



Operating instructions
Inclination sensor
EC20xx

GB

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1 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.

2 Preliminary note

You will find instructions, technical data, approvals, accessories and further information using the QR code on the unit / packaging or at www.ifm.com.

3 Intended use

The inclination sensors from the EC20xx series are designed for vertical mounting and measure inclination angles around the Z-axis.

They enable precise spatial monitoring of an object and measure its position in relation to the gravity of the earth without contact.

4 Installation

Fastening: M5 cylinder bolts (to DIN 912)

Tightening torque: 1.8 Nm

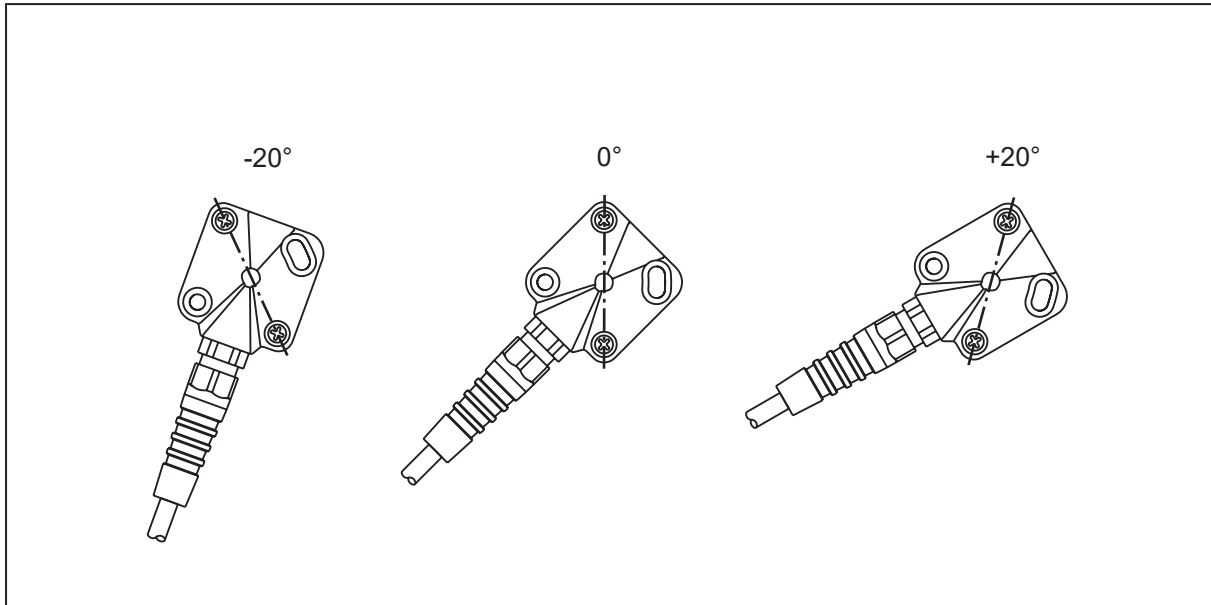


Fig. 1: Installation EC2060

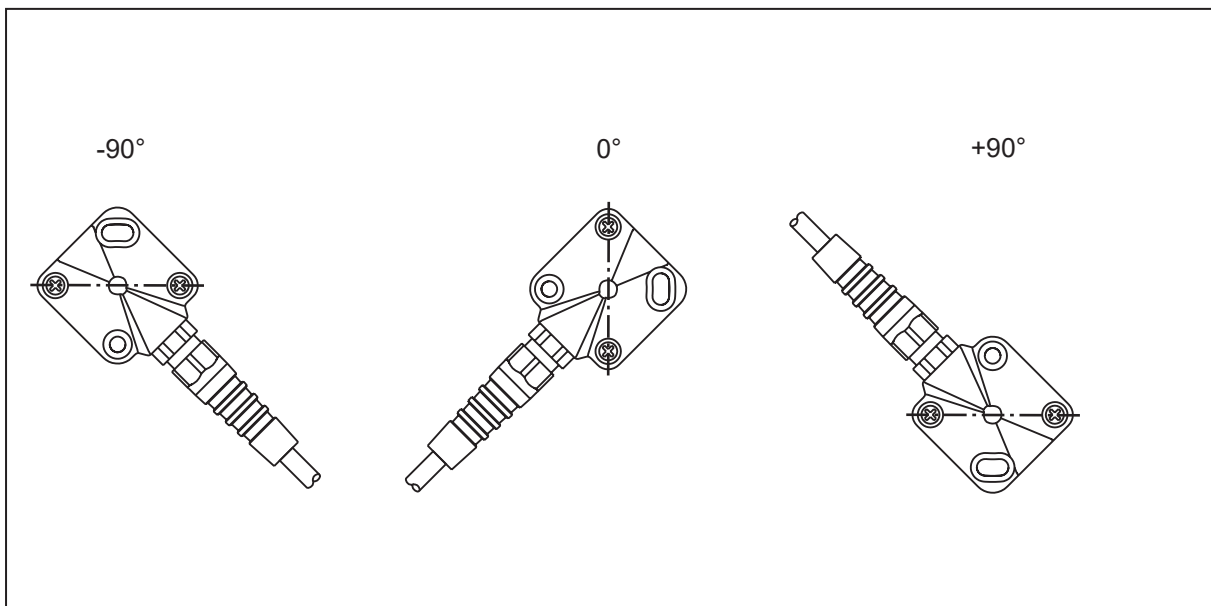


Fig. 2: Installation EC2019, EC2045, EC2082

4.1 Mounting surface


► Mount the device on a flat mounting surface.




► The housing must not be exposed to any torsional forces or mechanical stress.

5 Electrical connection

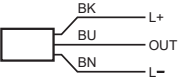
EC2060

| Designation | Pin | | Potential |
|-------------------|-------|---|--------------|
| Operating voltage | 1: L+ |  | 11...15 V DC |
