

Operating Manual

SERIES Z50-000

Single Axis Position Indicator (24 VDC)



- Suitable for incremental and absolute encoders
- 7 digit LCD display, digit height 14 mm
- Power down memory of all data
- Mode for speed measurement
- Two digital control inputs
- Serial interface via USB

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2 General, Safety, Transport and Storage

2.1 Information Operating Manual




This manual contains important information regarding the handling of the device. For your own safety and operational safety, please observe all safety warnings and instructions. Precondition for safe operation is the compliance with the specified safety and handling instructions. Moreover, the existing local accident prevention regulations and the general safety rules at the site of operation have to be observed.

Please read the operating manual carefully before starting to work with the device! It is part of the product and should be kept close to the device and accessible for the staff at any time. The illustrations in the manual are for better demonstration of the facts. They are not necessarily to scale and can slightly differ from the actual design.


2.2 Explanation of Symbols

Special notes in this manual are characterized by symbols. The notes are introduced by signal words which express the magnitude of danger. Please follow this advice and act carefully in order to avoid accidents, damage, and injuries.


Warning notes:

	DANGER! This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	WARNING! This symbol in connection with the word „Warning“ means a possibly impending danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	CAUTION! This symbol in connection with the signal word "Caution" indicates a possibly dangerous situation. Failure to heed these instructions can lead to minor injuries or damage of property.



Special safety instructions:

	DANGER! This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons due to voltage. Failure to heed these instructions can result in serious damage to health and even fatal injury. The operations may only be carried out by a professional electrician.
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Tips and recommendations:

	NOTE! ...points out useful tips and recommendations as well as information for an efficient and trouble-free operation.
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Reference marks:

-  Marks a reference to another chapter of this manual.
-  Marks a reference to another chapter of another document.

2.3 Statement of Warranties

The producer guarantees the functional capability of the process engineering and the selected parameters.

2.4 Demounting and Disposal

Unless acceptance and disposal of returned goods are agreed upon, demount the device considering the safety instructions of this manual and dispose it with respect to the environment.

Before demounting, disconnect the power supply and secure against re-start. Then disconnect the supply lines physically and discharge remaining energy. Remove operational supplies and other material.

Disposal:

Recycle the decomposed elements: Metal components in scrap metal, Electronic components in electronic scrap, Recycle plastic components, dispose the remaining components according to their material consistence



CAUTION!

Wrong disposal causes environmental damages!
Electronic scrap, electronic components, lubricants and other auxiliary materials are subject to special refuse and can only be disposed by authorized specialists!

Local authorities and waste management facilities provide information about environmentally sound disposal.

Safety



CAUTION!

Please read the operating manual carefully, before using the device! Observe the installation instructions!
Only start up the device if you have understood the operating manual.
The operating company is obliged to take appropriate safety measure.
The initial operation may only be performed by qualified and trained staff.
Selection and installation of the devices as well as their embedding into the controlling system require qualified knowledge of the applicable laws and normative requirements on the part of the machine manufacturer.

2.5 General Causes of Risk

This chapter gives an overview of all important safety aspects to guarantee an optimal protection of employees and a safe and trouble-free operation. Non-observance of the instructions mentioned in this operating manual can result in hazardous situations.

2.6 Personal Protective Equipment

Employees have to wear protective clothing during the installation of the device to minimize danger of health.

Therefore: Change into protective clothing before performing the works and wear them throughout the process. Additionally observe the labels regarding protective clothing in the operating area.

Protective clothing:

	<p>PROTECTIVE CLOTHING ... is close-fitting working clothing with light tear strength, tight sleeves and without distant parts. It serves preliminarily for protection against being gripped by flexible machine parts. Do not wear rings, necklaces or other jewelry.</p>
	<p>PROTECTIVE GLOVES ...for protecting the hands against abrasion, wear and other injury of the skin.</p>
	<p>PROTECTIVE HELMET ...for protection against injuries of the head.</p>

2.7 Conventional Use

The ELGO-device is only conceived for the conventional use described in this manual.
The Z50-000 position indicator only serves to visualize positions, pulses or other specified units.

**CAUTION!**

Danger through non-conventional use!

