



## General Description

DPF290M-LBS two-axis inclinometer is developed and produced by our company with high accuracy and high stability. Its measuring range is  $\pm 90^\circ$ . Output RS485 serial interface or CAN-bus.

## Features

- High accuracy,
- Fast response time
- cost-effective
- Aluminium case,
- Allow DC wide voltage supply
- Power supply anti-reverse protection

## Applications

- Angle measuring,
- leveling adjustment, zero setting.
- Security control, monitoring, alarm system,
- Angle measurement of arm, dam, construction,
- Aligning control, bending control
- Initial position control, grapher for tilt attitude

## Technical data:

Parameter	value	Unit	Remark
Measuring range	$\pm 90$	degree	Two axis
Resolution <sup>(1)</sup>	0.01	degree	
Accuracy <sup>(2)</sup>	$\leq 0.05$	degree	$0^\circ \text{---} \pm 60^\circ (25^\circ\text{C})$
	$\leq 0.2$	degree	$\pm 60^\circ \text{---} \pm 80^\circ (25^\circ\text{C})$
	$\leq 1$	degree	$\pm 80^\circ \text{---} \pm 85^\circ (25^\circ\text{C})$
	$\leq 3$	degree	$\pm 85^\circ \text{---} \pm 90^\circ (25^\circ\text{C})$
typical zero temperature drift <sup>(3)</sup>	$\pm 0.008$	degree/ $^\circ\text{C}$	$-25 \text{---} +85^\circ\text{C}$
Maximum zero temperature drift	0.86	degree	Set $25^\circ\text{C}$ as basic point, in the range of $-40 \text{---} +85^\circ\text{C}$
Output frequency	$12 \pm 1$	HZ	
Operating voltage <sup>(4)</sup>	8-30	V (dc)	
Operating current	$\leq 50$	mA	@12V
Operating temperature	$-40 \text{---} +85$	$^\circ\text{C}$	
Protection grade	IP65		DPF290M-LBS-1
	IP66		DPF290M-LBS-2

Note 1: Resolution means the min variable value of measured object which is measured by sensor in the measuring range. Different measuring range, different resolution. The resolution is 0.01 degree in the range of 60 degree. Larger angle, lower resolution.

Note 2: Accuracy means Root Mean Square Value of measured error for several times ( $\geq 16$  times) during measuring range. Measured error means the difference between measured value and noinal value. The formula is as follows;

$$\sqrt{\frac{X_1^2 + X_2^2 + X_3^2 + \dots + X_n^2}{n}}$$

n is measured times, it should be  $\geq 16$ ,  $X_1, X_2, X_3, \dots, X_n$  is measured error for each time.

Note 3: Zero temperature drift means angle offset which is caused by temperature change when in the room temperature and output angle is zero.

## **Default output**

### **RS485 serial interface communication protocol settings**

Baud rate: 9600bps (default) Start bit: 1 bit Data bit: 8 bit Stop bit: 1 bit

### **Angle output format (ASC11 Format)**

One set of data has 18 bytes.

Byte1: X

Byte2: +/-

Byte3: X-axis tens digit of angle value.

Byte4: X-axis units digit of angle value.

Byte5: point “.”

Byte6: one digit after the decimal point of X-axis angle value.

Byte7: two digit after the decimal point of X-axis angle value.

Byte8: 0x20

Byte9: 0x20

Byte10: Y

Byte11: +/-

Byte12: Y-axis tens digit of angle value

Byte13: Y-axis units digit of angle value

Byte14: point “.”

Byte15: one digit after the decimal point of Y-axis angle value.

Byte16: two digit after the decimal point of Y-axis angle value.

Byte17: 0x0d

Byte18: 0x0a

Format as follows:

ITEM	SIGNED	DATA	SPACE	ITEM	SIGNED	DATA	STOP
X	+/-	**.***	space	Y	+/-	**.***	enter/new line

Eg. current angle is +23.67 degrees on X-axis, -01.02 degrees on Y-axis, displaying as follows

