MUJIE 慕杰®

YOUR AUTOMATION,YOUR MUJIE!

钟表齿轮式多圈绝对值SSI输出系列

Clock gear type multi turn absolute value SSI output series

可承受较高的轴向和径向负荷
可在任意位置设置新的原点，
高防护等级外壳IP67,完全防水防油
应用于测量、自动控制、机器人、印刷包装及数控等

Can withstand high axial and radial load
New the origin can be installed in any position
High degree of protection shell IP67, completely waterproof and oil
Application in the measurement, automatic control, robotics, printing and packaging and CNC, etc

▶ 型号说明Model Explanation

MJCD	50S8	ES	SG	12	U	12	T3U	1024	F	2	0	□
基本型号 Model M:常规增量型 Incremental encoder M□: 特殊型号定义 Speciall definition	主体轴径 Main shaft diameter 50S8: 外径50mm 轴径8mm 50H8: 外径50mm 半空心 轴径8mm 58S10: 外径58mm 轴径10mm	E:无 nothing ES:隔离型 Isolated type	码制：Code system SG:SSI格雷码 SSI Gray code SB:SSI自然二进制码 SSI natural Binary code	单圈分辨率: Single cycle resolution 08:2⁸=256 09:2⁹=512 10:2¹⁰=1024 11:2¹¹=2048 12:2¹²=4096 13:2¹³=8192 14:2¹⁴=16384	电源电压：Power supply voltage: U:10-30VDC Z：5VDC	多圈圈数：Number of multiple turns: 12：4096圈 08:256圈 04:16圈	增量输出类型：Incremental output type: W:无增量信号输出 No incremental signal output LS6U:6相输出，副值略低于供电电压值 6-phase output, the secondary value is slightly lower than the supply voltage T3U:3相输出，副值略低于供电电压值 3-phase output, side value slightly lower than supply L6Z:6相输出，输出副值5V 6-phase output, output auxiliary value 5V	增量信号分辨率: Incremental signal resolution 360 600 1000 1024 2048 2000 2500	出线方式 Outlet way F:侧出线防水 Side outlet waterproof E:后出线 After the qualification FS:侧出双孔 Side out double orifice	线缆长度 Cable 2：2m	W:圈数中点 Number of turns (midpoint) 0:圈数零点 Turns zero	客户定制 Customized informat

注:方向是指面向轴的方向看过去。涂红色为常规型号。例如：MAM50S15-ESG12U12T3U1024F2

Note: the direction refers to the direction facing the axis. The conventional model is painted in red. For example: mam50s15-esg12u12t3u1024f2

