

AZ16 I series

Installation manual

Battery operated

**ABSOLUTE - Linear encoder and indicator System
with integrated sensor and magnetic tape guidance**



Features

- Measuring distances up to 8 meters possible
- Unique definition of the zero point (no further referencing necessary)
- Permanent retention of all data and settings
- Reserve energy up to 4 years
- AUTO-POWER-OFF function with adjustable „switch on“ time
- Switch over for absolute / incremental mode
- Millimeters or Inches operation
- Fraction views in the Inch mode possible
- User friendly menu levels
- Completely guided by magnetic tape guidance rail
- Key can be enabled or disabled individually
- Adjustable reference value and 3 tool offsets
- Symbols individually selectable (mm/inches/arrows etc.)
- Customer specified housing and guidance possible

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1. Introduction

The new linear „Absolute“ encoder and indicator unit AZ16 is based on the proven magnetic measuring principle. According to its battery supply, no wirings are necessary and the systems is able to operate as a complete stand alone unit. The max. possible measuring distance amounts to 8 meters. By using the AUTO-POWER-OFF mode the max. service life span of the battery amounts up to 4 years.

The magnetic sensor is integrated in the indicator housing. Further a version with an external sensor is available (AZ16E).

Characteristics of the AZ16I variant (integrated sensor):

For recording of measurement a guide rail in suitable length is provided (please indicate when order). The maximum length of a guide rail amounts to 2 m. It is possible to reach the max. measuring distance of 8 m by arranging 4 single 2 m rails in one line.

Guide rails up to 2 meters are already assembled with the necessary magnetic tape. In case of longer measuring lengths, the tape is delivered separately an must fitted by the costumer himself.

The guideway for the rail is located on the rear of the indicator unit.

On request the system can be supplied also without guidance and guide rail, then the user must provide and guarantee for a suitable mechanical guiding system. It must be ensured, that the sensor (integrated in the indicator) keeps the correct distance (0... 1.5 mm) along the whole measuring distance coplanar to the magnetic tape.

2. Safety



Please note: Before first commissioning read this installation manual carefully and observe absolutely the installation instructions. The measuring system is only dedicated for recording lengths. The type label is intended for exact identification of the measuring system. The label is situated on the indicator housing. It informs about the exact type designation (see chapter 9), the delivery date and the production number. When contacting the company ELGO Electric GmbH please use these terms.



Attention!

The company ELGO Electric GmbH is not liable for possible damages to machines and or to persons, which can result from defective material at the measuring system and the following circuit. The machine manufacturer is responsible for taking and realizing the necessary safety precautions.

3. Determination of the rail and tape length

Basically the following applies with an order of magnetic tape:

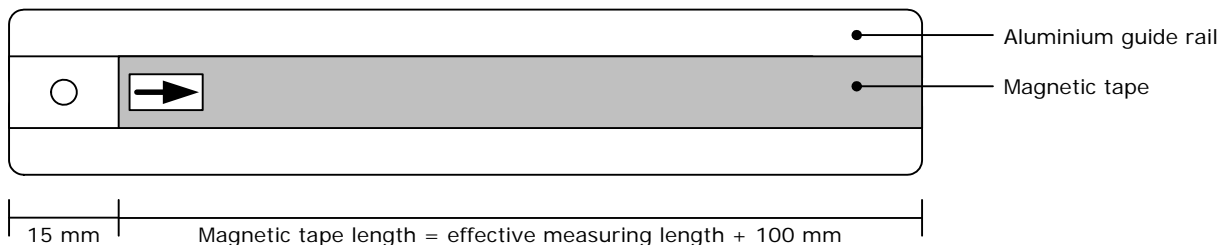
$$\text{Ordered length of tape} = \text{effective measuring distance} + 100 \text{ mm}$$

For further details see the „Type designation“ at the end of the manual.

3.1 Complete assembled guide rail

(for effective measuring distances up to 1.885 m)

With measuring distances < 2 m (effective 1.885 m), the guide rail is already factory-assembled with the magnetic tape. The side of the zero point is provided with a 4.2 mm mounting hole. For this further 15 mm must be added.



The total length of the rail is calculated as follows:

$$\text{Rail length} = \text{Ordering length of magnetic tape} + 15 \text{ mm}$$

3.2 Guide rail and Magnetic tape - Self assembling

(for effective measuring distances > 1.885 m)

If distances $> 1,885$ meters must be measured, the guide rail is multipart supplied, since for transport-technical reasons only a maximum length of 2 m are possible. The single rail parts still have no mounting holes. These must be done by the user and also be fastened align at a suitable place then.

