

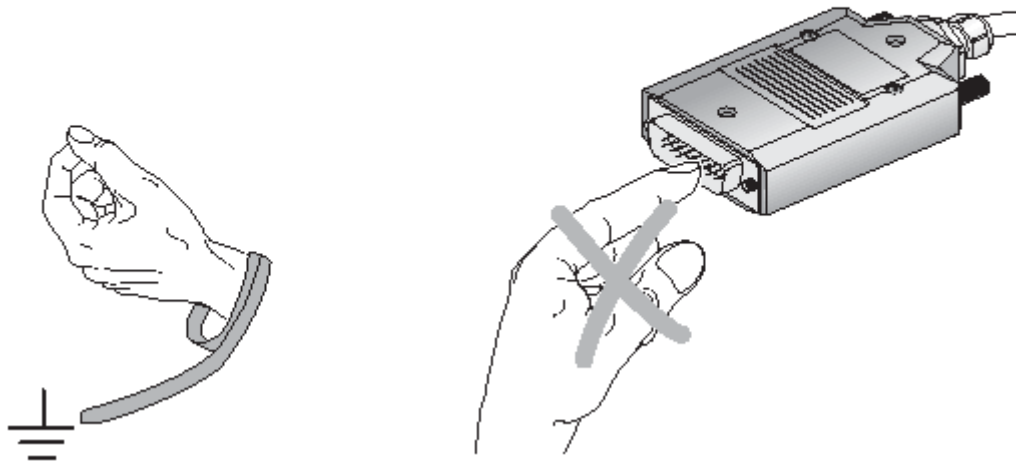
LIF 972W  
Montageanleitung

These mounting instructions are valid for the LIF 972W

Scanning heads LIF 97W	Scales LIF 902W
Id. No. 678 402	Id. No. 678 466-01
Id. No. 688 647	Id. No. 658 735-01

**Note:** The pictures show exemplary figures of the components. Details may change due to version.

**Warnings**



CLASS 3B if powered and not mounted according to dimension drawing D 640 990 / D 678 441

CLASS 1 if powered and mounted according to dimension drawing D 640 990 / D 678 441

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**Items Supplied**



Figure 1: LIF 97W scanning head




Figure 2: LIF 902W scale



Figure 3: 0.75 mm spacer foil

Note the protection mark for ISO 16016!

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## Mounting the Scale

Remove the scale from the packaging as shown in Figure 4.



Figure 4: Removing the scale

Ensure that under no circumstances do your fingers touch the graduation (danger of contamination). Figure 5 shows excellent handling without cap. You may want to wear lint-free protective gloves or finger cots.