Non-intended use and non-observance of this operating manual can lead to dangerous situations.

Therefore:

- Only use the device as described
- Strictly follow the instructions of this manual

Avoid in particular:

- Remodeling, refitting or changing of the construction or single components with the intention to alter the functionality or scope of the device.

Claims resulting from damages due to non-conventional use are not possible.
Only the operator is liable for damages caused by non-conventional use.

2.8 Safety Instructions for Transport, Unpacking and Loading

**CAUTION!**

Transport the package (box, palette etc.) professionally.

Do not throw, hit or fold it.

2.9 Handling of Packaging Material

Notes for proper disposal: ↗ 2.4

2.10 Inspection of Transport

Check the delivery immediately after the receipt for completeness and transport damage.
In case of externally recognizable transport damages:

- Do not accept the delivery or only accept under reserve.
- Note the extent of damages on the transportation documents or delivery note.
- File complaint immediately.

**NOTE!**

Claim any damage immediately after recognizing it.

The claims for damage must be filed in the lawful reclaim periods.

2.11 Storage

Store the device only under the following conditions:

- Do not store outside
- Keep dry and dust-free
- Do not expose to aggressive media
- Protect from direct sun light
- Avoid mechanical shocks
- Storage temperature (↗ 4.4) needs to be observed
- Relative humidity (↗ 4.4) must not be exceeded
- Inspect packages regularly if stored for an extensive period of time (>3 months)

3 Product Features

3.1 General Information



The compact Z50 position indicator has a 14 mm high LCD display which allows comfortable and accurate reading of actual positions. Commands like Reset or Preset to an arbitrary reference value can be done either via the dustproof front keypad or external signals to 0 or to an arbitrary reference value. The unit evaluates incremental square wave signals from conventional rotary encoders as well as from the ELGO magnetic linear encoder types LMIX, EMIX, MIX or PMIX.

Further, the ELGO absolute linear encoder EMAX can be connected at connector S2 (☞ 9).

**NOTE!**

During de-energized state, movements or displacements of the measuring system or encoder are not evaluated! After powering up an incremental measuring system, a referencing procedure must be performed. Information can be found in the operating manual of the respective measuring system.

3.2 Product Features

The Z50 unit has numerous useful features and functions:

- Position indicator with signal input for 1 axis
- LCD display with backlight
- 2 digital control inputs
- Multiplication factor
- 1, 2 or 4 edge triggering
- Saw blade width
- Reference value
- Tool offset
- Up/down operation
- Relative / absolute measurement switchover by front key
- Mode for speed measurement
- Power down memory of all data
- Quick and easy installation
- Serial interface via USB socket

Further information about these functions can be found within this manual.

4 Technical Data

4.1 Identification

The type label serves for the identification of the unit. It is located on the housing of the sensor and gives the exact type designation (=order reference 12) with the corresponding part number. Furthermore, the type label contains a unique, traceable device number. When corresponding with ELGO please always indicate this data.

