

# Analogue display with stepper motor

- For use in ships and rail vehicles
- Typical applications:  
Thrust direction and rudder position display
- Propeller adjustment angle, RPM display  
and speedometer
- LED scale and indicator illumination
- Accuracy class 0.5
- Non-sensitive to shocks and vibrations
- General purpose use

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electronics

## Metrix Electronics Limited

Minchens Court, Minchens Lane,  
Bramley, RG26 5BH, U.K.

Tel: +44 (0)845 034 3234, Fax: +44 (0)845 034 3233

E-mail: sales@metrix-electronics.com

Web: www.metrix-electronics.com





# Analogue display with stepper motor

**SM 72-270°**  
**SM 96-270°**  
**SM 144-270°**



## **SM 72, SM 96, SM 144 analogue display**

This device series has been developed mainly for use in ships and rail vehicles.

Typical applications are the display of thrust direction and rudder position with POD drives, display of the propeller adjustment angle of CPP propellers, machine and propeller RPM, temperature, pressure, speed and other physical values.

Highlevel accuracy is guaranteed, even in extreme environmental conditions.

Analogue display in stepper motor technology, comprising a stepper motor with indicator and the necessary input and control electronics.

## **Technical Data**

Supply voltage: . . . . . 18 ... 36 V DC  
Power consumption: . . . . . < 1.5 VA  
Starting current: . . . . . 1 A about 1 sec.

## **Electrical security**

Overvoltage category: . . . . . CAT III EN 61010-1:2001  
Working voltage: . . . . . 50 V EN 61010-1:2001  
Protection class: . . . . . IP 56 Front panel EN 60529  
IP 20 Terminals EN 60529  
Electromagnetic compatibility: . . . . . EMC Standart 89/336 EWG/EEC  
EN 61326:2004  
Shock level: . . . . . 30 g DIN EN 60 051  
Vibration level: . . . . . 5.0 g DIN EN 60 051

## **Range of application (Climatic demands)**

Humidity: . . . . . ≤ 75% (at 21 °C) annual mean  
≤ 95% (at 25 °C) 30 days per year  
≤ 85% (at 23 °C) remaining days  
Operating temperature: . . . . . -25°C ... +55 °C  
Storage temperature: . . . . . -25°C ... +65 °C

## **Electrical characteristic values**

Input: . . . . . 0-20 mA, 4-20 mA, ± 20 mA, 0-10 V, ± 10 V DC  
Input resistance: . . . . . I DC about 100 Ω, U DC 1 MΩ  
BUS: . . . . . CAN OPEN (Option)  
Illumination: . . . . . LED, 24V DC with dimmer for scale and pointer  
Stepping motor: . . . . . Gear motor, with resolution of 0.083°  
(4320 step)  
Rotation speed: . . . . . max. 1.5 sec./360°  
Accuracy: . . . . . class 0.5  
Linearity failure: . . . . . ± 1°

## **Housing**

Material: . . . . . Steel plate, hot-dip galvanized  
Frontframe: . . . . . Plastic, black  
Glass face plate: . . . . . Antirglare flood glass (flat glass)  
Mounting position: . . . . . any  
Weight: . . . . . 280 g (SM 72-270°), 420 g (SM 96-270°),  
710 g (SM 144-270°)  
Mounting fasteners: . . . . . Screw fasteners  
Scale design: . . . . . to be made to customer's specification  
Option: . . . . . Pointer position reflection at 180°  
by closing a free of potential-contact

## **Special feature:**

The devices are calibrated in the factory. The USB connection is used for customer-specific adjustments, with which the zero setting as well as the initial and final values can be calibrated as required by the customer, by means of the calibration programme.

# Analogue display with stepper motor

**SM 72-360°**  
**SM 96-360°**  
**SM 144-360°**



The advantage over moving-coil systems is the much greater mechanical stability. Guaranteed non-sensitive to shocks and vibrations in continuous operation. Developed according to state-of-the-art technology, the electronic design enables easy connection to CAN BUS applications or other BUS systems as well as the processing of standard signals, for example 0–10 V or 0/4–20 mA or double-slide potentiometers. Selectable display ranges from 0–90° to 0–360°.

The adjustable scale and indicator illumination (PBM) guarantees correct instrument read-out in the most variable light situations.

## Technical Data

Supply voltage: . . . . . 18 ... 36 V DC  
 Power consumption: . . . . . < 1.5 VA  
 Starting current: . . . . . 1 A about 1 sec.

