

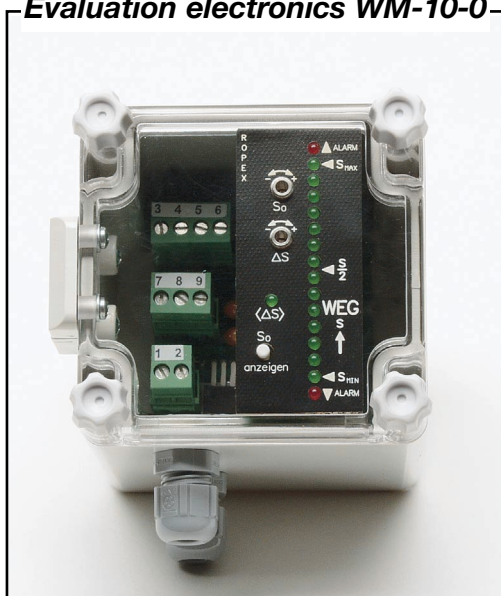
# WM 10

Displacement Measuring System

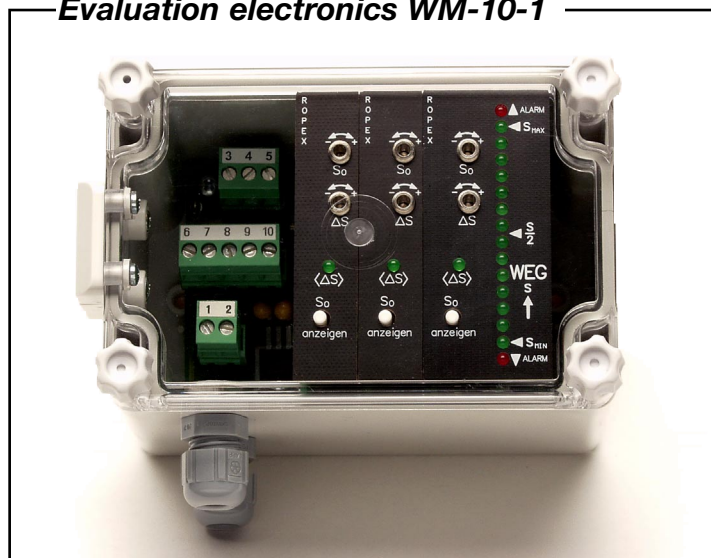
Linear displacement transducer WA-85-2



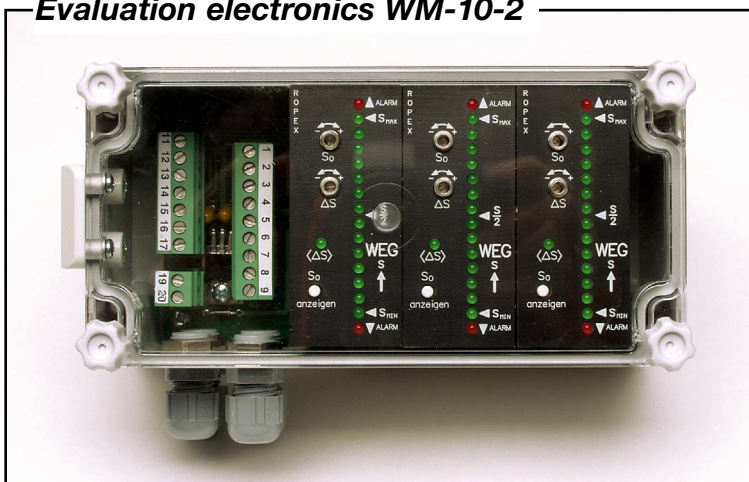
Evaluation electronics WM-10-0



Evaluation electronics WM-10-1



Evaluation electronics WM-10-2



## Application

The WA-85/WM-10 displacement measuring system was developed as an inexpensive measuring unit for testing, comparison and monitoring tasks.

The system is robust, compact and simple to handle; thanks to the modular design principle, it is also ideal for a very wide range of applications.