4.2 Dimensions Z50 (front)

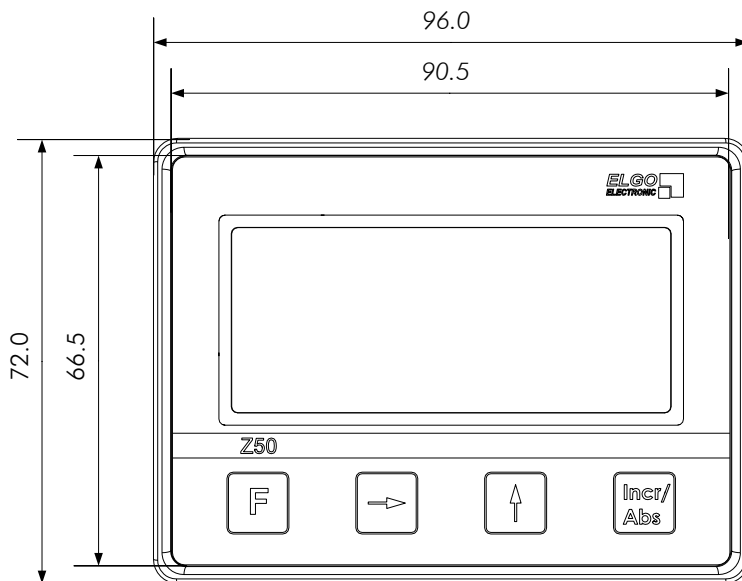


Figure 1: Z50 dimensions

4.3 Panel installation

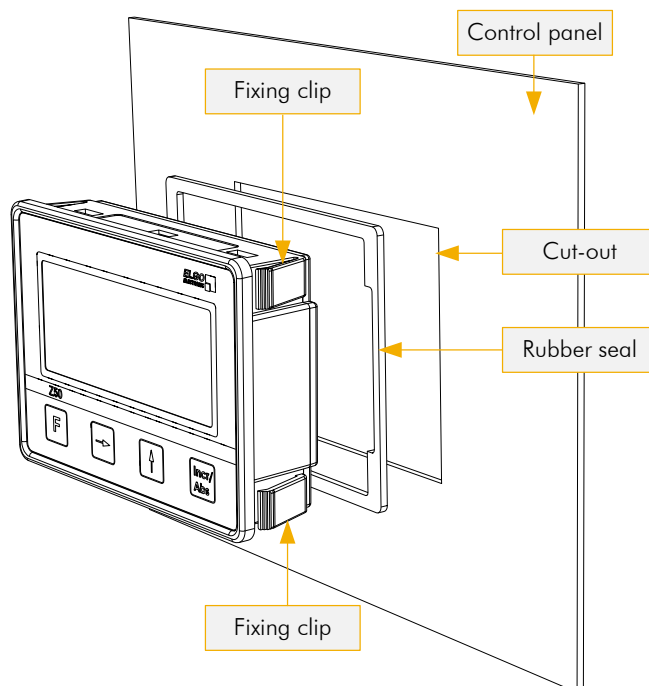


Figure 2: Installation into panel

The Z50 is very easy to install. No mounting accessories or tools are required.

The device inclusively rubber seal will be inserted into a prepared 93 x 67 mm panel cut-out until the four fixing clips snap in.

Please note: To avoid damage to the seal or the housing, the edges of the cut-out must be deburred.

To remove the unit from the cut-out, simply press the mounting clips inwards against the housing and pull the unit out from the panel.


4.4 Technical Data

Table 1: Technical Data


Indicator Z50-000



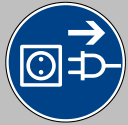

Power supply voltage	24 VDC +/- 20 %
Consumption	50 mA at 24 VDC (without measuring system)
Reverse polarity protection	yes
Encoder supply	24 VDC or 5 VDC (order information ☞ 12)
Load by measuring system	max. 300 mA
LCD display	7 digits, digit height 14 mm, with sign and measurement units
Perspective	12 o'clock
Keyboard	Membrane keypad
Measurement units	mm, m, Inch, rpm or °
System accuracy	+/- 1 digit
Operating temperature	0 ... + 50 °C
Storage temperature	-20 ... +80 °C
Humidity	max. 80 %, non-condensing
Inputs	max. input current 10 mA, PNP (active high), switching voltage 24 VDC
Data memory	FRAM
Serial interface	USB interface with COM port emulation on PC or PLC
Housing	Norm panel housing, ABS plastic, black
Housing dimensions	W x H x T = 96 x 72 x 31 mm (without seal) W x H x T = 98 x 74 x 31 mm (with seal)
Installation depth	27 mm (inclusive connectors)
Front panel cut-out	W x H = 93 x 67 mm
Suitable panel thicknesses	1.0 / 1.5 / 2.0 / 2.5 mm (when installed with seal) 2.5 / 3.0 / 3.5 mm (when installed without seal)
Protection class front	IP54 (installed state with seal) IP43 (installed state without seal)
Protection class back	IP40

5 Installation and First Start-Up

	<p>CAUTION Please read the operating manual carefully before using the device! Strictly observe the Installation instructions! In case of damage caused by failure to observe this operating manual, the warranty expires.</p> <p>ELGO is not liable for any secondary damage and for damage to persons, property or assets.</p> <p>The operator is obliged to take appropriate safety measures.</p> <p>The first start-up may only be performed by qualified staff that has been trained and authorized by the operator.</p>
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5.1 Operating Area

