

Dynamic Torque Sensor User Manual



Introduction to explain

The DYN-T40 torque sensor is a torque sensor that dynamically measures the torque and rotation speed. Can collect torque speed and speed signal with high speed and high precision, support various output modes. It has a smaller axial size in dynamic torque and a measuring shaft that can be removed, suitable for a variety of installation environments. The greatly simplified installation steps, also make the sensor has a certain anti-non-coaxial characteristics. The sensor torque sampling and signal output rate of more than 3000Hz, can be suitable for high-speed torque collection occasions. Its torque signal can output + -10V voltage signal and 4-20MA current signal, and the speed signal is 0-10V and 4-20MA. Also supports the output torque and speed signal through the RS485. The rotational speed signal can also support the differential ABZ signal output. Other output types will be continuously updated later.

Characteristic

- ❖ Power supply voltage: DC 12~28V
- ❖ Maximum power consumption: 7.3W
- ❖ Torque sampling speed: 3,200 Hz
- ❖ Torque sampling AD number: 24bit
- ❖ Analog output DA number: 14bit
- ❖ Allowable speed: 0 ~ 12000 RPM
- ❖ Rotate single coil pulse: 120Hz or 240Hz
- ❖ Torque Output Type: + -10V 4-12MA RS485
- ❖ Speed output type: 0-10V 4-20MA RS485, single frequency signal ABZ
- ❖ Comprehensive accuracy of torque: 0.1-0.05%
- ❖ Communication protocol: modbus RTU HEX Proactive send
- ❖ Photoelectric indicator: Double RGY indicator lamp

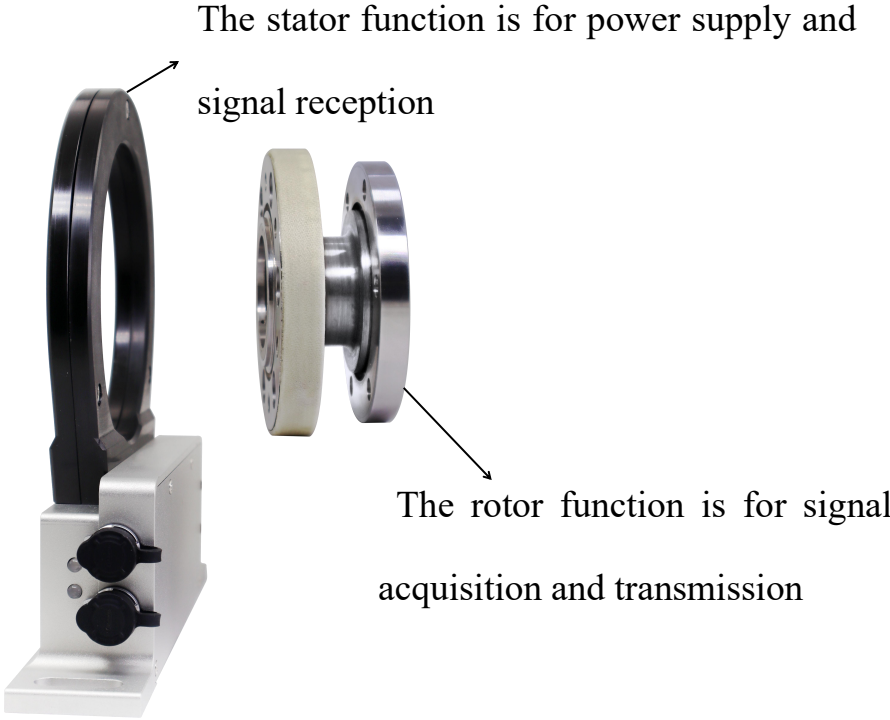
Apply

- ❖ New energy motor test system
- ❖ Generator test system
- ❖ Automated torque collection test
- ❖ Gearbox test platform
- ❖ Torque-destructive testing
- ❖ Analysis of force value process