It is especially suited for assembly machines and automatic production equipment whenever dimensional tolerances or limit values need to be monitored, the presence of small parts checked, specific operations verified etc.

The WA-85/WM-10 does not claim to be an absolute measurement system. Its main advantage is rather the easy reproducibility of measured values, which can be evaluated within a tolerance band of up to  $\pm 0.05$  mm.

The space-saving design, the high degree of protection of the housing and the transparent cover allow the unit to be installed directly at the measuring point, thus facilitating optimum operator control and monitoring.

## Description of the system

### 1. Linear displacement transducer

The linear displacement transducer takes the form of a feeler with a spring-loaded plunger. The plunger is mounted in two maintenance-free friction bearings. A special magnet that is moved together with the plunger generates an analog voltage proportional to the displacement by means of an air gap in a magnetosensor. This voltage is then evaluated by the electronic unit connected downstream, which also supplies the stabilized voltage required for the sensor.

Oblong through holes in the housing and a prod that can be adjusted by  $\pm 2$  mm enable the displacement transducer to be set mechanically without difficulty.

The connecting cable is encapsulated inside the housing of the displacement transducer. A rolling diaphragm protects the plunger from dirt.

(See also technical data)

### Displacement-voltage characteristic

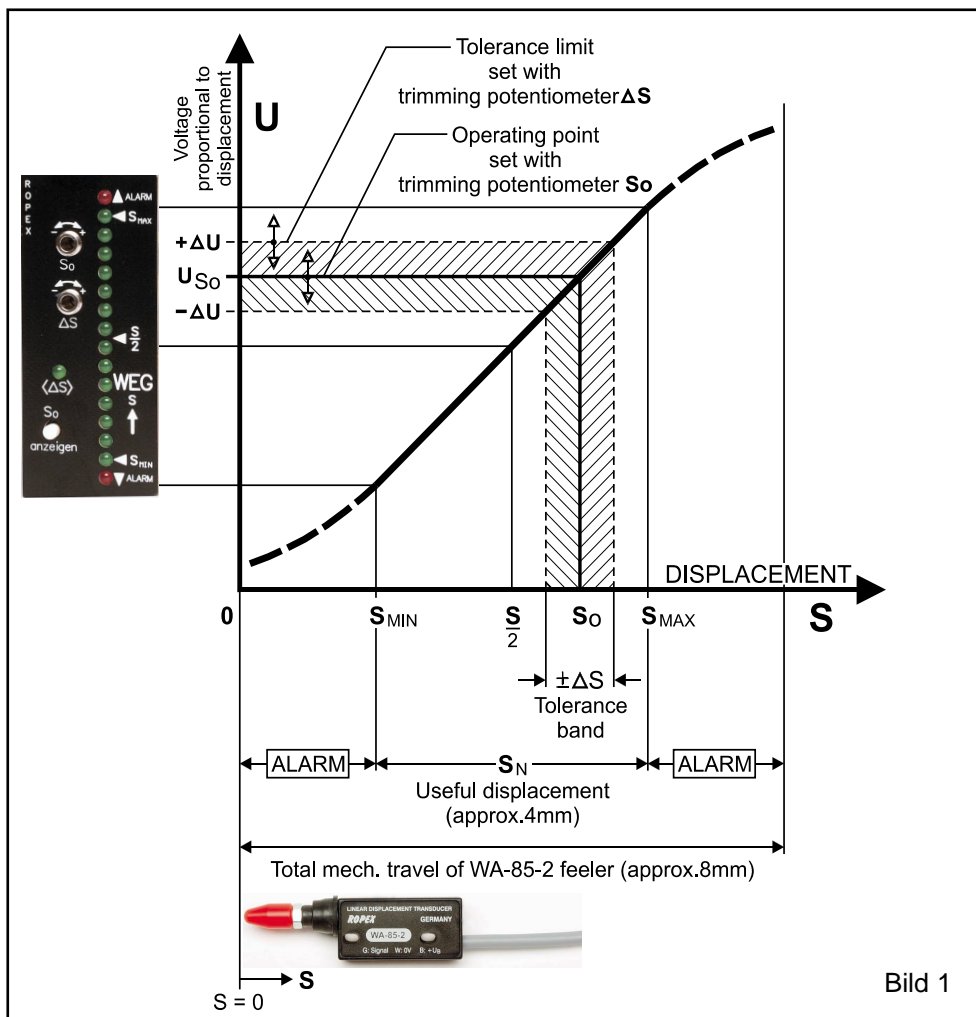


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## 2. Evaluation electronics

