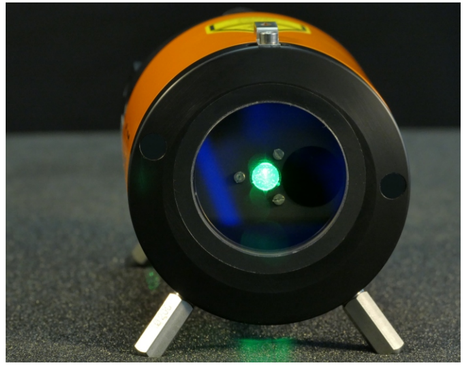
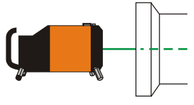
Operating Instructions
TKL-7





Congratulations on your new Theis Laser

This operating instructions contain enclosed in addition to information on how to use the laser **important safety information**.

Please note: First read the safety instructions on the supplement page **1 - 3** and then the operating instructions carefully before using the laser.

1. Description

The pipe laser emits an automatically levelled or defined inclined laser beam as reference axis. It was specially designed for pipe laying, but can also be used for a variety of other purposes.

2. Pipe Laying made easy

Mount device over the point of reference in such a way that the banking arrows are no longer seen (see **8.**). Adjust the inclination and align the laser beam to the point of aim. After that join pipe after pipe and align each end to the target.

3. Set-up

The laser can be set up centrically or at a constant distance above the pipe invert. Suitable legs, tripods and fastening systems are available for this.

Note: If the diameter indicated on the feet does not correspond with the pipe diameter, the target has to be set up directly in front of the laser and must be adjusted to the correct height ignoring the diameter marking.

4. Laser Description

4.1 Infrared Receiver
For short distance from the back.

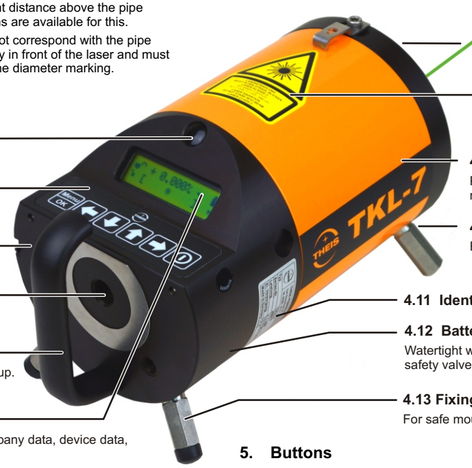
4.2 Keyboard
Clear layout. Big, user-friendly, self-explanatory keys.

4.3 Charging Socket
Behind the dust guard cap.

4.4 Central Fastening Thread 5/8“
Bulging ground area, niro St.

4.5 Handle
For easy handling, safe transport and simple set-up.

4.6 LCD-Display
Clearly legible, illuminated display for on/off, company data, device data, rotor speed, duty type and battery level.



4.7 Infrared Receiver
For a large range from the front.

4.8 Laser Warning Sign
TKL-7: Laser class 2, P < 1 mW
TKL-7 High Power: Laser class 3R, P < 5 mW

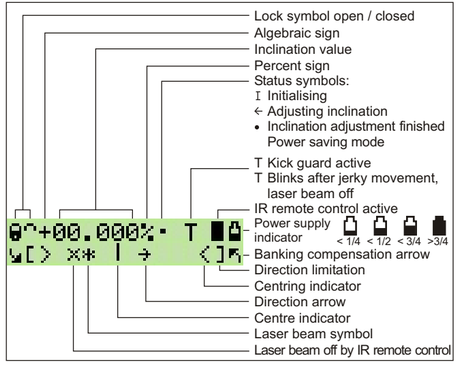
4.9 Robust Light Metal Housing
Plastic-coated, swept and filled with nitrogen, 100 % watertight.

