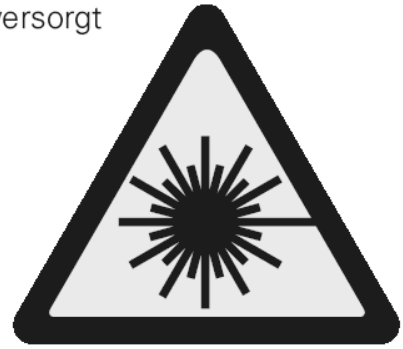
These mounting instructions are valid for the scanning head LIF 97W (ID 640 686-xx / ID 658 740-xx) and the scale 902W (524 065-01)

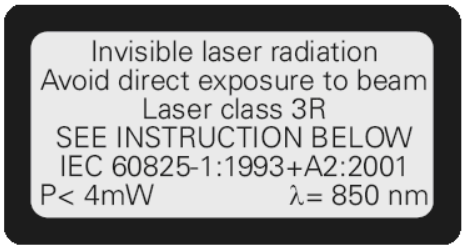
Warnings

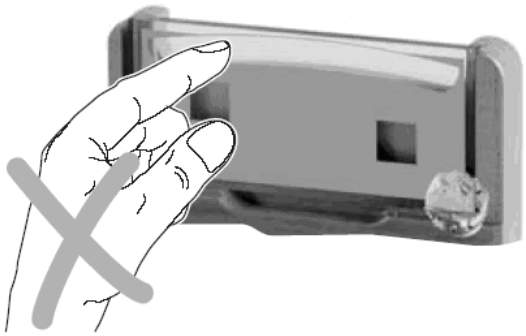
AK LIF 9xW

Klasse 3R: bei nicht angebauten AK LIF 9x W, mit Spannung versorgt
Class 3R: When AK 9x W is not mounted and is under power

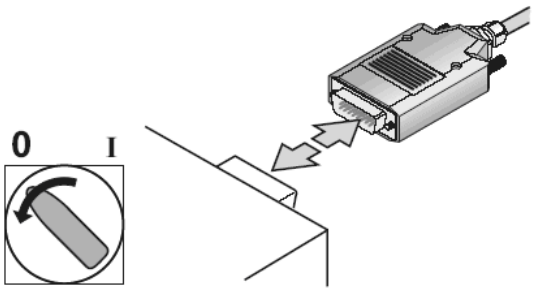
Klasse 1: bei korrekten Anbau des AK LIF 9xW
Class 1: When the AK LIF 9x W is properly mounted

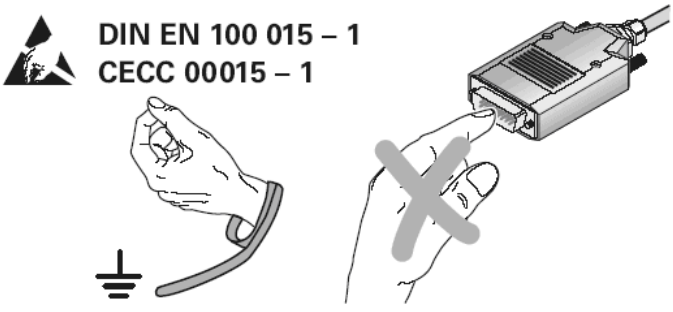






Teilung nicht berühren!
Do not touch the graduation!





Note the protection mark for ISO 16016!

Items Supplied

Figure 1: LIF 97W scanning head covered in shielding bag

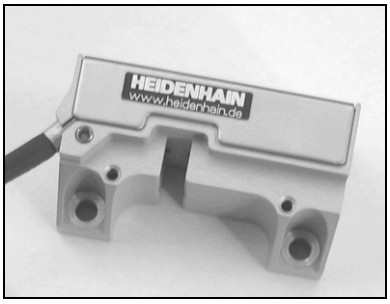


Figure 2: LIF 97W scanning head (ID 640 686-xx / ID 658 740-xx)

