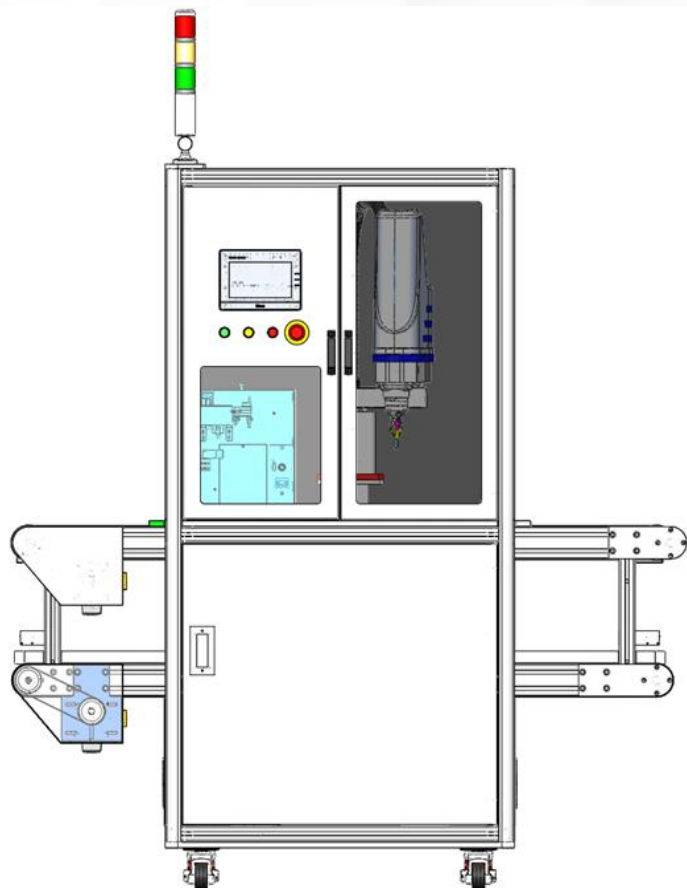


在线式系列
In-line Series

智能锁螺丝机器人 Intelligent Soldering Robot



扫码查看公众号



扫码查看视频号

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智能锁螺丝机器人

Intelligent Screw-locking Robot

专为锁螺钉应用开发的机器人

Robots specially developed for screw-locking applications

智

High Intelligent

高智能

产能数据采集
Production Data Collection
良率数据分析
Yield Data Analysis
锁付数据追溯
Screw Fastening Data
Traceability
实时监控报警
Real-time Monitoring and
Alarm

速

High efficiency

高效率

高效拧紧工艺
High-efficiency tightening
process
高效锁钉节拍
High-efficiency screw
locking cycle
高效即用即装
Efficient and Quick Deplo
yment
高效快捷调试
Efficient and Rapid
Debugging

准

High precision

高精度

新型扭矩算法
New Torque Algorithm
高精度传感器
High Precision Sensor
精准扭矩反馈
Precise Torque Feedback
智能角度控制
Intelligent Angle Control

易

Easy to use

易上手

工艺简单易懂
Simple and Intuitive
Procedure
操作简单便捷
Simple and Convenient
Operation
人机交互优越
Superior Human-Machine
Interaction
编程可视显示
Visual Programming
Display

专

High degree of
professionalism

高专业

专注螺丝拧紧
Focus on Screw Tightening
专业技术咨询
Professional Technical
Consultation
专业工艺对接
Specialized Process
Integration
专职研发团队
Dedicated R&D Team

应用场景：小家电、军工、汽车电子、医疗、新能源、通讯、3C等行业

Application scenarios: Small Household Appliances, Military Industry, Automotive Electronics, Medical, New Energy, Communications, 3C and other industries

气吹式供料器**Air-Blow Feeder**

层级推料方式上料至直线轨道，推料机构动力采用气缸，节能降噪；超大料仓容量，有效容积可达3L-4L，可放置螺丝例M3*10) 近000-6700颗。

A tiered pusher feeding mechanism loads screws onto a straight line track. The pusher unit is powered by a pneumatic cylinder, ensuring energy efficiency and noise reduction.