| Mass | 3: L- | | GND |
| Analogue output | 4 | | 4...20 mA DC |

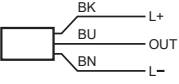
EC2082

| Designation | Pin | | Potential |
|-------------------|-------|---|--------------|
| Operating voltage | 1: L+ |  | 20...30 V DC |
| Mass | 3: L- | | GND |
| Analogue output | 4 | | 4...20 mA DC |

EC2019

| Designation | Core colour | Potential | |
|-------------------|-------------|--|--------------|
| Operating voltage | black (BK) |  | 15...30 V DC |
| Mass | brown (BN) | | GND |
| Analogue output | blue (BU) | | 0...10 V DC |

EC2045

| Designation | Core colour | Potential | |
|-------------------|-------------|--|----------------|
| Operating voltage | black (BK) |  | 8...30 V DC |
| Mass | brown (BN) | | GND |
| Analogue output | blue (BU) | | 0.5...4.5 V DC |

► To protect the whole system the supply voltage must be protected with max. 0.5 A.

Additional shielding measures may be required to ensure accurate sensor inclination information.

The max. signal cable length is 30 m.

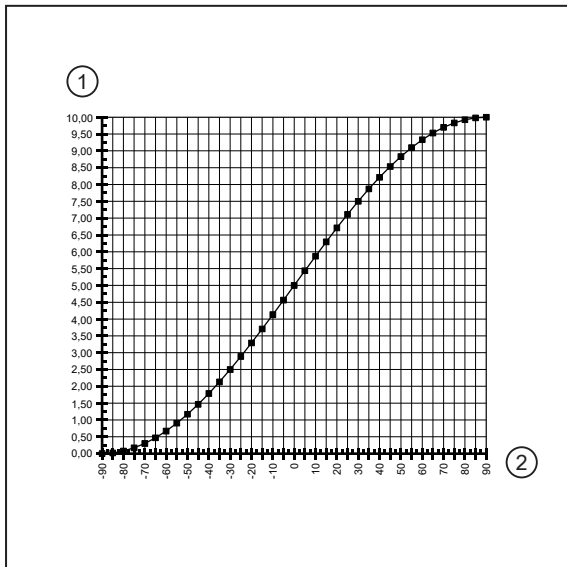
6 Operation

After power-on the device is in the normal operating mode.

The analogue output value is directly dependent on the mounting position.

