English

Universal 3D-Sensor

Instructions for Use

The Universal 3D-Sensor is a very precisioned and versatile measuring instrument for use on milling and erosion machines. With its help, milling spindles or electrode heads can be positioned quickly and exactly on the edges of the workpiece or fixture, the machine coordination system facilitated and lengths measured. The Universal 3D-Sensor is protected against impacts and can be kept in the tool magazine of the machine.

Technical data (fig. 1)

	with short probe tip	with long probe tip
Length L (without clamping shank)	113 mm 4.45 in.	153 mm 6.02 in.
Length Ls (clamping shank)	50 mm 1.97 in.	
Width B	63 mm / 2.48 in.	
Clamping Ø D	20 mm (16 mm on request)	
Weight	800 g	
Sensing ball d diam. d	4 mm 0.1575 in.	8 mm 0.3150 in.
Measuring radial exactness	±0.01 mm ±0.0004 in.	±0.02 mm ±0.0008 in.
axial	±0.01 mm ±0.0004 in.	±0.01 mm ±0.0004 in.
Sensing depth T	25 mm 1 in.	65 mm 2.6 in.
Insulation type	IP67	

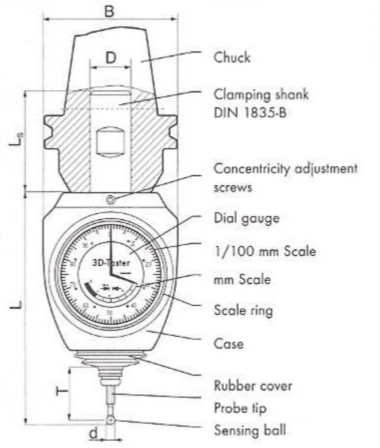


Fig. 1:
Description of construction parts, dimensions

The values given for the measuring exactness are only valid when using original probe tips (can be recognized by grooves on ceramic part, see fig. 8)

Handling

1 Setting concentricity (fig. 2)

The concentricity must be set:
- after instrument has been clamped in a chuck.
- after the probe tip has been changed.

Concentric errors of the machine spindle and tool holder can be compensated through the runout setting.
For optimum measuring precision adjust the concentricity, leave the sensor clamped in the tool holder and only use it on the same spindle.

1. Clamp sensor in according chuck (e. g. collet chuck).
2. Clamp sensor with chuck into spindle or erosion head.
3. Loosen all 4 concentricity setting screws (hexagon socket key, 2 mm, fig. 2.3)
4. Place testing gauge with measuring plate against sensing ball and turn spindle manually. Thereby the sensing ball must not be driven out (fig. 2.1).
5. Set 0-point of testing gauge so that the indicator deflects the same in both directions when the spindle is turned (fig. 2.2).

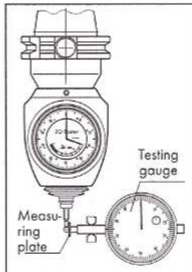


Fig. 2.1: Place testing gauge to sensing ball

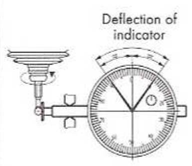


Fig. 2.2: Adjust testing gauge

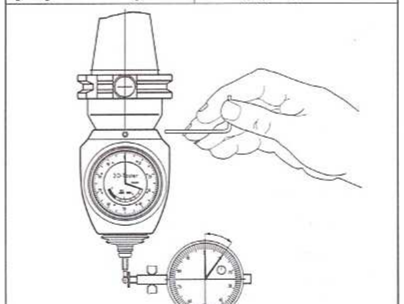


Fig. 2.3:
Adjust concentricity with setting screws

6. Turn sensor such that the two setting screws that are opposite each other are located in the measuring direction of the testing gauge. Bring the pointer of the testing gauge to 0 (Fig. 2.3) with these two setting screws and the attached key.
7. Turn the sensor by 90°, repeat step 6.
8. Repeat steps 6 and 7 until the pointer of the testing gauge does not move when the sensor is rotated.
9. All concentricity setting screws must be tightened firmly.

