

# Compact level limit value switch

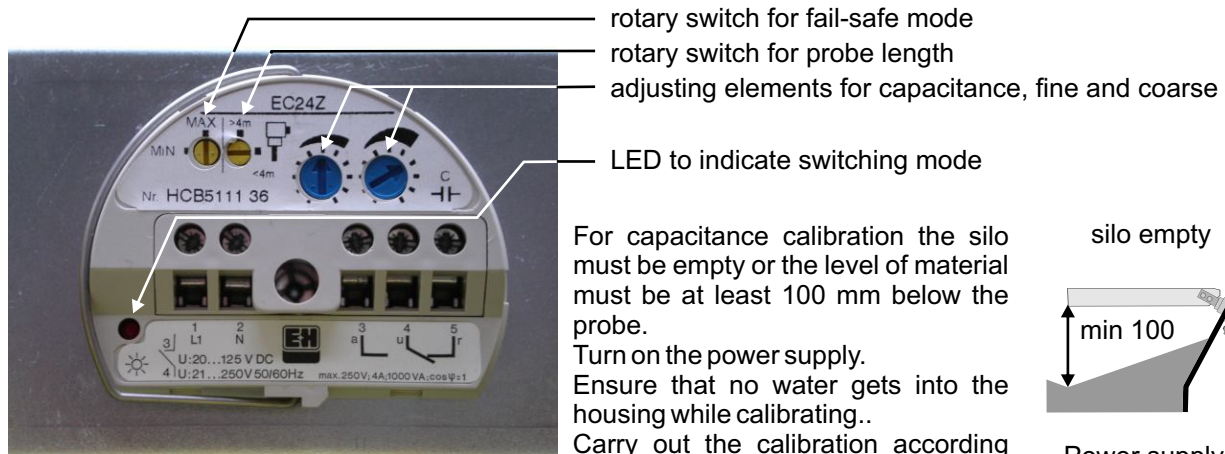
## Safety warnings



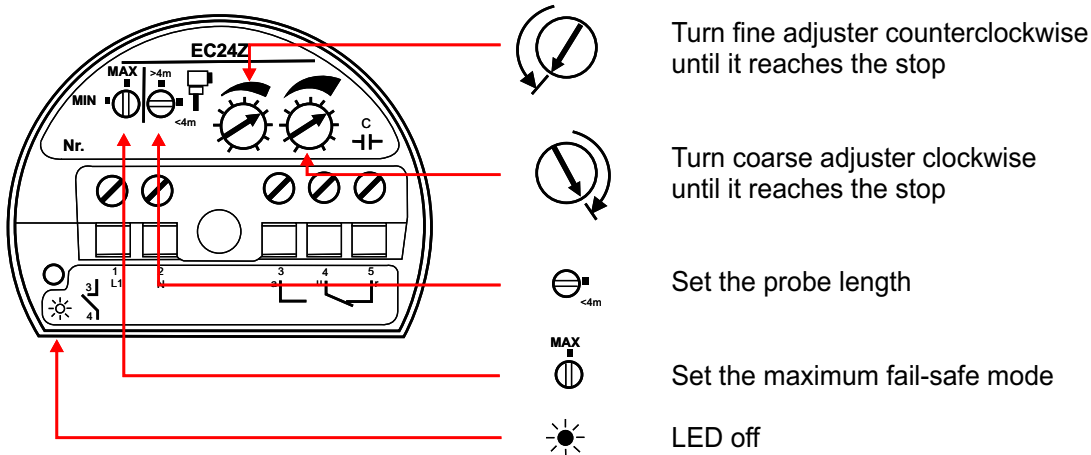
**General:** When mounting, initiating and operating this level limit value switch the safety precautions and regulations have to be observed. Only staff with a corresponding qualification should work with the level limit value switch. A non-observance of the safety regulations may cause serious injuries and/or damages. Check before initial operation the suitability of the level limit value switch for this area of application. The technical data of this manual have to be followed.

