

QUICK CALIBRATION OF ZEROTRONIC-SENSORS

Which corrections are possible?

Quick calibration is a 3 point calibration. The method allows the correction of linear gain errors. The method is not suitable to correct errors of a damaged measuring unit.



The following equipment is required:

- LEVELMETER 2000 WYLER part no.065-004-001
- Connecting cable WYLER part no. 065-025-878-001
- a rigid and precisely manufactured measuring base / support which will assure correct alignment of the sensor. Required is: Orthogonal alignment to the axis of rotation of the angular adjustment master, precise alignment of the sensor at zero degree and at the two maximum inclinations.
- a surface plate which is resting on a sturdy support.
- a sine plate with a set of gauge blocks.
or preferably
- a dividing head with horizontal axis.

The calibration must be performed in a climate controlled laboratory.

(As using a sine plate for the quick calibration is more demanding on the metrologist, this method will be explained).

Essentials to pay attention to:

Before and during calibration the ZEROTRONIC sensor must not be subjected to any source of heat. (E.g. individual workplace light or body temperature while handling).

Prior to the calibration the ZEROTRONIC sensor must be powered for at least 15 minutes.

The LEVELMETER 2000 should be supplied with external excitation or at least new batteries must be used.

All figures displayed are examples for display purpose only. For the quick calibration any of the available units may be selected.

Levelling of the sine plate.



With the closed sine plate (angle 0°) the top surface of the sine plate has to be precisely levelled in both directions. In order to achieve this, the adjusting jacks of the surface plate are preferably used. If no other electronic level is available the ZEROTRONIC Sensor with the measuring base / support may be used for levelling.

For the final check make use of the reversal mode. (Place the electronic level or the support with the ZEROTRONIC in two opposing directions and calculate $(A+B)/2$ the result should not differ more than 1 digit from ZERO using a fine unit setting).



Levelling of a dividing head.

The support for the ZEROTRONIC is to be designed so, that a reference surface, allowing the levelling with an electronic level in both directions, is available. (Horizontal when divider is set to 0° and rotational axis of the divider horizontal). Procedure as described under "levelling of the sine plate".

Empty the memory for zero-offset.

Press **ON/MODE**  several times until the cursor is positioned below ZERO. Confirm by pressing **ENTER** . The latest memorised zero-offset is shown on the display. The direction indicator is flashing.



Press **ON/MODE**  again, the display is now showing zero (0). Confirm with **ENTER** , doing this transfers the displayed zero into the memory. The LEVELMETER 2000 returns to the measuring mode.



Now the LEVELMETER 2000 should be in the measuring mode ABSOLUTE and a value should be displayed.





Remove the values from an earlier correction.


Replace the correction data at 0° and at ± maximum inclination with the value 0.

Information: The correction points for the maximum inclination are beyond the possible inclination displayable.

Proceed as follows:

Press **ON/MODE**  several times until the cursor is positioned below ZERO. Confirm by pressing **ENTER** . The display shows 0. The direction indicator is flashing.



Now press and keep depressed **ON/MODE**  (about 5 to 10 seconds) until a dashed line appears in the lower left part of the display. Release the button.



In the lower, left part of the display angular information is shown. The main display shows the correction value presently stored in the memory. Press **ON/MODE** ▲ shortly, which will set the displayed value to 0. Press now **ENTER** ■, the corresponding correction value is replaced with the value 0 and the next inclination angle and the corresponding correction value are displayed.



Set the correction value for 0° inclination to 0 as well using **ON/MODE** ▲ and **ENTER** ■ keys.



Proceed as above for the corrective value for the maximum negative inclination.

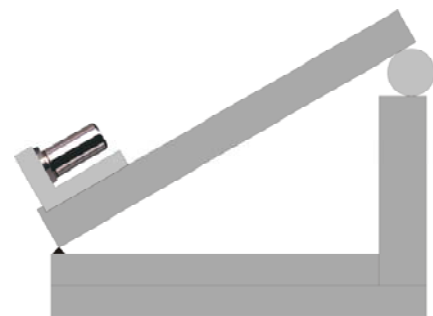
After completion the LEVELMETER 2000 will show a row of half high “o” (busy) for a few seconds and thereafter will return to measuring mode ABSOLUTE. The display will react to inclination changes of the sensor.



