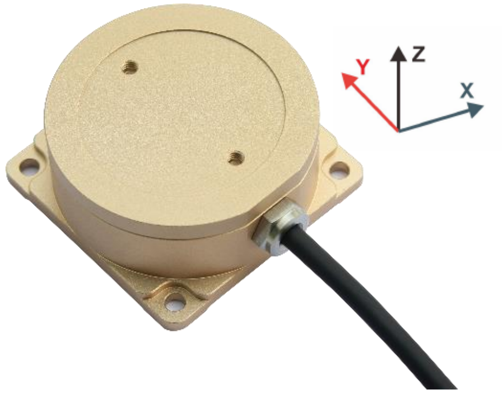
Caractéristiques

- Gyromètre dynamique – fournit l'azimuth, roulis, tangage + 3 accélérations et 3 vitesses angulaires
- Contient un accéléro triaxe + gyro triaxe pour le calcul des angles.
- Etendue de mesure : +/- 180°
- Signal de sortie : CAN 2.0A ou B
- Résolution : < 0.01°
- Précision : < 2 mm/m
- Bande passante : 0-100Hz
- Echantillonnage : 5, 15 25 ou 50Hz
- Alimentation : 9-36 VDC



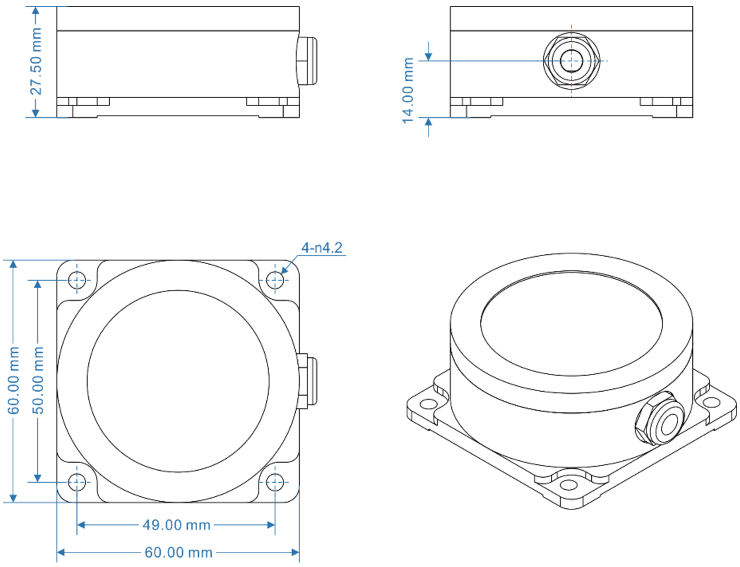
Spécifications

	PARAMETERS
Etendue de mesure	Azimuth Angle (±180°)
Bande passante	>100Hz
Résolution	0.01°
Dérive angle axe Z	<0.1°/min
Précision position	<2mm/m (dérivé de la dérive de l'angle)
Non linéarité	0.1% de la pleine échelle
Vitesse angulaire max	150°/s
Etendue accélérométrie	±4g
Résolution accéléromètre	1 mg
Précision accéléromètre	5mg
Démarrage	5s
Tension d'alimentation	+9V~36V
Courant	60mA(12V)
Temp. De fonctionnement.	-40 ~ +85℃
Temp. De stockage.	-40 ~ +85℃
Vibration	5g~10g
chocs	200g pk,2ms,½sine
Durée de vie	10 years
Echantillonnage	5Hz、15Hz、25Hz、50Hz can set
Signal de sortie	CAN2.0A OR CAN2.0B
MTBF	≥50000 hours /times
Impédance	≥100 Megohm
Tenue aux chocs	100g@11ms、3Times/Axis(half sinusoid)
Tenue vibratoire	10grms、10～1000Hz
Classe IP	IP67
Poids	110g (matched standard cable)

Applications

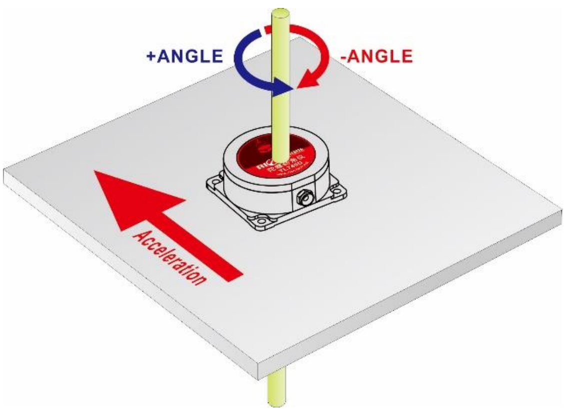
- Robotique
- Mise à niveau de plateformes
- Véhicule autonome