### A) Functional description

Figure 1 shows the output voltage characteristic of the WA-85 linear displacement transducer and compares it to the indication on the evaluation electronics (WM-GS card).

The measured travel of the feeler is indicated by means of a moving light point in a row of LEDs. An increment of one LED corresponds to a displacement of approximately 0.3 mm. A set point can be positioned anywhere on the characteristic curve within the useful measuring range (approx. 4.0 mm) using the "S<sub>0</sub>" trimming potentiometer. By pressing the "S<sub>0</sub> anzeigen" (Show S<sub>0</sub>) button, you can indicate the selected set point with the LED row. Normally, the actual value is always indicated, i.e. the instantaneous position of the feeler.

The "ΔS" trimming potentiometer is used to set the tolerance band  $\pm\Delta S$  symmetrically with the set point S<sub>0</sub>. If the measurement is inside this window, the "(ΔS)" LED lights up (= within DS) and an "OK" signal appears at the output.

The tolerance width can be set between  $\pm 0.05$  and  $\pm 1.5$  mm. If the set point S<sub>0</sub> is altered, the tolerance window is adjusted accordingly, whereby its width remains unchanged.

In order to prevent measurement errors in the highly non-linear range, this range is monitored electronically. If a measurement is outside the permissible tolerance (end positions), the red "ALARM" LED lights up. An alarm is also indicated if one of the three leads to the displacement transducer is interrupted (lead monitoring function).

### C) Variants

Type	Basic version*)		Expandable with (cards can be ordered as required)	Housing Size
WM-10-0	1 x WM-GS		-	0
WM-10-1	1 x WM-GS	+	1 ... 2 x WM-SS	1
WM-10-2	1 x WM-GS	+	1 ... 2 x WM-GS	2

\*) The GS card always incorporates a switching stage (SS)

### B) System structure

The modular evaluation electronics consist of two basic modules:

- WM-GS plug-in card (basic stage),
- WM-SS plug-in card (switching stage).

The basic stage always incorporates a switching stage. Housings for holding the plug-in cards are available in three different sizes (sizes 0, 1 and 2).

These elements can be used either individually or in combination to obtain the following displacement measuring systems:

WM-10-0: Evaluates the signal of one displacement transducer. One set point can be specified together with a tolerance band.

WM-10-1: Evaluates the signal of one displacement transducer. Up to three set points can be specified independently of one another together with their respective tolerance bands.

WM-10-2: Evaluates the signals of up to three displacement transducers independently of one another. One set point can be specified for each transducer together with a tolerance band. Equivalent to three WM-10-0 systems.

Each housing contains the motherboards with plug-in terminals and sturdy plug connectors required to hold the cards. The WM-10-1 and -2 types can also be expanded later.

## Technical data

### A) Evaluation electronics

Housing: Macrolon, color gray (RAL 7035), transparent cover with hinge and knurled screws  
Degree of protection IP 65

Dimensions (mm):  
Size 0: W 80 x H 85 x L 82, 3 x PG 7  
Size 1: W 80 x H 85 x L 120, 3 x PG 7  
Size 2: W 80 x H 85 x L 160, 6 x PG 7

Electrical connection:  
Plug-in terminals  
(see connection diagram)

Supply voltage: 24 V DC  $\pm 20\%$

Current input:  
Fully equipped versions,  
without output load  
WM-10-0: 60 mA  
WM-10-1: 100 mA  
WM-10-2: 180 mA

