Tilt/Inclinometer-Datalogger
Datasheet and Manual

(v2, 220811)

Wireless low-power inclination measurement system for precise and stable long term tilt-monitoring.

- 3-axis inclination sensing.
- Temperature compensated and long-term stable.
- Easy to handle.
- Long battery life.
- Easy battery exchange without tools.
- Compact dimensions.
- Wireless data-transfer and configuration under field-approved distances:
  - Communicates through a thickness of snow, water, rock, earth, ...
  - No disturbance to observation site as instrument does not need to be removed or exposed during readout.
- Non-volatile flash memory for safe data-storage.
- Wide range of user configurable settings:
  - Measurement periods.
  - Automatic change to a configurable period when a specified temperature- or inclination-band is left.
  - Offset and multiplier correction to suit the field application.

Two versions available

High-performance type	Full-range type
- Y +-10 °, high resolution and accuracy. - X +-90 °, standard accuracy and resolution.	- X/Y +-90 °

1. Technical data

- 3-axis (x,y,z) inclination[1] and temperature sensing.

- High-performance type:

  - Angle range +-10 °.

  - Resolution 0.0055 ° (angle); 0.06 °C (temperature).

  - Accuracy +-0.1 ° from -20 °C to 20 °C (angle); +-1 °C (temperature).

- Full-range type:

  - Angle range +-90 °.

  - Resolution 0.05 ° (angle); 0.06 °C (temperature).

  - Accuracy +-0.2 ° from -20 °C to 20 °C (angle); +-1 °C (temperature).

- Temperature drift over full operating range +-0.57 °.

- Long term stability +-0.23 ° for x,z and +-0.34 ° for y after 180,000 measurement-cycles without calibration.

- MEMS sensor-technology.

- Automatic temperature compensation of x and y angle.

- Operating temperature -40 to 80 °C.

- POM housing, IP67 rating.

- Dimensions 146 mm length, 20 mm diameter.

- Power supply 1 x 1.5 Volt Lithium AA-Cell.

- Power consumption:

  - Idle: 50 µA (direct wireless connectivity).

  - Measurement: 25 mA.

- Flexgate 2 OS.

- 433 MHz or 915 MHz (US region) radio communication for configuration and data-download.

- 2 MByte non-volatile flash memory for up to 400,000 values (100k measurements).

- Battery-lifetime up to 5 years @ 1 hour period or 50,000 cycles (whatever comes first)[2].

- Logging-Interval: 1 min to 24 hrs.

---

[1] Z axis is a calculated value from x and y.
[2] Extreme low and changing temperatures will decrease the lifetime of the battery.

2. Handling and mounting information

Battery:

- Lithium batteries can be dangerous! Prevent it from shock, physical damage or temperatures above the given specification.
- Old batteries must be recycled in special battery waste disposal.
- Always use correct polarity of the battery. Otherwise the whole device and battery are destroyed.

Highly sensitive device:

Do not drop or shock the datalogger! This will damage the sensor!

Additional information:

- "Doku_FlexGate_Software_Engl"
- https://www.thermistor-string.com/questions
- https://www.geo-precision.com

Datalogger-Mounting:

The dataloggers can be mounted to a flat surface with two pairs of hydraulic-hose brackets. The x-axis can be adjusted to horizontal by rotating the logger around its long axis until the notch in the front cap of the logger is horizontal before fully tightening the screws holding the brackets.

The types of hydraulic hose brackets offered a good fit in the past:

Manufacturer: PI.EFFE.CI. (https://www.pieffeci.com/en)

Type: C4 20

Manufacturer: Stauff (https://stauff.com)

Type: 3020-PP

→Afterwards a zero-point adjustment and record activation are required as described below.

3. Configuration

The measurement-system comes preconfigured to read the sensor with an interval of 1 hour. Follow the procedure below carefully for correct zero-point adjustment and data-recording!

To download the data from the device or to change the configuration the "Wireless USB-Dongle" (433 MHz /EU or 915 MHz US) and FG2-Shell software are required.