**Procedure to determine new correction values.
Using a sine plate (the less preferred equipment).**

Set the sine plate to the nominal, maximum inclination for the ZEROTRONIC sensor. Place the well acclimatised combination of ZEROTRONIC sensor and support on the sine plate. Make sure the sensor is placed in the orientation which produces a positive reading and that the sensors measuring axis is precisely aligned to the geometry of the sine plate.

To avoid errors due to body temperature wear gloves for all manipulations.

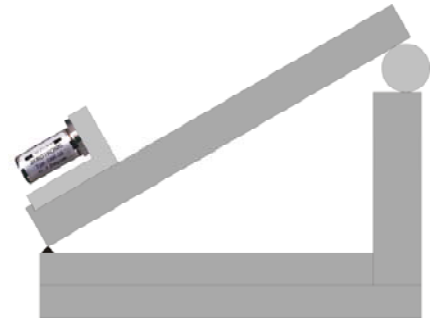


Provided that the sensor has been in operation for at least 15 min, copy the reading from the LEVELMETER 2000 on paper. (E.g. +29.949°)

Note: The difference to the target value of +30° is 0.051° (less on the plus side than expected)



Place the sensor in the opposite direction onto the sine plate, so that the readout will be negative. Take the same handling care and attention to alignment as above. The sine plate is under no circumstance to be moved.



Copy the negative reading from the LEVELMETER 2000 on to paper. (E.g. -29.951°)

Note: The difference to the target value of -30° is 0.049° (less on the minus side than expected)



Now find the deviation at 0° inclination. Close the sine plate (adjust to 0°). Again take care not to move the sine plate. (During preparation you have set the top precisely horizontal by reversal method). Before you take a reading check the sensors alignment again.



Copy the reading from the LEVELMETER 2000 on paper. (E.g. $+0.002^\circ$)

Note: The difference to the target value 0° is 0.002° (more on the plus side than expected)



**Procedure to determine new correction values.
Using a dividing head. (The preferred equipment).**

You have aligned and levelled the mechanical support and mounted the ZEROTRONIC sensor to the same. Set the dividing head to 0° (Sensor horizontal, the correct side of the sensor on top). Connect the sensor to the LEVELMETER 2000 and switch on to measuring mode ABSOLUTE. Dependant on the handling before, (input of body temperature) keep the sensor in operation for 15 to 30 minutes.

Set the dividing head to the nominal, maximum, positive inclination for the ZEROTRONIC sensor. (e.g. +30°)

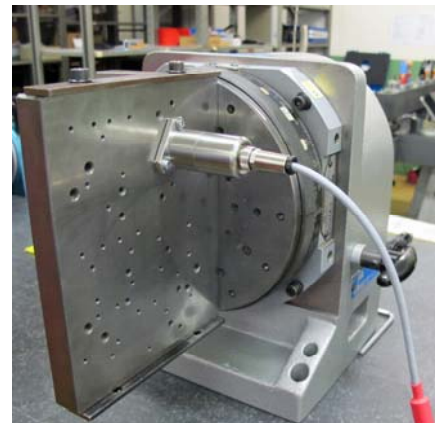


Copy the reading from LEVELMETER 2000 to paper (e.g. +29.949°)

Note: The difference to the target value of +30° is 0.051° (less on the plus side than expected)



Set the dividing head to 0° (sensor horizontal)

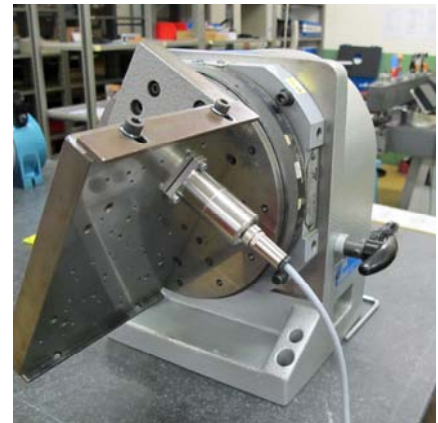


Copy the reading from the LEVELMETER 2000 on paper. (e.g. +0.002°)

Note: The difference to the target value 0° is 0.002° (more on the plus side than expected)



Set the dividing head to the nominal, maximum, negative inclination for the ZEROTRONIC sensor. (e.g. -30°)






