COMPACT AND VIBRATION RESISTANT DIGITAL OUTPUT
CONTACTLESS MEMS TILT ANGLE SENSOR
THD2000Z series

RoHS compliant

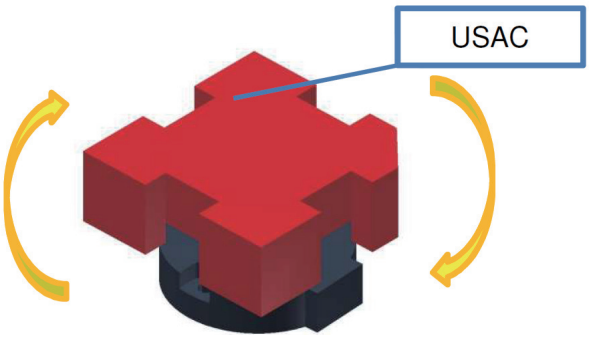
■ FEATURES

THD2000Z-Series inclinometers are high performance sensors used MEMS accelerometer to determine inclination in X and Y axes with excellent precision. THD2000Z is compact size and it has high vibration resistance.

- Dual Axis Measurement : up to ±60°
- High accuracy : Absolute Linearity < ±1%FS, Stable Temperature Characteristics
- High Vibration Resistance : THD2000Z has no mechanical resonance point in the detecting element. It is less subject to vibration.
- User-friendly Functions : Resetting Index Point, Choice of Digital Damping Control Function

■ NEW USER-FRIENDLY FUNCTIONS

● Easy Resetting Function for Index Point(0°)



※ Touch USAC 5 times each 90° CW rotation to THD2000Z

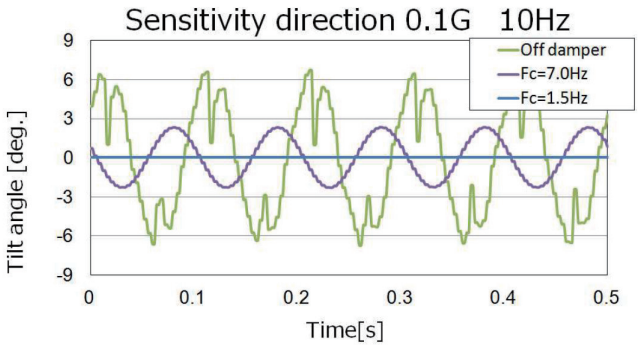
Using command control by RS-485, index point (0°) can be reset (±5°max./horizontality). Moreover using User-Settable Adjustment Card (USAC), index point (0°) can be reset without any electrical connection.

*Notes:

- USAC is optional item.
- Resetting index ponint by USAC type is option.

  Please choose "THD20xxx-xxK"

● Choice of Digital Damping Control Function



THD2000Z series implements the digital filter that would remove external noise to give the user a choice of certain filter factor from 16 available settings.

Existing inclinometers have to be add extra electrical low-pass filter or mechanical damping structure.

THD2000Z apply digital filter. It makes wider choice of cut-off frequency and easy to design frequency response.

● Serial communication Function

This series has RS485 interface model. Using RS485 serial interface command, the following functions will be able to be used.

1. Retrieving of electrical angle position.
2. Retrieving of Serial number.
3. Teach-in setting of index (0°) point. (Option)
4. Changing baud rate. (Option)
5. Changing output cycle of serial data. (Option)

THD2000Z
INCLINOMETERS

■ PART NUMBER DESIGNATION

THD20 10 Z - R B K - 1

Series name

X axis analog output Angle
Ratio
10 : ±10°
20 : ±20°
30 : ±30°
45 : ±45°
60 : ±60°
RS485
30 : ±30°
60 : ±60°

Output axis
Z : X & Y axis, Dual Output
X : X axis only, Single Output
Y : Y axis only, Single Output

Output type
R : Ratio 10-90 %Vin
D : RS485 only

Damper control
See table below

Index Point Resetting
None : Noncompliant
K : Compliant

Custom

※ Cut-off frequency and Time constant against Damper time constant are shown the below table.
It is possible to choose the best Damper time constant by operating speed and vibration condition

Part No.	Level	Cut-off frequency	Time constant
0	0	11.2 Hz	150 ms
1	1	9.27 Hz	170 ms
2	2	7.65 Hz	180 ms
3	3	6.32 Hz	190 ms
4	4	5.21 Hz	200 ms
5	5	4.30 Hz	240 ms
6	6	3.55 Hz	250 ms
7	7	2.93 Hz	290 ms
8	8	2.42 Hz	330 ms
9	9	2.00 Hz	360 ms
A	10	1.65 Hz	420 ms
B	11	1.36 Hz	500 ms (Standard)
C	12	1.21 Hz	590 ms
D	13	0.92 Hz	700 ms
E	14	0.76 Hz	840 ms
F	15	0.62 Hz	990 ms

■ HANDLING INSTRUCTION

- Hall-IC sensor is impossible to measure resistance value as a variable resistor.
- Use this sensor in the place where is protected from ESD.
- Under vibration condition, angle may not measured accurately.
- In certain temperature environment, output at 0° may be shifed by aging effect.

