

SH 11

Photoelectric Scanning Head



Application

The SH 11 model scanning head was especially designed both for scanning of the marks on the rotating discs of mechanical meters or simulated disc marks on LCD displays and for detection of light emitting diodes (LED's) of electronic meters. The choice of operation with mechanical or electronic meters is made by simple rotation of a selection switch. The precision optical lens is designed to make the scanning head insensitive to external light. Its compact, robust construction makes the head equally suitable for use in stationary test consoles as well as for use with mobile and portable equipment.

The impulse output of the scanning head delivers a positive output pulse of the duration 0.5 ms.

Disc mark detection with mechanical meters

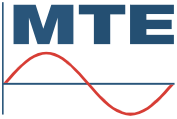
A pulsed green light beam is used to enable the scanning head to detect the optical contrasts on the perimeter of the disc. The marks may be either red or black, and within this colour range may be rough, matt or shiny or otherwise be marked with stroboscopic markings.

The manually sensibility set-up for the disc or LCD marks is not necessary. The optimal set-up is automatically learned by the integrated teach function, which can be activated by the rotary switch or an external control signal.

Light Emitting Diode (LED) impulse detection with electronic meters

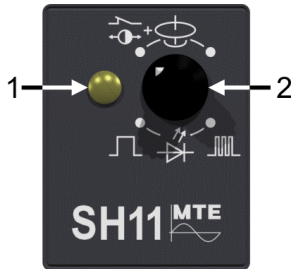
The duration of optical impulse signals from electric meters may be detected and evaluated by use of the SH 11 head. The LED signal from the meter under test must fulfil the following conditions:

1. The impulse length must be $\geq 100 \mu\text{s}$ and the impulse pause must be $\geq 600 \mu\text{s}$
2. The changeover from dark to light state must take place in $\leq 20 \mu\text{s}$ and the change from light to dark be $\leq 100 \mu\text{s}$
3. Short impulses or impulses with a 1:1 ratio (without modulation or with an 8 kHz modulated switch-on time) and with a frequency of up to 800 Hz may be scanned
4. The wavelength of the received signal must lie within the range of 500 - 950 nm




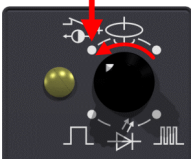
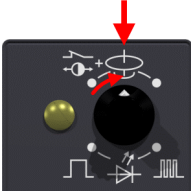

Scanning of disc or LCD marks with Scanning Head SH 11

User Controls



- 1 ⇒ Function LED:
LED on = OUT HIGH
LED off = OUT LOW
- 2 ⇒ Mode rotary switch:
- Scanning of disc or LCD marks, teaching disabled
 - Scanning of disc or LCD marks, teaching enabled
 - Detection of LED impulses
 - Detection of modulated LED impulses