4.10 Sliding Leg (front)
For comfortable mounting in the pipe.

4.11 Identification

4.12 Battery Box
Watertight with Li Ion rechargeable battery and safety valve.

4.13 Fixing Leg (back)
For safe mounting in the pipe.



5. Buttons

= ON/OFF Button

The device is switched on by pressing this button.
The device and company data are then shown, followed by the operating display with the last settings without button lock. The device is then levelled and referenced on the zero point automatically. After the levelling phase the laser beam and laser beam symbol stop blinking. If this does not happen, the device must be moved into the levelling range by tilting it forwards. The display illumination switches off after approx. 30 seconds automatically. The illumination is switched on again by pressing the ON/OFF button shortly.To switch off the device, press the ON/OFF button until “Auf Wiedersehen !” appears.

or **= Inclination Setting**

Pressing the arrow buttons changes the inclination value by 0.001 %.
The value is changed with increasing speed if the button is kept pressed.

+ = Setting Inclination on Zero

The inclination value is set on 0.000 % by pressing the two arrow buttons at the same time.

or **= Direction Setting**

After setting one of the two arrow buttons the laser beam symbol changes to an arrow. It indicates the direction of movement and the current position. When end position is reached, the laser beam and limitation symbol begin to blink. The setting must then be moved back within 2.5 minutes. If this is not done, the laser is switched off automatically.

+ = Direction Centering

After pressing the two arrow buttons the device is automatically centred in middle position.

Quick Setting

In addition to the respective arrow buttons also press the ON/OFF button.

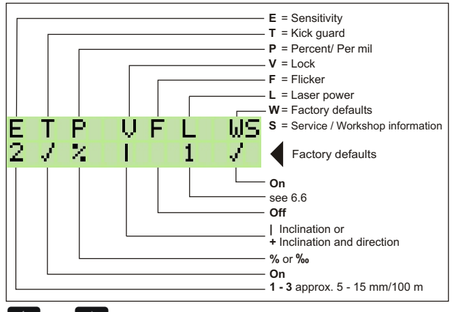
Menu / OK **= Button Lock**

Press the button 2 x: Lock symbol, select and confirm. The buttons are protected against accidential adjustment. Press the Menu button 2 x again, the lock is lifted.

6. Settings

Menu / OK **= select menu level**

Hold the button until the devices settings are displayed:



or **= Select Letter**
The selected letter begins to blink.

or **= Change Settings**

= Back to Operating Display

E 6.1 Sensitivity Setting (Wind/Vibration)

The self-levelling function corrects even the smallest deviation. Additionally the laser beam and the laser beam symbol at the operating mode display blink when the limit values of step 1 to 3 are exceeded,i. e. by influence of wind and/or vibration.

1 = 0.005 % no effect
2 = 0.010 % weak effect (factory defaults)
3 = 0.015 % stronger effect

T 6.2 Kick Guard (Automatic Laser Beam Cut-Out)

✓ =Kick guard switched on. It is only active after 30 sec. Then a **T** appears in front of the battery symbol at the operating mode display. This means the laser is switched off automatically as a precautionary measure in the event of a jerky movement (bump). The **T** then begins to blink. The laser must be switched on again by pressing briefly the ON-button and the positioning must be checked and corrected if necessary.

P 6.3 Inclination Value Display in % or ‰

Select between % or ‰ indicator.
✓ =factory defaults

V 6.4 Lock Function

The inclination or inlcination/and direction setting is blocked.

F 6.5 Flicker Mode

Turn on/off the flickermode to increase the visiblity at bad light conditions.

L 6.6 Laser Power

The laser power of the TKL-7 can be regulated in 2 steps, the laser power of the TKL-7 High Power can be regulated in 5 steps.

TKL-7: 1 = approx. 0.5mW, 2 = < 1 mW(default)
TKL-7 H.P.: 1 = < 1 mW (default, laserclass 2), 2 = approx 2 mW, 3 = approx. 3 mW, 4 = approx. 4 mW, 5 = <5 mW

W 6.7 Factory Defaults

✓ =All set to factory defaults.

S 6.8 Service/Workshop Notice

Authorized personnel can put in a numerical code here to come to the adjustment mode.

7. Banking Compensation

The height deviation caused by a banking compensation is levelled automatically. Arrows indicate the banking. When the banking increases, the arrows become larger. When the arrows start blinking, the final position is reached. Turn the laser in the direction of arrow as far as the arrows are no longer seen.

