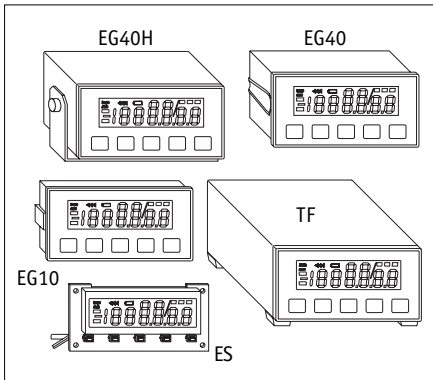


MA503/1

Electronic Display



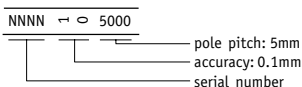
ENGLISH

1. Warranty information

- In order to carry out installation correctly, we strongly recommend this document is read very carefully. This will ensure your own safety and the operating reliability of the device.
- Your device has been quality controlled, tested and is ready for use. Please observe all warnings and information which are marked either directly on the device or specified in this document.
- Warranty can only be claimed for components supplied by SIKO GmbH. If the system is used together with other products, there is no warranty for the complete system.
- Repairs should be carried out only at our works. If any information is missing or unclear, please contact the SIKO sales staff.

2. Identification

Magnetic strip: identification by printing on the strip. Example Magnetic strip printing:



Electronic display: Please check the particular type of unit and type number from the identification plate. Type number and the corresponding version are indicated in the delivery documentation.

e.g. MA503/1-0023
 — version number
 — type of unit

3. Installation

For mounting, the degree of protection specified must be observed. If necessary, protect the unit against environmental influences such as sprayed water, dust, knocks, extreme temperatures, solvents.

3.1 Panel case type EG10

For panel mounting we recommend the following dimensions:

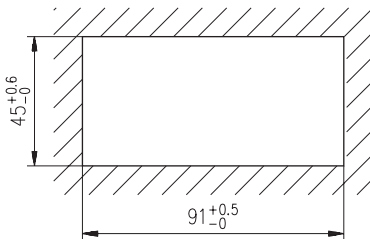


Fig. 1: Panel mounting

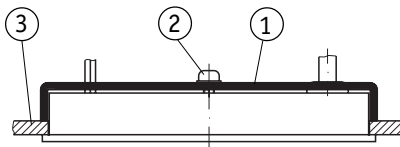
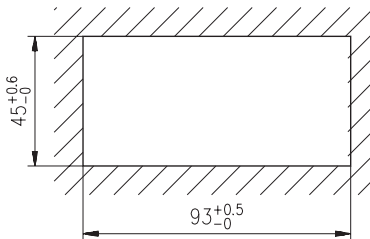


Fig. 2: Mounting of panel case EG10

EG10: Push device into panel (3). Tighten bracket screw on the rear (2). Align device on front plate and tighten screw.

3.2 Panel case type EG40

For panel mounting we recommend the following dimensions:



1. Panel (A) must be provided with cutout for MA503/1.
2. Push the display into the panel cutout until the mounting tabs snap completely.
3. Mounting tabs hold the unit, but allow easy removal, too.

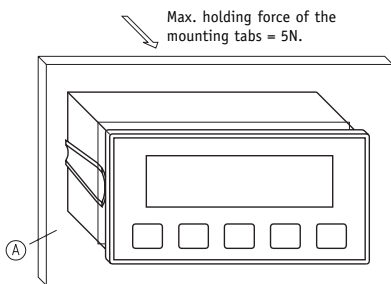


Fig. 3: Mounting of panel case EG40

3.3 Bench housing TF

The rubber feet can be removed to enable the unit to be screwed down.

Attention! Max. reach of screw is 5.0 mm!

3.4 Mounting the magnetic strip

The mounting surface / measuring track must be flat. Buckles or bumps will lead to measuring inaccuracies.

For applications which do not allow properly glueing of the magnetic strip, it can be inserted into a **profile rail** (accessory) - eg. rail type **PS** thus forming a compact mounting unit.

For technical reasons the strip should be approx. 100mm longer than the actual measuring distance.