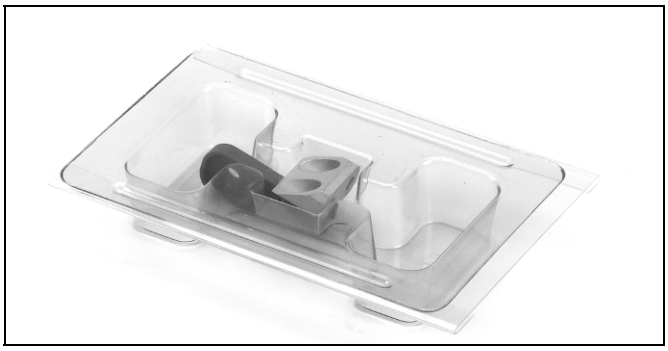


Figure 3: LIF 902W scale (ID 524 065-01)

Figure 4: LIF 972 mounting aid

Note the protection mark for ISO 16016!

Mounting the Scale

Remove the scale from the packaging as shown in Figure 5.

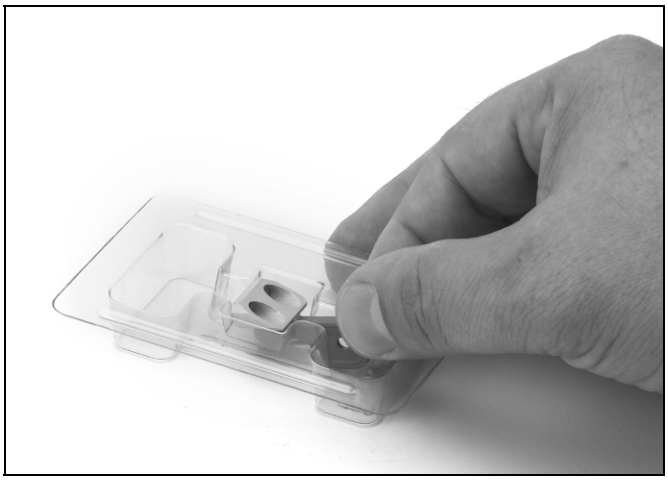


Figure 5: Removing the scale

Ensure that the red protective clip remains on the scale. Under no circumstances, never touch the graduation with your fingers (danger of contamination).

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.

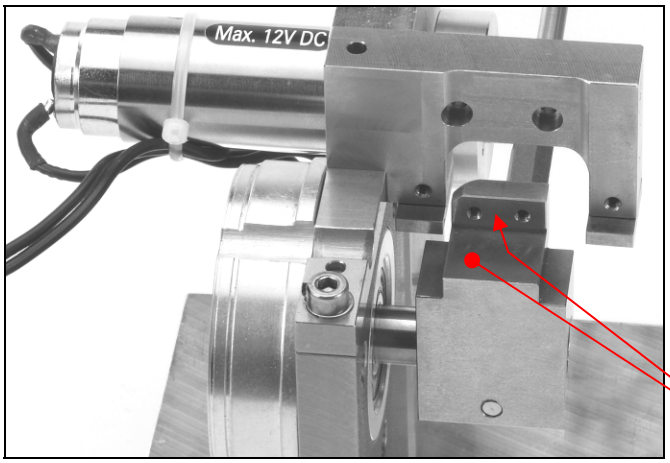


Figure 6: Support surfaces for the scale

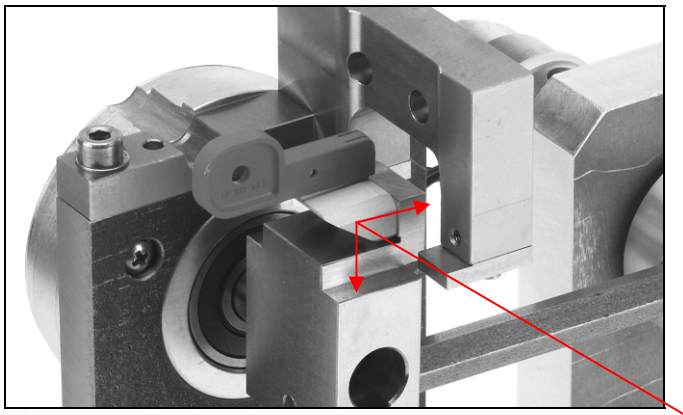


Figure 7: Aligning the scale

Note the protection mark for ISO 16016!