## Adjustment

For calibrating the level electronics should be adjusted to the capacitance value of the capacitor formed by the probe and wall of the silo (steel wall). The rotary switches and adjusting elements for calibration are on the electronic insert in the housing. Directly beside these calibration elements are the power connections with voltages up to 250 V. Only use screwdriver which has insulation as far as the blade or else tape over the terminals with insulating tape before calibration.

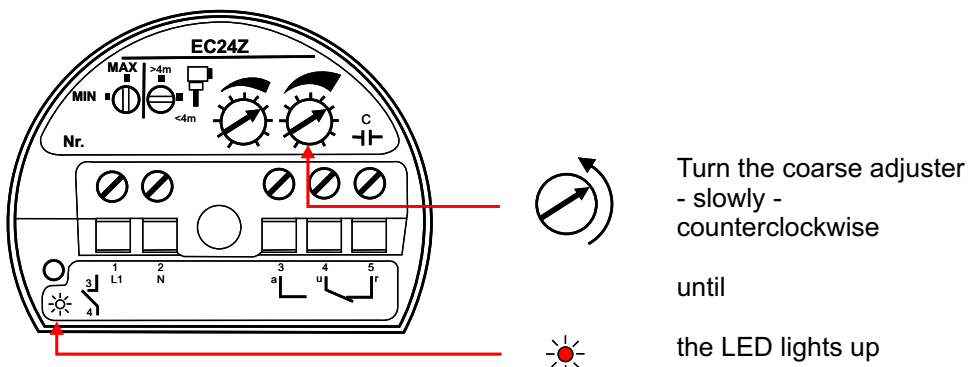


## Capacitance calibration, initial settings

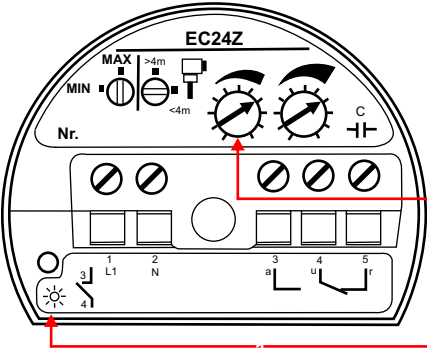


These initial settings must be done before the capacitance calibration

## Capacitance calibration, coarse



Capacitance calibration, adjust



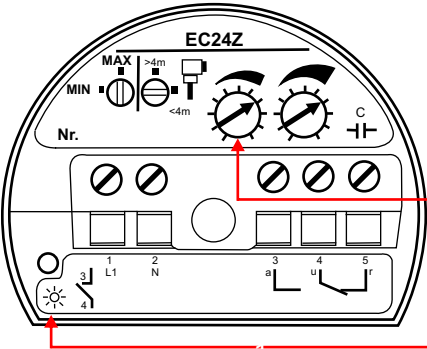
Turn the fine adjuster  
- slowly -  
clockwise  
  
until



LED goes out

When using products that cause build-up turn the fine adjuster further clockwise by approx. 2 index marks  
**Capacitance calibration must be carried out both slowly and carefully.**

Adjustment for material characteristics



Turn the fine adjuster  
clockwise

through



Material characteristics (bulk solid)

Low dielectric constant low conductivity	no build-up	approx. 1 division
	with build-up	approx. 1 to 2 divisions
High dielectric constant high conductivity	no build-up	approx. 2 to 4 divisions
	with build-up	approx. 4 to 6 divisions
Accurate adjustment ensures high switching reliability		



When the probe is covered with non-conductive bulk solid having a low dielectric constant, then the electronic only switches when the probe is completely covered with the material. The degree of covering depends on the calibration. Turning the fine calibrating element clockwise causes the level electronics to become less sensitive.

Function control

With the probe uncovered touch the central retaining screw of the electronic insert with screwdriver, holding it by the insulated handle. This simulates the bulk solid covering the probe. The LED indicates a change of status. This is only a function control test of the instrument. Please also check for the correct operation for limit detection by filling and emptying the silo at the installation point.