The magnetic tape must be inserted after arraying the rail parts into the slot of the rails and stuck together with the special sticky tape, attached at the magnetic tape. Subsequently for protection, a cover band must be stuck together with the magnetic tape.

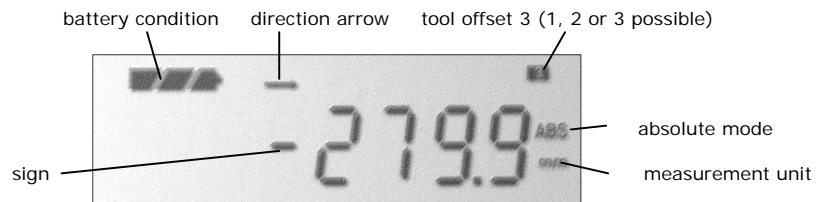
Included in delivery:

- Magnetic tape, sticky tape and cover band (order-related length)
- Aluminium profile rail parts (total length = ordered tape length + 15 mm)

Mounting:

1. Align and fasten the rail parts at the measuring place
2. Insert the magnetic tape into the rail slots
3. Detect the measuring direction (see chapter 5.1.1)
4. Stick the tape into the guide rail slot
5. Stick the cover band for protection

4. Display assignment



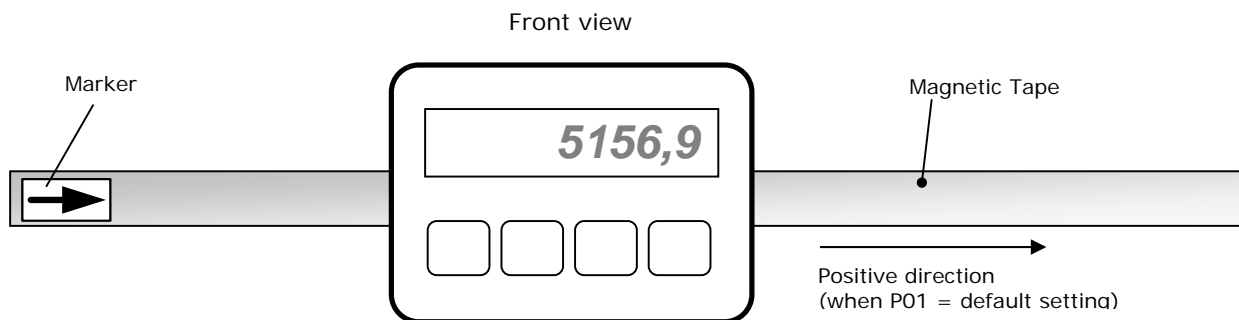
5. The AZ161 in operation

5.1 Initial operation

5.1.1 Detection of measuring direction

On the magnetic tape is an arrow marker, which indicates the positive direction. According to the following image, the arrow of the tape must show to the right.

The counting direction (+/-) can be changed by the register **P01** (see chapter 5.4).



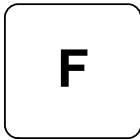
5.1.2 Referencing

Setting the zero-point: A new AZ161 unit shows always the absolute value of the magnetic tape and should be calibrated to the zero point at one time. The reference value default setting in register **P09** is **0**. To assign a zero point to an arbitrary position, move to the desired zero-point and press the buttons **F + Set** together.

Reference value: Alternatively an arbitrary value can be entered in **P09**, to set a demanded reference measurement by pressing **F + Set** together.

5.2 Basic functions (overview)

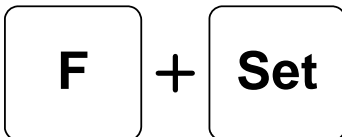
Switch back from the sleep mode



The unit switches into the sleep mode after completion of the adjustable time in register **P04**, if there are no changes in the display value and no key is pressed.

To switch back from the sleep mode, the button **F** must be pressed.

Reference value



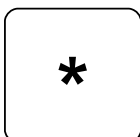
By pressing **F + Set** together, the display sets to the reference value, deposited in register **P09**.

Absolute-/ relative measurement



Press **Incr/Abs** to switch over from „absolute“ to „relative“ measurement: The actual value shows „0“ and also „INC“ appears in the display. With a renewed pressing of **Incr/Abs** the display switches back to „absolute“ measurement and the display shows the real absolute value again and „ABS“ also.