Four screws (DIN EN ISO 4762 M2 x 6) are recommended for securing the scale.
(Maximum tightening torque: 0.32 Nm).

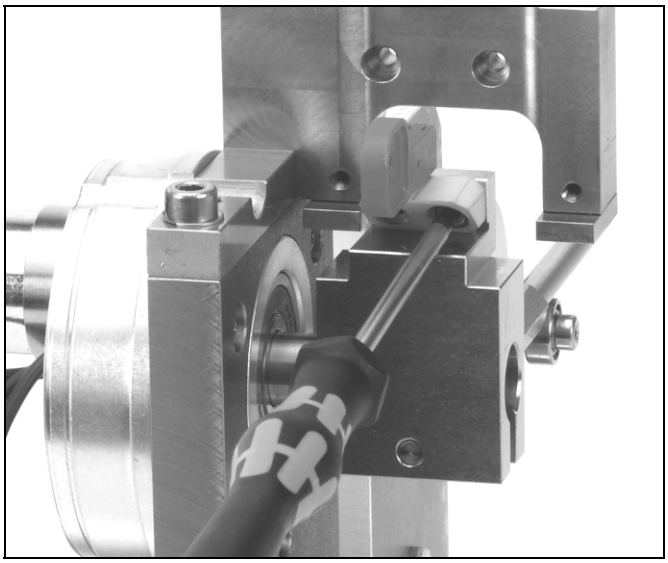


Figure 8: Securing the scale

Mounting the Scanning Head

Take the scanning head out of the shielding bag

Figure 9: Scanning head with shielding bag

Align the scanning head with the support surface.

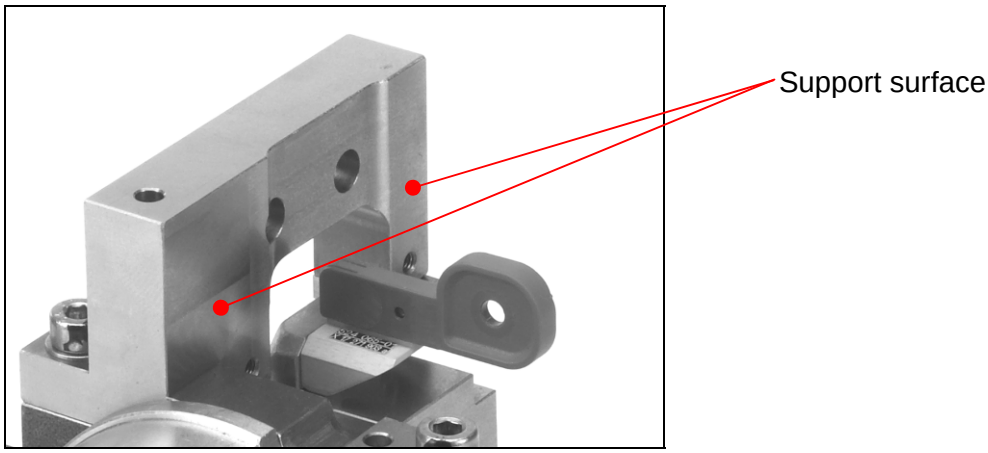


Figure 10: Support surface for the scanning head

Note the protection mark for ISO 16016!

Put the head at its approximate position while the protective cover still remains on the scale. Secure the head loosely in order to allow adjustment. Two screws (DIN EN ISO 4762 M2.5 x 20) and two washers (DIN EN ISO 7092 2.5) are recommended for securing the scanning head.