Indications: - Quasi-linear working range (useful displacement):  
Bar with 14 green LEDs  
- Overrange/underrange:  
2 red LEDs (ALARM)  
- Measured value within tolerance limits ( $\Delta S$ ): Green LED

Setting elements:  
Set point  $S_0$  and tolerance band  $\Delta S$  settable with spindle-operated potentiometers (25 turns)

Tolerance band:  
Settable window width  
From  $\Delta S_{\min} = \pm 0.05$  mm  
To  $\Delta S_{\max} = \pm 1.5$  mm  
(symmetrical with  $S_0$ )

Useful displacement range (with WA-85-2):  
Approx. 4.0 mm

Outputs: Semiconductor outputs 24 V DC, positive switching, max. 100 mA, short-circuit-proof

Ambient temperature:  
+5 ... +45 °C

### B) Linear displacement transducer WA-85-2

Total mechanical travel: 8 mm

Quasi-linear range: Approx. 4.0 mm

Housing: Precision die-cast zinc alloy

Weight (excl. cable): Approx. 30 g

Degree of protection: IP 64

Feeler: Spring-loaded plunger.  
Thread for fitting prod: M 4,  
11 mm long  
Spring constant  $c = 12.5$  p/mm  
Starting force: approx. 140 p  
Protected from dirt by rolling diaphragm. Prod made of polyamide  
Adjustment range:  $\pm 2$  mm

Supply: 8 V DC (generated by evaluation electronics)