Notes, wiring, technical data

## General information

### Load limit values

Note the limit values of the loads to which you want to connect the level switch. Exceeding the load can destroy the electronic insert (eg the relay point)

### Fuse

Ensure that the rating of the fine-wire fuse corresponds to the maximum load to be connected. The fine-wire fuse does not protect the electronic insert of the level switch.

### Diameter of wiring

Because of the small currents used, only small diameter cabling is required. Low-cost cabling with diameters of 0,5 mm<sup>2</sup> to maximum 1,5 mm<sup>2</sup> is recommended.

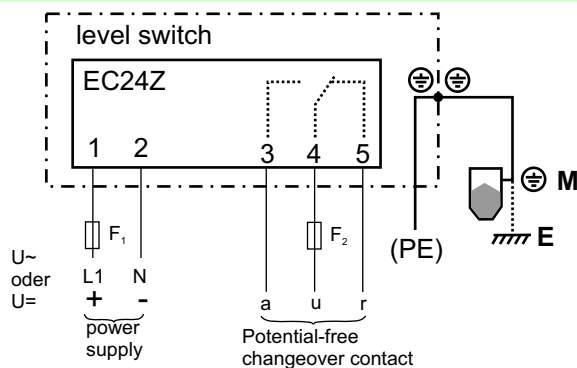
### Grounding

The level switch must be grounded to give reliable operation free from interference. This is done by either connecting it to a grounded silo with metal or reinforced concrete walls or else to the earth conductor PE. If a counter electrode is connected to a silo made of plastic material then there must be a short ground connection from the level switch to the counter electrode.

### Explosion protection

All local regulations and instructions given in certificates must be observed especially in regard to the creation of an equipotential plane (earth bonding)

## Connection



U~: 21 V ... 250 V

or

U=: 20 V ... 200 V (in non hazardous area)

U=: 20 V ... 125 V (in hazardous area)

F1: fine-wire fuse, 200 mA , semi-time lag (recommended)

F2: fine-wire fuse to protect the relay point, load dependant

M: ground connection to silo or to counter electrode

E: Grounding

### Relay point for load

The load is connected over a potential free relay point (changeover contact). The relay contact breaks the connection between terminal 3 and terminal 4 on level alarm or with a power failure.

### Protection against voltage peaks and short circuit

Protect the relay point by connecting a spark barrier to instruments with high inductance. A fine-wire fuse (load dependant) can protect the relay point if short circuit occurs.

## Technical data

### Input

Measurement:	capacitive
Medium:	sand / glass aggregate / gravel / moulding sand / lime / ore (crushed) / plaster aluminium shavings / cement / pumice grain / flour / kaolin / sugar beet chips fodder and similar bulk solids
Initial capacitance:	to approx. 400 pF adjustable
Dielectric constant:	$\epsilon_r > 2,5$
Measuring frequency:	approx. 770 kHz for short probes up to 4 m approx. 450 kHz for long probes
Switching delay:	approx. 0,5 s

### Output

Relay:	1 change-over contact 250 VAC / 4 A / 1000 VA / 500 kHz ( $\cos\phi = 0,7$ ) 100 VDC / 4 A / 100 W
Operating life:	>10 <sup>5</sup> switchings at maximum contact load
Switching delay:	additional 1,5 s
Status indication:	LED red

### Power supply

Supply voltage:	20...125 VDC (in hazardous area) 20...200 VDC (in non hazardous area) 21...250 VAC, 50/60 Hz
Current consumption:	5 mA maximal (eff.)
Peak inrush current:	200 mA maximum, 5 ms maximum
Pulse current:	50 mA maximum, 5 ms maximum
Pulse frequency:	approx. 1,5 s

### Ambient conditions

Operating temperature:	-20 °C ... +70 °C (inside silo)
Ambient temperature:	-20...+60°C (electronics)
Storing temperature:	-40 °C ... +85 °C