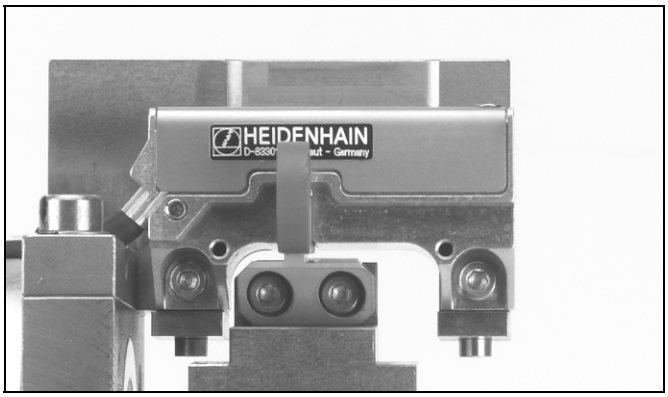


Figure 11: Pre-positioned scanning head

Remove the protective clip.

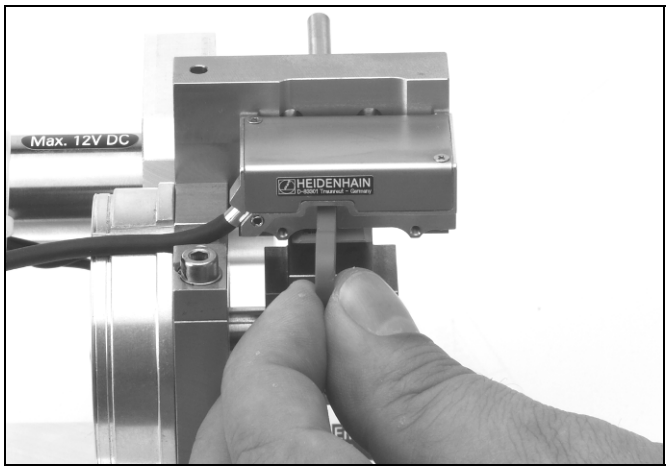


Figure 12: Removal of the protective clip

Set the scanning gap and the distance to the rotation center of the LIF 972 with the mounting aid. Ensure that the mounting aid is positioned correctly (Figures 13 and 14) and the scale is rotated into mounting position as shown in dimension drawing (2.8° tilted to scanning head base)

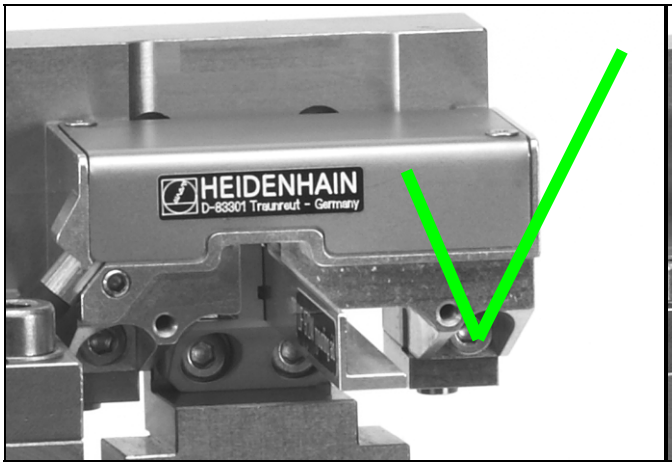


Figure13: Correct position LIF 972 mounting aid

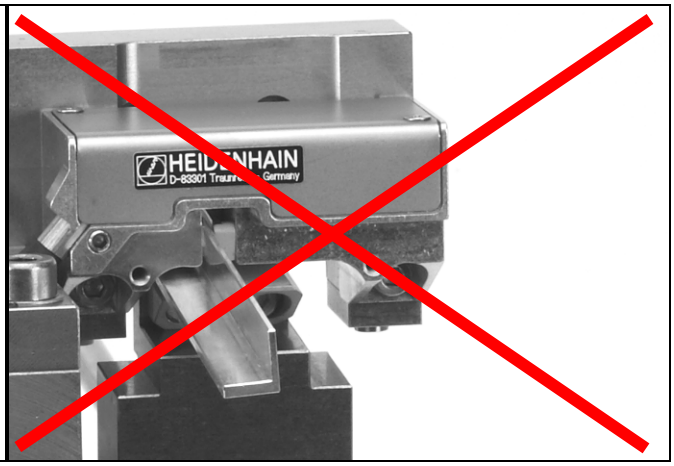


Figure 14: Incorrect position of the mounting aid

Note the protection mark for ISO 16016!