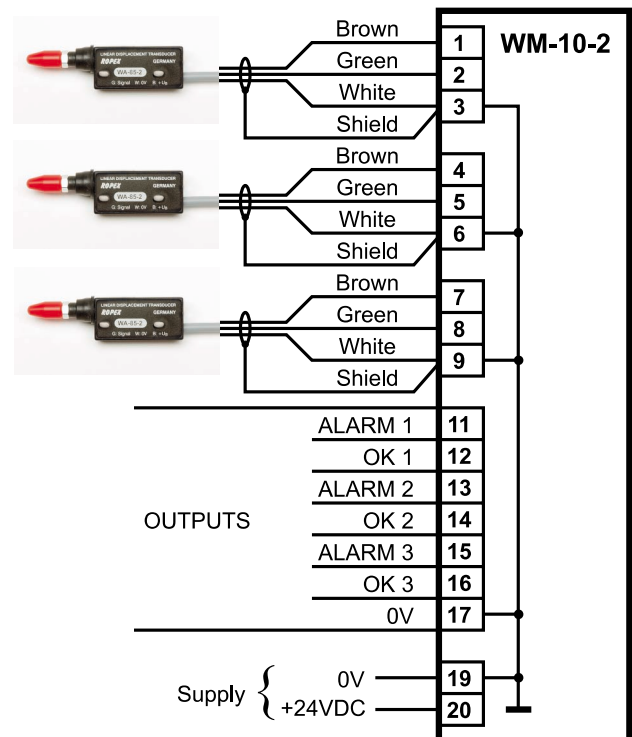
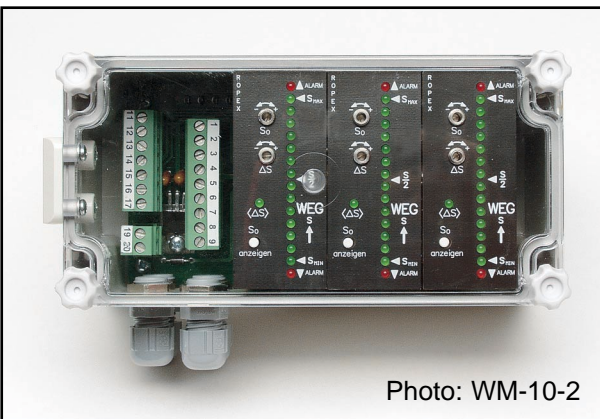
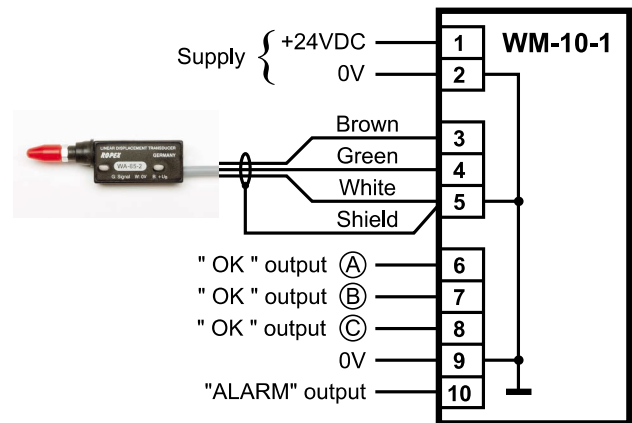
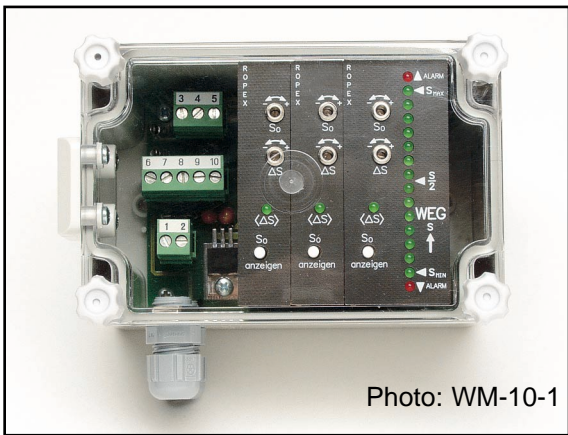
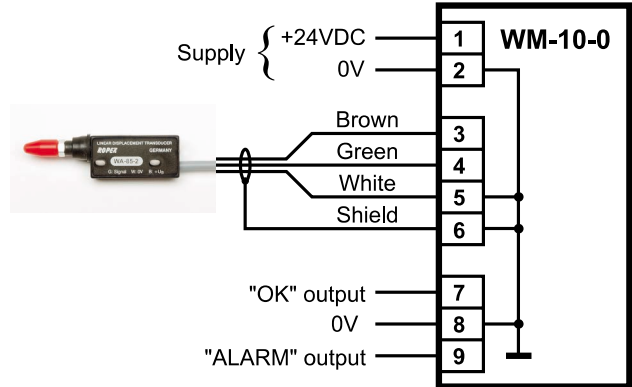
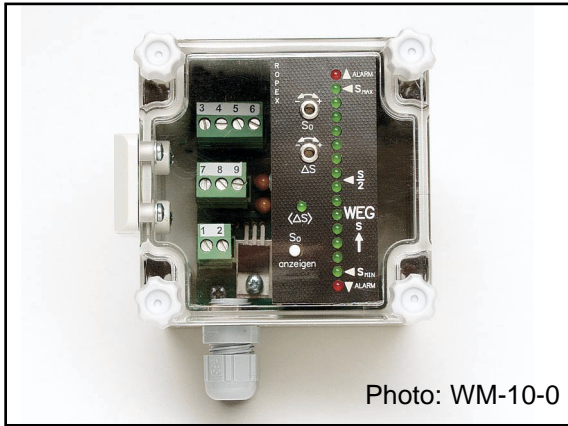
Connecting cable:  
3-core, shielded, encapsulated,  
standard length: 2.5 m  
  
External  $\varnothing$ : 4 mm  
Core cross-section: 0.14 mm<sup>2</sup>  
Core colors: White, brown, green  
Operating temperature: -5 ... 70 °C

