安装说明 Mounting instructions

ZJ-A 型转矩转速传感器

ZJ-A Torque Speed

江苏兰菱机电科技有限公司

Jiangsu Lanmec Electromechanical Technology Co., Ltd

安全说明 Safety instructions

指定用途 Designated use

ZJ-A 型转矩转速传感器专门用于扭矩测量以及相关的操控和监管工作。除此之外，其他任何方式的使用将不能达到其所预想的目的。

ZJ-A torque speed sensor is used exclusively for torque measurement tasks, and directly associated control and regulatory tasks. Use for any additional purpose shall be deemed to be not as intended.

为了安全起见，传感器应依据操作手册中的说明进行操作。此外，在使用中必须遵守相关应用的法律和安全的基本要求。对配件的使用也应如此。

In the interests of safety, the transducer should only be operated as described in the Operating Manual. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

该传感器在指定用途的意义层面并非是一件安全的元件。正确且安全地操作此传感器需要严格的运输，正确的储存、组装并安装，以及仔细的操作。

The torque speed sensor is not a safety element within the meaning of its designated use. Proper and safe operation of this transducer requires proper transportation, correct storage, assembly and mounting, and careful operation.

未能遵守安全说明的一般危险 General dangers of failing to follow the safety instructions

传感器和目前的工艺水平相对应，是故障自动保险的。如果传感器安装不当并且由未经培训的人员操作，它可能会导致潜在的危险。

The transducer corresponds to the state of the art and is failsafe. The torque speed sensor can give rise to remaining dangers if it is inappropriately installed and operated by untrained personnel.

任何涉及安装、启动、维护或修理传感器的人一定已经阅读并理解了操作手册，特别是技术安全说明。

Everyone involved with mounting, starting up, maintaining, or repairing the torque speed sensor must have read and understood the Operating Manual and in particular the technical safety instruction.

潜在危险 Residual dangers

传感器的性能和使用范围在应用中仅涉及一小部分的扭矩测量技术。此外，设备规划人员、安装人员和操作人员应计划、实施以减少潜在危险的方式并对扭矩测量技术的安全工程的想法做出回应。必须始终遵守现场监管。必须提及与扭矩测量技术相关的潜在危险。

The scope of supply and performance of the torque speed sensor covers only a small area of torque measurement technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of torque measurement technology in such a way as to minimize remaining dangers. On-site regulations must be complied with at all times. Reference must be made to remaining dangers connected with torque measurement technology.

在本操作手册中用下列符号指出潜在危险：

The following symbols are used in this Operating Manual to point out remaining dangers:

符号 **Symbol:**  DANGER

含义：最大危险水平 *Meaning:* Maximum danger level

紧急危险情况警告，即未能遵守安全要求将会导致死亡或严重的身体伤害。

Warns of an imminently dangerous situation in which failure to comply with safety requirements will result in death or serious physical injury.

符号 **Symbol:**  WARNING

含义：危险情况 *Meaning:* Dangerous situation

潜在危险情况警告，即未能遵守安全要求可能会导致死亡或严重的身体伤害。

Warns of an potentially dangerous situation in which failure to comply with safety requirements can result in death or serious physical injury.

符号 **Symbol:**  ATTENTION

含义：可能的危险情况 *Meaning:* Possible dangerous situation

潜在危险情况警告，即未能遵守安全要求也许会导致财产损失或某种形式的身体伤害。

Warns of an potentially dangerous situation in which failure to comply with safety requirements could result in damage to property or some form of physical injury.

应用和处理指示符号，以及有用的信息：

Symbols for application and disposal instructions, as well as useful information:

符号 **Symbol:**  NOTE

意味着提供关于产品或其使用的重要信息。

Means that important information about the product or its handling is being provided.

符号 **Symbol:** CE

含义：CE 标记 *Meaning:* CE mark

CE 标记使制造商保证产品符合相关 CE 指令的要求（符合性声明可以参见

http://www.lanmec.com）。

The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant CE directives (the Declaration of Conformity can be found at http://www.lanmec.com).

变换和修改 Conversions and modifications

除了通过明示协议修改外，传感器必须从设计或安全工程观点进行修改。对于任何因修改所导致的损害我们都不应负责。

The transducer must be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting there from.

合格的人员 Qualified personnel

传感器仅能由合格的人员进行安装和使用，严格按照说明书以及安全要求和规范。此外，在使用中必须遵守有关应用的法律和安全的基本要求。对配件的使用也应如此。安装，启动和操作他们具备其功能合适的产品之后。

The torque speed sensor must only be installed and used by qualified personnel, strictly in accordance with the specifications and with safety requirements and regulation. It is also essential to comply with the legal and safety requirements for the application concerned during use. The same applies to the use of accessories.