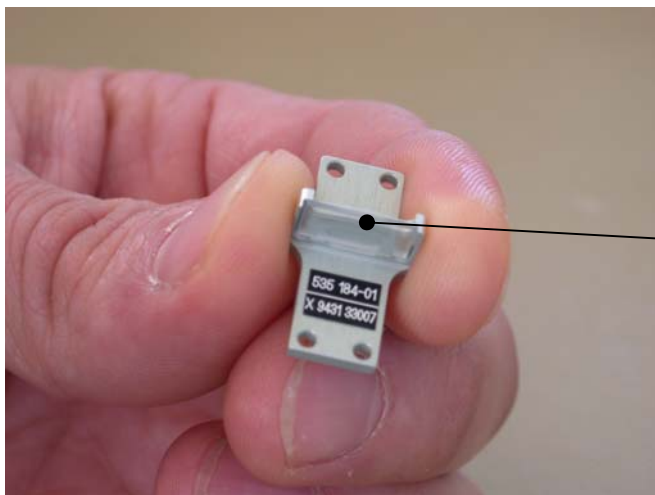


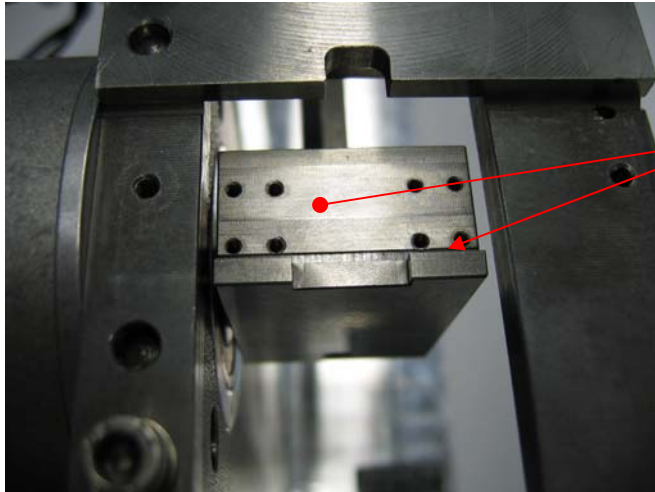
Figure 5: Handling the scale

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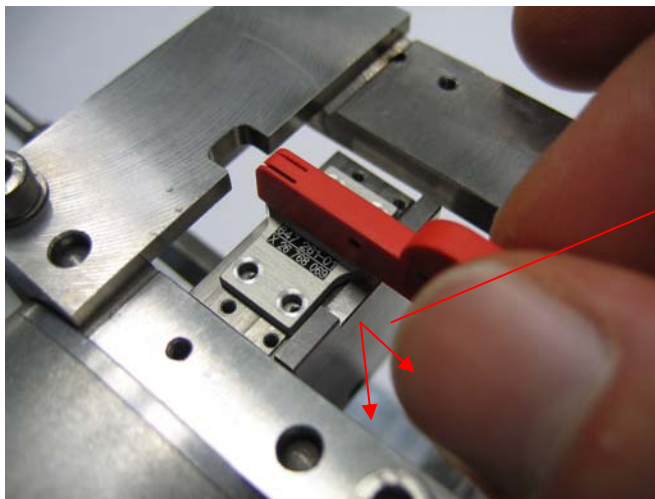
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In order to align the scale (Figures 6 and 7), the top surface and a side surface of the scale holder both serve as supports.



Support surfaces for the scale

Figure 6: Support surfaces for the scale



Alignments for the scale

Figure 7: Aligning the scale

Four screws (ISO 4762 / DIN 912 M1.6 x 5) are recommended for securing the scale. (Maximum tightening torque: 0.15 Nm).

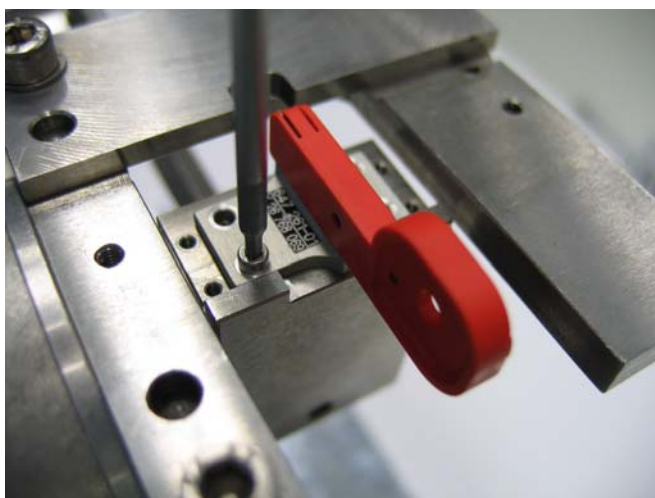


Figure 8: Securing the scale

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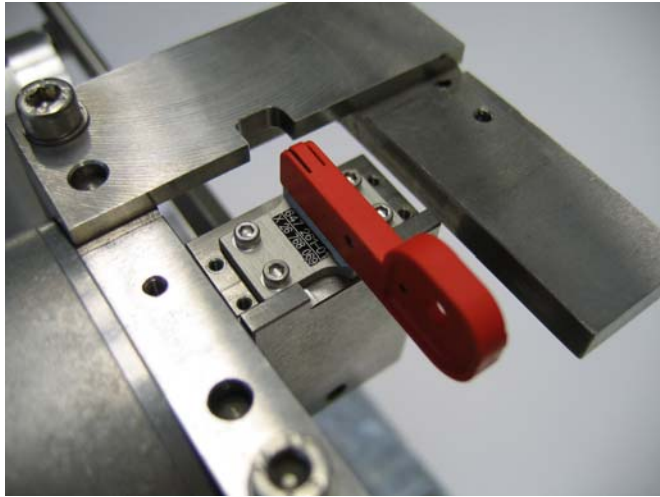