▶ 技术规格Specification

电气参数 Electric parametar						
工作电压 Working voltage	U:10~30VDC±5%				Z:5VDC±5%	
容许纹波 Allowable ripple	P-P:5%以下 Following					
消耗电流 Current consumption	<70mA(无负载) (no load)				<100mA(无负载)(no load)	
保护回路 Protection circuit	电源反接保护 Power reverse connection protection				无 Nothing	
圈数 Number of turns	2^4 16圈		2^8 256圈		2^{12} 4096圈	
单圈分辨率 Single circle resolution	08:2^8=256	09:2^9=512	10:2^{10}=1024	11:2^{11}=2048	12:2^{12}=4096	13:2^{13}=8192	14:2^{14}=16384
重复精度 Repeatability	≤1Bit 具体视分辨率而定 Depending on the resolution					
SSI通讯相关电气参数 Electrical parameters related to s s I communication						
SSI模式 SSI mode	同步SSI模式 Synchronous SSL mode					
接口信号 Interface signal	差分信号 Differential signal Clock+ Clock- Data+ Data-					
最大时钟频率 Maximum clock frequency	50kHz.....1.2MHZ					
数据更新时间 Data update time	20uS					
码制 Code system	格雷码/自然二进制码 Gray code / natural binary code					
启动时间 Start time:	<100ms					
旋转方向 Rotation direction	通过编码器外部线(黄色线接电源正极改变数值增加旋转方向) Through the external line of the encoder (the yellow line is connected to the positive pole of the power supply to change the value and increase the rotation direction)					
原点位置 Origin position	可在任意位置设置新的原点,无需通过机械旋转方式找到原点,通过编码器外部线(橙色线)设置.The new origin can be set at any position without finding the origin by mechanical rotation, and can be set by the encoder external line (Orange Line)					
环境规格参数 Environmental specification parameters						
环境温度范围 Ambient temperature range	工作时:-10~+70℃(无结冰) 保存时:-20~85℃(无结冰) During operation: - 25 ~ + 80 ℃ (no ice) during storage: - 20 ~ 85 ℃ (no ice)					
环境湿度范围 Ambient humidity range	≤RH85%(无结露) ≤ rh85% (no condensation)					
绝缘电阻 insulation resistance	100MΩ以上（DC500V) 导线与外壳之间 Between conductor and shell					
耐电压 Withstand voltage	AC500V 50/60Hz 1min 导线与外壳之间 Between conductor and shell					
耐冲击 Impact resistance	1000m/s², X , Y , Z 轴向方向各三次 Three times in the axial direction					
耐振动 Vibration resistance	100m/s²,10~200Hz 上下振幅 Up and down amplitude 2mm ， X , Y , Z 方向各振动2小时 Vibration in each direction for 2 hours					
防护等级 Protection level	外壳 Ip67 (出线处，本体外壳结合处），转轴 IP65(轴前端轴承部分) Housing IP67 (outgoing line, body shell junction), rotating shaft IP65 (shaft front end bearing part)					
机械规格参数 Mechanical specifications						
规格 Specifications		50S8		50H8		58S10
外壳 Shell		Aluminium alloy 铝合金φ50mm		Aluminium alloy 铝合金φ50mm		Aluminium alloy 铝合金φ58mm
本体 noumenon		Aluminium alloy 铝合金φ50mm		Aluminium alloy 铝合金φ50mm		Aluminium alloy 铝合金φ58mm
轴 Axis		Stainless steel 不锈钢φ8mm		Brass inner diameter 黄铜内径8mm		Stainless steel 不锈钢φ10mm
防水接头 Waterproof joint		黄铜镀镍 Nickel plating on brass		黄铜镀镍 Nickel plating on brass		黄铜镀镍 Nickel plating on brass
机械附件 Mechanical accessories		联轴器 Coupling		弹性支架 Elastic support		–
起动转矩 Starting torque		≤0.004Nm		≤0.004Nm		≤0.005Nm
惯性力矩 Moment of inertia		≤40g cm²		≤40g cm²		≤50g cm²
轴负载 Axle load	径向 Radial	50N		40N		80N
	轴向 Axial	30N		20N		40N
允许最高转速 Maximum allowable speed		3000r/min		3000r/min		300000r/min
重量 Weight		About 约236g		About 约241g		About 约280g

▶ 原点设置方法 Origin setting method

为避免可能的累积误差，以及安装时寻找原点的麻烦，在编码器内部嵌入了原点设置程序，在外部预留了原点设置线，用户可方便快捷的设置原点。
（Modbus RTU、RS485、SSI三种输出类型的原点设置方法一样）

In order to avoid possible accumulated errors and the trouble of finding the origin during installation, an origin setting program is embedded in the encoder, and an origin setting line is reserved outside, so that the user can easily and quickly set the origin. (the origin setting method of Modbus RTU, RS485 and SSI output types is the same)

1、通电状态下，把设置原点的芯线(橙色线)接到编码器电源正极(棕色线) 3 秒后断开，当前位置设为新的原点，并能掉电保存。

1. In the power on state, connect the core wire (orange wire) that sets the origin to the positive electrode (brown wire) of the encoder power supply and disconnect it for 3 seconds. The current position is set to the new origin and can be saved after power off.

2、如果把设置原点的芯线(橙色线)一直接在编码器的电源正极，那么编码器将只设置一次原点。

2. If the core wire (orange wire) for setting the origin is always connected to the positive pole of the power supply of the encoder, the encoder will only set the origin once.

3、设置完原点之后把芯线(橙色线)接蓝色线或者棕色线，不要悬空。

3. After setting the origin, connect the core wire (orange wire) to the blue wire or brown wire, and do not hang in the air.

※注：保持时间 3 秒，为出厂设置，用户不可自行修改，可根据用户要求更改这个时间。

※ note: the holding time is 3 seconds, which is the factory setting and cannot be modified by the user. The time can be changed according to the user's requirements.

※注：出厂默认原点设置操作后,编码器单圈数据为0,圈数数据为圈数中间值。

※ note: after the factory default origin setting operation, the encoder single turn data is 0, and the number of turns data is the middle value of the number of turns.