合格的人员意味着拥有适当资质条件的人员，即能被委托进行选址、安装、启动和操作产品的人。

Qualified personnel means persons entrusted with siting, mounting, starting up and operating the product who possess the appropriate qualifications for their function.

1.应用 Application

该 ZJ-A 型转矩转速传感器用来测量在旋转或静止的机器部件在各个方向的静态和动态的扭矩。

The ZJ-A torque speed sensor measures static and dynamic torque on rotating or stationary machine parts in any rotation direction.

2.安装 Mounting

2.1 安装使用 Installation and usage

1、使用环境：转矩传感器应安装在环境温度为 0℃ ~ 60℃，相对湿度小于 90%，无易燃、易爆品的环境里。不宜安装在强电磁干扰的环境中。

1、 Use of the environment : torque speed sensor should be installed in an ambient temperature of 0 ℃ ~ 60 ℃, relative humidity is less than 90%, non flammable, explosive environment. Should not be installed in strong electromagnetic interference environment.

2.2 安装选择 Installation options

注意 ATTENTION

在选择规格时需符合该型号所允许的载重限制。

The permitted load limits set out in the specifications must be complied with.

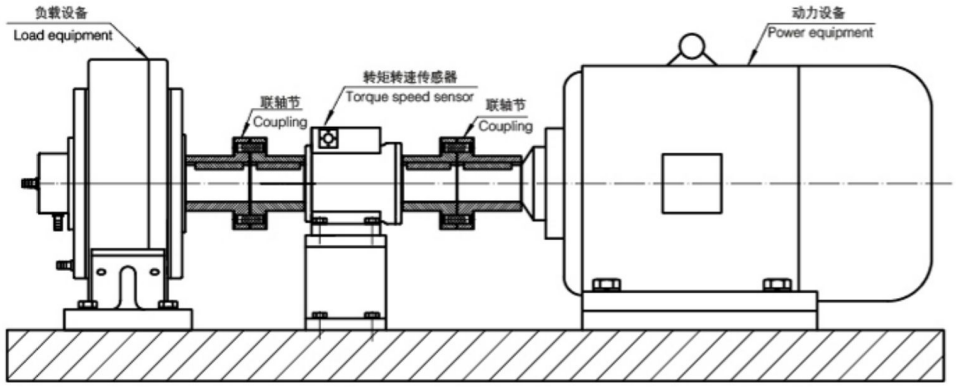


图.2.1 转矩转速传感器水平安装示意图

Fig.2.1: Horizontal installation schematic diagram of torque speed sensor

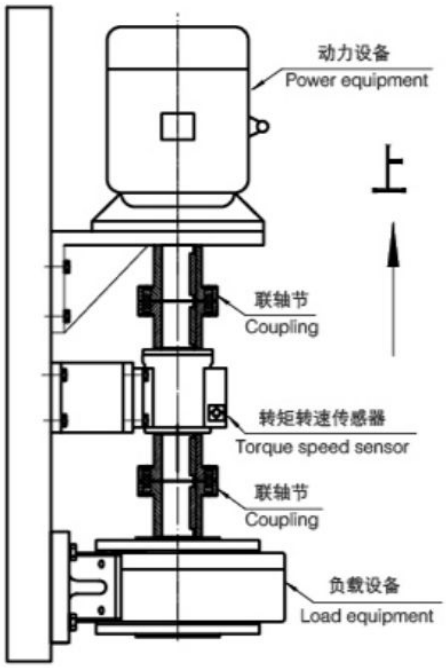


图.2.2 转矩转速传感器垂直安装示意图

Fig.2.2 Vertical installation schematic diagram of torque speed sensor

2.3 联轴器 Couplings

2.3.1 联轴器的安装位置 Mounting position with couplings

ZJ-A 型转矩转速传感器与梅花联轴器在任何位置（水平，垂直，倾斜）安装都可以运转。当在垂直和倾斜时运转时，请确定有足够的支撑。

The ZJ-A torque speed sensor can be operated with bellows couplings in any mounting position (horizontally ,vertically or at an angle). When operating vertically or at an angle, please make sure that the additional elements are adequately supported.