Tool offset



Switches over between three adjustable Tool Offsets. These can be deposited in the registers **P10/11/12**. The display appears (right above):

1, **2** or **3**

The selected tool offset will be added to the actual value.

Fraction views in Inch- Mode



In the inch mode four different fraction views can be selected:







Press SET for one time: LSB = 1/64 Inch

Press SET for two times: LSB = 1/32 Inch


Press SET for three times: LSB = 1/16 Inch

Press SET for four times: LSB = 0.001 Inch

5.3 Parameter settings

	<p>1) Press button F for 3 seconds. → "P01" (Parameter 01) appears in the display window.</p>
	<p>2) Press button F The appropriate parameter value appears in the display</p>
	<p>3) Select the desired decade by pressing Set</p>
	<p>4) Adjust the desired value by using the Incr/Abs button</p>
	<p>5) Press F to select the next parameter Repeat No. 2)... 4) for the next parameter</p>
	<p>6) Press F for 3 seconds → The display shows the actual value again</p>

Default settings

	<p>If during battery insertion the button Incr/Abs is pressed, the unit sets all registers to the default settings.</p>
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5.4 Parameter list

P 01 / Configuration of system: (default setting = 11100)

X X X X X

- 0 = Positive counting direction
- 1 = Negative counting direction
- 0 = mm operation (0.1 mm resolution)
- 1 = Inch operation (0.1 inches resolution)
- 0 = mm/Inch symbol disabled
- 1 = mm/Inch symbol enabled
- 0 = Arrow symbol for „positive direction“ disabled
- 1 = Arrow symbol for „positive direction“ enabled
- 0 = LCD in standby mode disabled
- 1 = LCD in standby mode enabled (Display "OFF" and battery condition)

P 03 / Decimal place: (default setting = 1)

X = 0...3 (for mm operation only)

P 04 / Auto power off time: (default setting = 10 s)

X X = 0...99 seconds (0 = standby mode disabled)

P 05 / keyboard interlock: (default setting = 111)

X X X

- 0 = button * disabled
- 1 = button * enabled
- 0 = button **Incr/Abs** disabled
- 1 = button **Incr/Abs** enabled
- 0 = button **Set** disabled
- 1 = button **Set** enabled

Parameter list (continuation)

P 09 / Reference value: (default setting = 0.0 mm / 0.000 Inch)

- 999999.9 mm ... + 999999.9 mm (- 9999.999 Inch ... + 9999.999 Inch)

P 10 / tool offset 1: (default setting = 10.0 mm / 0.100 Inch)

- 999999.9 mm ... + 999999.9 mm (- 9999.999 Inch ... + 9999.999 Inch)

P 11 / tool offset 2: (default setting = 20.0 mm / 0.200 Inch)

- 999999.9 mm ... + 999999.9 mm (- 9999.999 Inch ... + 9999.999 Inch)

P 12 / tool offset 3: (default setting = 30.0 mm / 0.300 Inch)

- 999999.9 mm ... + 999999.9 mm (- 9999.999 Inch ... + 9999.999 Inch)

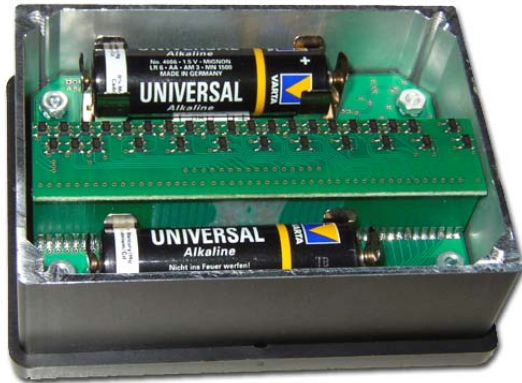
P 99 / Software version:

9

Indicates the software version of the unit

6. Battery change

Remove the back wall of the display unit to change the batteries (commercial battery type, size AA, 1.5 V) with a standard unit (internal battery case). All values and settings remains in case of changing the batteries.