THD2000Z
INCLINOMETERS

■ STANDARD SPECIFICATIONS

Item \ Output		Voltage Ratio	Serial (RS-485)
Electrical Angle		±10°, ±20°. ±30°. ±45°. ±60° Separate choice of X and Y axis (Option)	±30°, ±60°
Absolute Linearity		±1 %FS	
Input Voltage		5±0.25 VDC	
Current Consumption		Steady-state: 20 mA	Steady-state: 30 mA
Output Range		10 ~ 90 %Vin	–
Output Resolution		12 bit equivalent	0.006° (Not included Noise)
Response Time		Step Response (Time Constant): 500 ms (Std.) Selectable 16 steps during 150 ms ~ 990 ms (Option)	
Temp. Characteristics -30 ~ 85°C (25°C std.)	0° position	±0.2°	±0.2°
	Tilt Angle	±10°: ±0.7° ±20°: ±1.2° ±30°: ±2.1° ±45°: ±3.6° ±60°: ±6.0°	±10°: 1.6° ±60°: 4.4°
EMS		IEC 61000-4-3 : Level 3 (10 V/m)	
EMI		IEC 61000-4-6 : CISPR22_A_10 m	
ESD		IEC 61000-4-2 : ±16 kV	
Operating Temp. Range		-30 ~ 85°C	
Vibration		70 m/s², 5 ~ 500 Hz (10 min.) 2 hours	
Shock		1000 m/s², Half sine wave 6 ms	
IP Grade		IP50	
Index point Teach-in		Index point (±5° max. / horizontality) resetting (Option)	

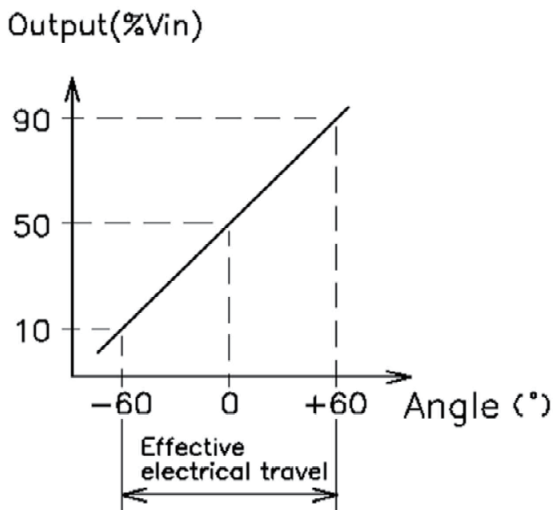
■ TEMPERATURE CHARACTERISTICS

By our unique technology, THD2000Z series is individually conpensented temperature characteristics each unit.

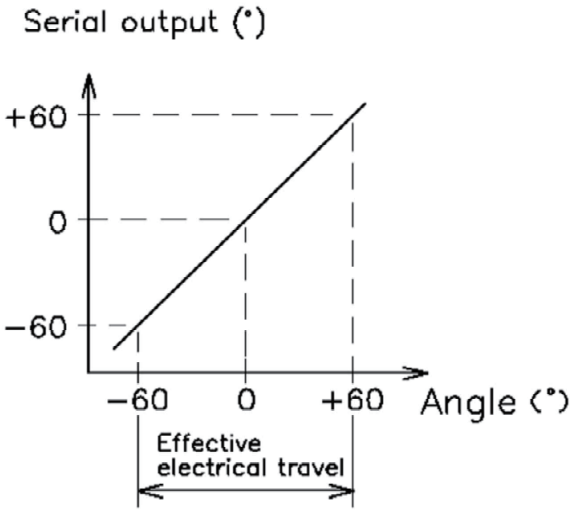
THD2000Z series realized stable temperature characteristics.