	<p>WARNING! Do not use the device in explosive or corrosive environments! The device must not be installed close to sources of strong inductive or capacitive interference or strong electrostatic fields!</p>
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	<p>CAUTION! The electrical connections must be made by suitably qualified personnel in accordance with local regulations.</p>
	<p>The device may be designed for switchboard mounting. During work on the switchboard, all components must be de-energized if there is a danger of touching the energized parts! (protection against contacts)</p> <p>Wiring works may only be performed in the de-energized state!</p>
	<p>Thin cable strands have to be equipped with end sleeves!</p> <p>Before switching on the device, connections and plug connectors have to be checked!</p>
	<p>The device must be mounted in a way that it is protected against harmful environmental influences such as splashing water, solvents, vibration, shock and severe pollution and the operating temperature must not be exceeded.</p>

6 Design and Functions

6.1 Key assignment

The Z50 unit has 4 front-panel keys. The figure below shows the respective basic functions:

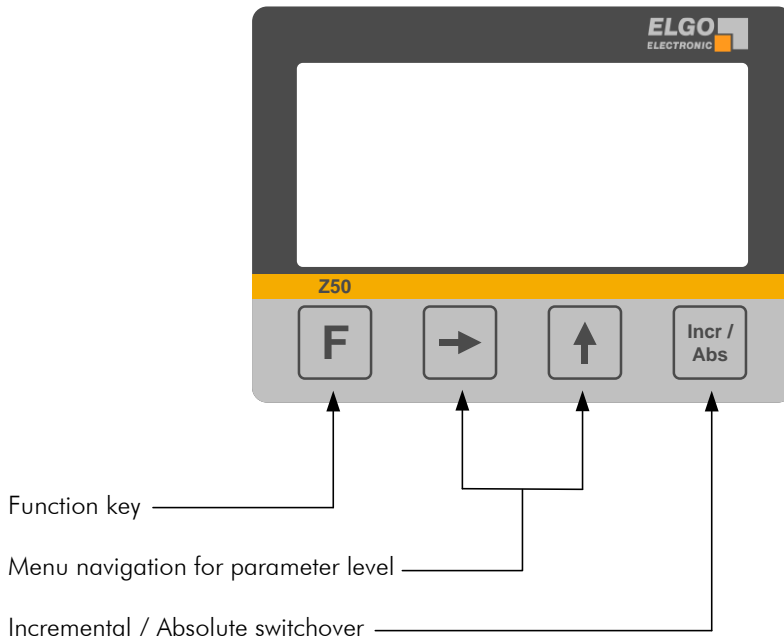


Figure 1: Key assignment of Z50

6.2 External inputs

The device has 2 digital control inputs which can be connected at the 5 pin connector S1 (☞ 9).

The sensitivity of external input 1 is adjustable by parameter P19 and can be defined “level-sensitive” or “edge-sensitive”. The input is 24 VDC / PNP and active with a high level resp. with a positive edge.

The external input 2 is always „level-sensitive“ and cannot be changed. The input is 24 VDC / PNP and active with a high level.

- The function of input 1 can be programmed by using parameter 17 (connector S1/4 ☞ 9)
- The function of input 2 can be programmed by using parameter 18 (connector S1/5 ☞ 9) (see parameter description ☞ 7).

6.3 Encoder supply

A 24 VDC or 5 VDC encoder supply (depends on order information, ☞ 12) is available at pin 1(–) and 2(+) of the 9 pin connector S2.

The maximum current load is 300 mA.









6.4 Key functions

The operation of the device is divided into 2 levels:







- **Parameter level:** For configuration of the main operating parameters (☞ 7).
- **User level:** Allows access to the basic functions of the unit (depends on software version).

All entries and settings are made exclusively via the 4 front keys or various key combinations.