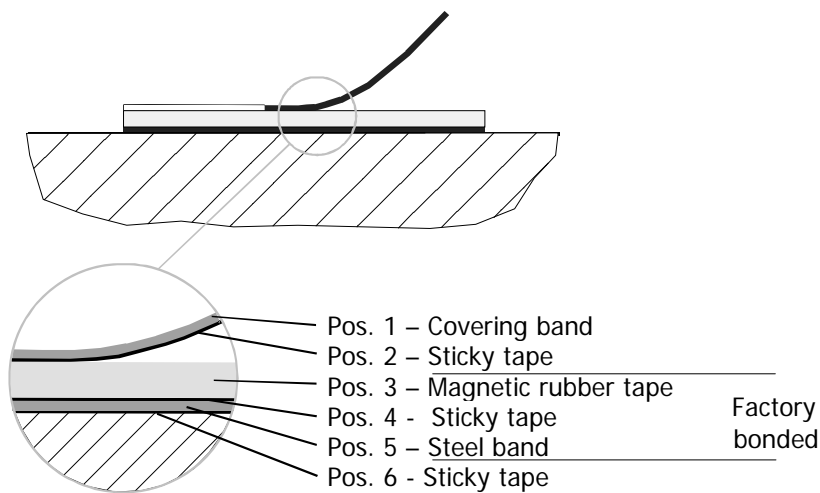


Please pay attention to the correct polarity!
The polarity is marked by a label inside the housing.

7. Magnetic Tape

The magnetic tape consists of 3 components (see picture 1)

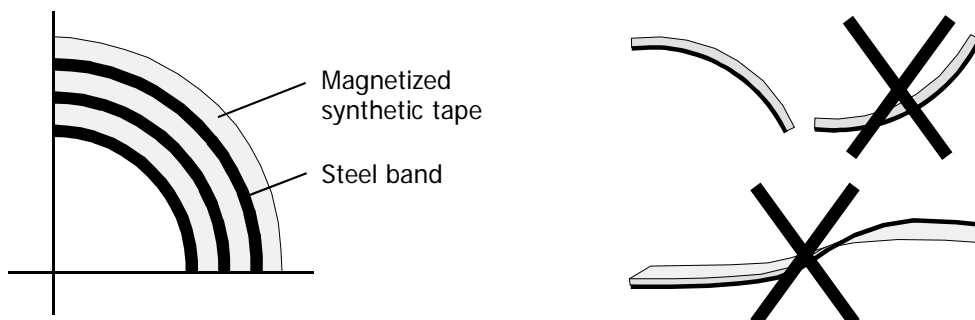
- a magnetized flexible rubber tape (Pos. 3), which is connected factory made with a
- steel band (Pos. 5) and a
- covering band (Pos. 1) , which is intended for the protection of the rubber tape.
- For mechanical protection of the magnetic tape the covering band must be stuck on. Additionally it protects the magnetic tape from extreme external magnetic influences. To reach a complete adhesion between the several materials a special sticky tape is used (Pos. 2, Pos. 4, Pos. 6).



Picture 1: Components of the magnetic tape

Handling

To avoid tension in the magnetic tape, don't tuck or twist it. Avoid also to store or to handle it with the magnetic rubber tape to the inside (min. bend radius 150 mm).



Picture 2: Storage and transport

Processing note for sticking

The provided sticky tapes stick well on clean, dry and plain surfaces. The more pollution exists the more proper the surface has to be. A surface roughness of $R_a \leq 3,2$ ($R_z \leq 25 / N8$) is recommendable. Typical solvent for cleaning surfaces are a 50/50 - isopropyl-alcohol / water mixture or heptane. The surfaces of materials as copper, brass etc. should be sealed to avoid an oxidation. The stability of the adhesion is directly depending on the contact, which the adhesive develops to the stuck surfaces. A high pressure results in a good surface contact.

The optimal sticking temperature is between + 21°C and 38°C.

Avoid colder sticking surfaces than + 10 °C, because in this case the adhesive becomes to hard and perhaps a sufficient immediate adhesion is hardly to achieve. After proper sticking the stability of the connection is ensured also when the temperature is below zero. The final tackiness of a sticking is from experience reached after approximately 72 hours (at + 21 °C). For sticking use only the provided sticky tape.

Resistance to chemicals of the magnetic tape

The magnetic tape shows **no or only small effects** when contacting permanently the following materials after 2 to 5 years: Formic acid, Glycerol 93°C, Linseed oil, Soy beans oil, Cotton seed oil, N-hexane, Lactic acid, Formaldehyde 40%, Isooctane, Petroleum.

Poor to medium effects result when contacting permanently the following materials after approximately 1 year: Acetone, Gasoline, Acetic acid 30%, Olein acid, Acetylene, Steam, Acetic acid, pure Acetic acid, Sea water, Ammonia, Acetic acid 20%, Isopropyl ether, Stearic acid 70°C anhydrous, Kerosene.