■ OUTPUT CHARACTERISTICS

● Voltage Ratio

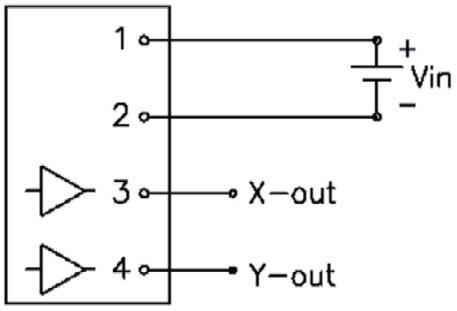


● Serial RS-485



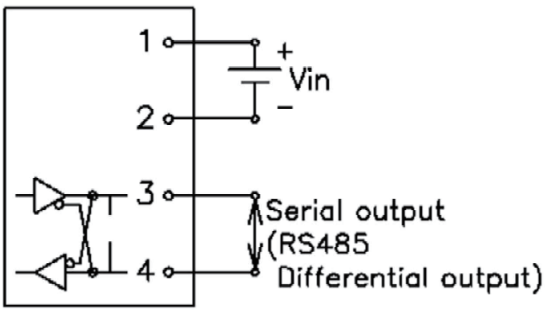
■ SCHEMATIC

● Voltage Ratio



1,2,3,4 : Terminal No.

● Serial RS-485

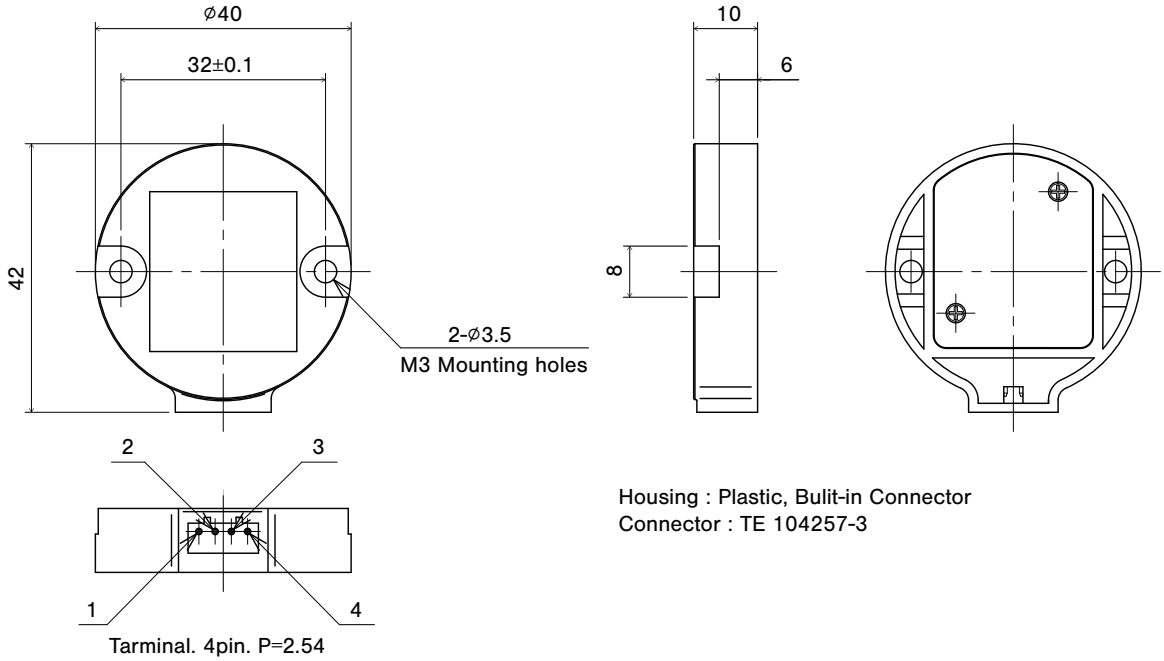


1,2,3,4 : Terminal No.

THD2000Z
INCLINOMETERS

■ OUTLINE DIMENSIONS

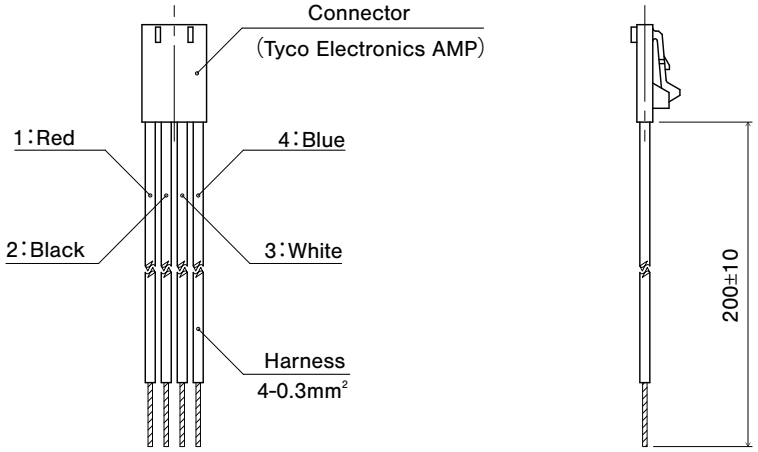
(Unit:mm)



Housing : Plastic, Bulit-in Connector
Connector : TE 104257-3

■ ACCESSORY

(Unit:mm)



■ TILT ANGLE DIRECTION