Copy the negative reading from the LEVELMETER 2000 on to paper. (e.g. -29.951°)



Note: The difference to the target value of -30° is 0.049° (less on the minus side than expected)



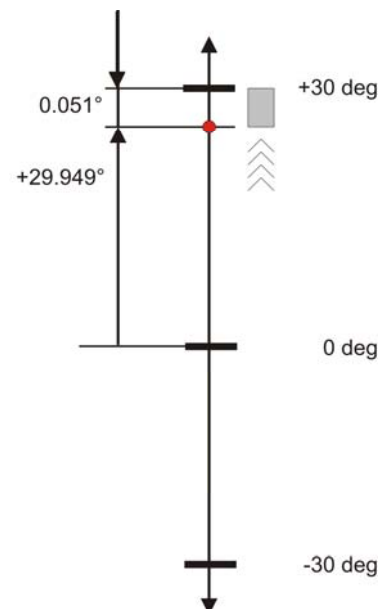
Enter and memorise the new corrective values.




Press **ON/MODE**  several times until the cursor is positioned below ZERO. Confirm by pressing **ENTER** . The display shows 0. The direction indicator is flashing. Now press and keep depressed **ON/MODE**  (about 5 to 10 seconds) until a dashed line appears in the lower, left part of the display. Release the button.

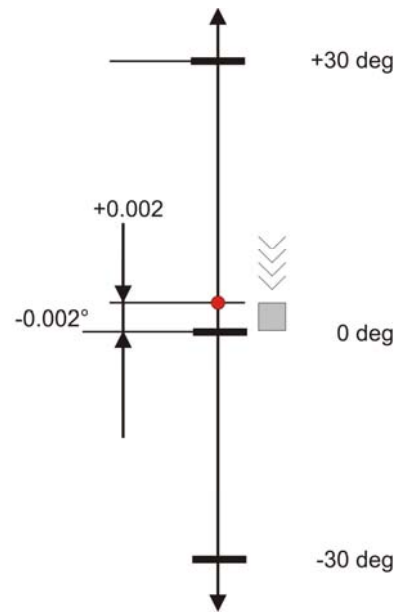
The first corrective value for the nominal, maximum, positive inclination may now be entered. The angle indicated in the left, lower part of the display is larger, it correspond with the last point of the base calibration. (e.g. for 30° the display will be 33°)

Use **ZERO/SELECT**   to enter the previously determined correction to the main display. (To follow the example enter +0.051°)



Confirm with **ENTER** .

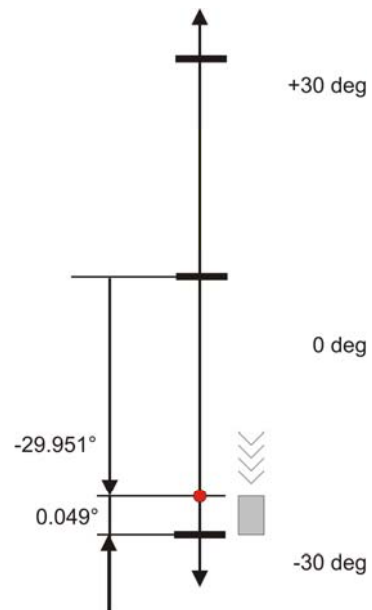


The LEVELMETER 2000 is now ready to accept the corrective value for 0°. Use **ZERO/SELECT**   to enter the previously determined correction to the main display. (To follow the example enter -0.002°)
Confirm with **ENTER** .



The corrective value for the nominal, maximum, negative inclination may now be entered. (According to the example -30°, displayed is -33°).

Use **ZERO/SELECT**   to enter the previously determined correction to the main display. (To follow the example enter -0.049°)



Confirm with **ENTER** .

With this last entry the procedure is completed. Provided that the procedure has been carefully performed the ZEROTRONIC sensor will now perform within the specified limits of error. Should an inspection still show errors at the maximum positive and/or at the maximum negative inclination, it is possible to retouch the corrective values. Open the input again and add or subtract the remaining error to/from the value displayed.

Important warning: Under no circumstance are changes of the corrective value exclusive at 0° allowed. Should such a correction be necessary, e.g. the value to be shifted by 0.005° to the minus side, both values at maximum inclinations must also be changed by 0.005° to the minus side.