Strong effects result when contacting permanently the following materials after 1 to 5 months: Benzene, Nitric acid 70%, Turpentine, Toluene, Lacquer solvent, Nitric acid red and Vitriolic, Carbon Tetrachloride, Trichloroethane, Nitrobenzene, Hydrochloric acid 37% and 93°C, Tetrahydrofuran, Xylene.

Sticking and cutting



Attention! When sticking the magnetic tape pay attention to the marks on the magnetic tape. A faulty installation delivers incorrect values. An already stuck magnetic tape is ruined after removing and can't be used again. Observe also the counting direction of the measuring system.

The magnetic tape and the covering band must be cut to the exact length before sticking:

$$\text{Magnetic tape length} = \text{measuring length} + 0.1 \text{ m}$$

Preferably the magnetic tape should be stuck into a nut or aligned to an edge.

Procedure for sticking:

1. The magnetic tape is already factory bonded with the steel band, in between is a double sided sticky tape. Stick the provided sticky tape onto the carrier side (= steel band).
2. Now adjust the magnetic tape and stick it onto the surface. The best way to stick the magnetic tape is to do it in two steps. Remove the first half of the adhesive film from the sticky tape and stick it, then do the rest length.
3. Then stick the sticky tape onto the covering band. It is not important on which side of the covering band the sticky tape is stuck on.
4. Stick the covering band onto the visible brown magnetic rubber tape

7. Technical specifications (preliminary)

AZ16I (battery powered absolute encoder and indicator system with an integrated sensor)	
POWER SUPPLY	2 internal AA sized batteries (1,5 V) or an external battery box with arbitrary 1.5 V batteries sizes
Battery service life	1... 4 years (depends on adjusted switch-on time)
Distance Sensor - Tape	max. 1.5 mm
Resolution of encoder	0.1 mm
Measuring units	mm's or INCHES
Measuring length	max. 8 m
Principle of Measurement	Magnetic, absolute
Character of Measurement	Linear, no rotative movements possible
LCD-Display	6 Decades, height = 8 mm, with battery condition, signs and symbols
Keypad	Membrane keypad
Operating temperature	+ 5... + 50° C
Stock temperature	0... 70° C
Humidity	Not condensing, max. 80 %
Altitude	max. 2000 m above sea level
Protection class	IP 43
Outer dimensions	W x H = 96 x 72 mm
Cut out	W x H = 93 x 67 mm
Depth	(install depth) 32.0 mm (total depth) 37.5 mm
Magnetic tape for AZ16	
Code	Absolute, single track system
Extension coefficient	$a = 16 \times 10^{-6} K^{-1}$
Linear extension	$\Delta L = L \times a \times \Delta \theta$ (L= measuring length in meters)
Dimensions (W x H)	10 mm x ca. 1.8 mm
min. bend radius	150 mm
Operating temperature	0... + 50° C
Protection class	IP 67

9. Type designation

AZ16I-	000-	2-	0-	X
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Type _____

AZ16I: Indicator with integrated sensor

SN- Number: _____

000 = Standard

001 = First special version

Power supply _____

2 = 2 internal 1.5 V batteries (AA)

Housing / Guidance _____

0 = for Aluminium Guide Rail (25 x 6 mm)

Options _____

Magnetic tape and guide rail for AZ16I

Magnetic tape length to order = Effective measuring length + 100 mm

- A)** With effective measuring distances smaller than 1.885 m, the guide rail is already assembled with the magnetic tape (Please note: Owing to the mounting hole, the rail is 15 mm's longer!)
- B)** With effective measuring distances larger than 1.885 m, several guide rail parts (according to the total length) and a separately magnetic tape are included in the delivery and must be assembled by the user.

10. Liability exclusion / Guarantee

We have checked the contents of this instruction manual carefully, to the best of our knowledge and belief for conformity with the described hardware and software. Nevertheless errors, mistakes or deviations can not be excluded, therefore we do not guarantee complete conformity. Necessary corrections are included in the subsequent editions.

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The guarantee period is to two calendar years from the date of delivery and includes the delivered unit with all its components. ELGO Electric GmbH will at its option replace or repair without charge defects at the unit or the included parts, verifiable caused by faulty manufacturing and/or material in spite of proper handling and compliance to the instruction manual.

Damages verifiably not caused by ELGO-Electric GmbH and due to improper handling are excluded from any guarantee e.g. by applying faulty voltage, diffusion of liquid into the interior of the engine, using force, scratching the surface, chemical influences etc.!