Regular mode:

			Press shortly = switching from absolute to incremental measuring
			Press shortly = activate tool offsets. (in the absolute mode) An activated tool offsets are indicated by the digit „1“, shown in the upper display frame.
	+		Press shortly = set to reference value (in the absolute mode) Press for 3 seconds = change reference value Switching back to normal mode: Incr/Abs key
	+		Press shortly = set to „0“ (in the absolute mode) Press for 3 seconds = change tool offset Switching back to normal mode: Incr/Abs key
	+		Press for 3 seconds = entering the parameter level

Parameter level:

			Press shortly = select decade
			Press shortly = increase decade
			Press shortly = save changes and switch over to next parameter
			Input of negative parameters (negative sign only possible for a value unequal 0)
	+		Press for 3 seconds = quit the parameter level



NOTE!

Entering the parameter level "P01" shows up in the display. When release the buttons „F“ and „Incr/Abs“, the display shows up the value of P01. Forward the parameter with „Incr/Abs“. The selected parameter is displayed for the duration of pressing the „Incr/Abs“-button (e.g. "P05"). When release the button, the display jumps into the respective parameter value.

7 Parameter level

This section describes all available parameters and their settings. A parameter list for a quick overview of all available parameters can be found in the next chapter (☞ 8). Specific customer settings can be added there.

P01: Counting direction

Up / down switchover (0 = forwards / 1 = backwards)

P02: Measurement unit for the display

Available measurement units:

- 0 = mm
- 1 = Inch
- 2 = m
- 3 = °
- 4 = RPM
- 5 = no measurement unit

P03: Decimal place

To define a decimal place:

- 0 = 1
- 1 = 0.1
- 2 = 0.01
- 3 = 0.001

P05: Keyboard lock

Arrangement in the display "ABCD" (from left to right):

- A = Button „F“ (0 = deactivated / 1 = activated)
- B = Button „⇌“ (0 = deactivated / 1 = activated)
- C = Button „↑“ (0 = deactivated / 1 = activated)
- D = Button „Incr/Abs“ (0 = deactivated / 1 = activated)

P06: Edge evaluation¹

Selection of 1, 2 or 4 edge triggering:

- 0 = x 1
- 1 = x 2
- 2 = x 4

P07: Measuring system¹

Selection of the measuring system:

- 0 = incremental
- 1 = absolute EMAX
- 2 = reserved for FMAX
- 3 = reserved for INAX2

¹ After changes switch off the device then switch it on again.

P08: Multiplication factor

Define a multiplication factor.

Range: 00.00001 ... 99.99999

P09: Reference value

Enter a reference value.

Range: 000000.1 ... 999999.9

P10: Tool offset

Enter a tool offset:

Range: 000000.1 ... 999999.9

P11: Saw blade width

Enter the saw blade width:

Range: 0000.1 ... 9999.9

P16: Default initialization¹

Parameters are reset to default values. (0: not init., 1: default init.)

After entering „1“, confirm with button „Incr/Abs“ and switch off the device.

After restart the default parameters are loaded and the device is reset to its default values.

P17: Function of external input 1

The external input 1 can be programmed as follows:

0 = External input 1 has no function

1 = Set the actual value to reference value (P09)

2 = Add offset dimension (P10)

3 = Set actual value to 0

P18: Function of external input 2

The external input 2 can be programmed as follows:

0 = External input 2 has no function

1 = Set the actual value to reference value (P09)

2 = Add offset dimension (P10) (only possible if P19=0)

3 = Set actual value to 0

P19: Trigger external input 1

0 = level sensitive

1 = positive edge sensitive

P20: Display mode

0 = Standard

1 = Speed

P21: Revolution speed

Enter the number of pulses per revolution

P24: Transmission of the actual value¹

0 = Z50 will transmit the actual value on request

1 = Z50 will transmit the actual value periodically (every 100ms)

P99: Software version

This parameter displays the software version.