Download the latest version of the FG2-Shell software here:

https://www.thermistor-string.com/additional-string-information/downloads/category/2-software

How to install and use the FG2-Sehll software, please refer to the documentation "Doku_FlexGate_Software_Engl":

https://www.thermistor-string.com/additional-string-information/documentation-thermistor-string/category/3-documentation

→**Note**:
- All configuration/parameters of the device are stored in a separate non-volatile memory. Even after power-loss or erasing the data-storage (🗑 Clear Logger...), the configuration is valid.
- Carefully check the parameters for the activated Record-Checkbox (☑ Record), otherwise no data is recorded!

Error-Code displayed or recorded instead of degree-value:
Please check carefully that the positioning of the device is within the specified angle-range.
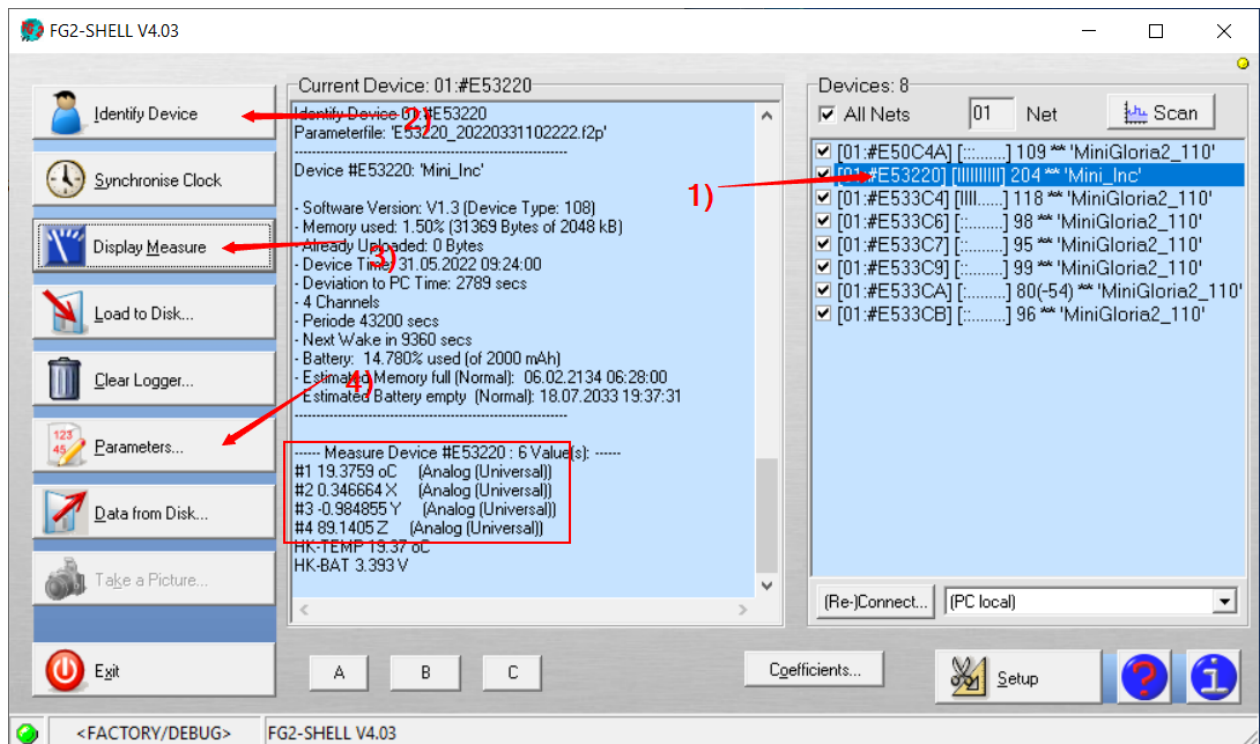Also be sure that the device is not moving during measurement, which can take up to 30 seconds.

Zero-Point adjustment after mounting:

- The adjustment of the zero point for the x- and y-axis is required after the device is properly mounted.
- Following these steps presumes a horizontal position of the device and sets the associated axis to 0 °.
- A basic knowledge of "FG2-Shell" software is required. See "Doku_FlexGate_Software_Engl".