Dimensions



Dimesions : 60 x 60 x 27,5mm, Installation : 4 x M4

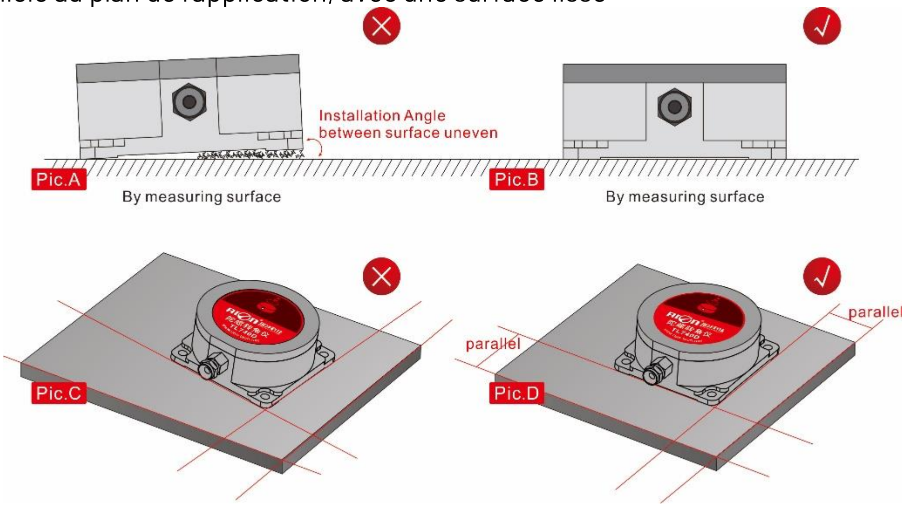
Installation



Recommandations :

1. Installation au centre de l'application, pour minimiser l'influence de l'accélération sur la mesure.

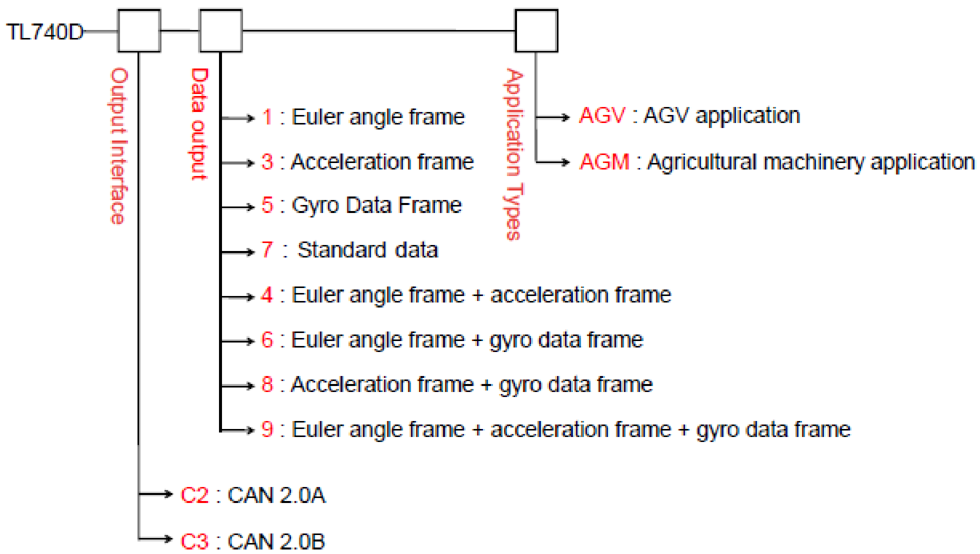
2. Installation parallèle au plan de l'application, avec une surface lisse



Connectique

LINE COLOR FUNCTIONS	BLACK	WHITE	GREEN	RED
	GND Power Negative	CAN_L	CAN_H	Vcc 9～36V Power Positive

Codification article



E.g :TL740D-C2-1-AGV : CAN2.0A Output Interface/Euler angle frame data output/AGV application.

Exemple :TL740D-C2-1-AGV : CAN2.0A Output Interface/Standard format 1 output – Application : AGV.

Protocole

CAN2.0 protocol supports 2.0 A (11 bit ID) or 2.0 B (29 bit ID). default to CAN2.0A PROTOCOL.

Communication Protocol:

1) Modify node number (node range :0x01 - 0x7F), default node number is 0x05 .

Request message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x600+0x05	0x40	0x10	0x10	0x00	Node_ID	0x00	0x00	0x00

Response message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+0x05	0x40	0x10	0x10	0x00	Node_ID	0x00	0x00	0x00

Note : if controller send CAN-ID=0x600+0x05, send data ： 40 10 10 00 10 00 00 00

Sensor return CAN-ID=0x580+0x05, Return data ： 40 10 10 00 10 00 00 00. Re-power then received frame ID 0 x590(0x580+0x10), Indicates that the frame ID modified successfully.