Figure 9: Fully mounted scale

### Mounting the Scanning Head

Before mounting, remove the protective cover from the scanning head

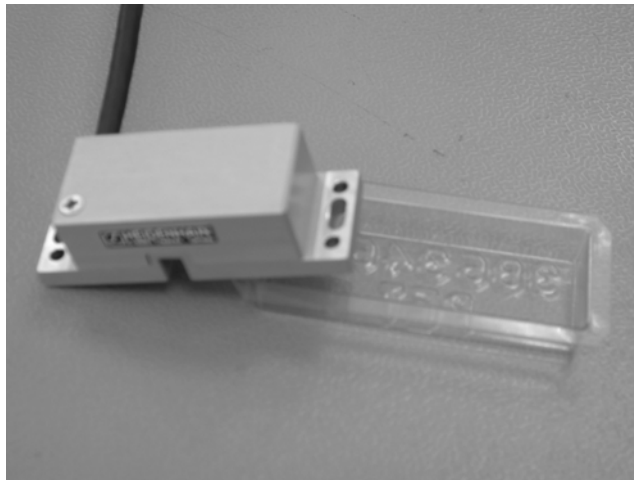


Figure 11: Scanning head and protective cover

It must be easy to remove the protective cap from the scale after the scanning head has been mounted. The correct scanning gap is

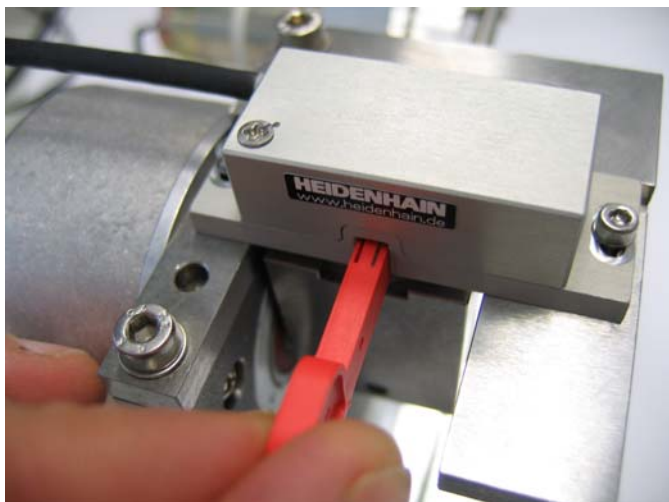



Figure 15: Removal of the protective cap

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## Adjusting the Scanning Gap without Protective Cap

The scanning gap of 0.75 mm can be set with the spacer foil as well. In that case, ensure that the spacer foil is positioned correctly (Figures 16a and 16b).

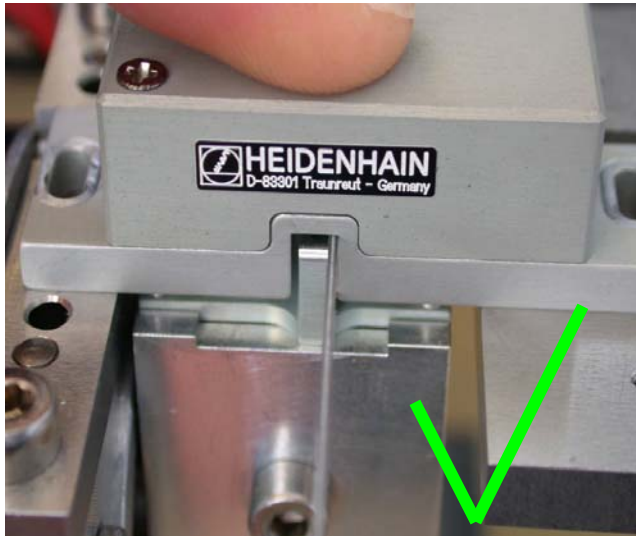



Figure 16a: Correct position of the spacer foil



Figure 16b: Incorrect position of the spacer foil

It must be easy to remove the spacer foil from the scanning gap after the scanning head has been mounted.

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## Adjusting the Output Signals

A PWM8 phase-angle measuring unit from HEIDENHAIN (ID 309 956-xx), for example, along with a connecting cable (ID 331 692-xx) and oscilloscope, is suited for adjusting the output signals.