### Notes for users of the WA-85-2 linear displacement transducer

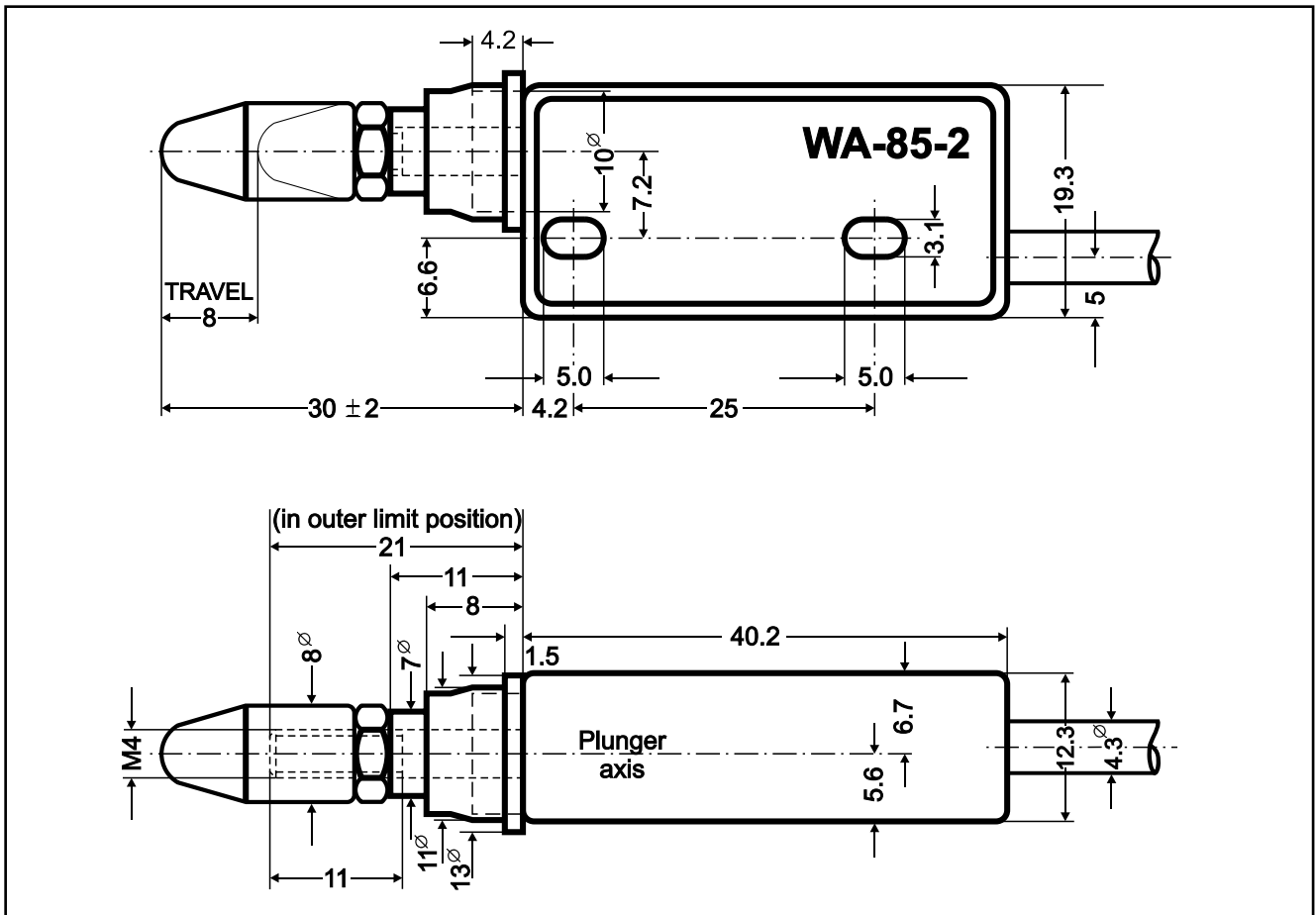
- Never "overtravel" the maximum stroke of the plunger (8 mm). Fit spring retainers if necessary.
- Never "force" the plunger, e.g. when locking the prod, because this could damage the plunger's anti-rotation element.
- The measurement is based on a magnetic system. The displacement transducer should therefore never be installed in the direct vicinity of strong electromagnetic fields.