Press the scanning head to the support alignments and tighten the mounting screws. (Maximum tightening torque: 0.65 Nm).

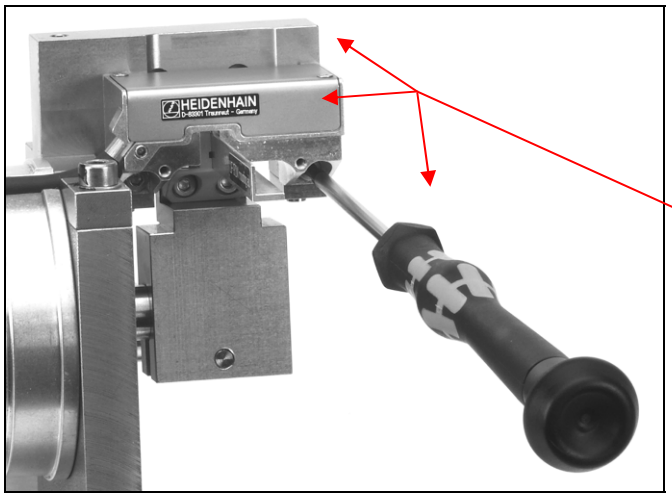


Figure 15: Securing the scanning head

It must be easy to remove the LIF 972 mounting aid from the scanning gap after the scanning head has been mounted.

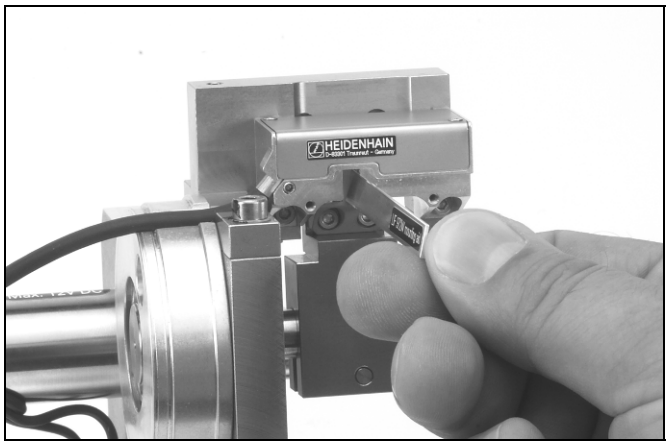


Figure 16: Removal of the mounting aid

Note the protection mark for ISO 16016!

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.

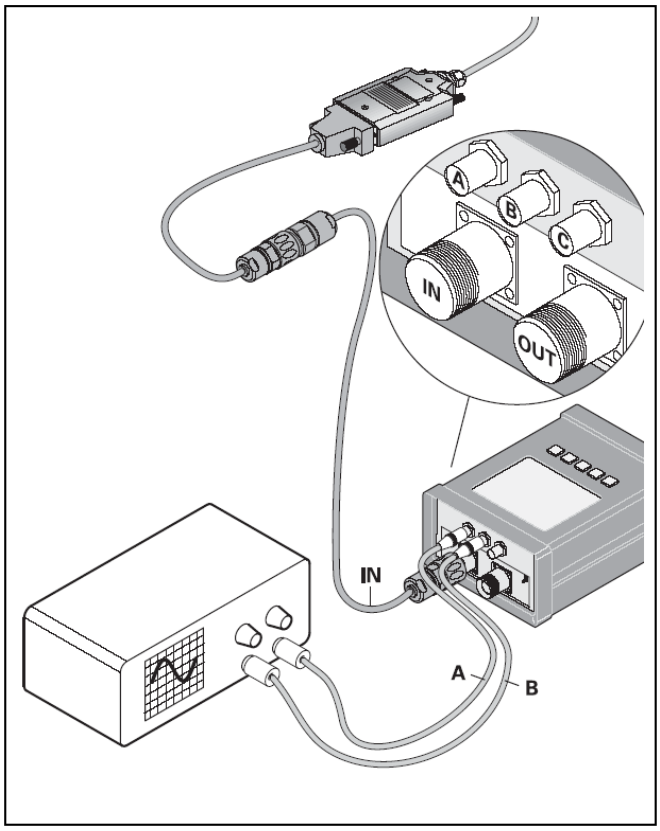


Figure 17: Accessories for adjustment

The PWM8 displays the signals as shown below.