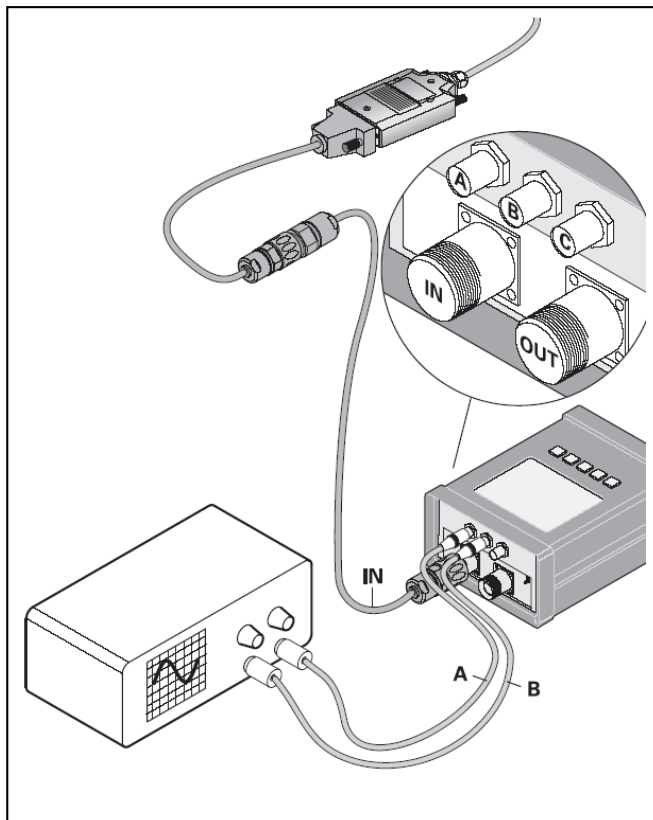


Figure 17: Accessories for adjustment

The PWM8 displays the signals as shown below.

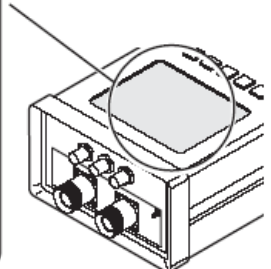
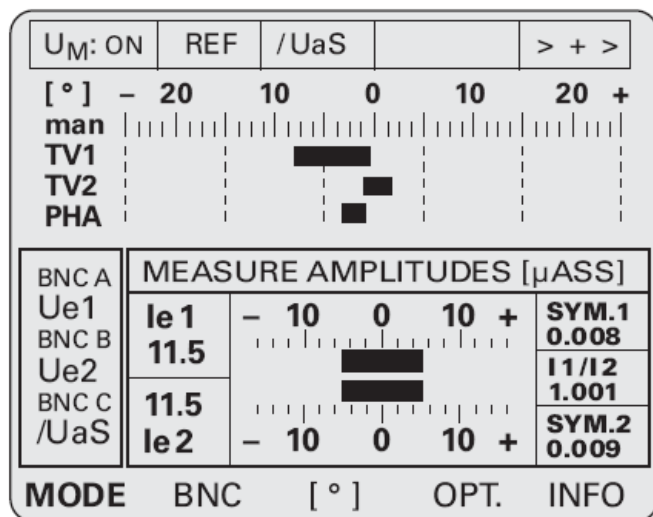


Figure 18: Display of the signals on the PWM8

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The signals can also be displayed on the oscilloscope as follows:

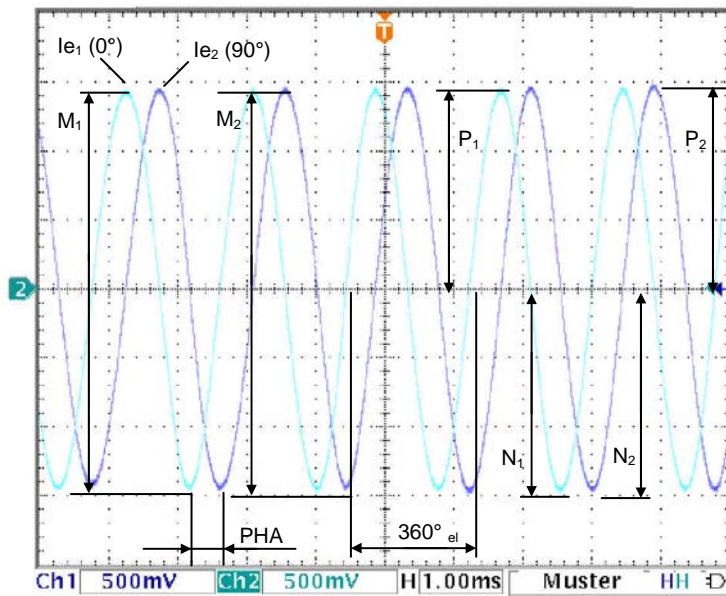


Figure 19: Incremental signal display on the oscilloscope

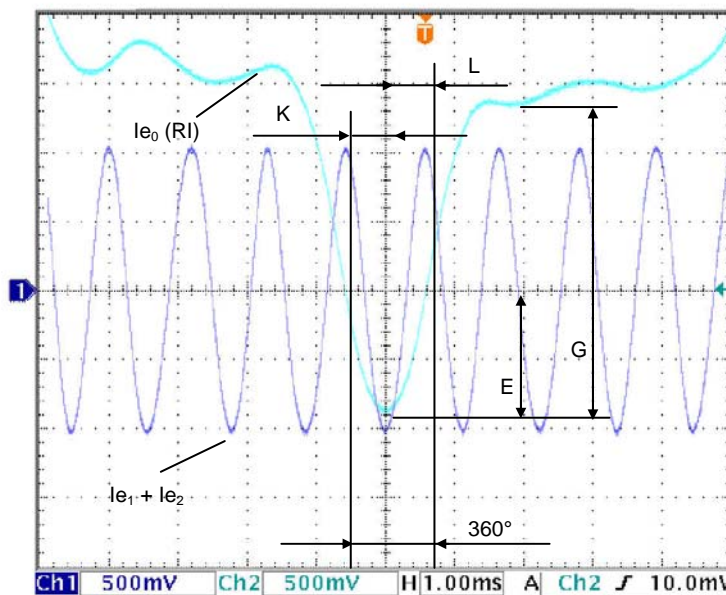


Figure 20: Reference signal display on the oscilloscope

Note: The device setting of the PWM8 is as follows:

300 mV/ $\mu$ A for the incremental signal  $ie_1$ ,  $ie_2$  ( $0^\circ / 90^\circ$ ) and the reference signal  $ie_0$  (RI)

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Output signals on the PWM 8:

Signal values	Initial operation	Fine adjustment	Typical values <sup>*1)</sup>	
Signal levels $M_1, M_2$ ( $I_{e1}, I_{e2}$ )	7 ... 13 $\mu A_{pp}$	7 ... 13 $\mu A_{pp}$	7 ... 13 $\mu A_{pp}$	
Amplitude ratio $M_1 / M_2$	0.8 ... 1.25	0.95 ... 1.05	0.95 ... 1.05	<b>P4</b>
Phase angle PHA	$90^\circ \pm 10^\circ$	$90^\circ \pm 5^\circ$	$90^\circ \pm 3^\circ$	<b>P3</b>
On-off ratio $TV_1$ and $TV_2$ $TV = 2 \arcsin( P - N  / M)$	$0^\circ \pm 15^\circ$	$0^\circ \pm 5^\circ$	$0^\circ \pm 3^\circ$	<b>P1</b> <sup>*2)</sup> <b>P2</b> <sup>*2)</sup>
Usable component G	2 ... 8.5 $\mu A_{pp}$	2 ... 8.5 $\mu A_{pp}$	2 ... 8.5 $\mu A_{pp}$	
Switching threshold E	0.2·G ... 0.7·G	0.2·G ... 0.7·G	0.2·G ... 0.7·G	
Zero crossovers K, L	$180^\circ \pm 90^\circ$ el.	$180^\circ \pm 45^\circ$ el.	$180^\circ \pm 45^\circ$ el.	<b>P5</b>
$ (K-L) / 2 $	$< 90^\circ$	$< 60^\circ$	$< 60^\circ$	<b>S1</b> <sup>*2)</sup>

\*1) Typically, these values can be achieved by accurate mechanical mounting and fine adjustment by potentiometers and DIP-switch.

\*2) S1 is shifting the reference signal position in  $90^\circ$  steps. This allows to adjust the value  $|(K-L) / 2| < 60^\circ$ . Depending on the setting of S1, the RI is shifted and the allocation of  $TV_1$  and  $TV_2$  to P1 and P2 is as follows:

S1 setting				
RI-shift	0°	-90°	+90°	180°
$TV_x / P_x$ allocation	$TV_1 = P1$ $TV_2 = P2$	$TV_1 = P2$ $TV_2 = P1$	$TV_1 = P2$ $TV_2 = P1$	$TV_1 = P1$ $TV_2 = P2$

Remove the cover of the adapter connector in order to access the potentiometers.