Attention! To guarantee **optimal adhesion** oil, grease dust etc. must be removed by using cleansing agents which evaporate without leaving residues. Suitable cleansing agents are eg. ketones (acetone) or alcohols; Messrs. Loctite and 3M can both supply such cleansing liquid. Make sure that the surface to be glued is dry and apply the strip with maximum pressure. Glueing should preferably be undertaken at temperatures between 20 to 30°C and in dry atmosphere.

Advice! When applying long pieces of magnetic strip do not immediately remove the complete protective foil, but rather peel back a short part from the end sufficient to fix the strip. Now align the strip. As the protective strip is then peeled back and out press the tape firmly onto the mounting surface. A wall paper roller wheel could be used to assist in applying pressure onto the magnetic strip when fixing it in position.

Mounting steps (see fig. 2)

- Clean mounting surface (1) carefully.
- Remove protective foil (2) from the adhesive side of the magnetic strip (3).
- Stick down the magnetic strip (4).

- Clean surface of magnetic strip carefully.
- Remove protective foil (6) from adhesive tape on the cover strip (5).
- Fix cover strip (both ends should slightly overlap).
- Also fix cover strip's ends to avoid unintentional peeling.

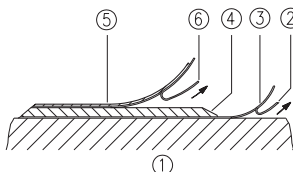


Fig. 4: Mounting of the magnetic strip

Attention! Do not expose the system to magnetic fields. Any direct contact of the magnetic strip with magnetic fields (eg. adhesive magnets or other permanent magnets) is to be avoided. Sensor movements during power loss are not captured by the follower electronics.

Mounting examples

Mounting with chamfered ends (fig. 5) is not recommended unless the strip is installed in a safe and protected place without environmental influences. In less protected mounting places the strip may peel. There we recommend mounting accord. to fig. 6 and 7.

Mounting in a groove (fig. 8) best protects the magnetic strip. The groove should be deep enough to totally embed the magnetic strip.

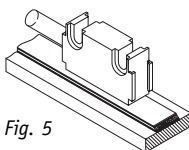


Fig. 5

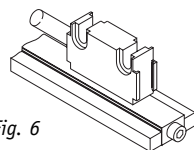


Fig. 6

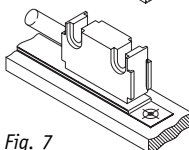


Fig. 7

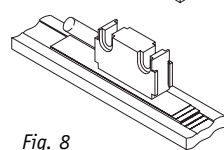


Fig. 8

3.5 Mounting the sensor

Use two M3 screws to fix the magnetic **sensor L** via the $\varnothing 3.2$ mm through holes.

Magnetic **sensor F** can for example be mounted by using a mounting bracket. For fixing sensor to mounting bracket use bores and the two nuts M8x0.5.

- Cable layout should avoid damages due to cable strain or other machine parts. If necessary use a drag chain or protective hose and provide for strain relief.
- When mounting the magnetic sensor, ensure that the gap between strip and sensor and the max. admissible deviation are maintained over the total measuring length! (see fig. 9)

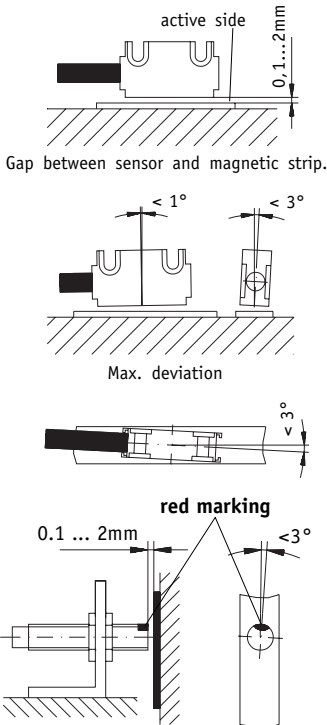


Fig. 9: Mounting of sensor

3.4 Mounting of the battery box

The battery box supplied together with the display are for panel mounting. The battery box should be mounted at a 'cold' site: heat accelerates the self-discharge of batteries.

