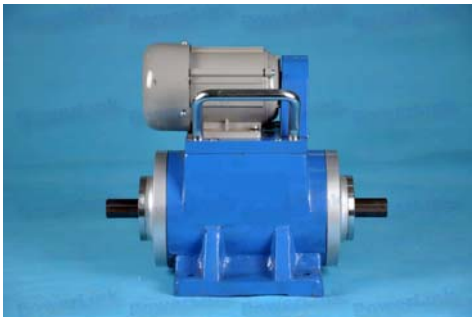
Torque Transducer



1. Description

POWERLINK NTI-JC/ JCG series Dynamometer Torque Sensor works with NTI-JW-3 Torque Meter for precise measurement of various power machineries' rotational torque, speed and mechanical power. The usage range can be very wide including motors, blowers, pumps, gears, gearboxes, railway locomotives, cars, tractors, aircraft, ships, mining machinery and hydraulic pneumatic components. Almost all machinery manufacturing sectors and research institutes, universities need this rotary power measurement.

2. Dynamometer Torque Sensor Basic Principle

Through the flexible shaft of Dynamometer Torque Sensor and two groups of magnetoelectric signal generator, the measured torque and speed are converted as two groups of alternative current signals with phase difference. These 2 groups AC signals have the same frequency and are proportional to the axial speed while the changing part of phase difference is proportional to the measured torque.

Two signal gears are mounted on the ends of the elastic shaft of Dynamometer Torque Sensor. The top of two gears equip with a set of signal coils. Within the signal coil, magnetic steel is equipped and grouped with signal gears to become magnetoelectric generator. When the signal gear rotates with elastic shaft, because the tooth top and tooth bottom of signal gear periodically sweep the bottom of magnetic steel, the periodic change of air gap permeance is generated. The magnetic flux of internal coil also generates periodic change and causes coil inducing approximate sinusoidal alternating current signals.

These two alternative current signal groups have the same frequency and are proportional to the shaft speed. Therefore Dynamometer Torque Sensor can be used for rotational speed measurement. There are relationship of torque amount and direction between the phase of these two AC signal groups and relative position of installed elastic shaft.

When the elastic shaft of Dynamometer Torque Sensor is against twisting, the phase difference between two alternating current signals only relate with the relative installed position of signal coil and gear. This phase difference generally is called “initial phase difference”. During design and fabrication, around half tooth pitch difference is made, i.e. the initial phase difference between two sets of alternating current signal is about 180 degrees.

When the elastic shaft of Dynamometer Torque Sensor is under torsion, torsional deformation is generated so that the phase difference between two sets of alternating current signal is changed. Within the elastic deformation range, the absolute value of phase difference is proportional to the torque.

These two sets of alternating current signal are inputted to JW-3 Torque Meter or JX3 Mechanical Efficiency Unit through the dedicated shielded cable to the computer. The exact value of torque, speed and power can be obtained.

3. Correct selection of VTS-JC/ JCG series Dynamometer Torque Sensor

VTS-JC/ JCG series Dynamometer Torque Sensor is mainly used to measure the speed and torque of various power machineries. For VTS-JC/ JCG series Dynamometer Torque Sensor selection, the maximum device torque and speed should be first determined. The maximum torque of the tested device is best to be 120% of the rated torque of Torque Transducer. The maximum speed should not exceed the rated speed of Torque Transducer.

After understanding the measured power and speed, the amount of measured torque can be calculated as follows:

Torque calculation：M =

M：Torque (Nm)

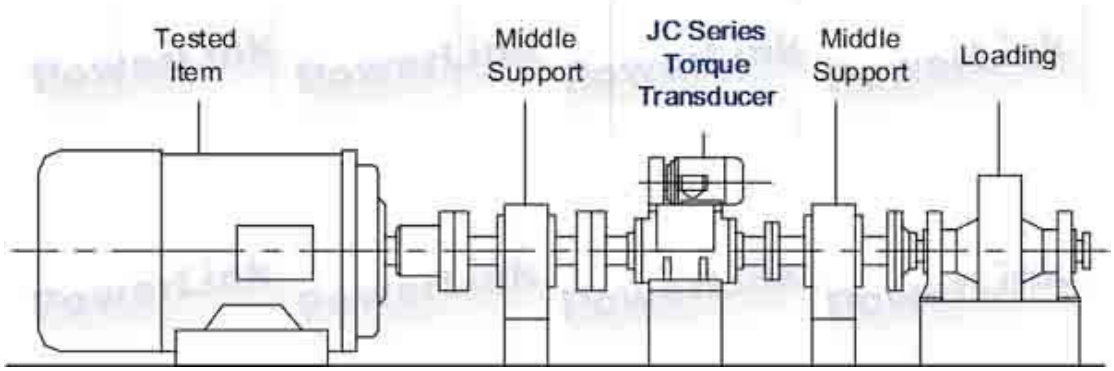
N：Speed (rpm)