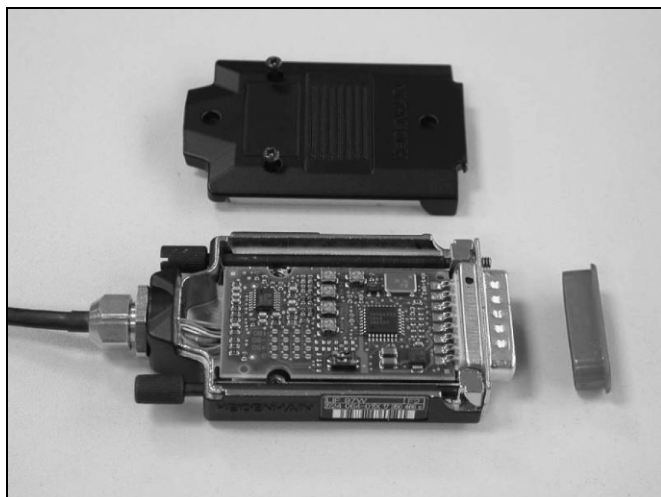


Figure 21: Opened adapter connector

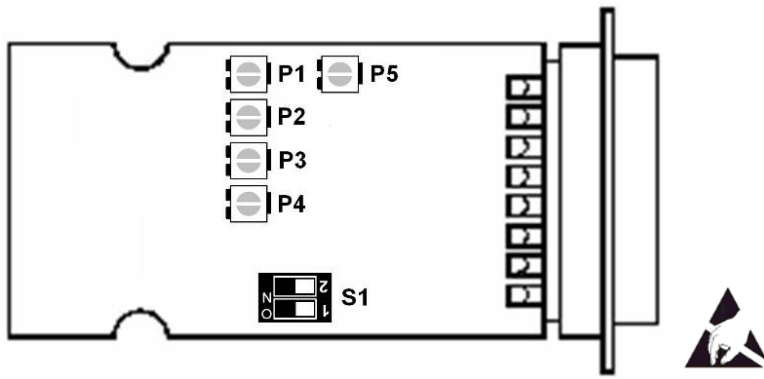


Figure 22: APE PCB with potentiometers

When reassembling the adapter connector, ensure that no cable wires are crimped.