### Mechanics

Case electronics:	158x158x90 mm
Material of case:	diecast aluminium, powder coated RAL 1021
Probe:	carrier: Pythagoras ceramic (Ø65x283 mm) sword: steel zinc plated, 1000 mm 90...180° (adjustable)
Angle of probe:	90...180° (adjustable)
Process connection:	flange DN100/114 DIN 2633 C22.8 with 8 screws M16x60 an sealing
Mating flange:	DN100 DIN 2527 RST37.2 (to weld on on silo wall)
Range of pressure:	probe: PN10 flange: PN16
Degree of protection:	IP 54
Connection:	up to 2,5 mm <sup>2</sup> via cable entry 1x M20x1,5
Weight:	approx. 22 kg

Installation

Filling the silo

The filling stream should not be directed onto the probe.

Angle of material flow

Note the angle of material flow or the outlet funnel when determining the measuring point or probe length.

Distance between probes

If more than one probe is mounted in a silo then a minimum distance of 0,5 m must be allowed for in order to avoid mutual interferences.

Heat insulation

with high silo temperatures: insulate the outside silo wall to avoid exceeding the maximum permissible temperature of the level switch housing. This insulation also prevents condensation near the things built in and so reduces build-up and the danger of error switching

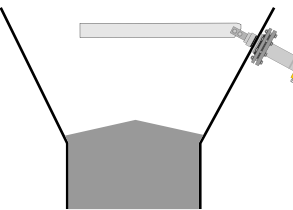
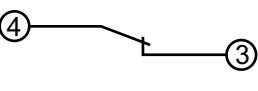
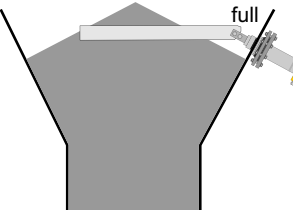
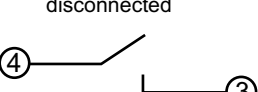
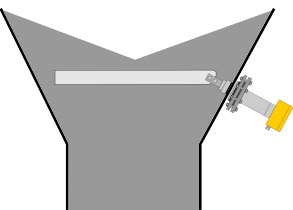
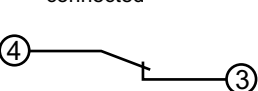
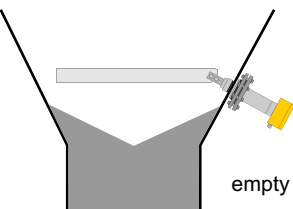
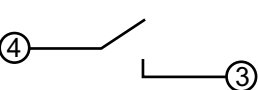
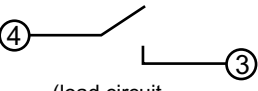
Installation in the open

A protective sun cover protects the level switch with the aluminium housing from excessive temperatures and from condensation which may form in the housing due to large temperature variations.

Installation in a building

Install an easily accessible power switch in the proximity of the device. Mark the power switch as a disconnecter for the device.

Fail-safe mode

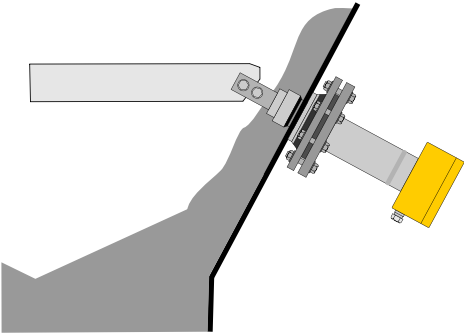
Safety switching	Level	electronic switch
Maximum fail-safe mode		connected  (load circuit closed)
		disconnected  (load circuit open)
Minimum fail-safe mode		connected  (load circuit closed)
		disconnected  (load circuit open)
Power failure		disconnected  (load circuit open)

The built-in feature for minimum and maximum fail-safe switching allows the level switch to be used in all applications requiring high operational safety.

