/4

**Materials:**
- Housing: anodized aluminum
- Connector: nickel plated brass

**Connection diagram**

**Materials:**
- Housing: anodized aluminum
- Connector: nickel plated brass

<table>
<thead>
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<th>Axes</th>
<th>Female connector (see section H)</th>
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**ORDERING REFERENCES**

- ISG/2360DS