P：Power (kW)

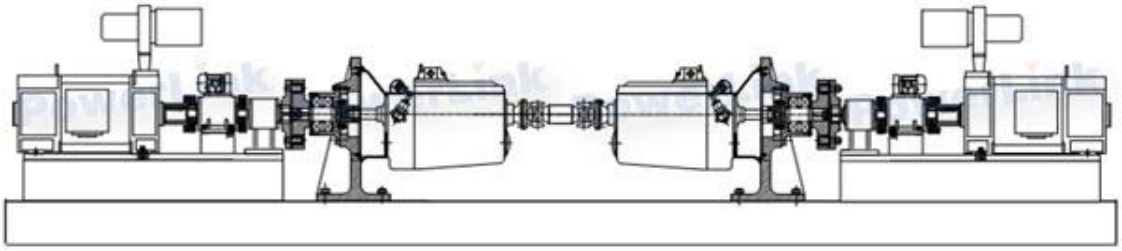
4. General Installation

The installation of VTS-JC/ JCG series Dynamometer Torque Sensor is shown as below. Please be noted that the drive end of Torque Transducer is connected with a prime mover. Existence of middle support can guarantee the Torque Transducer coaxality for the frequent replacement of the tested item without tested data variation. The middle support also helps to avoid the bending moment on Torque Transducer during installation of different axes for tested data instability.

4.1 TORQUE TRANSDUCER INSTALLATION



4.2 BACK-TO-BACK MECHANICAL EFFICIENCY MEASUREMENT



5. Technical Indicator

5.1 TORQUE MEASUREMENT ACCURACY

For Class 0.1 and Class 0.2

5.1.1 DYNAMOMETER TORQUE SENSOR STATIC CALIBRATION

Directly using counterweight for torque calibration, the measurement error should not be greater than rated value ±0.1% (Class 0.1), not be greater than rated value ±0.2% (Class 0.2).

5.1.2 ADDITIONAL ERROR FOR SPEED CHANGE

Changing in a predetermined speed range, the torque reading fluctuation should not be greater than the rated torque ±0.18% (National standard is ± 0.2%).

5.2 Dynamometer Torque Sensor Speed Measurement Accuracy

±1rpm ±1 digit

5.3 Dynamometer Torque Sensor Torque Measurement Overload Capacity

5.3.1 Overload is not greater than 120% of the rated torque. The accuracy of torque measurement can still be guaranteed.

5.3.2 For the instant impact load greater than 300% of the rated torque, after loading is disappeared, the torque zero reading variation is not more than ±0.1%.

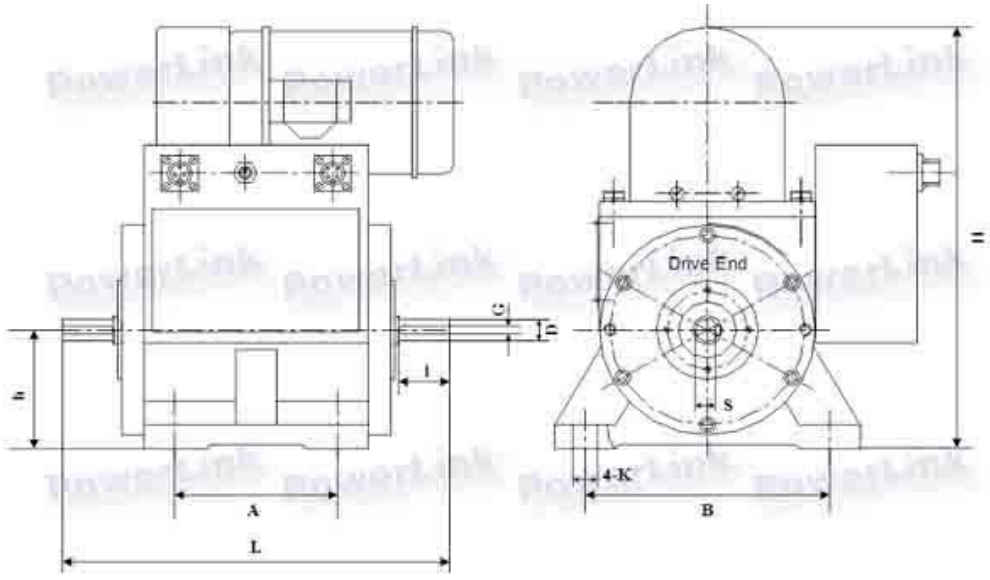
6. VTS-JC/ JCG series Torque Transducer specification

- Torque measurement accuracy：±0.1FS or ±0.2FS
- Speed measurement accuracy：±1rpm