Pay attention to

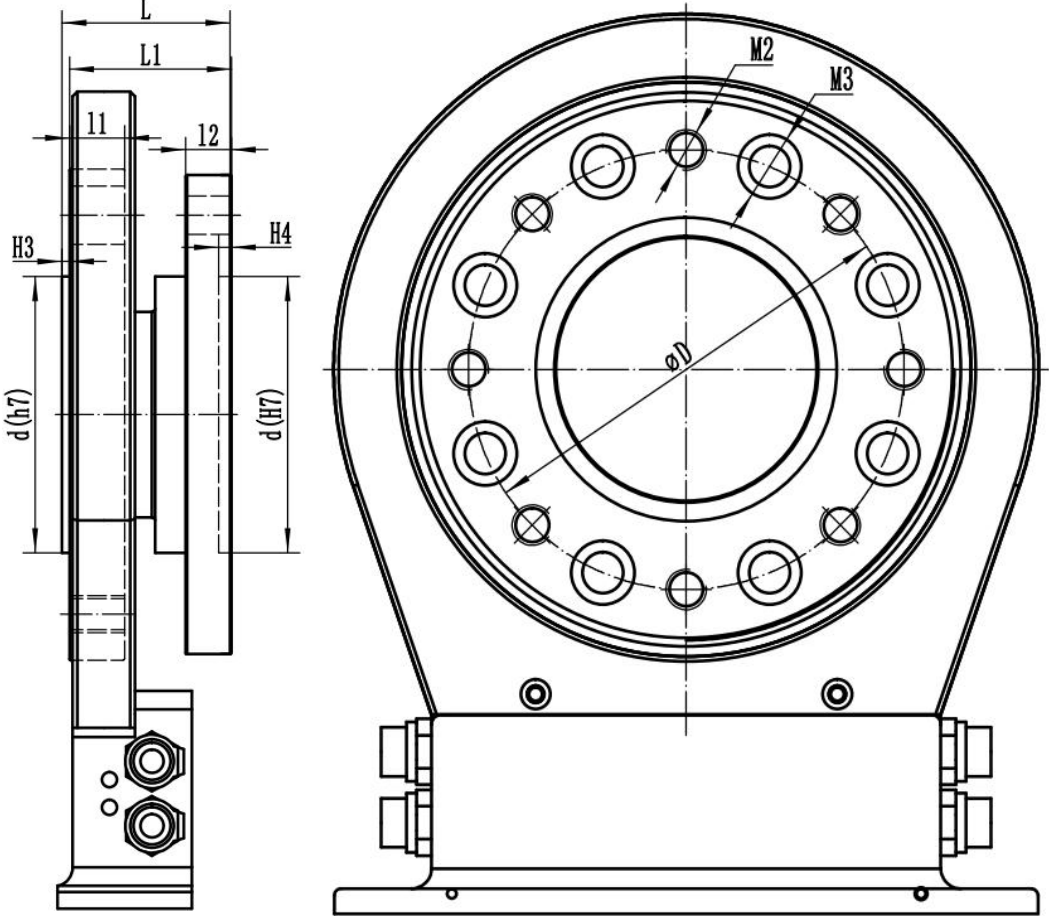
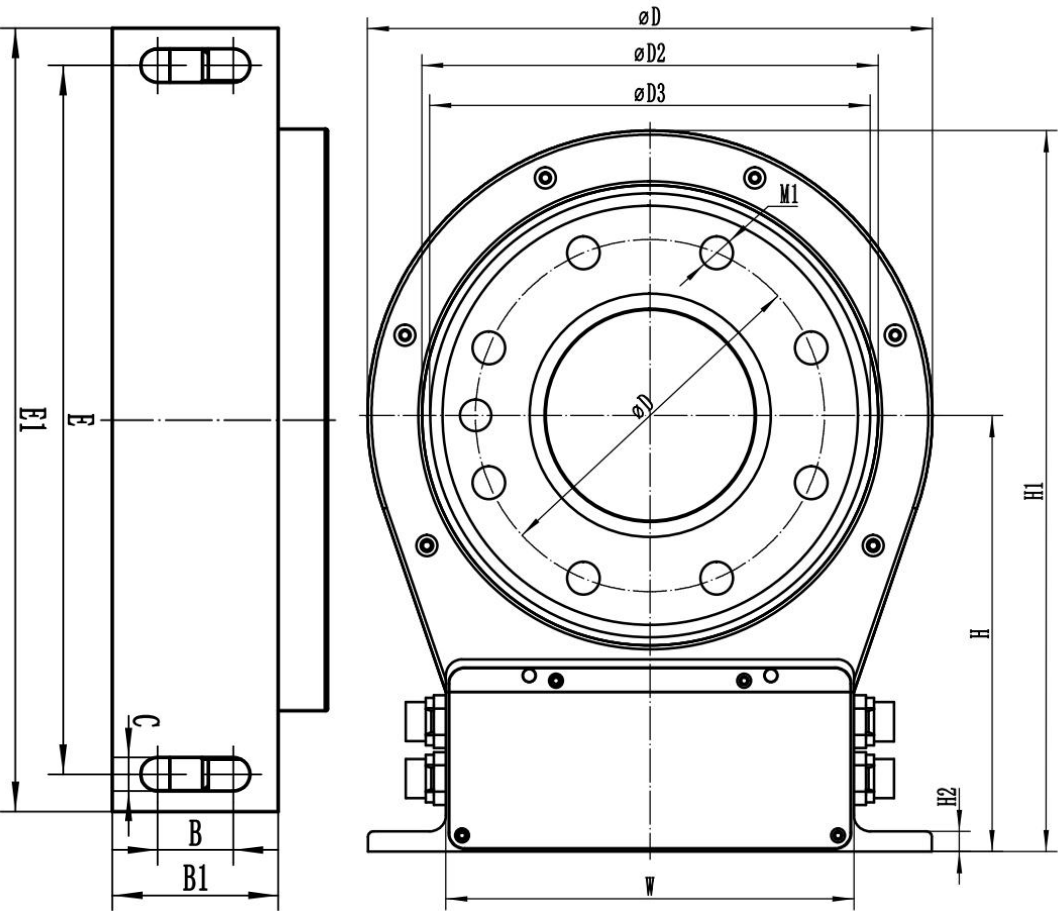
- ❖ Do not use them on atomic energy devices and medical devices related medical devices.
- ❖ All input and output signal lines of this product, to prevent surge, please set the appropriate surge suppression circuit.
- ❖ In order to prevent instrument damage and machine failure, install safety circuit breaker devices on the power line or input / output line with high current capacity.
- ❖ Please do not mix metal sheet or wire debris into this product, otherwise it may cause electric shock, fire or failure.
- ❖ Be sure to clean after cutting off.
- ❖ When cleaning, please wipe off the dirt of the product with a dry soft cloth. Please do not use a moisture absorption agent. Otherwise, it may lead to deformation and discoloration.
- ❖ Please do not use hard objects or tap the display.
- ❖ The installation, commissioning and maintenance of this product shall be carried out by the qualified engineering and technical personnel.