Steps for teaching and scanning

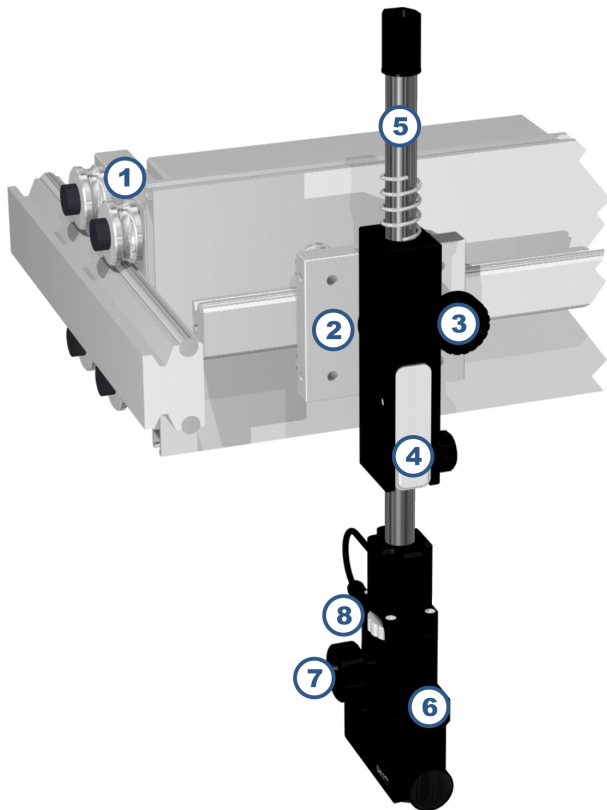
1	<p>Make sure that the meter under test is running The disc mark must be passing by or the LCD mark must be switched on/off</p>
2	 <p>Select mode Scanning of disc or LCD marks A green light beam is switched on</p>
3	<p>Adjust the scanning head Position the green light spot exactly on the disc or the LCD mark (optimal distance lens front to disc / LCD: 40 mm ± 3 mm)</p>
4	 <p>Select mode Teaching of disc or LCD marks Turn the rotary switch two steps to the left</p>
5	<p>Teach Wait until disc mark has passed or LCD mark changed off / on at least once (optimum for disc mark: one full disc revolution)</p>
6	 <p>Stop teach Turn one step right (intermediate position 12 o'clock)</p>
7	<p>Check Function LED / light beam OFF: Teaching was successful, go to step 8 Blinking: Teaching failed, repeat procedure at step 2</p>
8	 <p>Select mode Scanning of disc or LCD marks Turn one step right</p>
9	<p>Check Function LED Scanning is fine, if function LED is only on during disc mark is passing or LCD mark is on</p>

Hints

If additional impulses are detected or teaching is not successful check / change:

- Orientation of SH 11 to meter to be rectangular (angles between axes of SH 11 and meter 90°)
- Bend SH 11 horizontal to meter front ($\leq \pm 15^\circ$) to prevent detection of reflections from meter front
- Change distance lens to disc or LCD ($<$ or $>$ 40 mm) and retry teaching

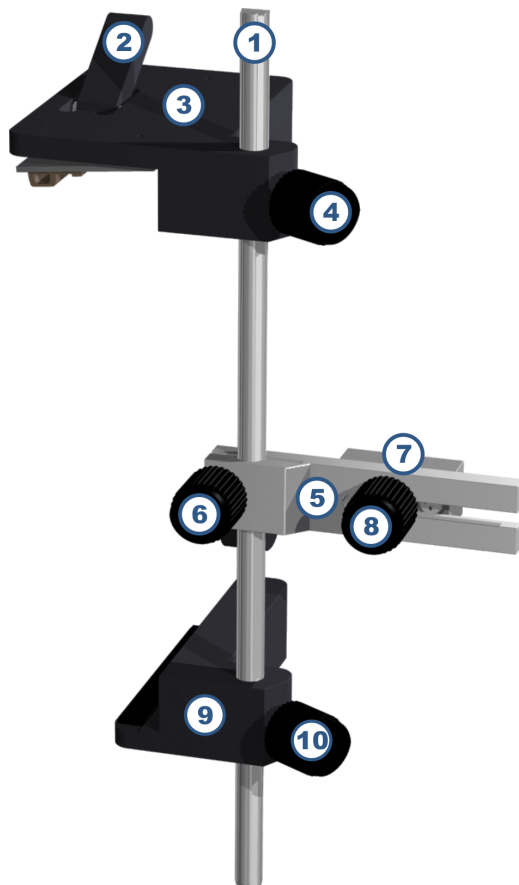
Scanning head supports for SH 11



SHC 2.2 stationary scanning head support

The SHC 2.2 scanning head support has been developed to allow an easy and rational setting of the depth of the complete set of scanning heads at the same time.