¹ Parameter P24 is available starting with software version 1.12

8 Parameter list

Table 2: Parameter list

Par. No.	Function	Default settings	Description	Customer settings
P01	Counting direction	0	upwards	
P02	Measurement unit (display)	0	mm	
P03	Decimal place	1	1 decimal place	
P04	Reserved	-		
P05	Keyboard lock	0	deactivated	
P06	Edge evaluation	0	1 edge triggering	
P07	Measuring system selection	0	incremental	
P08	Multiplication factor	01.00000		
P09	Reference value	000000.0		
P10	Tool offset	000000.0		
P11	Saw blade width	0000.0		
P12	Reserved	-		
P13	Reserved	-		
P14	Reserved	-		
P15	Reserved	-		
P16	Default Init	0	not active	
P17	Function of external input 1	0	not active	
P18	Function of external input 2	0	not active	
P19	Trigger external input 1	0	level sensitive	
P20	Display mode	0	standard	
P21	Speed	500	pulses / revolution	
P22	Reserved	-		
P23	Reserved	-		
P24	Actual value transmission ¹	0	transmits on request	
P25	Reserved	-		
P99	Software version	-		

¹ Parameter P24 is available starting with software version 1.12

9 Serial Interface

Type: USB with COM port emulation on PC or PLC

Data format:

Baud rate = 9600

8 data bit, 1 stop bit, no parity

The position indicator responds only to requests of the PC.

	<p>IMPORTANT:</p> <ul style="list-style-type: none"> The PC is connected to the Mini USB socket S3 (☞ 10). For communication a special driver must be installed on the PC. Download on https://www.elgo.de/fileadmin/user_upload/software/CDM20802_Setup.zip
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9.1 Interface commands

Read actual value:

Command	STX	,R'	,D'	,X'	ETX
Example	0x02	0x52	0x44	0x58	0x03

Answer	STX	,+'	,1'	,2'	,3'	,4'	,5'	,6'	,7'	CRC	ETX
	0x02	0x2b	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x97	0x03

- The data is sent in the ASCII-Code
- In case of an invalid command, a „Q“ is sent
- The CRC is a summation of the 8 data bytes (incl. sign)
- An eventual carry-over does not apply

10 Connections

Table 3: Power supply and digital inputs

5 pin Connector S1:

Power supply voltage and external control inputs

Pin	Function
1	PE / shield
2	0 V / GND (power supply input)
3	+24 VDC (power supply input)
4	External input 1 (24 V, PNP)
5	External input 2 (24 V, PNP)

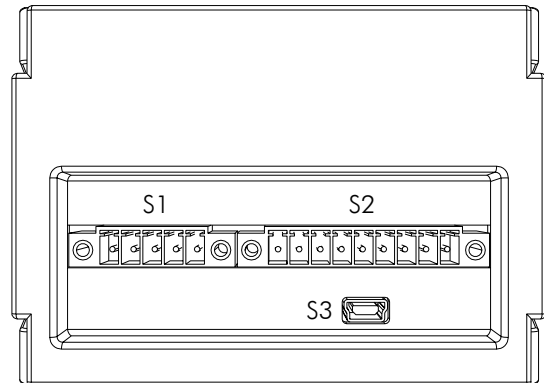


Table 4: Incremental measuring systems

9 pin Connector S2:

Encoder variant 1: Incremental, channel A/B

Pin	Function
1	0 V / GND
2	+ 5 VDC or 24 VDC
3	Channel A
4	Channel B
5	PE / shield
6	-
7	-
8	-
9	-

Encoder variant 2: Incremental, differential

Pin	Function
1	0 V / GND
2	+ 5 VDC or 24 VDC
3	Channel A
4	Channel B
5	PE / shield
6	Channel A'
7	Channel B'
8	Channel Z'
9	Channel Z

Table 5: Absolute measuring system and serial interface

9 pin Connector S2:

Encoder variant 3: Absolute, RS422

Pin	Function
1	0 V / GND
2	+ 5 VDC or 24 VDC
3	RS422 RxD(+)
4	RS422 TxD(+)
5	PE / shield
6	RS422 RxD(-)
7	RS422 TxD(-)
8	-
9	-

Socket S3: USB interface

with COM port emulation on PC or PLC

The connection is pluggable.
No wiring is required.



Note!

Shield / earth must be connected both-way (to the indicator and also to the measuring system). This is necessary for an interference free operation!