7 Function

7.1 Characteristics

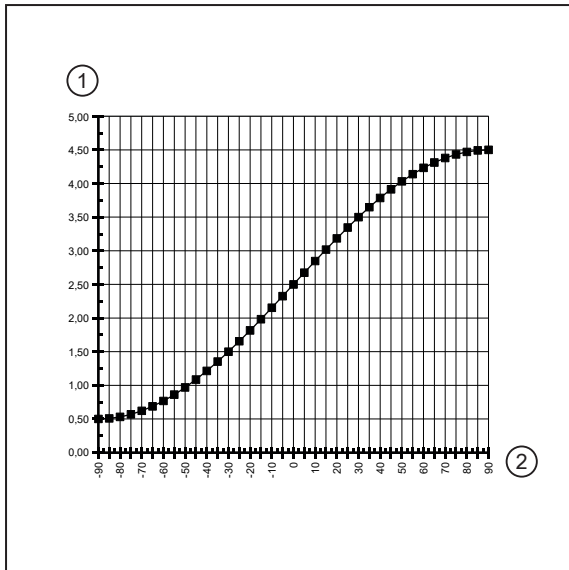


EC2019

1: Output voltage U [V]

2: Inclination angle α [°]

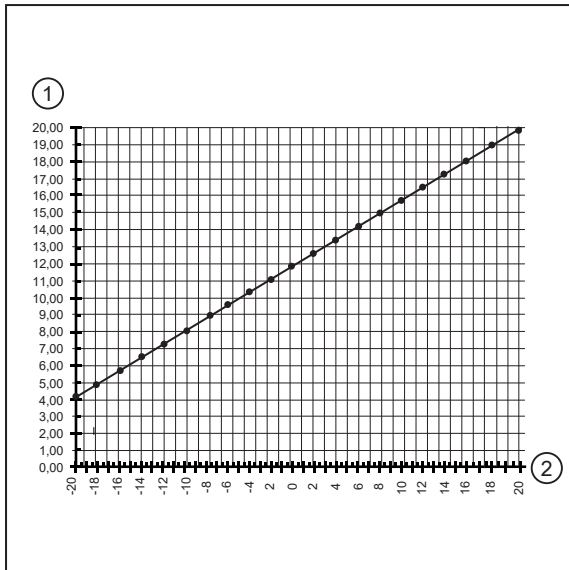
| Angle and output values | | | |
|-------------------------|---------|--------------|---------|
| α [°] | U [V] | α [°] | U [V] |
| -90 | 0.00 | 5 | 5.44 |
| -85 | 0.02 | 10 | 5.87 |
| -80 | 0.08 | 15 | 6.29 |
| -75 | 0.17 | 20 | 6.71 |
| -70 | 0.30 | 25 | 7.11 |
| -65 | 0.47 | 30 | 7.50 |
| -60 | 0.67 | 35 | 7.87 |
| -55 | 0.90 | 40 | 8.21 |
| -50 | 1.17 | 45 | 8.54 |
| -45 | 1.46 | 50 | 8.83 |
| -40 | 1.79 | 55 | 9.10 |
| -35 | 2.13 | 60 | 9.33 |
| -30 | 2.50 | 65 | 9.53 |
| -25 | 2.89 | 70 | 9.70 |
| -20 | 3.29 | 75 | 9.83 |
| -15 | 3.71 | 80 | 9.92 |
| -10 | 4.13 | 85 | 9.98 |
| -5 | 4.56 | 90 | 10.00 |
| 0 | 5.00 | | |



EC2045

- 1: Output voltage U [V]
- 2: Inclination angle α [°]