- Maximum fail-safe: the current is blocked if the probe is covered or the power supply fails.
- Minimum fail-safe: The current circuit is blocked if the probe is uncovered or the power supply fails.

A red LED on the electronic insert indicates switching status.

Build-up



If the medium causes a build-up, it is possible to take this into consideration when adjusting the electronic insert (see page 2). As a rule the electronic insert can compensate it.

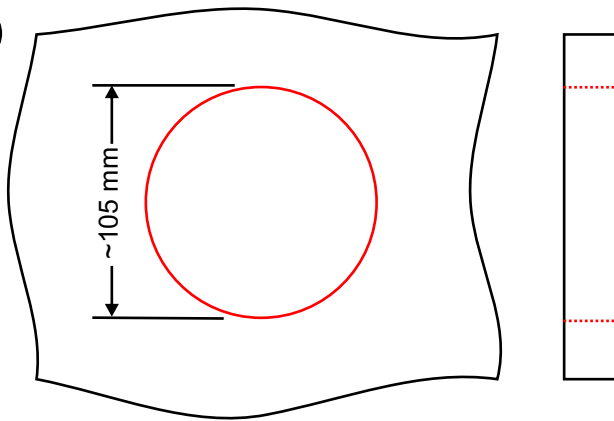
MANUAL

MANUAL

MANUAL

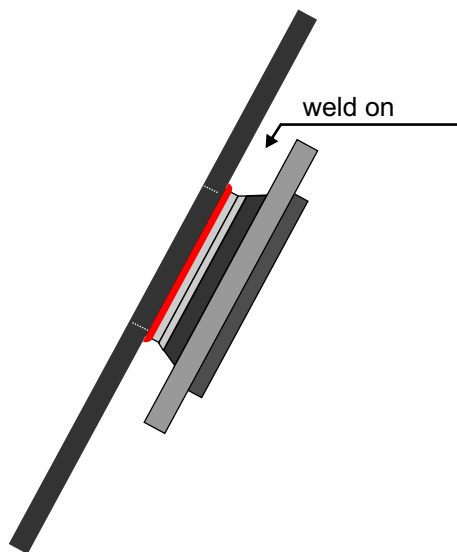
## Mounting

1

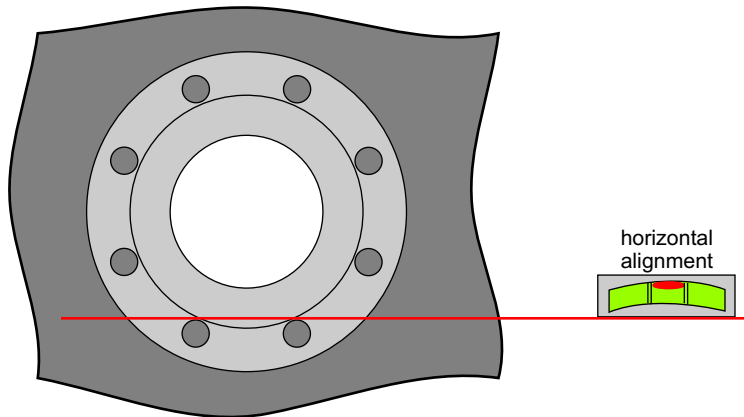


Cut out a hole with diameter of approx. 105 mm in the silo wall (take care that the location is suitable for the device).

2



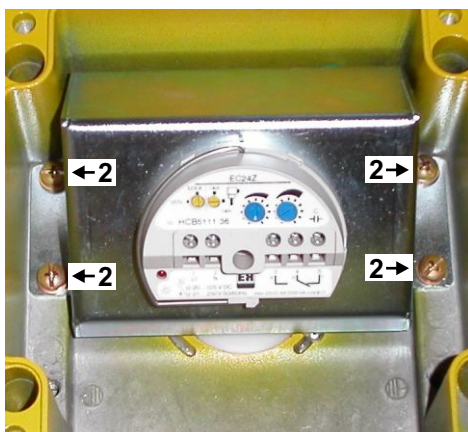
Remove the mating flange off the level limit value switch and weld on above the hole.