Below are the dimensions for panel mounting:

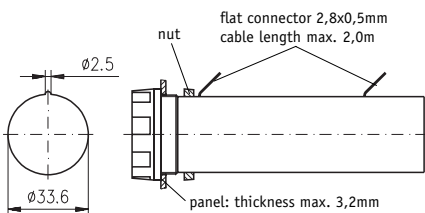


Fig. 10: Battery box for operating voltage 7 (3Volt, 2xBaby/R14)

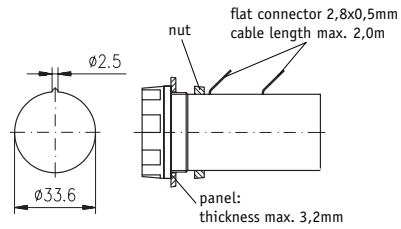


Fig. 11: Battery box for operating voltage 8 (1,5Volt, 1xBaby/R14)

4. Electrical connection

- Wiring must only be carried out with power off!
- Provide stranded wires with ferrules.
- Check all lines and connections before switching on the equipment.

Interference and distortion

All connections are protected against the effects of interference. **The location should be selected to ensure that no capacitive or inductive interferences can affect the sensor or the connection lines!** Suitable wiring layout and choice of cable can minimise the effects of interference (eg. interference caused by SMPS, motors, cyclic controls and contactors).

The sensor should be positioned well away from cables with interference; if necessary a **protective screen or metal housing** must be provided. The running of wiring parallel to the mains supply should be avoided.

Power supply

Battery powered, via external connection cable and enclosed battery box.

UB= 3 VDC (operating voltage 7)

UB= 1,5 VDC (operating voltage 8)

Designation	Color
+ UB	red
GND	black

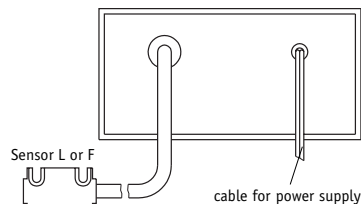


Fig. 12: Built-in housing EG10, EG40

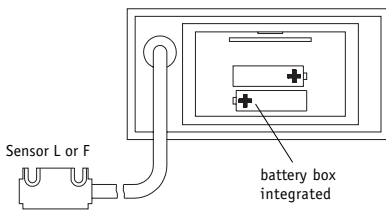


Fig. 13: Housing EG40, EG40H

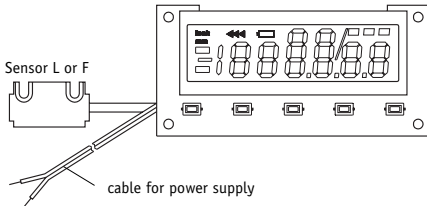


Fig. 14: Kit ES

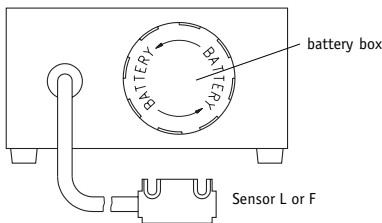


Fig. 15: Bench housing TF

Connection of the battery box

The battery box (mounted as described in chapter 3.6) has to be connected as follows:

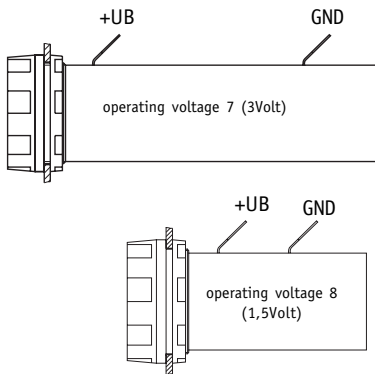


Fig. 16: Connection of the battery box

Battery types

Batteries are **not** supplied together with the MA503/1.

The following standard types could be used:
for operating voltage 7 (3Volt):

2 x Baby / R14

for operating voltage 7 (3Volt) with interated battery box:

2 x Mignon / AA

for operating voltage 8 (1,5Volt):

1 x Baby / R14

Change of batteries

When display shows battery symbol, battery should be replaced as soon as possible.

Unscrew cap to insert / remove batteries.

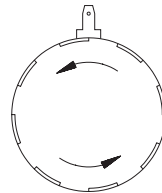




Fig. 17: Change of batteries

When exchanging the batteries take care that their polarity is correct ! Take the marking on the bottom of the box as orientation. 