2.3.2 安装 Installation

1. 用溶剂（如丙酮）去除联轴器的轮毂中心孔和轴端的油污。
   Degrease the hub bores of each coupling section and shaft ends with solvent(e.g. acetone).
2. 在安装联轴器时,设置参考距离 L（使用联轴器完整的夹具距离），同时对准轴。
   Push the hub onto the shaft, set the reference gap L(using the full clamping length of the coupling)and align the shaft.
3. 用扭矩扳手拧紧夹紧元件的夹紧螺栓。
   Tighten the clamping bolts of the clamping element with a torque wrench.

注意 ATTENTION

安装联轴器时，允许的纵向力和横向力，和扭矩传感器的极限弯矩不得超过额定数值（见第 12 页）!

When mounting the coupling, the permissible longitudinal and lateral forces, and the limit bending moments of the torque transducer must not be exceeded(see chap.7)!

当拧紧夹紧螺栓时，请在夹紧元件上固定住联轴器。

Hold the coupling on the clamping element when tightening the clamping bolts.

3 电气连接 Electrical connection

3.1 一般信息 General information

为了使转矩转速传感器和放大器相连接，我们推荐使用兰菱机电的低电容测量屏蔽电缆。

To make the electrical connection between the torque speed sensor and the amplifier, we recommend using shielded, low-capacitance measurement cables from LANMEC.

在使用电缆时，确保以最小的接触电阻和良好的绝缘来正确连接。所有的插头连接或旋转螺母必须完全拧紧。

With cable extensions, make sure that there is a proper connection with minimum contact resistance and good insulation . All plug connections or swivel nuts must be fully tightened.

不要使测量电缆的路线平行与电源线和控制电路。如果不能避免（例如电缆槽），那就保持最小 50 厘米的距离，同时将测量电缆拖进钢管里。

Do not route the measurement cables parallel to power lines and control circuits. If this cannot be avoided(in cable pits, for example), maintain a minimum distance of 50 cm and also draw the measurement cable into a steel tube.

避免变压器，电动机，接触器，晶闸管控制和类似的杂散磁场的来源。

Avoid transformers, motors, contactors, thyristor controls and similar stray-field sources.

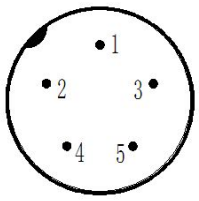
3.2 连接器插头 Connector plug

该传感器配备了一个永久安装的壳体插头。

The torque speed sensor is equipped with a permanently mounted housing plug.

它可以通过传感器连接电缆连接到可用于测量的电子设备。传感器连接电缆的引脚分配可参见下表：

It can be connected to the applicable measurement electronics via the transducer connection cable. The pin assignments for the transducer connection cable can be found in



e:

1pin： +15V

2pin：地 ground

3pin：-15V

4pin：转速信号输出 Speed signal output

5pin：转矩信号输出 Torque signal output

3.3 延伸电缆 Cable extension

延伸电缆必须是屏蔽的和低电容的。我们推荐使用兰菱电缆，因为这些电缆能满足这些要求。

Extension cables must be shielded and of low capacitance. We recommend the use of LANMEC cables, which satisfy these requirements.

关于电缆延长，关键在于确保配以最小接触电阻和良好的绝缘的正确连接。这就是为什么所有连接处应被焊接或至少配以安全、牢固的接头或螺纹连接头。

With cable extensions it is important to ensure that a good connection is provided, with minimum contact resistance and good insulation. This is why all the connections should be soldered or at least made with secure, stable terminals or screwed connectors.

测量电缆不应平行于电源线及控制电路（例如不共享电缆槽）。如果这无法达到，那请用刚性导管保护测量电缆，同时让它尽可能远离其他电缆。避免偏离变压器，电动机和接触开关。

Measurement cables should not be routed parallel to power lines and control circuits (not in shared cable pits, for example). If this is not possible, protect the measurement cable with a rigid steel conduit, for example, and keep in as far away from the other cables as possible. Avoid stray from transformers, motors and contact switches.

3.4 屏蔽设计 Shielding design

在因电位差（补偿电流）而导致干扰的情况下，请将电压设为零，同时壳体必须从放大器上断开，并且须在传感器壳体和放大器壳体间建立起电位均衡线。（铜导体，导线截面 10mm²）

In the case of interference due to potential differences (compensating currents), supply voltages zero and housing ground must be disconnected on the amplifier and a potential equalization line established between the transducer housing and the amplifier housing(copper conductor, 10 mm² wire cross-sec-tion) .