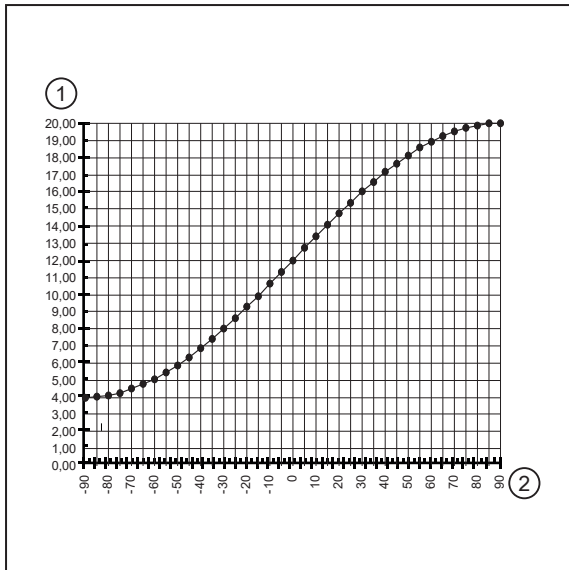
| Angle and output values | | | |
|-------------------------|-------|--------------|-------|
| α [°] | U [V] | α [°] | U [V] |
| -90 | 0.50 | 5 | 2.67 |
| -85 | 0.51 | 10 | 2.85 |
| -80 | 0.53 | 15 | 3.02 |
| -75 | 0.57 | 20 | 3.18 |
| -70 | 0.62 | 25 | 3.35 |
| -65 | 0.69 | 30 | 3.50 |
| -60 | 0.77 | 35 | 3.65 |
| -55 | 0.86 | 40 | 3.79 |
| -50 | 0.97 | 45 | 3.91 |
| -45 | 1.09 | 50 | 4.03 |
| -40 | 1.21 | 55 | 4.14 |
| -35 | 1.35 | 60 | 4.23 |
| -30 | 1.50 | 65 | 4.31 |
| -25 | 1.65 | 70 | 4.38 |
| -20 | 1.82 | 75 | 4.43 |
| -15 | 1.98 | 80 | 4.47 |
| -10 | 2.15 | 85 | 4.49 |
| -5 | 2.33 | 90 | 4.50 |
| 0 | 2.50 | | |



EC2060

1: Output current I [mA]
 2: Inclination angle α [°]

| Angle and output values | | | |
|-------------------------|----------|--------------|----------|
| α [°] | I [mA] | α [°] | I [mA] |
| -20 | 4.01 | 0 | 12.00 |
| -19 | 4.39 | 1 | 12.41 |
| -18 | 4.78 | 2 | 12.82 |
| -17 | 5.17 | 3 | 13.22 |
| -16 | 5.56 | 4 | 13.63 |
| -15 | 5.95 | 5 | 14.04 |
| -14 | 6.35 | 6 | 14.44 |
| -13 | 6.75 | 7 | 14.85 |
| -12 | 7.14 | 8 | 15.25 |
| -11 | 7.54 | 9 | 15.65 |
| -10 | 7.94 | 10 | 16.06 |
| -9 | 8.35 | 11 | 16.46 |
| -8 | 8.75 | 12 | 16.86 |
| -7 | 9.15 | 13 | 17.25 |
| -6 | 9.56 | 14 | 17.65 |
| -5 | 9.96 | 15 | 18.05 |
| -4 | 10.37 | 16 | 18.44 |
| -3 | 10.78 | 17 | 18.83 |
| -2 | 11.18 | 18 | 19.22 |
| -1 | 11.59 | 19 | 19.61 |
| | | 20 | 19.99 |



EC2082

- 1: Output current I [mA]
- 2: Inclination angle α [°]

| Angle and output values | | | |
|-------------------------|----------|--------------|----------|
| α [°] | I [mA] | α [°] | I [mA] |
| -90 | 4.00 | 5 | 12.70 |
| -85 | 4.02 | 10 | 13.39 |
| -80 | 4.12 | 15 | 14.07 |
| -75 | 4.27 | 20 | 14.74 |
| -70 | 4.48 | 25 | 15.38 |
| -65 | 4.75 | 30 | 16.00 |
| -60 | 5.07 | 35 | 16.59 |
| -55 | 5.45 | 40 | 17.14 |
| -50 | 5.87 | 45 | 17.66 |
| -45 | 6.34 | 50 | 18.13 |
| -40 | 6.86 | 55 | 18.55 |
| -35 | 7.41 | 60 | 18.93 |
| -30 | 8.00 | 65 | 19.25 |
| -25 | 8.62 | 70 | 19.52 |
| -20 | 9.26 | 75 | 19.73 |
| -15 | 9.93 | 80 | 19.88 |
| -10 | 10.61 | 85 | 19.97 |
| -5 | 11.30 | 90 | 20.00 |
| 0 | 12.00 | | |

8 Maintenance, repair and disposal

The unit is maintenance-free.

- ▶ Contact ifm in case of malfunction.
- ▶ Do not open the housing as the unit does not contain any components which can be maintained by the user. The unit must only be repaired by the manufacturer.
- ▶ Clean the device using a dry cloth.
- ▶ Dispose of the unit in accordance with the national environmental regulations.