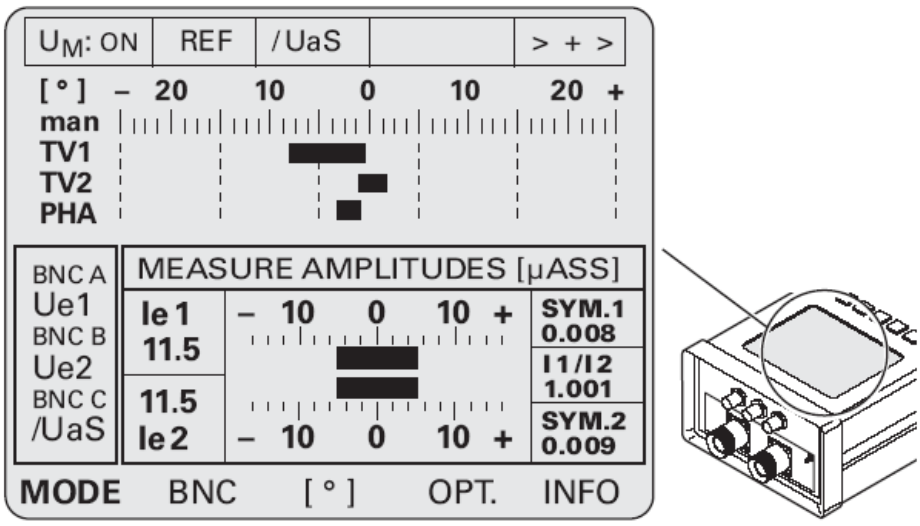


Figure 18: Display of the signals on the PWM8

Note the protection mark for ISO 16016!