2 Approaching radially (x, y axis, fig. 3)

- Switch off the spindle and coolant supply.
- Clamp chuck with sensor in spindle or erosion head. It can be installed in any direction (horizontally or vertically).
- Check resting position of dial gauge.
  The long indicator of the dial gauge (1/100 scale) must show vertically to 0 while in resting position. Should this resting position change, return sensor for examination to manufacturer or distributor.
- Turn spindle so that the dial gauge is facing the operator. The turning angle doesn't matter. The sensor works in every direction.
- Slowly approach workpiece with sensing ball. The approaching motion must follow vertically to the workpiece surface. The sensing ball must not slide along the edge of the workpiece (could lead to errors in measurements).
- During the approaching procedure do not twist the sensor (could lead to errors in measurements).
- As soon as the sensing ball has touched the workpiece, the spindle axis is 2 mm / 0.079 in. in front of the workpiece edge (when using the long probe tip: 4 mm / 0.157 in.). From here the clearance between the spindle axis and the edge of the workpiece can be read off at the dial gauge (long probe tip: double the indication on the dial gauge; one unit = 0,02 mm / 0.00079 in.).
- When the dial gauge shows 0 (both indicators) the spindle axis is exactly over the edge of the workpiece. The machine axis can now be nulled without further calculation. Should the 0-point be overrun, set back and approach again.

Note:
The 0-point can be overrun without danger of damage up to 4 mm / 0.16 in. After this a ceramic part in the probe tip breaks and protects the workpiece as well as the sensing mechanism against damage. Only the probe tip must then be replaced (see no. 6).

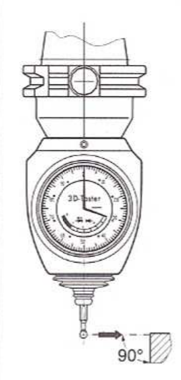


Fig. 3.1:
Approaching radially

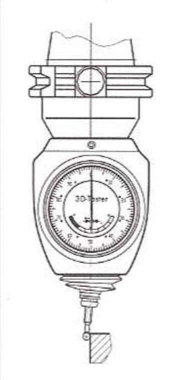


Fig. 3.2:
0-Position radially

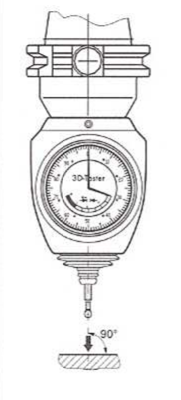


Fig. 4.1:
Approaching axially

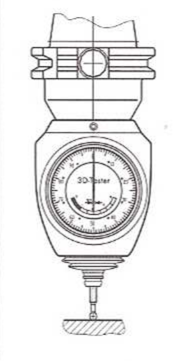


Fig. 4.2:
0-Position axially

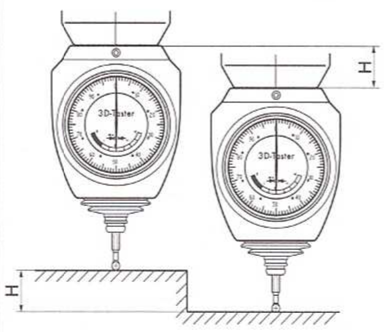


Fig. 4.3: Measuring heights

3 Approaching axially (z axis, fig. 4)

Height measurements can be executed in the axial direction. There is no difference here between short and long probe tip.

- Approach the first surface until the gauge shows 0 (as radial, figs. 4.1 and 4.2).
- Zero the z-axis.
- Approach the second surface until the gauge shows 0.
- The display of the machine (z-axis) shows the height difference (fig. 4.3).

4 Measuring lengths (fig. 5)

With the Universal 3D-Sensor workpieces can be measured in the machine, for example for controlling finished products.

- Approach first workpiece surface as under no. 2.
- Zero machine axis.
- Approach 2nd workpiece surface.
- Display on the machine shows distance in direction of axis.