4 承载能力 Loading capacity

ZJ-A 型转矩转速传感器，可用于测量静态和动态扭矩。

The torque speed sensor ZJ-A can be used to measure static and dynamic torques.

在静态上可以超过额定转矩达到极限扭矩。如果超过额定转矩，额外的非规则载荷是不允许的。这包括纵向力、侧向力和弯矩。

Nominal torque can be exceeded statically up to the limit torque. If the nominal torque is exceeded, additional irregular loading is not permissible. This includes longitudinal forces, lateral forces and bending moments.

4.1 测量动态扭矩 Measuring dynamic torque

下列规则适用于动态扭矩测量：

The following rule applies to the measurement of dynamic torque:

·适用于静态扭矩的标度同样对动态扭矩测量有效。

The calibration performed for static torques is also valid for dynamic torque measurements.

NOTE

动态作用扭矩的频率必须小于机械测量系统的固有频率。

The frequency of the dynamically acting torques must be smaller than the natural frequency of the mechanical measuring system.

- 机械测量固有频率 f0 取决于所连接的旋转质量的惯性矩 J1、J2 和传感器的扭转刚度 C_T 。

  The natural frequency f0 of the mechanical measuring depends on the moments of inertia J1 and J2 of the connected rotating masses and the torsional stiffness of the transducer.

下面的公式可以用来近似地确定的机械测量装置的固有频率 f0。

The equation below can be used to approximately determine the natural frequency f0 of the mechanical measuring arrangement.

即使处于交变载荷之下，振幅（峰间值）最大也可以达到指明用于扭矩传感器的额定转矩的 80%。振幅必须处于指定的负荷范围内（-Mnom，+Mnom）。

The oscillation width (peak-to-peak) can be max. 80% of the nominal (rated) torque designated for the torque transducer, even under alternating load. The oscillation width must fall within the loading range specified by –Mnom and +Mnom.

4.2 速度限制 Speed limits

ZJ-A 型转矩转速传感器测量扭矩时的最大允许速度范围在 800 转和 8000 转之间。速度限制值，见第 7 章

The torque speed sensor ZJ-A enables measuring range-dependent torque measurements of between 800 rpm and 8000 rpm. Limit values, see Chap.7

• 信号输出与信号采集 Signal output and the signal acquisition

1、信号输出基本形式 The basic form of torque signal output:

• 扭矩方波信号、转速脉冲信号。Square signal, pulse signal.

• 可根据用户需要制成电压模拟信号输出或电流模拟信号输出。

According to user' needs made into voltage analog signal output or current analog signal output (one-way, static torque measurement).

2、扭矩信号处理形式 Torque signal processing form：

• 转矩转速传感输出的频率信号送到频率计或数字表，直接读取与扭矩成正比的频率信号或电压、电流信号。

Frequency signal from torque sensor send to the frequency meter or digital meter, read directly frequency signal or a voltage, current signal which proportional to the torque.

• 转矩转速传感的扭矩与频率信号送给单片机二次仪表，直接显示实时扭矩值、转速及输出功率值及 RS232 通讯信号。

Torque of torque sensor and frequency signal sent to MCU secondary instrument, direct display real-time torque, speed and output power value and RS232 communication signal.

• 直接将扭矩与转速的频率信号送给计算机或 PLD 进行处理。

Directly send the the frequency signal of torque and speed to the computer or PLD for processing.

6 保养 Maintenance

1.每隔一年应给转矩传感器两端轴承加润滑脂。加润滑脂时，仅将两端轴承盖打开，将润滑脂加入轴承，然后装上两端盖。

1.Should give grease to both ends of the bearing of torque sensor every year.When add the grease, only open the two ends of the bearing cover, add the grease into bearing, and then loaded on the two end covers.

2.应储存在干燥、无腐蚀、室温为 -20℃——70℃的环境里。

2.Should be stored in a dry, non corrosive, room temperature is -20 ℃ -- 70 ℃ environment.