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

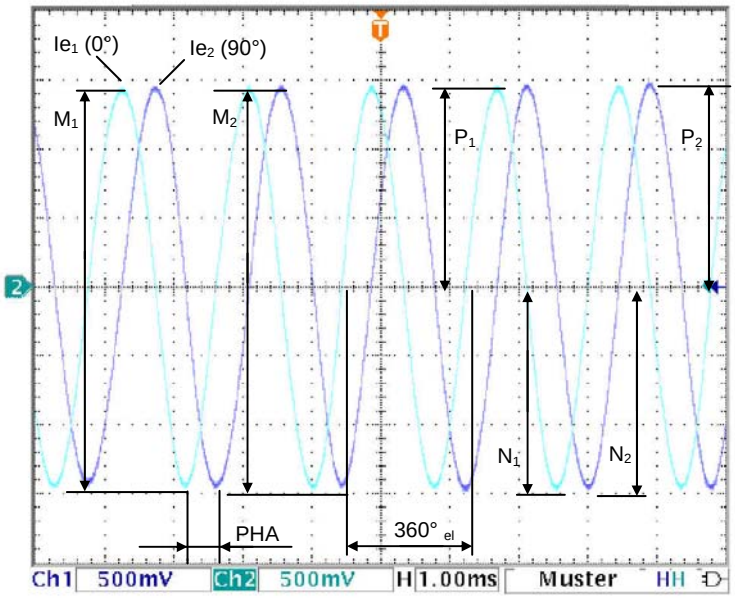


Figure 19: Incremental signal display on the oscilloscope

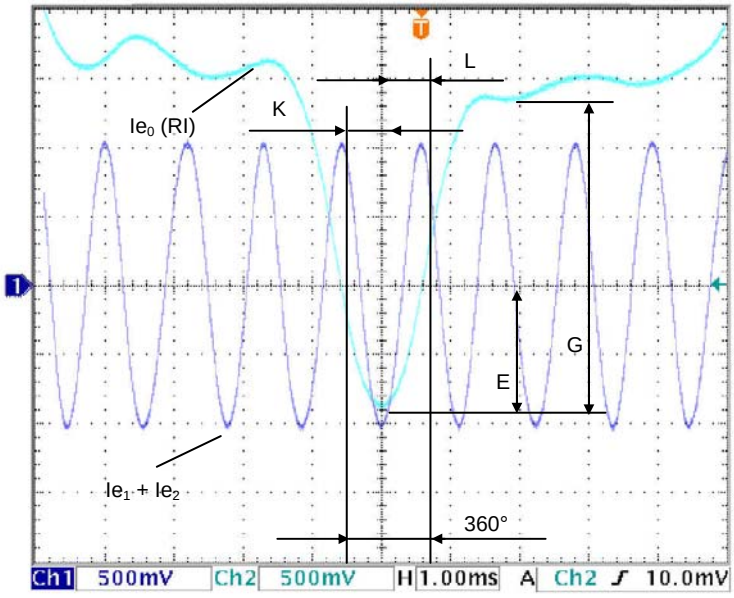


Figure 20: Reference signal display on the oscilloscope

Note: The device setting of the PWM8 is as follows:
300 mV/µA for the incremental signal Ie_1, Ie_2 (0° / 90°) and the reference signal Ie_0 (RI)

Note the protection mark for ISO 16016!

Output signals on the PWM 8:

Signal values	Initial operation	Fine adjustment	Typical values*[1)]	
Signal levels M_1, M_2 (Ie_1, Ie_2)	7 … 13 μA_{pp}	7 … 13 μA_{pp}	7 … 13 μA_{pp}	
Amplitude ratio M_1 / M_2	0.8 … 1.25	0.95 … 1.05	0.95 … 1.05	**P4**
Phase angle PHA	90° ± 10°	90° ± 5°	90° ± 3°	**P3**
On-off ratio TV_1 and TV_2 TV = 2 arcsin (|P - N| / M)	0° ± 15 °	0° ± 5 °	0° ± 3 °	**P1***[2)] **P2***[2)]
Usable component G	2 … 8.5 μA_{pp}	2 … 8.5 μA_{pp}	2 … 8.5 μA_{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° ± 90° el.	180° ± 45° el.	180° ± 45° el.	**P5**
|(K-L) / 2|	< 90°	< 60°	< 60°	**S1***[2)]

*[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° steps. This allows to adjust the value |(K-L) / 2| < 60°. 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 / Px 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.