Attention! No modification of the sensor connection, eg. by cable extension, is permitted. 


5. Commissioning

Five membrane keys on the front panel are used for programming and operation of the display.

Switch on

Use key ON/OFF to switch on the display. Then a starting routine begins:

- value 0 – now the display is ready for use!
(The last measured value is displayed if the parameter 'Last value memory' is programmed to 'on'.)

Attention! MA503/1 does not automatically switch on when the operating voltage is applied. 

Switch off

- Press ON/OFF key to switch off the unit (switch-off delayed, if parameter "_4_off" has been programmed to "on" before).

- After the last measurement the display switches off automatically.

Operating modes

There are two operating modes accessible via the keyboard:

1. **Programming mode:** to program the display at initial installation.
2. **Input mode:** to enter parameters/select functions used during standard operation.

6. Joining magnetic strips together

For some applications it may be necessary to extend the magnetic strip. The magnetic strip can be cut and rejoined using standard tools.

But however carefully this is done the accuracy of the strip at the join will be impaired (error of at least 0,1 ... 0,2 mm).

The following tools / accessories are required:

- magnet magnifier, magnetic foil or metal dust
- rule or suitable tool
- compass needle

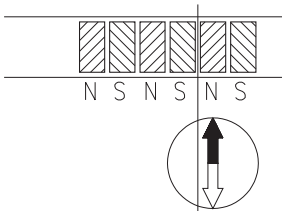


Fig. 18: Determination of the pole position. Cutting the magnetic strip

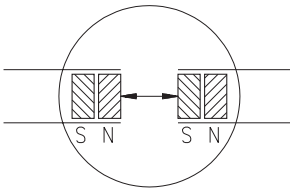


Fig. 19: Determination of the pole position. Joining the magnetic strip

Steps

- If there is a cover strip, this is to be removed first.
- To determine the pole division either use metal dust, a magnet magnifier or magnetic foil.
- If necessary, use a compass needle to determine the location of the poles on the magnetic strip (fig. 18).
- Use a rule and a sharp knife to cut the magnetic

strip at a right angle. Then also cut the carrier strip accordingly.

- Previous steps are to be repeated with the other part of strip.
- Check polarity before joining the two parts. Both ends must attract each other (if necessary, use compass needle). In case both ends have the same polarity, shorten one end by a half pole division (fig. 19).
- Join the two ends closely together and add the cover strip.

7. Maintenance of the magnetic strip

We recommend cleaning the magnetic strip's surface from time to time with a soft rag. This avoids dirt (dust, chips, humidity ...) sticking to the strip.

Key's function / Programming mode / Parameter description / Input mode etc., see enclosed page with software description.



Software S (standard)

ENGLISH

1. Keys' function

Depending on the operating mode the keys may have additional functions (see 'Programming mode' and 'Input mode'). The keys are pressed singly or in pairs (two together).

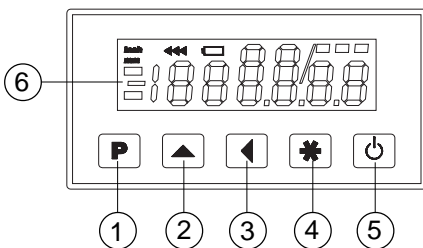


Fig. 1: Key's function EG

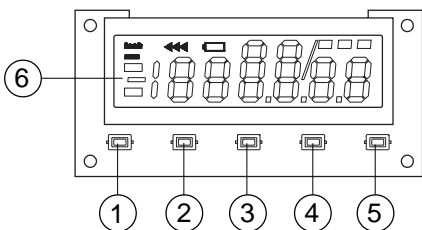
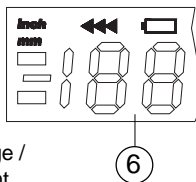


Fig. 2: Key's function ES

1. Programming
2. Select 'value'
3. Select 'digit'
4. Store value
5. ON / OFF
6. Display: battery change / incremental measurement function / sign



2. Programming mode

The display is either pre-programmed to standard values at our works or, if the order defines customer-specific parameters, these will be pre-programmed at SIKO. Enter programming mode for parameter modification / programming. Normally programming is only necessary at initial installation. Parameters can be modified and checked at any time. They are stored in a non-

volatile memory. Each parameter's designation, function and value range is shown in tables on the following pages.

