

Precision Angle Displacement Sensor

Capacitive, without contact rings

Series 88600

Code:	88600 EN
Delivery:	ex stock / 5 weeks
Warranty:	24 months



- Measurement ranges up to 160°
- High linearity up to 0.05% F.S.
- Contact-free transmission
- Integrated amplifier
- Robust, maintenance-free
- Very low inertia moment
- Special versions by request

Application

The 88600 series combines the precision of expensive optical angle encoders with high resolution and an analog output, without being subject to the restricted applications of potentiometric angle sensors.

Typical applications

- ▶ Position feedback in servo-systems
- ▶ Zero detectors
- ▶ Pendulum weighing machines
- ▶ Cam and butterfly flap positions
- ▶ Twist angles
- ▶ Angular actuators
- ▶ Optical angle measurements
- ▶ Jockey roller controllers

Description

This capacitive DC/DC angle displacement sensor with integrated amplifier only requires a DC voltage for a power supply and delivers an output voltage that is proportional to the angular position of the shaft. The shaft can be turned clockwise or counterclockwise with a permissible angular speed of up to 18,000 °/s (option).

A highly accurate differential rotary capacitor is used to convert the angle into an electrical voltage. The integrated electronics consists of an oscillator, demodulator and amplifier. It can display the measurement signal directly or can, for instance, pass it to process monitoring equipment.

Power supply and transmission of measured signals is without contact within the sensor. Operation is therefore maintenance-free. The precision roller bearings used give the sensor a long service life.

Parts that are important for the function are made from material with no internal stresses and protected against corrosion.

Mounting instructions

The three threaded holes on the front plate (shaft side) allow the sensor to be mounted in any position. To determine the angular position of the measuring range, the shaft has a reference groove and the front face a reference hole (see rear).

Technical Data

Model	Operating Measurement Range 1.	Non-Linearity (% F.S.)	Possible Measurement Range 1.	Non-Linearity in Possible Measurement Range	Position of Measurement Range 1.+2.	Output Voltage mV/°
88600-000	± 30°	≤ ± 0.05 %	± 40°	≤ ± 0.10 %	0° ± 3°	100
88601-000	+ 10° ... + 70°	≤ ± 0.05 %	0 ... + 80°	≤ ± 0.10 %	+ 40° ± 3°	100
88602-000	- 10° ... - 70°	≤ ± 0.05 %	0 ... - 80°	≤ ± 0.10 %	- 40° ± 3°	100
88603-000	± 60°	≤ ± 0.10 %	± 80°	≤ ± 0.15 %	0° ± 3°	100
88603-001	± 60°	≤ ± 0.05 %	± 80°	≤ ± 0.10 %	0° ± 3°	100
88603-002	+ 20° ... + 140°	≤ ± 0.10 %	0 ... + 160°	≤ ± 0.15 %	+ 80° ± 3°	50
88603-003	+ 20° ... + 140°	≤ ± 0.05 %	0 ... + 160°	≤ ± 0.10 %	+ 80° ± 3°	50
88603-004	- 20° ... - 140°	≤ ± 0.10 %	0 ... - 160°	≤ ± 0.15 %	- 80° ± 3°	50
88603-005	- 20° ... - 140°	≤ ± 0.05 %	0 ... - 160°	≤ ± 0.15 %	- 80° ± 3°	50