## Electrical security

Overvoltage category: . . . . . CAT III EN 61010–1:2001  
 Working voltage: . . . . . 50 V EN 61010–1:2001  
 Protection class: . . . . . IP 56 Front panel EN 60529  
 IP 20 Terminals EN 60529  
 Electromagnetic compatibility: . . . . . EMC Standart 89/336 EWG/EEC  
 EN 61326:2004  
 Shock level: . . . . . 30 g DIN EN 60 051  
 Vibration level: . . . . . 5.0 g DIN EN 60 051

## Range of application (Climatic demands)

Humidity: . . . . . ≤ 75% (at 21 °C) annual mean  
 ≤ 95% (at 25 °C) 30 days per year  
 ≤ 85% (at 23 °C) remaining days  
 Operating temperature: . . . . . –25°C ... +55 °C  
 Storage temperature: . . . . . –25°C ... +65 °C

## Electrical characteristic values

Input: . . . . . 0–20 mA, 4–20 mA, ± 20 mA, 0–10 V, ± 10 V DC  
 Input resistance: . . . . . I DC about 100 Ω, U DC 1 MΩ  
 BUS: . . . . . CAN OPEN (Option)  
 Illumination: . . . . . LED, 24V DC with dimmer for scale and pointer  
 Stepping motor: . . . . . Gear motor, with resolution of 0.083°  
 (4320 step)  
 Rotation speed: . . . . . max. 1.5 sec./360°  
 Accuracy: . . . . . class 0.5  
 Linearity failure: . . . . . ± 1°

## Housing

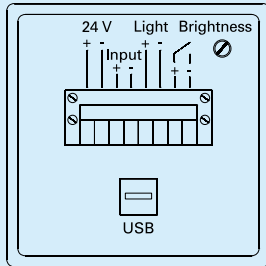
Material: . . . . . Steel plate, hot-dip galvanized  
 Frontframe: . . . . . Plastic, black  
 Glass face plate: . . . . . Antirglare float glass (flat glass)  
 Mounting position: . . . . . any  
 Weight: . . . . . 280 g (SM 72–360°), 420 g (SM 96–360°),  
 710 g (SM 144–360°)  
 Mounting fasteners: . . . . . Screw fasteners  
 Scale design: . . . . . to be made to customer's specification  
 Option: . . . . . Pointer position reflection at 180°  
 by closing a free of potential-contact

## Special feature:

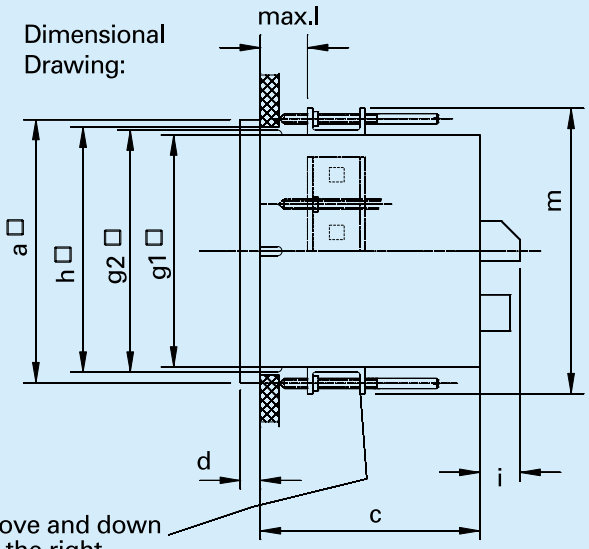
The devices are calibrated in the factory. The USB connection is used for customer-specific adjustments, with which the zero setting as well as the initial and final values can be calibrated as required by the customer, by means of the calibration programme.

# Connections and Dimensional Drawing

**Connections:**



**Dimensional Drawing:**



Device mounting above and down or on the left and on the right

Type:	a □	g1 □	g2 □	c	d	m	max.l	i	Cutout h □
SM 72	72	66	67,5	70	5,5	82	15	7	68+0,7 x 68+0,7
SM 96	96	90	91,5	53	5,5	106	16	11	92+0,8 x 92+0,8
SM 144	144	136	137,5	57	7,5	152	14	13	138+1 x 138+1

- Analogue display units
- Measuring transducers
- Digital measuring instruments
- Appliance testers
- Contact devices
- Text displays / printers
- Bar graph displays
- Probes
- Accessories



## Product Table



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**GMW** **GOSSEN**  
Müller & Weigert

### GOSSEN Müller & Weigert

Kleinreuther Weg 88  
D-90408 Nuremberg, Germany  
Phone: +49(0)911 35 02-0  
Fax: +49(0)911 35 02-3 07  
Internet: http://www.g-mw.de  
e-mail: info@g-mw.de