X+23.67 Y-01.02

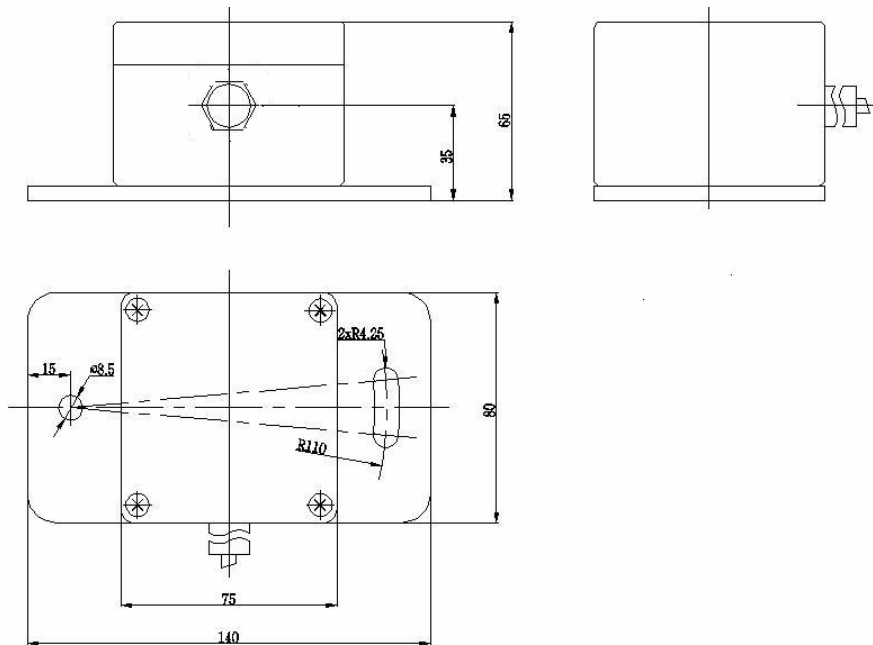
Note: display angle 99.999 when over range.

### Command word related:

- Sensor will output version of soft to PC after power-on: “ZCT290M-LBS V1.0”
- System will enter into angle output mode automatically.
- PC send “\$” command to module, it will enter into command mode.( module can only receive command,do not collect and send angle data under this mode)
- PC send “\*n” to module,then it can exit command mode.System will return to angle output mode,continue to output angle data.

### Installing and Connection Definition

In order to get max tilt range, module should be installed horizontally under normal condition.



### Connection Definition:

- Pin 1———VCC (8-30V) (Red wire)
- Pin 2———GND (Black wire)
- Pin 3——— 485A (Blue wire)

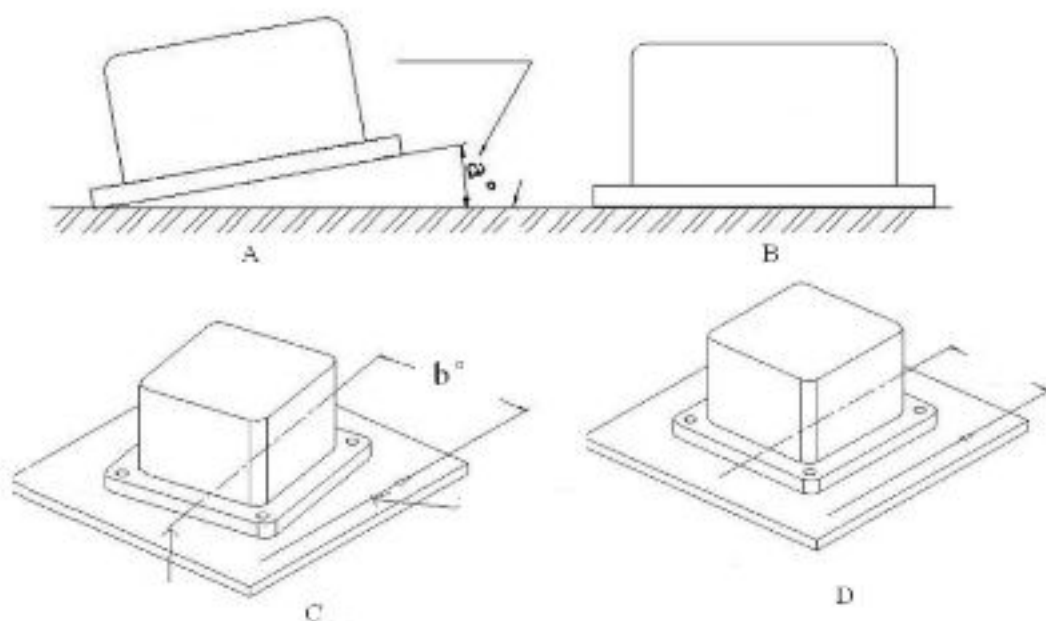
Pin 4——— 485B (Yellow wire)

### Attentions in mounting

Incorrect mounting way will cause large angle error. Please make sure correct mounting way of two surfaces and two lines.

(1) Two surfaces means mounted surface of inclinometer should completely close to mounted surface of measured object (mounted surface of measured object should be horizontal), included angle is not allowed. Correct mounting way is as diagram B.

(2) Two lines means axis of inclinometer horizontal to axis of measured surface, no included angle between this two axis. Correcting mounting way is as diagram D.



#### Ordering information:

Connect way: Connector Product number: DPF290M-LBS-1( default 1m wire)

Connect way: Fasten head Product number: DPF290M-LBS-2(default 1 m wire)

**Specifications subject to change without notice!**



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