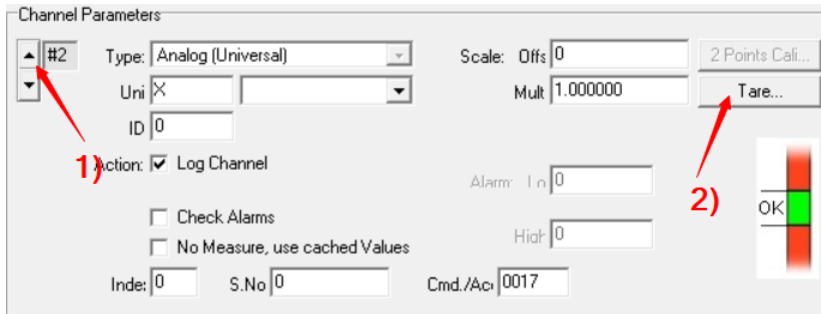Step 1:

1) Select device in list.
2) Identify.
3) Display Measure: The current position with zero-offset is displayed.
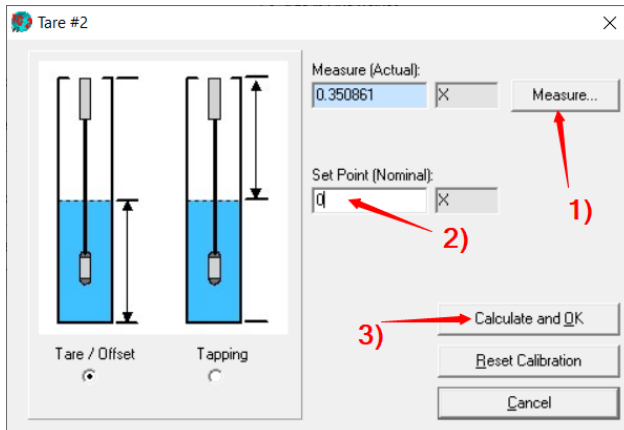4) Open Parameters.

Step 2:

1) Select the 2nd channel for x-Axis value.

2) Click "Tare".
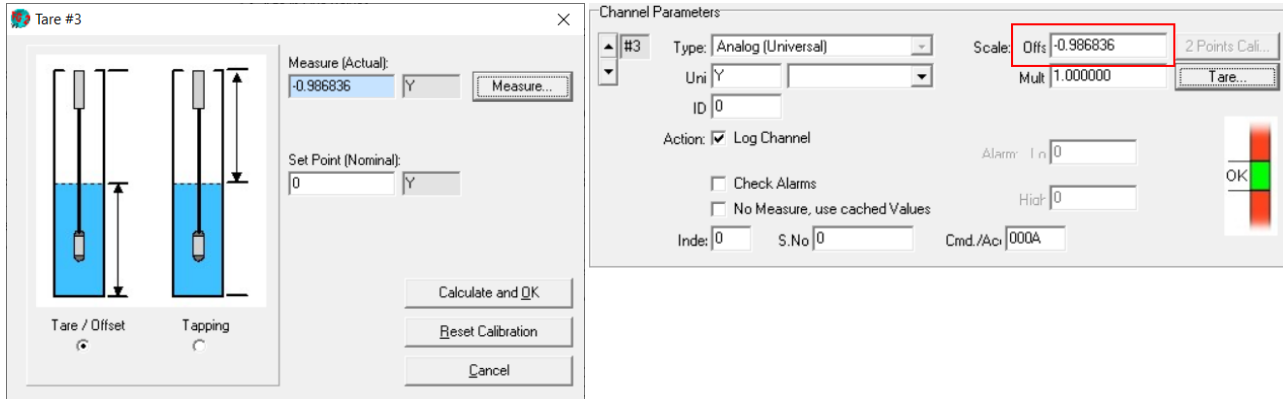

Step 3:

1) "Measure" to read the latest value (displayed in the blue column).

2) Enter the correct angle (0 °).

3) "Calculate and OK" to set the new offset.

Step 4:

Select the 3rd channel and repeat Step 2 and 3.

Last Step:

- Activate the Record-Checkbox ☑ Record to start the recording.
- Click "Transfer" at the Parameter-Form to write the configuration to the device-memory.

To check the new configuration and the correct zero-point simply click "Display Measure":