8. Infrared Remote Control

For direction setting and laser switch on/off. Additionally the flicker mode can be switched on/off by the ON/OFF button.

9. Calculating the Percentage

If the percentage value that is to be set is not known, it can be calculated as follows:

Example: Height difference between 2 points = 0.2 m
Length between 2 points = 50 m

$$\frac{\text{Height difference} \times 100}{\text{Length}} = \frac{0.2 \times 100}{50} = 0.4\ \%$$

Convert % in ‰ - move the decimal point one place to the right.
Convert ‰ in % - move the decimal point one place to the left.

10. Power Supply

7.4 V DC internal lithium ion rechargeable battery or 12 V DC external rechargeable battery via connection cable 0117.02.

11. Battery Charging

- Carry out charging only with the power and charging unit, type NE-80 or a 12 V DC external rechargeable battery via connection cable 0117.02.
- Keep charger dry and only use in rooms.
- For charging take the laser out of the transport case.
- Permissible charging temperature 0°C to + 40°C, as best + 10°C to + 25°C.
- After approx. 5 hours the charging time is finished. The display goes out or the battery symbol shows a full battery.
- Low ambient temperatures reduce the running time, high temperatures reduce the battery life.
- Damaged batteries must be disposed.

12. Troubleshooting

1. No laser beam - check power supply. Low battery?
2. Low range - clean laser beam exit window.
3. Laser beam blinks slowly - move device into the levelling range by tilting forwards.
4. Laser beam and direction limitation symbol blink slowly - reset laser from the limitation.
5. Laser beam + banking arrows blink slowly - twist laser in direction of arrow until the arrows are no longer seen.
   If the errors of point 3, 4 and 5 are not corrected within 2.5 minutes, the device is switched off automatically.
6. Laser switched off automatically (kick guard) - switch on the device again.

13. Maintenance

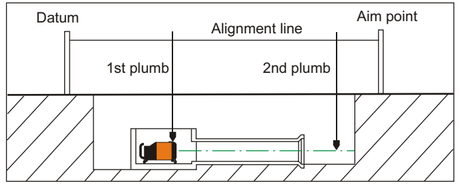
The laser requires no special maintenance. Keep the electrical connections clean. Do not clean with water spray. Clean glass parts with a soft, clean cloth. Store dry. Always transport the laser in its original case.

Table of Contents

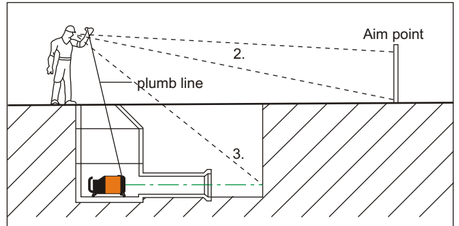
Theis Feinwerktechnik GmbH
Zum Bolzenbach 26
35236 Breidenbach
Tel. 06465 67-0

14. Transfer Possibilities

Axis transfer with the alignment line

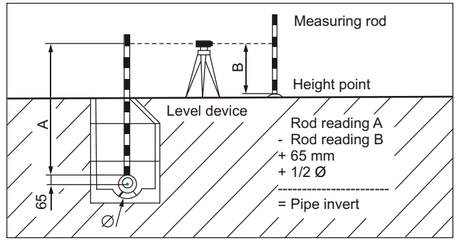


Axis transfer by bearing over the plumb line

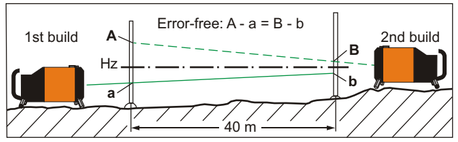


1. Set up laser over the axis.
2. Look over the plumb line and align it to the alignment rod.
3. Look over the plumb line to the laser beam and align the laser in the direction.