也可以根据要求让编码器原点设备操作后，编码器单圈数据为0 ,圈数数据为0，列如256圈，原点操作后圈数值变成0。

You can also operate the encoder origin device according to the requirements. After the operation of the encoder origin device, the data of a single turn of the encoder is 0, and the data of the number of turns is 0. The column is 256 turns. After the operation of the origin device, the number of turns becomes 0.

※也可以软件重置原点，通讯指令详见后页。

※ you can also reset the origin by software. See the following page for communication instructions.

▶ MJ485自定义协议模式（即主动发送模式）Mj485 custom protocol mode (i.e. active transmission mode)

数据帧格式 Data frame format

帧头 Frame header		数据长度 Data length:	数据位 Data bit				和校验 Sum verification	异或校验 Exclusive or check	帧尾End of frame
0XAB	0XCD	0X05	0X00	0X00	0X1F	0X23	校验码 Check code	校验码 Check code	0X3D
					单圈 高八位 Single lap High octave	单圈 低八位 Single lap Lower octet			

※注： 数据格式:1个起始位，8个数据位，1个停止位，无奇偶校验位。※ note: Data Format: 1 start bit, 8 data bits, 1 stop bit, no parity bit.
和校验 = 0X05 + 0X00 + 0X00 + 单圈高八位 + 单圈低八位 Sum check = 0x05 + 0x00 + 0x00 + single loop high eight bits + single loop low eight bits
异或校验 = 0X05 ^ 0X00 ^ 0X00 ^ 单圈高八位 ^ 单圈低八位 Exclusive or check = 0x05 ^ 0x00 ^ 0x00 ^ single loop high eight bits ^ single loop low eight bits

修改参数 Modify parameters

帧头 Frame header		帧字节 长度 Frame byte length	参数 Parameter				帧尾End of frame
0XAB	0XCD	0X08	分辨率 resolving power	递增方向 Increasing direction	波特率 Baud rate	协议模式 Protocol mode	0X3D

单圈分辨率 Single circle resolution	0X00	14Bit 2^{14} = 16384	波特率 Baud rate	0X01	4800
	0X01	13Bit 2^{13} = 8192		0X02	9600
	0X02	12Bit 2^{12} = 4096（出厂默认）(factory default)		0X03	19200（出厂默认）(factory default)
	0X03	11Bit 2^{11} = 2048		0X04	38400
	0X04	10Bit 2^{10} = 1024		0X05	11520
	0X05	9Bit 2^{9} = 512	协议模式 Protocol mode	0X01	自定义主动发送（出厂默认） Custom active sending (factory default)
	0X06	8Bit 2^{8} = 256		0X02	MODBUS RTU
递增方向 Increasing direction	0X01	逆时针旋转递增（从轴的方向看过去）Counterclockwise rotation increment (viewed from the direction of the shaft)			
	0X02	顺时针旋转递增（出厂默认）Clockwise rotation increment (factory default)			

※注： 修改参数的步骤 ※ note: steps for modifying parameters
1、把黄色线接到编码器正极，编码器停止主动发送数据，等待接收配置参数。
1. Connect the yellow line to the positive electrode of the encoder. The encoder stops actively sending data and waits for receiving configuration parameters.
2、通过串口向编码器发送 2. Send to encoder through serial port
例如 for example :0XAB 0XCD 0X08 0X02 0X02 0X03 0X02 0X3D
编码器应答 Encoder response: 0X02 0X02 0X03 0X02
表明配置成功，进入Modbus RTU模式。Indicates that the configuration is successful and enters Modbus RTU mode.

恢复默认参数 Restore default parameters

在通电状态下，把（橙色线和黄色线）同时接到编码器正极（棕色线），保持5秒，然后断开。 In the energized state, connect (orange line and yellow line) to the positive electrode (brown line) of the encoder at the same time, keep it for 5 seconds, and then disconnect it.	
波特率 Baud rate	19200
分辨率 Resolving power	2^{12}=4096
旋转方向 Rotation direction	从轴向看顺时针数值增加 From the axial direction, the clockwise value increases

▶ Modbus RTU 协议（即被动发送模式）

Modbus RTU 协议模式下读取编码器数据 功能码 04H或03H Read encoder data function code 04H or 03h in Modbus RTU protocol mode

示例:以单圈4096分辨率为例。编码器当前位置在1579，十六进制连个字节表示为062B。 Example: take the 4096 resolution of single circle as an example. The current position of the encoder is 1579, and hexadecimal consecutive bytes are represented as 062b.