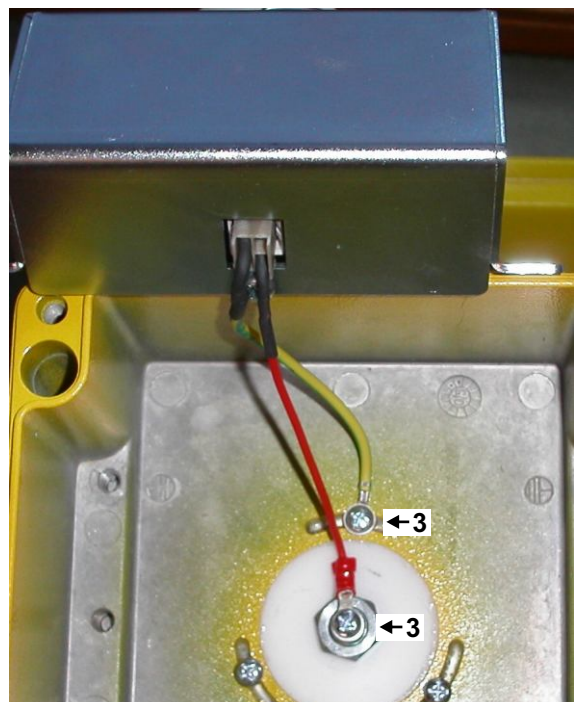
3



The electronic insert has to be removed for the later welding. Otherwise the electronics can be destroyed.



1. Open enclosure.
2. Release screws (2) and lift carrier with electronic insert.
3. Release screws (3) and put aside the carrier with the electronic insert..



④

horizontal  
alignment

marking

sealing

vertical  
alignment

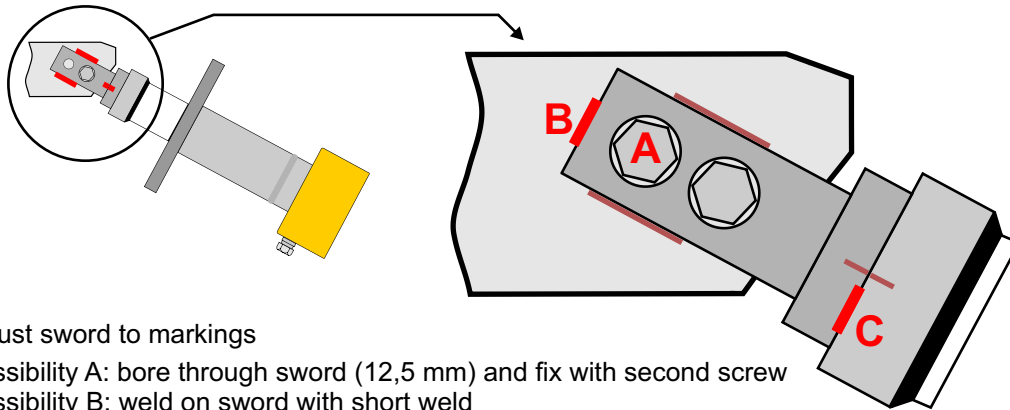
sword

1. Provisional mounting of probe
2. Horizontal and vertical alignment of sword
3. Carry out markings for later fixing

⑤



**The electronic insert has to be removed for the later welding. Otherwise the electronics can be destroyed. See description point ③**



1. Adjust sword to markings
2. Possibility A: bore through sword (12,5 mm) and fix with second screw  
Possibility B: weld on sword with short weld
3. Weld on rotating sword support with short weld on probe carrier (C)

⑥

Mount back carrier with electronic insert reverse to point ③

⑦

sealing ring

Bolt together the level probe with the mating flange. Afterwards the electrical connection can be done (page 3)