11 Disturbances, Maintenance, Cleaning

This chapter describes possible causes for disturbances and measures for their removal. In case of increased disturbances, please follow the measures for fault clearance in chapter 11.1. In case of disturbances that cannot be eliminated by following the advice and the fault clearance measures given here, please contact the manufacturer (see second page).

11.1 Fault Clearance



CAUTION!

The device, the connection line and the signal cable must not be installed next to sources of interference that emit strong inductive or capacitive interference or strong electrostatic fields.

External perturbations can be avoided through suitable cable routing.



The screen of the signal output cable should only be connected to the following circuit on one side. The screens should not be grounded on both sides. Signal cables always have to be routed separately from the load power line. A safety distance of at least 0.5 m has to be kept from inductive and capacitive sources of interference such as contactors, relays, motors, switching power supplies, clocked controllers etc.!

If interferences occur in spite of all the items stated above being observed, please proceed as follows:

1. Installation of RC-circuits via contactor coils of AC-contactors (e.g. 0,1 μ F / 100 Ω)
2. Installation of recovery diodes via DC-inductors
3. Installation of RC-circuits via the different motor phases (in the terminal box of the motor)
4. Do not connect protective earth and ground
5. Connect a mains filter ahead of the external power pack

11.2 Possible Errors and their Clearance

The following table shows possible interferences and their clearance.

Table 6: Error messages and clearance

Error number	Description	Clearance
„Err 110“	Data storage error	Switch the device off and on. If the error occurs again, return the device for repair.
„Err 210/220“	Sensor error (applies only with absolute encoders)	Switch the device off and on. If the error occurs again, check the encoder and its wiring. If unsuccessful, return the device for repair.
„Err 240“	Power supply voltage broke down during operation	Switch the device off and on. If the error occurs again, check the power source resp. power pack. If unsuccessful, return the device for repair.
„Err 250“	Power supply voltage broke down at power on	Switch the device off and on. If the error occurs again, check the power source resp. power pack. If unsuccessful, return the device for repair.

11.3 Re-start after Fault Clearance

After the fault clearance:

1. Reset the emergency stop mechanism if necessary
2. Reset the error report at the super-ordinate system if necessary.
3. Ensure that there are no persons in the danger area.
4. Follow the instructions from chapter 5.



WARNING!
Danger of injury through non-conventional fault clearance!

Non-conventional fault clearance can lead to severe injuries and damage of property.

Therefore:

- Any work to clear the faults may only be performed by sufficiently qualified staff
- Arrange enough space before starting the works
- Make sure that the mounting area is clean and tidy. Loose components and tools are sources of accidents.

If components need to be replaced:

- Pay attention to a correct installation of the spare parts.
- Reinstall all the fixing elements properly
- Before turning on the device, ensure that all covers and safety equipment is installed correctly and functions properly

11.4 Maintenance

The device is maintenance-free.



WARNING!
Danger through non-conventional maintenance!

Non-conventional maintenance can lead to severe injuries and damage of property.

Therefore:

Maintenance works may only be completed by staff that has been authorized and trained by the operator.

11.5 Cleaning



WARNING!
The device can only be cleaned with a damp cloth, do not use aggressive cleanser!

12 Type designation

Z50 - 000 - 024 - X

Device designation: ————

Z50 = 1 Axis Position Indicator

Version: ————

000 = Standard unit

001 = 1. customized version

002 = 2. customized version (etc.)

Power supply voltage: ————

024 = 24 VDC

Signal inputs: ————

0 = A/B with 24 VDC encoder supply, HTL levels (PNP), 100KHz

2 = A/A' B/B' Z/Z' with 24 VDC encoder supply, TTL levels (PNP), 100 KHz

3 = A/A' B/B' Z/Z' with 5 VDC encoder supply, TTL levels (PNP), 100KHz

5 = Adapted to the ELGO EMAX linear encoder, RS422

6 = A/B/Z with 5 VDC encoder supply, TTL levels (PNP), 100KHz



NOTE

When ordering, please use the here described ordering code (Type Designation). Options that are not required are filled in with „-“.

12.1 Accessories

Table 1: Accessories

Order Designation	Description
NG24.0	External 24 VDC power pack (primary 115/230 VAC) as power supply for Z50

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