主机发送指令 Host sends instructions	01	04	0000	0002			71 CB
	站号地址 Station number and address	功能码 Function code	起始地址0X0000 Starting address: 0x0000	读两个16Bit寄存器 Read two 16bit registers			校验码 Check code
编码器应答 Encoder response	01	04	04	00	00	06	28	B83B
	站号地址 Station number and address	功能码 Function code	四个字节 Four bytes	编码器当前位置数据 Encoder current position data			校验码 Check code

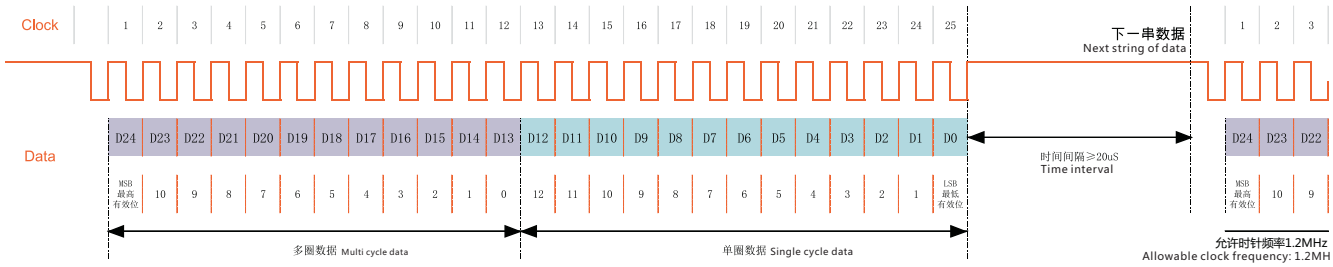
增量信号电气规格参数 Incremental signal electrical specifications			
型号 Model	T3U	T6Z	LS6U
电源电压 Supply voltage	1-30V±5%或者5-12VDC±5%	5VDC ±5%	10-30v+5%
输出类型 Type of output	全兼容型推拉输出 Fully compatible push-pull output	Rs422类型 Rs422 type	RS422类型兼容TTL HTL Rs422 type compatible with TTL and HTL
输出幅值 Output amplitude	波形幅值为略低于电源电乐 The amplitude of the waveform is slightly lower than that of the power supply	波形幅值为5V Waveform amplitude is 5V	波形幅值为略低于电源 The waveform amplitude is slightly lower than the power supply
输出形式 Output form:	推拉输出 Push pull output	线性驱动输出 Linear drive output	加强型线性驱动输出Enhanced linear drive output
输出容量 Output capacity	High: 负载电流2mA以下输出电压:3.5V以上Low:负载电流2mA以下残留电压:05V以下 High: load current below 2mA output voltage: above 3.5V low: load current below 2mA residual voltage: below 05V		
分辨率 Resolving power	360、600、1000、1024、2048、2000、2500		
输出相数 Number of output phases	3相ABZ方波 square wave	6相A B Z $\bar{A}$ $\bar{B}$ $\bar{Z}$ 方波square wave	6相A B Z $\bar{A}$ $\bar{B}$ $\bar{Z}$ 方波square wave
输出相位差 Output phase difference	Ab之间相位差 Phase difference between :1/4T±1/8T (即9±45)		
Z相信号宽度 Z-phase signal width	T±1/8T (即 Namely 360+45)或者 perhaps 1/2T，1/4T		
上升时间/下降时间 Rising time / falling time	≤0.2us	≤0.2us	≤0.2us
最大响应频率 Maximum response frequency	300KHz	300KHz	300KHz
允许最大转速 Allowable maximum speed	16800rpm分辨路为1000时数据，分辨率更低 Data with 16800rpm resolution of 1000, lower resolution		

▶ SSI 时序图 SSI sequence diagram

举例说明:圈数12位，单圈13位，共计25位数据，上位机如PLC，控制板等，需给出25+1=26个时钟信号
For example: the number of turns is 12 bits, the number of turns is 13 bits, and the total data is 25 bits. The upper computer such as PLC and control board need to give 25 + 1 = 26 clock signals

圈数12位，单圈12位，共计24位数据，上位机如PLC，控制板等，需给出24+1=25个时钟信号
The number of turns is 12 bits, the number of single turn is 12 bits, and the total data is 24 bits. The upper computer, such as PLC and control board, needs to give 24 + 1 = 25 clock signals