7 产品外形尺寸 Dimensions

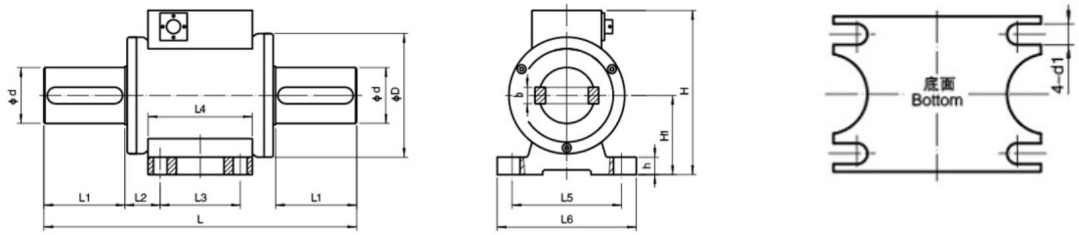


图 7.1 ZJ-A 型 转矩转速传感器外形尺寸图

Fig.7.1 ZJ-A Overall dimension chart of torque speed sensor

型号 Model	额定转矩(N.m) Rated Torque	许用转速(r/min) Allowable rotational speed	外形尺寸 Overall dimension			轴联结尺寸 Shaft couping size			机座支撑尺寸 Base support size								重量 (kg)
			H	L	D	d(h7)	键 b(p7)X 数量 n	L1	L2	L3	L4	L5	L6	H1	d1	h	
ZJ-0.5/1/2/3A	0.5/1/2/3	6000	100	170	68	11	削偏至 10	15	23	60	76	46	70	50	6	8	1.8
ZJ-5/10/20/50A	5/10/20/50	6000	114	188	78	18	6X1	31	14	72	90	75	100	55	8	12	3.8
ZJ-100A	100	6000	114	188	78	18	6X1	31	14	72	90	75	100	55	8	12	3.8
ZJ-200A	200	5000	125	209	92	28	8X1	41	14	72	90	75	100	60	8	12	5.1
ZJ-500A	500	4000	135	238	96	38	10X2	55	15	72	90	75	100	65	8	12	6.5
ZJ-1000A	1000	3000	143	270	106	48	14X2	70	19	69	90	78	120	68	12	15	9
ZJ-2000A	2000	3000	143	270	106	48	14X2	70	19	69	90	78	120	68	12	15	9.5
ZJ-5000A	5000	2000	187	347	144	75	20X2	105	32	69	100	156	180	90	13	15	23
ZJ-10000A	10000	2000	214	389	158	98	28X2	118	32	80	110	170	200	110	13	5	35
ZJ-20000A	20000	1800	225	420	168	105	32X2	125	36	88	125	180	205	115	4-M12	15	56
ZJ-30000A	30000	1500	258	420	206	125	32X2	125	36	88	125	180	205	136	4-M12	5	56
ZJ-40000A	40000	1500	301	480	240	150	40X2	150	42	90	125	190	250	158	4-M16	20	95
ZJ-50000A	50000	1500	301	480	240	150	40X2	150	42	90	125	190	250	158	4-M16	20	95
ZJ-100000A	100000	1200	331	560	280	180	45X2	180	45	90	130	230	290	168	4-M16	20	160
ZJ-150000A	150000	1000	420	900	350	235	56X2	310	50	180	240	250	290	220	4-M20	25	420
ZJ-200000A	200000	800	446	900	380	255	56X2	310	48	180	240	250	300	240	4-M20	25	480
ZJ-300000A	300000	800	480	900	416	295	70X2	310	48	180	240	268	310	250	4-M20	25	580

注：高转速转矩转速传感器需要定制，订货前说明

Note: High torque and speed torque sensors need customization, pls. inform before make order

8 主要功能及性能指标 Main function and performance index

扭矩示值误差(Torque indication error)： ＜± 0.2 % F · S

灵敏度 (Sensitivity)： 1±0.2 mv / V

非线性(Nonlinear)： ＜±0.2 % F· S

重复性(Repeatability)： ＜±0.2% F· S

滞后(Lag)： ＜0.2 % F· S

零点飘移（24 小时）Zero drift (24 hours) ： ＜0.2 % F· S

输出阻抗(Output impedance)： 1KΩ ±3Ω

绝缘阻抗(Insulation resistance)： >500MΩ

静态超载(Static overload)： 150 %

断裂负载(Breaking load)： 200 %

电源电压(Power supply voltage)： +15V±5%,-15V±5% 或 24VDC

转速输出信号：60-120 个脉冲/转 Speed output signal: 60-120 pulse / turn

频率信号输出(Frequency signal output)： 5KHz—15KHz 或 电流 电压

0 转矩频率输出(0 torque frequency output)：10KHZ

正向转矩满量程频率输出(Positive torque full scale frequency output)：15KHZ

反向转矩满量程频率输出(Reverse torque full scale frequency output)：5KHZ

信号占空比(Signal duty ratio)： （50±10）%

传感器功耗(Power consumption of the sensor)： 4W

使用温度(Temperature when use)： -20 ~ 60℃

相对湿度(Relative humidity)： ≤90%RH