Structural introduction



Before installation, tighten the rotor in the measured shaft with a screw, then insert the stator into the rotor, and then adjust the stator distance to ensure that the rotor has no contact with the stator in the static or rotating state. In the absence of a rotational speed module, the axial distance between the stator and the rotor is within 3mm of the allowable deviation.

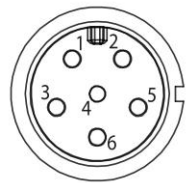
Product size



specifications	ΦD	$\Phi D1$	$\Phi D2$	$\Phi D3$	H	H1	H2	H3	H4	d	L	L1	L2	L3	M1	M2	M3	E	E1	B	B1	C	W
50、100、200	$\Phi 84$	$\Phi 154.4$	$\Phi 114$	$\Phi 104$	133	210.2	7.5	2	4.2	$\Phi 57$	47	45	14	10.5	6- $\Phi 8.2$	6- $\Phi 14$	6-M8	190	210	20	44	9	152
500、1000	$\Phi 101.5$	$\Phi 176.4$	$\Phi 136$	$\Phi 130$	144	232.2	7.5	3	4.2	$\Phi 75$	51	49	17	12	8- $\Phi 10.5$	8- $\Phi 17$	8-M10	190	210	20	44	9	152
2000、3000	$\Phi 130$	$\Phi 210.4$	$\Phi 170$	$\Phi 164$	161	266.2	7.5	2.5	4.2	$\Phi 90$	55	53	18	15	8- $\Phi 12.5$	8- $\Phi 19$	8-M12	190	210	20	44	9	152
5000	$\Phi 155.5$	$\Phi 239.4$	$\Phi 199$	$\Phi 193$	175.5	295.2	7.5	2.8	4.2	$\Phi 110$	65.8	63	20	22	8- $\Phi 14.5$	8- $\Phi 22$	8-M14	190	210	20	44	9	152
10000	$\Phi 196$	$\Phi 286.4$	$\Phi 246$	$\Phi 240$	199	342.2	7.5	3.5	4.2	$\Phi 140$	79	75.5	22	24	8- $\Phi 17$	8- $\Phi 26$	8-M16	190	210	20	44	9	152

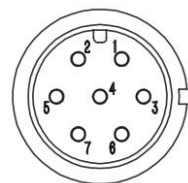
Air and plug wiring definition and functions