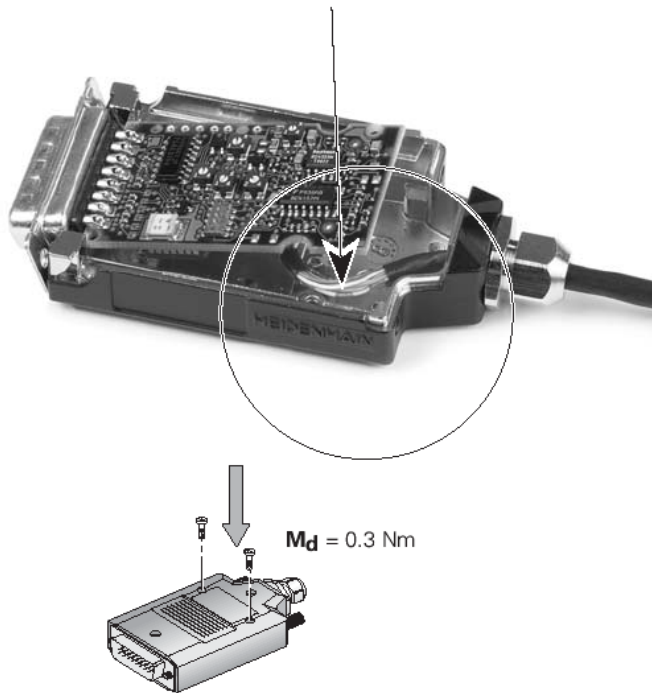


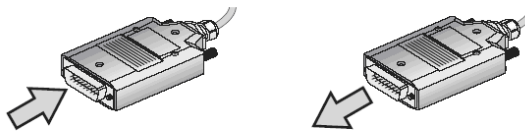
Figure 23: Assembly of the connector

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## Electrical Data

### Power supply

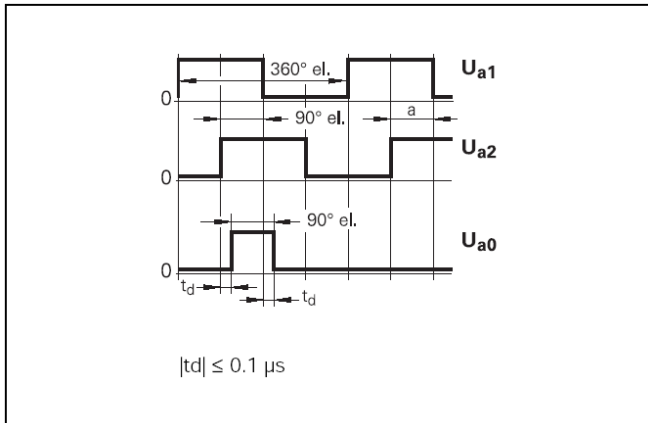


$U_P = 5\text{ V} \pm 5\%$   
 (max. 130 mA)

**TTL**  
 $U_{a1}, U_{a2}, U_{a0}$   
 $\overline{U_{a1}}, \overline{U_{a2}}, \overline{U_{a0}}, \overline{U_{aS}}$

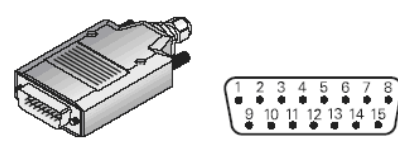
 EN 50 178/4.98; 5.2.9.5  
 IEC 364-4-41: 1992; 411(PELV/SELV)  
 (siehe, see, voir, vedi, véase  
 HEIDENHAIN D 231 929)

### Output signals



## Electrical Connection

### Adapter



**1)** Im Normalbetrieb mit 0 V der Folge-Elektronik verbinden.  
 Bei anlegen von 5 V Umschaltung TTL/11  $\mu\text{A}_{SS}$ .  
*In normal operation, connect with the 0 V line of the subsequent electronics.  
 Apply 5 V and switch to TTL/11  $\mu\text{A}_{PP}$ .*

1	9	3	11	14	7	4	2	12	10	8	6	13	15
$U_{a1}$	$\overline{U_{a1}}$	$U_{a2}$	$\overline{U_{a2}}$	$U_{a0}$	$\overline{U_{a0}}$	5 V $U_P$	0 V $U_N$	5 V sensor	0 V sensor	/	/	$\overline{U_{aS}}$	1)
braun <i>brown</i>	grün <i>green</i>	grau <i>gray</i>	rosa <i>pink</i>	rot <i>red</i>	schwarz <i>black</i>	braun/grün <i>brown/green</i>	weiß/grün <i>white/green</i>	blau <i>blue</i>	weiß <i>white</i>	grün/schwarz <i>green/black</i>	gelb/schwarz <i>yellow/black</i>	violett <i>violet</i>	gelb <i>yellow</i>

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## Cleaning

You must always ensure that the encoder is protected from contamination during both mounting and operation. If the encoder must be cleaned, the following must be kept in mind:

There are no optical components inside the scanning head that can be accessed from the outside. The graduated scale is exposed in its holder, meaning that it might become necessary to clean the scale. Dust particles should not be wiped off, but rather blown off with dry, oil-free pressurized air. An ultrasonic bath is recommended for removing organic contaminations (e.g., fingerprints). Good cleaning results can be achieved in a cleaning bath with demineralized water and dishwashing detergent available off the shelf, at approx. 40 °C (104 °F) and 35 KHz.



Figure 25: Ultrasonic cleaning bath

The parts should be placed in a basket and completely submerged in the cleaning liquid, as shown in Figure 26. The glass must not come into contact with other parts during cleaning, since it might become damaged.

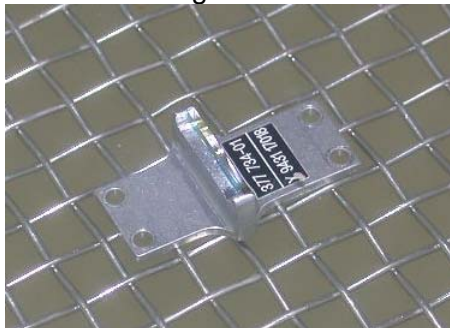



Figure 26: Scale in a basket in the ultrasonic cleaning bath (*Photograph of a similar device*)

A treatment of approx. three minutes is recommended. The scale should then be rinsed with demineralized water and be blown dry with dry, oil-free pressurized air.

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