Electrical values

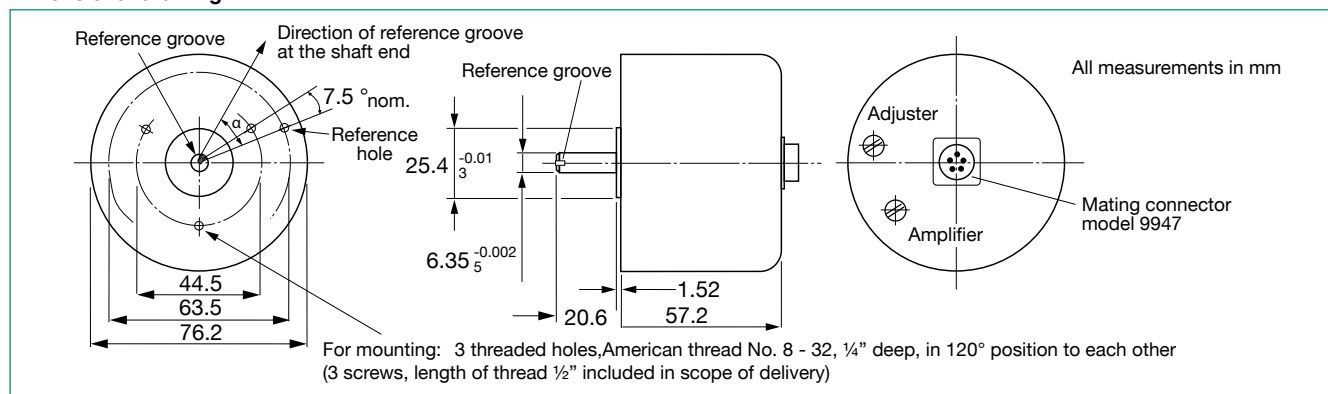
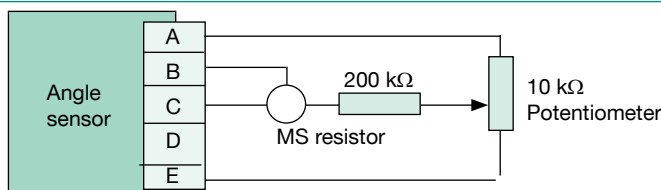
Excitation voltage:	15.00 V DC (other voltages, refer to options), with protection against polarity reversal
Excitation current:	≤ 30 mA
Output:	short-circuit proof, best linearity at 1 kΩ load
ripple	≤ 20 mV _{pp} / 400 kHz
impedance	< 2 Ω
Repeatability:	≤ 0.01 %
Resolution:	< 0.01°
Electrical zero adjustment:	± 3 %
Internal carrier frequency:	400 kHz

Environmental conditions

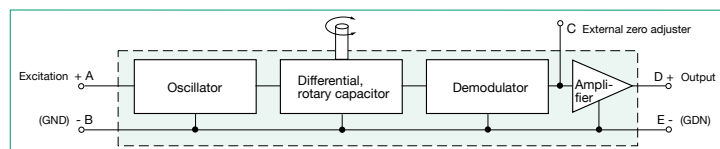
Range of operation temperature:	0 °C ... + 75 °C
Range of storage temperature:	- 55 °C ... + 125 °C
Thermal sensitivity shift:	≤ ± 0.027 % F.S./K

Mechanical values

Area of rotating:	continuous rotation is possible, no mech. stoppers
Torque:	breakaway torque 49 x 10 ⁻³ Ncm slip torque 34 x 10 ⁻³ Ncm
Moment of inertia:	0.76 gcm ²
Max. shaft load:	radial: 44 N axial: 31 N
Durability of the ball bearing:	≈ 17 000 h at 10 RPM and 44 N axle load
Mounting position:	irrespective of its position
Maximum angular speed:	1440 °/s, with ≤ 2 % output voltage drop optionally: 18.000 °/s
Weight:	approx. 400 g

Dimensional drawing

Wiring diagram for remote zero

Wiring code

A:	+ Excitation
B:	Excitation ground
C:	Remote Zero
D:	+ Signal output
E:	Signal ground

Block diagram

Order Information

Angle sensor
Measuring range ± 30°C, with option V005 **Model 88600-000-V005**

Accessories

Mating connector (cable coupling), 5 pin	Model 9947
Mating connector 5 pin, 90° outlet	Model 9900-V647
Connecting cable, length 3 m, one end open	Model 99547-000A-0160030
Connection cable, length 3 m, with connector 9941, 12 pin, for burster desktop devices	Model 9916

Options

- V001: Excitation voltage
The sensor may be adjusted to a fix excitation voltage in range between 12 V DC and 16 V DC (standard is 15 V DC). Please mention the desired voltage when ordering.
- V005: Maximum angular speed 18 000 °/s with output voltage drop of maximum 2 %.

Explanations

- Arithmetic sign: when quoting angles, "+" indicates clockwise rotation, while "-" indicates counterclockwise (looking at the shaft).
- The shaft of the sensor is located at the center of the measuring range when the angle between the reference groove (in the shaft) and the reference hole (in the housing) correspond to the value given in the table (see drawing).
- In addition to the zeroing potentiometer, external zeroing by approx. ± 4.5° or ± 9° (depending on type) is possible – see connection diagram.