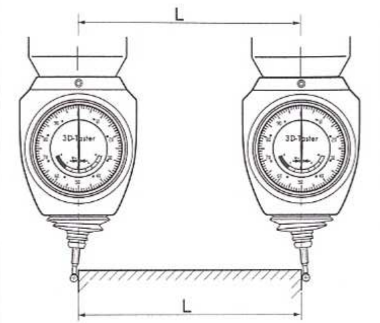


Fig. 5: Measuring lengths

5 Centering and measuring drillings and shafts (x, y, axis, fig. 6)

- Drive route A-B (possibly near to center) and halve.
- Drive route C-D, vertically to A-B, and halve: 1. center coordinate.
- Drive route E-F, parallel to A-B, and halve: 2nd center coordinate.

Drilling or shaft has now been centered and measured at the same time.

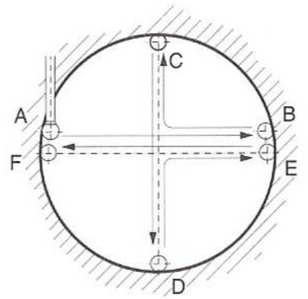


Fig. 6: Centering and measuring drillings and shafts

6 Aligning areas (fig. 7)

The alignment of an area (e.g. workpiece, fixture, machine table) to the machine axes can be tested, and corrected if required, by using the Universal 3D-Sensor.

- Screw in the short sensor insert
- Approach the surface with the sensing ball (radial or axial).
- Only slightly deflect the sensing ball, approx. 0.1 mm (display on the dial gauge: -1.9 mm)
- Slide along the surface with the sensing ball (Fig. 7). The deflection at the dial gauge shows how strongly the parallelity of the surface to the machine axis deviates.
  If there is only a small deflection of the sensor balls it is also possible to cross over breaks in the surface (drilled holes, grooves).

Caution: As a result of the sliding along the surface, the pointer deflection can differ slightly from the actual value.

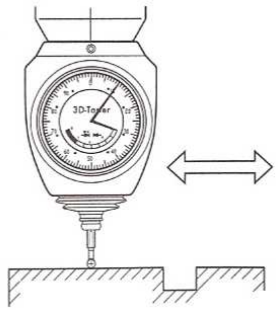


Fig. 7: Aligning areas

7 Replacing probe tip

When using the long probe tip or upon breakage, the probe tip can be easily replaced.

- Unscrew old probe tip by hand.
- The rubber cover must not be removed.
- Screw in new probe tip (check for cleanness).
- Check rubber cover. The rubber cover protects the sensing mechanics against dirt. Please check that it sits properly (fig. 8).
- Check concentricity and if necessary reset (see no. 1).

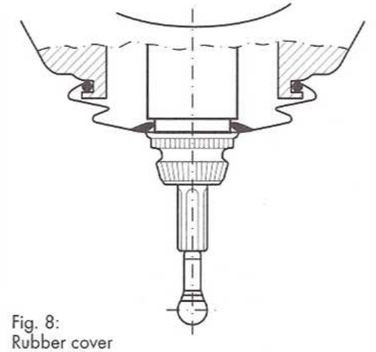


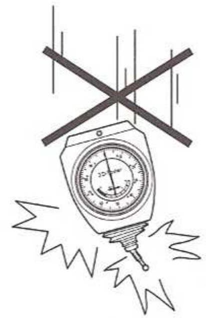
Fig. 8: Rubber cover

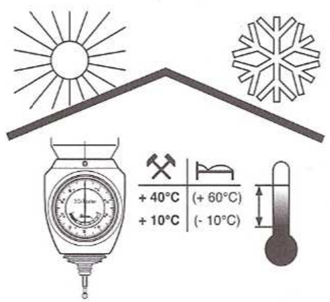
8 Cleaning

- Clean a dirty Universal 3D-Sensor with a clean cloth.
- Use a solvent-free cleaner if it gets very dirty.

9 General notes

- The Universal 3D-Sensor is maintenance free.
- During its use, the machine spindle must be still. Turn off any coolant.
- Do not expose the device to any hard blows.
- Protect the device from direct sunlight when it is in use. Thermal expansion can lead to measuring errors.
- Should the sensor be opened, the guarantee expires.





10 Delivery contains:

- 1 Universal 3D-Sensor with short probe tip;
- 1 hexagon socket screw key, 2 mm

11 Accessories

- Short probe tip
- Long probe tip