Height transfer



15. Checking of Adjustment



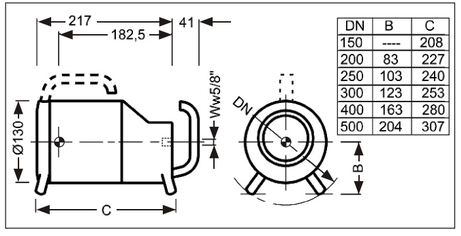
Although the laser is adjusted precisely by the manufacturer, jolts and strong vibrations can lead to maladjustment. The laser should therefore be checked before use:

1. Select a measuring area of approx. 40 m that is as horizontal as possible and set up the laser with the counter at 0.000%.
2. Set up two control points, one directly in front of the laser and the other in a distance of approx. 40 m, and measure the distance on the centre of the laser beam **"a"** and **"b"**.
3. Set up the laser behind the second measuring point and repeat the measuring process in reverse direction, this means measure **"A"** and **"B"**.
4. If the adjustment is correct, A - a = B - b. This means, the laser beam of the first installation is parallel to the second one.
   If the adjustment is incorrect, please contact your specialist dealer.

16. Technical Specifications

TKL-7 laser class:	2, < 1 mW
TKL-7 High Power laser class:	3R, < 5 mW
Laser:	Diode, visible green, 520 nm
Beam diameter:	at laser 13 mm
Range depending on ambient conditions:	TKL-7 /- H.P. up to 200 / 500 m
Inclination range:	- 10 % to + 40 %
Self-levelling range:	- 5 % to + 40 %
Reading accuracy:	0.001 %
Permissible deviation:	± 5 mm/100 m %
Direction setting range:	± 5.000 %
Banking compensation:	± 4°
Operating time with 7.4 V lithium ion rechargeable battery:	TKL-7/-H.P.: up to 50/34 hours
External power supply:	11 to 14 V DC with cable 0117.02
Undervoltage cut-out:	yes
Watertight:	to 0.35 bar
Temperature range:	- 10° C to + 50 °C
Dimensions:	Ø 130 mm, length 265 mm
Weight:	3 kg
Range IR remote control:	to 150 m from front
	to 18 m from back
Guarantee:	24 months
CE:	certified

17. Dimensional Sketch



DN	B	C
150	----	208
200	83	227
250	103	240
300	123	253
400	163	280
500	204	307

18. Standard Delivery Package

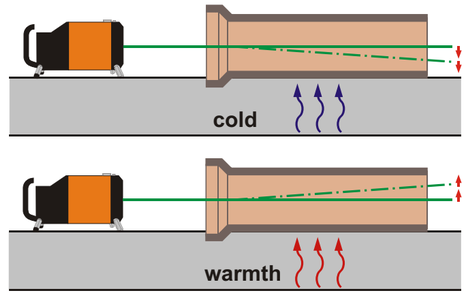
No.	Descripton
01	Pipe laser
02	Transport case
03	Target frame
03	Plexi target DN 150 - 300
04	Power supply/Battery charger
05	Double headed wrench 10/13
06	Leg set DN 200 (2 x sliding leg/ 2 x fixing leg)
07	Leg set DN 250 (2 x sliding leg/ 2 x fixing leg)
08	Leg set DN 300 (2 x sliding leg/ 2 x fixing leg)
1 - 8	**TKL-7 with standard delivery package**
1 - 8	**TKL-7 High Power with standard delivery package**

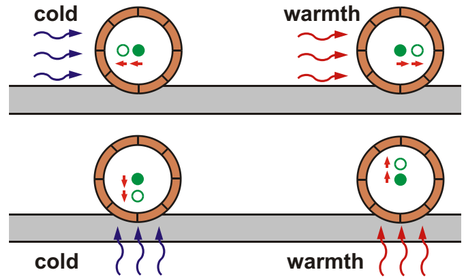
19. Optional Accessories

No.	Descripton
09	Plexi target DN 400 - 500
10	IR remote control
11	Leg set DN 400 (2 x sliding leg/ 2 x fixing leg)
12	Leg set DN 500 (2 x sliding leg/ 2 x fixing leg)
13	Leg adapter for mounting with 3 legs

20. Effects of the Refraction

The laser beam is deflected to cold air.
It is deformed and moved by atmospheric turbulences.





Countermeasures:

Do not keep tubes in direct insolation. Store tubes in the shadow or cover them with a canvas.

Align the pipe in the ditch immediately. If the laser beam is deformed by temperature influences and/or in movement, define the centre by averaging.