2) CAN baud rate set (Default baud rate:125Kbps).

Request message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x600+0x05	0x40	0x20	0x10	0x00	Baud	0x00	0x00	0x00

Response message format ：

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+0x05	0x40	0x20	0x10	0x00	Baud	0x00	0x00	0x00

Note ： 5th byte (Baud). Possible values : 0x00, 0x01, 0x02, 0x03 or 0x04 :

- 0x00 means baud rate set to 1M bps
- 0x01 means baud rate set to 500K bps
- 0x02 means baud rate set to 250K bps
- 0x03 means baud rate set to 125K bps
- 0x04 means baud rate set to 100K bps.

Default baud rate 125K bps, After sending this command and receiving the returned data, The sensor needs to be re-powered for the baud rate modification to succeed.

3) Set automatic output cycle time (factory default output cycle 10 ms).

Request message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x600+0x05	0x22	0x00	0x22	0x00	T_L	T_H	0x00	0x00

Response message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+0x05	0x22	0x00	0x22	0x00	T_L	T_H	0x00	0x00

The fifth and sixth bytes represent time. The fifth byte is low byte, 6th byte is High byte. Time range 10ms~1000ms. For example :

- 50ms TIME_L=0x32, TIME_H=0x00
- 100ms TIME_L=0x64, TIME_H=0x00,
- 1000ms TIME_L=0xE8, TIME_H=0x03,

factory default value : 100ms(10Hz).

4) Azimuth clear zero

Request message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x600+0x05	0x40	0x10	0x10	0x00	0x10	0x10	0x10	0x10

Response message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+0x05	0x40	0x10	0x10	0x00	0x10	0x10	0x10	0x10

Clear the current heading angle to zero.

5) Set output frame type (factory default: angle frame + acceleration frame + gyroscope angle rate frame)

The output data frame includes: angle frame, acceleration frame, gyro angular rate frame and standard frame. Turn on the corresponding frame output, the sensor will output these frames according to the set period.

For example, if the output period is 100mS, the angle frame+acceleration frame+gyro angular rate frame is turned on, then the continuous output angle frame+acceleration frame+gyro angular rate frame every 100mS (There will be a small time interval between the angle frame, acceleration frame, and gyro angular rate frame).

Request message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x600+0x05	0x40	0x30	0x10	0x00	MASK	0x00	0x00	0x00

Response message format :

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+0x05	0x40	0x30	0x10	0x00	MASK	0x00	0x00	0x00

The lower 4 bits of the fifth byte Mask are valid. Mask (binary: 0B0000dcba).

- a: Represents the **angle** frame (roll angle, pitch angle, azimuth angle). 1: turn on the output, 0: turn off the output.
- b: Represents the **acceleration** frame (three-axis acceleration), 1: turn on the output, 0: turn off the output.

- c: Represents the **gyro angular velocity** frame (three-axis angular velocity), 1: turn on the output, 0: turn off the output.
- d: Represents the **standard** frame (Z-axis angular rate, forward acceleration, azimuth), 1: turn on the output, 0: turn off the output.

Examples :

- The host sends: 40 30 10 00 07 00 00 00, will turn on the angle frame, acceleration frame and gyro angular velocity frame output, turn off the standard frame output.
- The host sends: 40 30 10 00 05 00 00 00, the output of angle frame and gyro angular velocity frame will be turned on, and the output of acceleration frame and standard frame will be turned off.

6) Data parsing

①Data frame types are divided into four types: angle frame, acceleration frame, gyroscope frame, standard frame.

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	Data0	Data1	Data2	Data3	Data4	Data5	Data6	flag

- Data0-Data6: Represents the data. According to the flag, the data is determined to be angle, acceleration, or gyro frame.
- flag (ddddccaa): unsigned single byte, 8bit indicates the data frame type and installation measurement method:
  - aa: indicates the data type of the frame
    - 00: Represents the angle frame (roll angle ±180°, pitch ±90°, azimuth ±180°);
    - 01: Indicates acceleration (±32.765g);
    - 10: Represents the gyroscope (±327.65°/S);
    - 11: Represents the standard frame (Z-axis angular rate + Y-axis forward acceleration + Z-axis azimuth);
  - cc: reserved.
  - dddd: reserved.