To enter into programming mode:

Press key **[P]** for at least 4 s

To leave programming mode:

Automatically, if no key has been pressed during approx. 30 s, or press key **[P]** until the end of the parameter list is reached.

To scroll parameter information:

Use key **[P]**

To change parameters:

Use keys **[▲]** and **[▼]**

To store modified parameters:


Press key **[*]**, then message "-SA-" will be briefly displayed.

3. Parameter description

At the end of this user information brochure you will find a detailed **parameter list** showing all programmable parameters and offering space for customer-specific programming values .

(in English, parameter LAN = "E")


Display "choice"	Designation / description
AuFL	Resolution: Determines the resolution of the display. Parameter "FrEE" allows the programming of a calculating factor.
FAc	Calculation factor (only available, if 'Resolution' has been programmed to "FrEE" before): Used to obtain for example an angle display. Basis is the maximal possible resolution of 1/100 mm. The calculation factor "FAc" which has to be programmed results from: $FAc = \text{meas. range} / \text{total travel distance [1/100 mm]}$ <i>Example:</i> Angle measurement on a circular disk with a display range of 0 ... 180°; display in 1/10°; circumference of the circular disk 942,48 mm; hence total travel distance 471,24 mm; $FAc = 1800 / 47124 = 0,38200$
dP	Decimal point (only available if 'Resolution' has been programmed to 'FrEE' before): Determination of the decimal point according to the resolution.

rEF	Reference value: Absolute reference point of the measuring system. This value is set by referencing the system according to chapter 4.
oFS	Offset: Can be any value; used to influence the value displayed, eg. tool correction value.
dir	Counting direction of the measuring system: depends on the sensor's mounting position and can be changed subsequently.
"UP"	Upward
"dn"	Downward
Auto	Switch-off method: State of the automatic switch-off:
"oFF"	no switch-off.
"on"	automatically switch-off
PERiod	Switch-off time : Time since last measurement / sensor move after which the display will switch-off.
rSto	Last value memory:
"oFF"	Last value memory off. When switched on, the display must be calibrated (zeroed).
"on"	Last value memory on. When switched on, the last measured value is displayed.
4_oFF	Delayed switch-off: ON/OFF key must be pressed for approx. 4s to switch off the display.
F_AbS	Access reset function: resetting to reference value via key  on front of the display.
"oFF"	Reset function off
"on"	Reset function on
F_rEL	Access incremental measurement: to switch from absolute dimension and zero-setting to subsequent relative dimension
"oFF"	Increm. meas. function off
"on"	Increm. meas. function on
F_rEF	Access reference value: to enter / change reference value
"oFF"	Reference value function off
"on"	Reference value function on
F_oFS	Access offset value: to enter / change offset value
"oFF"	Offset value function off

"on"	Offset value function on
LAN	Language: to choose the language in which the menu points are to be displayed
"d"	German
"E"	English

4. Input mode

Reset function via keyboard





- Press key  to set the display to the reference value.

Precondition: Parameter 'Reset enable' (F_AbS) in programming mode must be programmed to "on", but unit must **not** be left in programming mode (see chapter 2 **To leave** programming mode').



Incremental measurement



Press the two arrow keys  +  simultaneously to activate incremental measurement function.



- The display is zeroed.
- The Display shows the symbol 
- Leave incremental measurement function by another simultaneous press of the two arrow keys  + . The absolute measuring value is displayed again.
- While in the incremental measurement mode the display can also be set to zero by pressing key . This does not change the absolute measurement in the background.

Precondition: Menu point 'Incremental measurement enable' (F_rEL) in programming mode must be programmed to "on", but unit must **not** be left in programming mode (see chapter 2 **To leave** programming mode').




Reference and/or offset value modification

Press the two keys  +  simultaneously to enter a new reference value.

Press the two keys  +  simultaneously to enter a new offset value.

The display then shows the reference/offset value, which can be changed via the two arrow keys.

Press key  to store the new value.

If no key has been pressed for approx. 30 s or if you press again key , MA503/1 will return to display mode.