# Connection diagrams

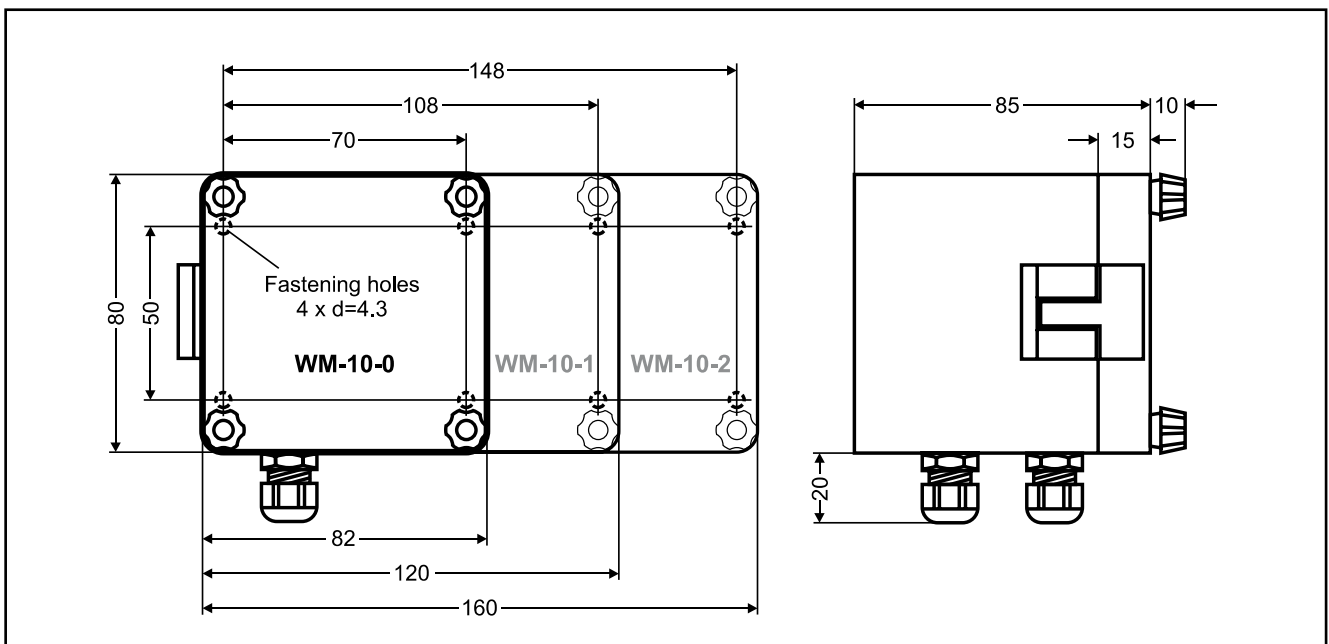
(Evaluation electronics shown fully equipped)



### Dimensions of the WA-85-2 linear displacement transducer



### Dimensions of the evaluation electronics housing (mm)



## Ordering information

Please indicate the following information in all orders for evaluation electronics:

Basic type	Expansion stages
WM-10-x	WM-SS or WM-GS

Example 1: Required: 1 measuring circuit  
(1 x WA-85-2) with 2 evaluators  
Order:  
1 x WM-10-1  
1 x WM-SS  
1 x WA-85-2 linear displacement  
transducer

Example 2: Required: 3 measuring circuits  
(3 x WA-85-2) each with 1 evaluator  
Order:  
1 x WM-10-2  
2 x WM-GS  
3 x WA-85-2 linear displacement  
transducer

Important: The WA-85-2 linear displacement  
transducer (= order designation)  
must always be ordered separately  
from the evaluation electronics.

Note: If the WM-10-1 variant is expanded  
to 2 or 3 switching stages, the  
jumper(s) on the motherboard must  
be removed.

Article nos.:

WM-10-0:	99 21 00
WM-10-1:	99 21 01
WM-10-2:	99 21 02
WM-GS :	99 20 01
WM-SS :	99 20 02
WA-85-2 :	99 10 00




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