上位机给出的时钟频率最大支持1.2MHz，每次数据间隔的时间必须大大于20uS
The clock frequency given by the upper computer can support 1.2MHz at most, and the time of each data interval must be greater than 20us



▶ SSI输出旋转方向设置方法 SSI output rotation direction setting method

编码器的(黄色线)接编码器正极(棕色线)
Encoder (yellow line) is connected to encoder positive electrode (brown line)

从编码器轴方向看过去，顺时针方向数值增加
When viewed from the encoder shaft, the value increases clockwise

编码器的(黄色线)接编码器负极(蓝色线)
Encoder (yellow line) is connected to encoder negative electrode (blue line)

从编码器轴方向看过去，顺时针方向数值减小
When viewed from the encoder shaft, the value decreases clockwise

▶ 原点设置方法igin setting method

为避免可能的累积误差，以及安装时寻找原点的麻烦，在编码器内部嵌入了原点设置程序，在外部预留了原点设置线，用
In order to avoid possible accumulated errors and trouble of finding the origin during installation, an origin setting program is embedded in the encoder, and an origin setting line is reserved

户可方便快捷的设置原点(Modbus RTU、RS485、SSI三种输出类型的原点设置方法一样)
outside, using the user can easily and quickly set the origin (the origin setting methods of the three output types of Modbus RTU, RS485 and SSI are the same)

1、通电状态下，把设置原点的芯线(橙色线)接到编码器电源正极(棕色线)3秒后断开，当前位置设为新的原点，并能掉电保存
1. In the powered on state, connect the core wire (orange wire) with the origin set to the positive pole (brown wire) of the encoder power supply for 3 seconds and then disconnect it. The current position is set to the new origin and can be saved after power down

2、如果把设置原点的芯线(橙色线)一直接在编码器的电源正极，那么编码器将只设置一次原点
2. If the core wire (orange wire) for setting the origin is always connected to the positive power supply of the encoder, then the encoder will only set the origin once

3、设置完原点之后把芯线(橙色线)接蓝色线或者接地
3. After setting the origin, connect the core wire (orange wire) to the blue wire or ground

※注:数据原点设直线(橙色线)和电源正极(棕色线)保持时间3秒，为出厂设置，用户不可自行修改，可根据用户要求更改这个时间
※ note: the straight line (Orange Line) and the positive line (brown line) of the power supply are set at the data origin for 3 seconds, which are factory settings and cannot be modified by the user, but can be changed according to the user's requirements

※注:出厂默认原点设置操作后，编码器单圈数据为，
※ note: after the factory default origin setting operation, the encoder single turn data is,

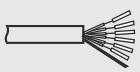
圈数数据头也可以根据要求让编码器原点设置操作后，编码器单圈数据位，圈数数据为中间值，例如256圈，原点操作后圈数值变成128。
The number of turns data head can also let the encoder set the data bits of a single turn of the encoder according to requirements. The number of turns data is the middle value, for example, 256 turns. After the operation of the origin, the number of turns becomes 128.

这样做目的是让编码器正反转尽量在总圈数量程范围内
The purpose of this is to make the forward and reverse rotation of the encoder within the range of the total number of turns as far as possible

▶ 电气连接图 Electrical connection diagram

仅绝对值信号SSI输出接线图 Only absolute value signal (SSI) output wiring diagram

SSI绝对信号接线 SSI absolute signal wiring



- 白色 White :Data +
- 灰色 Grey:Data-
- 黑色 Black:Clock+
- 红色 Red:Clock-
- 橙色 Orange:原点设置线
- 黄色 Yellow:方向设置
- 棕色 Brown:+V
- 蓝色 Blue:0V
- 黑粗线:屏蔽线 Black thick wire: shielded wire

※橙色线出厂默认为圈数中点设置线，
※ the orange line is set at the midpoint of the number of turns by default,
也可以根据要求改为圈数任意点设置线
You can also set the line at any point according to the number of turns as required
更改的主要目的是尽量保证编码器在圈数量程范围内。
The main purpose of the change is to ensure that the encoder is within the range of the number of turns as far as possible.