Precondition: In programming mode menu points 'Reference value input enable' (F_rEF) 'Offset input enable' (F_oFS) respectively must be programmed to "on", but unit must **not** be left in programming mode (see chapter 2, 'To leave programming mode').

5. Last value memory

Precondition: 'rSto' = "on"

When switched off the last measured value is stored in a non-volatile memory.

6. Trouble shooting

Error states are recognized and shown in the display:

Message: full

Description: display overrun

Action: check parameters and adjust them if necessary; set display to reference value

Message: display blinking.

Description: missing referencing.

Action: set display to reference value

Message: S_Err

Description: faulty / no sensor signal

Action: check gap between sensor and magnetic strip

Symbol: Battery symbol is active

Description: battery voltage below the admissible values.

Action: Change the batterie.

Message / Effect: comes on / MA503/1 cannot be referenced

Description: Display is still in incremental measurement function

Action: Leave incremental measurement function as described in chapter 4 or proceed as follows:

1. Enter into programming mode
2. Program parameter 'F_rEL' to "on"
3. Leave programming mode
4. Leave incremental measurement function as described in chapter 4
5. Enter programming mode again
6. Program parameter 'F_rEL' to "oFF"
7. Leave programming mode

7. Application Examples

Length measurement

Required: Display accuracy 1/10 mm. Display shall be zeroed via function key

Designation	Display	Progr. value
Resolution	AuFL	0.1
Decimal point	dP	0.0
Reference value	rEF	00000.0
Offset	oFS	00000.0
Counting direction	dir	UP
Switch-off method	Auto	oFF
Last value memory	rSto	oFF
Delayed switch-off	4_oFF	oFF
Access: reset	F_AbS	on
Access: increm. meas.	F_rEL	oFF
Access: ref. value	F_rEF	oFF
Access: offset	F_oFS	oFF
Language	LAN	E

Angle measurement

Required: display range 0 ... 360°; display accuracy 1/10° . Display shall be zeroed via function key. Automatically switch-off after 0.5h.

Conditions: circular disk with Ø 300 mm; resulting total circumference: $U = \pi \times 300 \text{ mm} = 942,48 \text{ mm}$

The programmable factor is calculated as follows: $FAC = \text{total display range} [1/10^\circ] / \text{circumference} [1/100 \text{ mm}]$

$$3600 / 94248 = 0,038200$$

Designation	Display	Progr. value
Resolution	AuFL	FrEE
Calculating factor	FAC	0.03820
Decimal point	dP	0.0
Reference value	rEF	00000.0
Offset	oFS	00000.0
Counting direction	dir	UP
Switch-off method	Auto	on
Switch-off time	PEriod	0.5
Last value memory	rSto	oFF
Delayed switch-off	4_oFF	oFF
Access: reset	F_AbS	on
Access: increm. meas.	F_rEL	oFF
Access: ref. value	F_rEF	oFF
Access: offset	F_oFS	oFF
Language	LAN	E

Appendix: Parameter list

Display	Designation / value range	Standard programm.	your programming
AuFL	resolution (mm, In=inch) 1, 0.1, 0.05, 0.01, In 0.01, In 0.001, FrEE, 1/16in, 1/32in; 1/64in	0.1	
FAc	calculation factor (only if resolution has been programmed to "FrEE") 0.00000 ... 9.99999	0.00000	
dP	decimal point (only if resolution has been programmed "FrEE") 0. to 0.000	0.00	
rEF	reference value -99999 ... (+)99999	00000.0	
oFS	offset value -99999 ... (+)99999	00000.0	
dir	counting direction UP, dn	UP	
Auto	switch-off method on , oFF	oFF	
PEriod	switch-off time (in hours)(only for switch-off methods 'on') 0.2; 0.5; 1.0; 2.0; 4.0; 8.0	0.2	
rSto	last value memory on , oFF	oFF	
4_oFF	Delayed switch-off: on, oFF	oFF	
F_AbS	access reset function: on , oFF	on	
F_rEL	access increm. measurement: on , oFF	oFF	
F_rEF	access reference value: on , oFF	oFF	
F_oFS	access offset value: on , oFF	oFF	
LAN	language d, E	d	

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