

Temperature correction of VW vertical multi-point inclinometer

Model 1430 In-place type Inclinometer does not need factory temperature compensation,

1430 VW Inclinometer is due the change of output value by temperature change is 0.000833 Degree/°C and the influence of temperature change is very small

Another reason is that the 1430 VW Inclinometer is connected to the STS Extension tube and mounted in the ABS casing.

The water temperature in the ground is very constant, about 12°C ~ 14°C

1430 In-place type Inclinometer is constrained by ABS casing and metal extension tube.

Therefore, assuming that the temperature of the groundwater changes greatly due to the sudden change of the atmospheric temperature, the larger coefficient of linear expansion is the variable in which the casing is more influential than the expansion coefficient of the extension is the variable in which the casing is more influential than the expansion coefficient of the extension tube in the order of Casing > Extension tube (ABS Casing – coefficient of linear expansion of about 100ppm/°C, Extension tube – coefficient of linear expansion of about 12ppm/°C)

This should compensate for the linear expansion coefficient in terms of angular displacement, which is a very difficult task.

For this reasons, if the temperature, of the Model 1430 needs to be calibrated, it can only be corrected as a whole profile by the amount of temperature test result of 1430 In-place type Inclinometer is as follows.

For reference, the sampling temperature test result of 1430 In-place type Inclinometer is as follows.

1. The average frequency change of the sample 10nos tested at a deviation of 40°C is less than 2Hz. What is the changed frequency per 1°C ?
= $2/40 = 0.05\text{Hz}/^\circ\text{C}$
2. The average changing frequency per 1 degree(Degree) of 1430 In-place type Inclinometer is 60Hz. What is the angle of change per 1Hz?
= $1/60 = 0.01666^\circ/\text{Hz}$
3. What is the angle of change per 1°C based on the values calculated in paragraphs 1 and 2 ?
= $0.01666 \times 0.05 = 0.000833^\circ/\text{C}$
4. Calculate the angle of change per 1°C calculated in Section 3 as the horizontal displacement(Δmm) based on the interval. ?
= $2000 \times \sin 0.000833 = 0.029\text{mm}/^\circ\text{C}$

Conclusion : As mentioned above, the amount of displacement due to temperature change is very fine, so temperature compensation is not required..