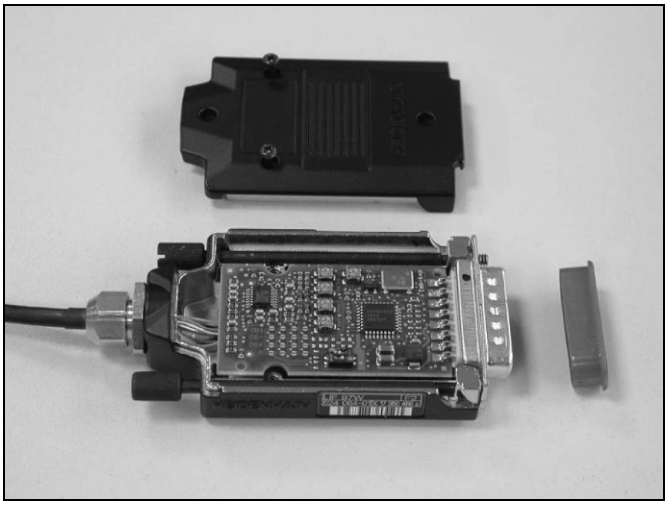


Figure 21: Opened adapter connector

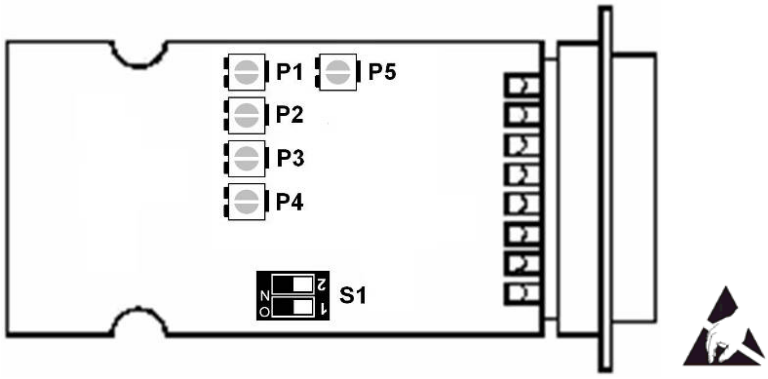


Figure 22: APE PCB with potentiometers

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

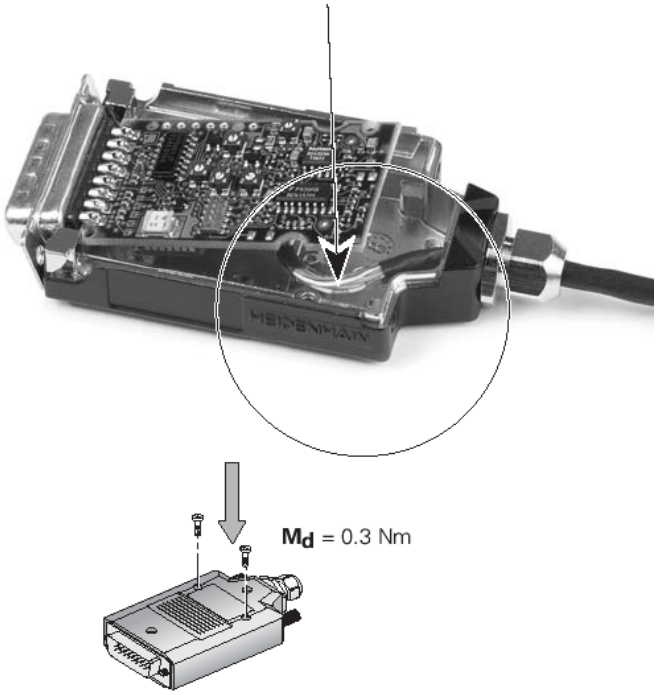
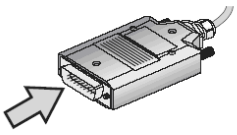


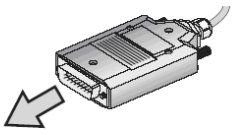
Figure 23: Assembly of the connector

Note the protection mark for ISO 16016!

Electrical Data

Power supply



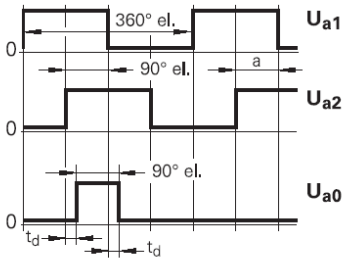


U_P = 5 V ± 5 %
(max. 130 mA)

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

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)

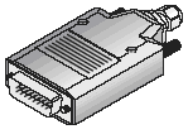
Output signals

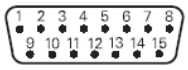


$|td| \leq 0.1\ \mu s$

Electrical Connection

Adapter





1) Im Normalbetrieb mit 0 V der Folge-Elektronik verbinden.
Bei anlegen von 5 V Umschaltung TTL/11 μA_{SS}.
In normal operation, connect with the 0 V line of the subsequent electronics.
Apply 5 V and switch to TTL/11 μA_{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 *brown*	grün *green*	grau *gray*	rosa *pink*	rot *red*	schwarz *black*	braun/grün *brown/green*	weiß/grün *white/green*	blau *blue*	weiß *white*	grün/schwarz *green/black*	gelb/schwarz *yellow/black*	violett *violet*	gelb *yellow*

Note the protection mark for ISO 16016!

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 24: Ultrasonic cleaning bath

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

Figure 25: Scale in a basket in the ultrasonic cleaning bath

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.

Note the protection mark for ISO 16016!