A logo navigation plug



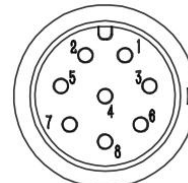
Airplug number label	Definition	Function	Remarks
1	The DC24V positive pole	Sensor overall power supply line	/
2	Power base point	Sensor overall power supply line	/
3	RS485-A	The RS485 signal line	/
4	RS485-B	The RS485 signal line	/
5	Zero signal line	Torque zero clearance signal line	The 24V power supply can provide a torque clearance operation
6	shield line	landing	/

C No. Airline



Airplug number label	Definition	Function	Remarks
1	R_OUT_V	Speed and voltage signal output	/
2	R_OUT_I	Speed and current signal output	/
3	N_OUT_V	Torque-voltage signal output	/
4	shield line	landing	/
5	N_OUT_I	Torque-current signal output	/
6	OUT_GND	Analog quantity output reference point	/
7	OUT_GND	Analog quantity output reference point	/

D logo navigation plug



Airplug number label	Definition	Function	Remarks
1	A+	Speed frequency output	At 128Hz or 1028Hz
2	A-	/	/
3	B+	/	/
4	B-	/	/
5	Z+	/	/
6	Z-	/	/

7	RPM_GND	Speed frequency output reference	/
8	shield line	landing	/

B logo navigation plug



Airplug number label	Definition	Function	Remarks
Follow-up updates are used	/	/	/

Electrical performance and basic parameters

Absolute maximum rating value

Name	Least value	Crest value	Unit
supply voltage	9	32	V
Use ambient temperature	-30	75	degree Celsius
Use ambient humidity	5	90	%
Application frequency	/	18000	RPM
Use torque	/	The 300% maximum range	/

Pressure listed above the absolute maximum rating may cause permanent damage to the sensor. These are only pressure ratings, and being ratings for a long time may affect sensor reliability.

It is recommended to run conditions

Name	Least value	Recommended value	Crest value	Unit
supply voltage	12	24	28	V
Use ambient temperature	-20	/	65	degree Celsius
Use ambient humidity	10	/	85	%
application frequency	/	12000	12000	RPM
Use torque	/	/	200% maximum range	/

Analog volume output electrical performance

Test conditions: power supply voltage 24V, voltage output external impedance 1 MΩ, voltage output type + -10V, wire length 25cm.

Parameter	Least value	Representative value	Crest value	Unit
Torque-voltage output ripple peak-peak	6	12	25	mV
Speed and voltage output ripple peak-peak	6	12	25	mV
Torque output response delay	/	0.89	1.8	ms
Analog volume output bandwidth	3.8	4	/	kHz

The EMC test performance

Test equipment: EFT S4 Pulse group generator ESD 20K electrostatic discharge generator Ambient temperature: 25 degrees Celsius



Name	Grade	Test frequency	Unit
Pulse group test	4	500kHz	KV
Electrostatic contact discharge test	8	1S	KV

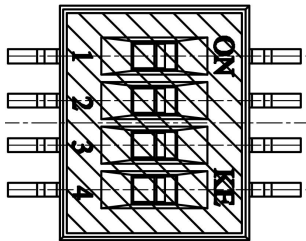
Indicator lamp status

After the rotor is installed, adjust the axial distance between the stator housing and the rotor according to the following instructions. Number 2 shows red: the rotor is too far from the stator shell, or the stator is damaged. No.2 bead display yellow: some deviation between the rotor and the stator shell, and loss of power supply and signal transmission. Pearl 2 is green: the axial distance between the rotor and the stator shell is appropriate, and the power supply and signal are normal.

Dial switch description

The sensor has a four-digit dial switch in the housing so that the customer needs to modify the parameters or output mode without the permission of the technicians.

Schematic diagram of the dial-code switch



No.1 dial code switch: initialize the use of the data of our company. Do not dial it in any state, otherwise it will cause data loss. No.2 code switch: When the data in the sensor is mistakenly modified and there is no communication modification parameter in the field, the code switch can be dialed to the right after the sensor is powered off. Then power up the sensor and wait for 5 seconds and call back to the left. Then the parameters of this sensor are restored to the factory set value. 3 dial code switch: When the communication mode is required to switch and the RS485 communication protocol, dialing the dial code switch to the right means that the communication protocol is actively uploaded by HEX. When the dial switch is dialed to the left, the communication protocol is the modbus RTU protocol. No.4 dial switch: If the need to modify the transmission output mode and switch the transmission output to the unsigned output, the dial switch can be moved to the right (the unsigned output is only valid for the current output). If you need to change a signed output, dial the dial switch to the left.