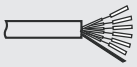
※为使信号更稳定，屏蔽线请良好接地
※ In order to make the signal more stable, the shielded wire should be well grounded

※不使用的配线请做绝缘处理，避免线末端相互触碰
※ The unused wiring should be insulated to avoid touching the ends of the wires

▶ 电气连接图 Electrical connection diagram

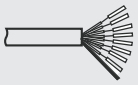
绝对值信号SSI增量信号，同时输出接线图 Absolute value signal and SSI increment signal, and output wiring diagram at the same time

SSI 绝对信号接线 SSI absolute signal wiring



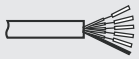
- 白色 White :Data +
- 灰色 Grey :Data-
- 黑色 Black :Clock+
- 红色 Red:Clock-
- 橙色 Orange :原点设置线 Origin setting line
- 黄色 Yellow:方向设置 Direction setting
- 棕色 Brown :+V
- 蓝色 Blue:0V
- 黑粗线:屏蔽线 Black thick wire: shielded wire

增量信号接线 线驱动输出 Incremental signal wiring line drive output



- 黑色 Black :OUT A
- 白色 White :OUT B
- 橙色 Orange :OUT Z
- 棕色 Brown:OUT $\overline{A}$
- 蓝色 Blue :OUT $\overline{B}$
- 黄色 Yellow:OUT $\overline{Z}$
- 线黑粗线:屏蔽 Line black thick line: shielding

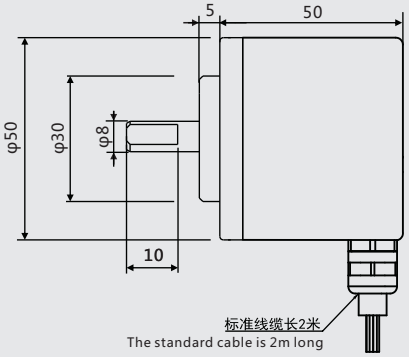
增量信号接线 通用推拉输出 Incremental signal wiring universal push-pull output

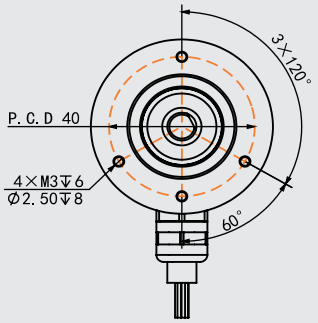


- 黑色 Black :OUT A
- 白色 White :OUT B
- 橙色 Orange :OUT Z
- 黑粗线:屏蔽线 Black thick wire: shielded wire

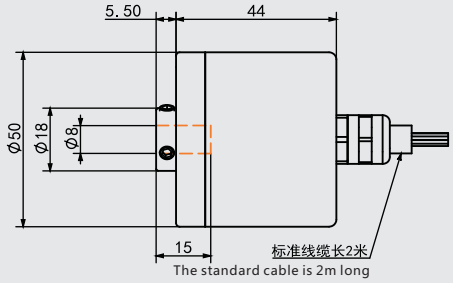
▶ 安装尺寸图 Mounting Dimensions(单位Unit:mm)

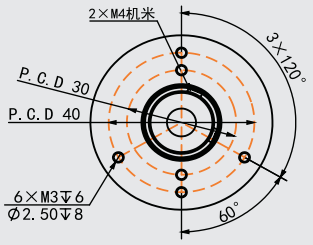
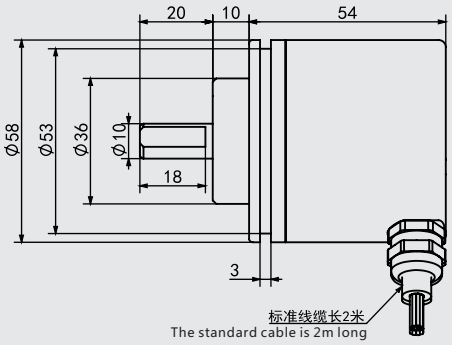
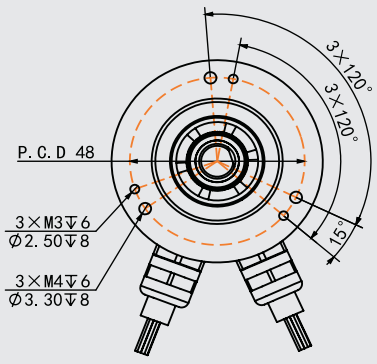
侧出线 Side outlet





后出线 Rear outgoing line





侧出线 Side outlet