#	Model	Rated Torque (Nm)	Standard max. speed (rpm)	Special order max. speed (rpm)
1.	VTS-JC0	0.2	4,000	-
		0.5		
		1		
		2		
		5	6,000	12,000 (NTI-JCG0)
		10		
		20		
2.	VTS-JC1A	50	6,000	-
		100		
		200		
3.	VTS-JC2C	500	4,000	20,000 (NTI-JCG2)
		1,000		
		2,000		
4.	VTS-JC3A	5,000	3,000	-
		10,000		
		20,000		
		30,000		
5.	VTS-JCG4	5,000	-	10,000
		6,000		

		8,000		
		10,000		
		12,000		
		15,000		
		16,000		
		18,000		
		20,000		
6.	VTS-JC4B	40,000	2,000	-
		50,000		
		60,000		
		80,000	1,500	-
		100,000		
		120,000		

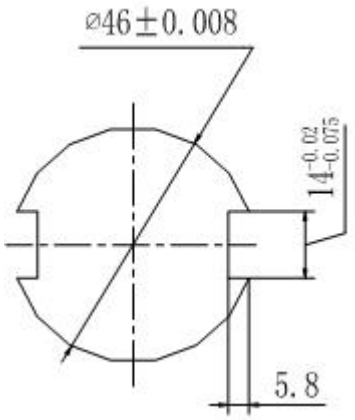
7. Overall and installation dimension



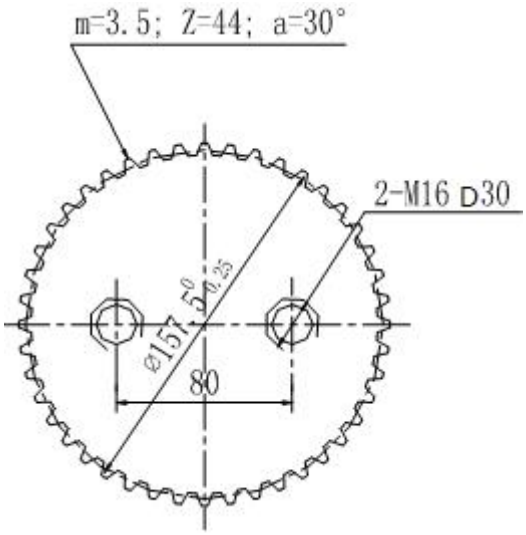
#	Model	Torque (Nm)	A	B	D	G	L	H	h	l	S	K
		0.2	80	120	8	3	174	222	60	17	6	12
		0.5										
		1										
		2										
		5			12	4					9.5	
		10					190			25		
		20										
2.	VTS-JC1A	50	140	180	26	8	360	293	85	55	21.5	14
		100										
		200					390					
3.	VTS-JC2C/JCG2	500	170	200	46	14	420	110	85	71	40.2	18
		1,000					490			106		
		2,000										
4.	VTS-JC3A	5,000	220	230	102		520	390	130	60		25
		10,000					580			90		
		20,000					660			130		
		30,000					760			180		
5.	VTS-JCG4	5,000	220	230	94.5		653	390	130	58		
		6,000										
		8,000										
		10,000										
		12,000										
		15,000					693			78		
		16,000										
		18,000										
		20,000										
		40,000					920			100		

8. Shaft end dimension

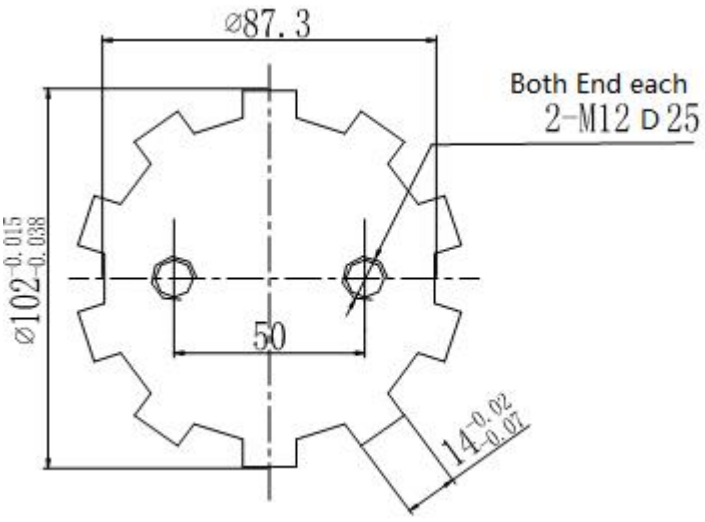
VTS-JC2C



VTS-JC4B



VTS-JC3A


⌀87.3
Both End each
2-M12 D 25
⌀102-0.015 -0.038
50
14-0.02 -0.07