Torque zero

In the normal use environment, due to the temperature increase or long-term use, the torque zero can be cleared by the following method, and the zero data will be saved for power off.

1. Communication zero clearance: see the communication section
2. External zero clearance: the current torque data can be cleared by connecting the reset signal line with the sensor 24V power supply line for more than 0.2 seconds. In general, it is recommended to connect the signal line to the 24V power line button.

The RS485 communication instructions

The sensor is standard with RS485 communication, which can be used to modify the internal parameters of the sensor, or with the company's upper computer software. The protocol used by RS485 is the modbus RTU or the HEX proactive delivery protocol defined by the Company.

Modbus RTU Agreement description

This sensor supports the 03H, 05H and 10H instructions of Modbus RTU, and all parameters can be modified through modbus RTU.

Parameter list

The parameter name	Span	Default value	Mailing address	Support instructions	Explain
Torque filter	1~99	20	0X04	03,10H	Torque data filtering strength.
Speed filter	1~99	20	0X06	03,10H	Speed data filter intensity.
Torque coefficient	1~99999	/	0X08	03,10H	The fication factor of torque sampling AD.
Speed decimal place	0~4	/	0X0A	03,10H	The actual decimal place of the rotational speed.
Torque decimal place	0~4	/	0X0C	03,10H	Actual decimal places of the torque.
Torque direction	0~1	0	0X0E	03,10H	Torque rotation direction modification, 1 indicates the reverse torque change.
Power zero	0~1	0	0X10	03,10H	The torque signal is power up and then cleared zero once.
RPM pulse number	1~2000	/	0X12	03,10H	The number of actual pulses of the rotor rotation.
Torque range	1~99999	/	0X14	03,10H	The decimal range of torque is the same as the torque data.
Speed range	1~99999	/	0X16	03,10H	Actual rotational speed measuring range. The decimal point is the same as the rotational speed data.
Torque transfer zero point	0~16383	/	0X1A	03,10H	Torque transformer output zero.
Torque is full	0~16383	/	0X1C	03,10H	Torque changes the maximum output.
Speed to zero	0~16383	/	0X1E	03,10H	Speed transmission and output zero.
The speed changes to full	0~16383	/	0X20	03,10H	Torque changes the maximum output.
Mailing address	1~128	1	0X22	03,10H	The slave address of the protocol.
Traffic rate	0~4	3	0X24	03,10H	Communication wave rate: 0 indicates the shutdown of the communication.1 representation 9600. 2 representation 19200. 3 representation 38400. 4 representation 115200.
Communication stop	0~1	1	0X26	03,10H	Communication stop.0 indicates a stop of 2.1 indicates a stop bit of 1.
High and low in the front	0~1	0	0X28	03,10H	High and low bit exchange of the returned data.0 means that the high level is ahead.1 means that the low level is ahead.
Real-time torque	/	/	0X00	03H	Current torque value. The highest bit of 1 indicates a negative number, and the data can be reversed and then add 1 into the absolute value. The read data should be the accurate torque data after adding the torque decimal point.

Real-time speed	/	/	0X02	03H	Real-time rotational speed data. The read data needs to be added to the decimal point of the rotation speed.
Torque zero	/	/	0X51	05,10H	Conduct the torque zero clearance operation. Under 10H instruction, write data greater than 0.
Restore factory	/	/	0X55	05,10H	Conduct all data recovery operations. Under 10H instruction, write data greater than 0.
Transform commissioning mode	0~2	0	0x60	03,10H	Set the commissioning mode, adjust the transmission output mode, set 1 means constant output torque and speed zero, and 2 means constant output torque and speed full. This parameter is not saved.
Calibration Point (1)	20~999999	999999		03,10H	Display value of 1 at calibration
Correction factor (1)	1~50000	10000		03,10H	Correction factor 1= (actual value 1 / displayed value 1) * 10000
Calibration Point (2)	20~999999	999999		03,10H	Display value of 2 at calibration
Correction factor (2)	1~50000	10000		03,10H	Correction factor 2= (actual value 2 / displayed value 2) * 10000
Calibration Point (3)	20~999999	999999		03,10H	Display value 3 at calibration 3
Correction factor (3)	1~50000	10000		03,10H	Correction factor 3= (actual value 3 / displayed value 3) * 10000
Calibration Point (4)	20~999999	999999		03,10H	Display value 4 at calibration
Correction factor (4)	1~50000	10000		03,10H	Correction factor 4= (actual value 4 / displayed value 4) * 10000
Calibration Point (5)	20~999999	999999		03,10H	Display value of 5 at calibration
Correction factor (5)	1~50000	10000		03,10H	Correction factor 5= (Actual 5 / Display 5) * 10000
Calibration Point (6)	20~999999	999999		03,10H	Display value at calibration 6
Correction factor (6)	1~50000	10000		03,10H	Correction factor 6= (Actual 6 / Display 6) * 10000
Calibration Point (7)	20~999999	999999		03,10H	Display value at calibration 7
Correction factor (7)	1~50000	10000		03,10H	Correction factor 7= (Actual 7 / Display 7) * 10000
Calibration Point (8)	20~999999	999999		03,10H	Display values at calibration of 8
Correction factor (8)	1~50000	10000		03,10H	Correction factor 8= (actual value 8 / displayed value 8) * 10000
Calibration Point (9)	20~999999	999999		03,10H	Display values at calibration of 9