- The depth position is adjusted, with this model, for all of the supports at the same time. To this end, all of the head supports are mounted on a further trolley system [1]
- The running trolley [2] is easily moved along the rail. When the desired position is reached, the trolley is blocked in place by use of the thumbscrew [3]
- The vertical tube [5] is released by the 'press-button' [4] and may then be slid vertically to the desired position
- The fine adjustments [6], as well as the scanning head itself are made after positioning the trolley. The thumb screws [7] and [8] are used to focus the light point at the desired position by means of the depth and height adjusters



TVU 7.2 portable scanning head support

For the optimal fixing of the scanning head the instructions below should be followed step by step:

- Put the vertical positioning part [5], the support above [3] and the support below [9] onto the guide rod [1]. Control that the rubber contacts of the supports are facing each other
- Define the positions of the supports [4] and [9] and of the vertical positioning part [5] regarding the size of the meter under test. The tension arm [2] must be put down in direction away from the guide rod [1]
- Put the scanning head support onto the meter under test and fix the supports above [3] and below [9] with the locking screws [4] and [10]
- Clamp the scanning head support by putting down the tension arm [2] in direction to the guide rod [1]
- Fasten the scanning head SH 11 on the horizontal positioning part [7] by means of the two screws
- Put the horizontal positioning part [7] onto the scanning head support and fix it with the locking screw [8]
- After adjusting the scanning head by arranging the vertical and horizontal positioning, the test can be started

Technical data SH 11

Power supply:	$U_s = 10 - 30 \text{ V DC}$
Current consumption:	$< 40 \text{ mA}$ (without load on the output)
Housing:	Metal
Dimensions:	$W30 \times H73 \times D103 \text{ mm}$
Weight:	approx. 300 g
Ambient temperature:	$-10 \dots +55 \text{ }^\circ\text{C}$

Output signal OUT

Output switching:	NPN
Output voltage HIGH:	U_s
Output voltage LOW:	$< 2 \text{ V}$
Output current:	$< 100 \text{ mA}$, protected against short circuits
Capacitive load:	max. 22 nF
Output impedance:	8.25 k Ω (Pull-up resistor)

Scanning of disc or LCD marks

Light wavelength:	green 525 nm
Optimal distance:	$40 \text{ mm} \pm 3 \text{ mm}$, Scanning angle $\pm 15^\circ$
Light spot dimensions:	1.1 mm x 4.2 mm
Reproducibility:	With a disc rotation rate of 20 r/min the difference between the start of the disc mark and the positive edge of the output impulse Out is reproducible to 0.01 %. The disc mark length should be a minimum of 4 mm.

Detection of LED impulses

Frequency:	$f \leq 800 \text{ Hz}$
Period:	$T \geq 1.25 \text{ ms}$
Dark / Light changeover:	$t_r \leq 20 \text{ } \mu\text{s}$
Impulse duration:	$t_p \geq 100 \text{ } \mu\text{s}$
Light / dark changeover:	$t_f \leq 100 \text{ } \mu\text{s}$
Impulse pause:	$t_L \geq 200 \text{ } \mu\text{s}$

Detection of modulated LED impulses

Frequency:	$f \leq 800 \text{ Hz}$
Period:	$T \geq 1.25 \text{ ms}$
Dark / Light changeover:	$t_r \leq 20 \text{ } \mu\text{s}$
Impulse duration:	$t_p \geq 625 \text{ } \mu\text{s}$
Light / dark changeover:	$t_f \leq 100 \text{ } \mu\text{s}$
Recordable modulated signals:	Signal ($t_p / t_L \geq 1:1$) during the impulse duration 100% amplitude modulated with 8 kHz (1:1)

Connection



Connector M12x1, 4 pole
1 \Rightarrow DC 10 V ... 30 V
2 \Rightarrow IN TEACH
3 \Rightarrow GND
4 \Rightarrow OUT $< 100 \text{ mA}$

Safety requirements

CE- certified	
Isolation protection:	EN 61010-1
Degree of protection:	IP-67
Storage temperature:	$-25 \dots +75 \text{ }^\circ\text{C}$
Relative humidity:	$\leq 85\%$ at $T_a \leq 21 \text{ }^\circ\text{C}$
Relative humidity for 30 days / year spread:	$\leq 95\%$ at $T_a \leq 25 \text{ }^\circ\text{C}$