The following is the analysis of different data types of horizontal measurement methods:

A : Angle data frame

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x00

There are eight bytes of data after CAN-ID :

- the first two bytes are XL, XH is the inclination of X axis (ROLL angle)
- the third and fourth bytes are YL, YH is Y axis (PITCH pitch angle) Inclination
- the 5th and 6th bytes ZL, ZH is the inclination of the Z axis (YAW azimuth)

The angle value type is int16_t, the low byte is first, the high byte is after, and finally divided by 100 to get the angle floating point number. The seventh byte is the temperature value, which is a signed single-byte integer.

Angle conversion. Example : 26 15 DA EA 28 23 19 00

- Flag = 0x00, indicating that the data is an angle.

- The angle data of the X-axis roll angle is represented by a 16-bit signed binary number, the upper 8 bits are XH, and the lower 8 bits are XL. The 16-bit signed hexadecimal number shall be converted to a decimal number, then divided by 100, to obtain the angle.
    - XL=0x26, XH=0x15 → Word: 0x1526 in hexadecimal → 5414 in decimal → the angle is 54.14°
    - YL=0xDA, YH=0xEA → Word : 0xEADA in binary → -5414 in decimal → -54.14°
    - ZL=0x28, ZH=0x23 → Word : 0x2328(9000) → Angle : 90.00°
    - Temp : 0x19(25) = 25 Celsius

B : Acceleration Data Frame

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	0x00	0x01

There are eight bytes of data after CAN-ID :

- the first two bytes are XL, XH is the acceleration of the X axis,
- the third and fourth bytes are YL, YH is the acceleration of the Y axis,
- the fifth and sixth bytes are ZL, ZH are Z-axis acceleration;

acceleration is int16_t, low byte first, high byte last, and finally divided by 1000 to get acceleration floating point number. The seventh byte is reserved.

Examples of acceleration conversion: 26 15 DA EA 28 23 00 01

- Flag= 0x01, indicating that the data is acceleration.
- XL=0x26, XH=0x15, the acceleration is 5.414g
- YH = EA, YL = 0xDA, Acceleration Y =-5.414g
- ZH = 0x23, ZL = 0x28, Acceleration Z = 9.000g

C : Gyro Data Frame

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	0x00	0x02

There are eight bytes of data after CAN-ID :

- the first two bytes are XL, XH is the X-axis gyro value,
- the third and fourth bytes are YL, YH is the Y-axis gyro value,
- the fifth and sixth bytes are ZL, ZH are the Z-axis gyro value;

gyro data is int16_t, low byte first, high byte last, and finally divided by 100 to get gyro data floating point number. The seventh byte is reserved.

Examples of gyro data conversion: 26 15 DA EA 28 23 00 01

- Flag= 0x02, indicating that the data is gyro.
- XL=0x26, XH=0x15, the X-axis gyro is 54.14°/S
- YH = EA, YL = 0xDA, the Y-axis gyro =-54.14°/S
- ZH = 0x23, ZL = 0x28, the Z-axis gyro = 90.00°/S

the gyro value is int16_t, the low byte is first, the high byte is after, and finally divided by 100 to get the gyro floating point number. The seventh byte is reserved.

D : Standard data frames

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	ZrateL	ZrateH	YaccL	YaccH	ZangL	ZangH	0x00	0x03

There are eight bytes of data after CAN-ID :

- the first two bytes are ZrateL, ZrateH is the Z-axis gyro angular rate value,
- the third and fourth bytes are YaccL, YaccH is the Y-axis acceleration,
- the fifth and sixth bytes are ZangL, ZangH is the Z-axis azimuth value;

all data items are int16_t, the low byte first, high byte last, Zrate and Zang are divided by 100 to get the Z-axis gyro angular rate and Z-axis azimuth. Yacc divided by 1000 to get the Y-axis body acceleration, the seventh byte is reserved byte 0x00, and the eighth byte is 0x03.

Examples of standard frame conversion: 26 15 DA EA 28 23 00 03

- Flag= 0x03, indicating that the gyro angular rate frame.
- XL=0x26, XH=0x15, the gyro value is 54.14°/S
- YH = EA, YL = 0xDA, the acceleration =-5.414 g
- ZH = 0x23, ZL = 0x28, the azimuth = 90.00°

② Periodic output of data frame: 4 kinds of data frames can be output in any combination. AGV generally chooses standard data frame output. For attitude control, you can choose angle frame output, or choose angle frame, acceleration frame and gyro angular rate output.

A. Single frame of angle output (output one frame of angle frame in cycles, the default output mode), the message format is as follows:

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x00

B. Dual-frame angular acceleration output (double-frame, double-frame output in cycles), the message format is as follows:

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x00

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	0x00	0x01

C. Three-frame angular gyro acceleration output (three frames, three consecutive output frames according to the cycle), the message format is as follows:

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x00

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x01

CAN-ID	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
0x580+Node_ID	XL	XH	YL	YH	ZL	ZH	Temp	0x02