Correction factor (9)	1~50000	10000		03,10H	Correction factor 9= (actual 9 / displayed 9) * 10000
Calibration point (10)	20~999999	999999		03,10H	Display value of 10 at calibration
Correction factor (10)	1~50000	10000		03,10H	Correction factor 10= (actual value 10 / displayed value 10) * 10000

Modbus RTU Protocol communication instance (communication supports N81 or N82 format)

0X03 instruction (read the current torque value)

Send: 01 03 00 00 00 02 C4 0B (read current torque value)

Return: 01 03 04 00 00 00 12 7A 3E (current torque 00 00 00 12, converted to 10 to 18)

Send out: 01 03 00 0C 00 02 04 08 (read the current torque decimal point)

Return: 01 03 04 00 00 00 02 7B F2 (current torque decimal point 00 00 00 02, converted to 10 to 2)

The above communication indicates the current torque of 0.18 NM.

0X10 command (torque clearance)

Send: 01 10 00 51 00 02 04 00 00 00 01 F 6 9F (perform one torque reset)

Return: 01 10 00 51 00 02 10 19 (write successfully, reset operation)

HEX actively sends protocol instructions

Before using HEX active sending protocol, it is necessary to make clear that HEX protocol is a single protocol, and the data can only flow to the upper machine or PLC through the instrument. If you need to modify the internal parameters of the sensor, you can contact our technical personnel for guidance to modify the modbus RTU protocol. The HEX protocol is the fixed wave rate, the fixed wave rate is 460800, the data format is N81 or N82, according to the actual value of the parameter "stop bit".

Communication instances

00 01 F2 00 0F 30 0A 87

The above is a string of data sent by the sensor. The first three bytes of the data are torque data, the fourth to sixth bytes are speed data, and the last two data are the first six bytes of CRC 16 calibration data.

The above data string indicates that the torque data is 0X0001F2, and the speed data is 0X000F30. After conversion to decimal, the torque data is 498, and the speed data is 3888. According to the sensor name plate, the torque decimal point is 2, and the speed decimal point is 1, the real torque data is 4.98 NM, and the speed is 388.8RPM.

It should be noted that the data has no frame head and frame tail, and you need to pass the recursive-check-recursion-check.... When the CRC 16 check of the current six bytes of data is the same as the last two check bytes, the data is correct. Subsequently, the data can be collected in 8 bytes for verification, because the data string length and transmission time are fixed values.

Analog of the quantity output description

This sensor supports the torque and speed analog output, and the torque transmission output is 4-12-20MA or-10~0~10V. You can also choose 4-20MA in absolute torque output. The rotational speed output supports 4-20MA or 0-10V. (The following parameters illustrate the torque analog output.)

Torque transmission zero: the change of transmission zero will lead to the change of zero output voltage and zero

output current. For example, when the torque is 0 NM, change the torque transmission "zero" parameter, then the torque analog output is not 0V or 12MA. It has been adjusted to the appropriate value before delivery. Please do not modify this parameter arbitrarily.

Torque capacity: "torque capacity" is the output DA value of the torque when the torque reaches the maximum range. The purpose of this parameter is to eliminate the error caused by the analog hardware circuit. The sensor has been adjusted to the appropriate value before delivery. Please do not modify this parameter arbitrarily.

Torque range: the default is the current sensor range, and modifying the transmission range can change the change rate of the transmission output. Take the 50 NM sensor as an example, when the transmission range is adjusted to 10 NM, when the sensor applies more than 10 NM torque, the output voltage is full output, but the excess range is not recommended.