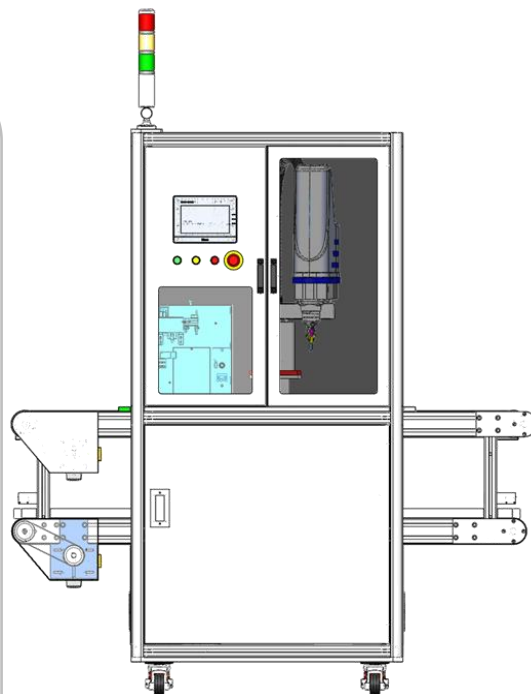
Equipped with an extra-large hopper, the effective capacity reaches 3L to 4L, capable of holding approximately 6,000 to 6,700 screws (e.g., M3×10).

**工控电脑Industrial Computer**

运行上位机系统。

Run the upper computer system.

采集存储螺丝拧紧数据和对接MES。
Collect and store screw tightening data and interfaces with the MES system.

**智能扭力测试仪 Intelligent Torque Tester**

人工预先编好校准扭矩程序，即可进行自动扭矩校验。

The automatic torque verification can be performed once the pre-programmed torque calibration procedure is set up.

**支持选配视觉相机 Supports Optional Visual Camera**

支持Scoket通讯

Support Scket communication.

坐标数据交互

Coordinate data interaction.

**扫码枪 Code Reader/Scan Gun**

读取产品一维码或者二维码。

Read the products' barcode (1D) or QR code(2D).

气吸式供料器 Vacuum Suction Feeder

适用 M1.0-M6.0 螺丝。

Applicable to M1.0-M6.0 screws.

有卡料反转和故障报警功能。

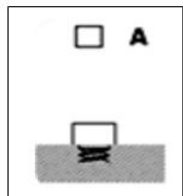
Equipped with jam reversal and fault alarm functions.

有信号输出配合自动机使用，重复定位精度±0.02mm。

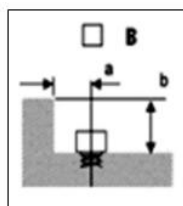
Provides signal output for integration with automated machinery, with a repeat positioning accuracy of ±0.02 mm.



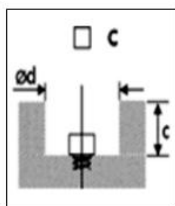
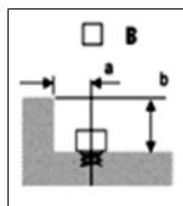
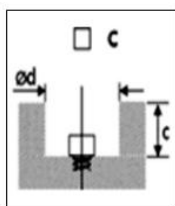
02 螺丝供料形式/Screw Feeding Method



螺丝无沉孔、螺孔周边无干涉
No countersink on screw, no interference around screw hole.



沉孔螺丝、螺孔周边干涉
Countersunk screw, interference around screw hole.



沉孔螺丝、螺孔周边干涉
Countersunk screw, peripheral interference around screw hole.

吹气式供螺丝 Air-blow Screw Feeding

适用无干涉螺孔

Suitable for non-interference screw holes

节拍：约1.5秒/颗（全过程）

Cycle Time: Approximately 1.5 -2seconds /pcs (full process)

螺丝长径比满足：1:1.3（帽头/全长）

Screw length-diameter ratio: 1:1.3 (total length)

适用螺钉：M2-M6*20mm及以下长度

Applicable screw: M2-M6*20mm and below length

吸取式供螺丝 Suction Screw Feeding

适用深孔螺丝、螺孔周边干涉

Suitable for deep hole screws, screw hole peripheral interference

节拍：约3秒/颗（全过程）

Cycle Time: about 3 seconds /pcs (whole process)

兼容螺丝帽头最大直径:8mm

Maximum diameter of compatible screw head :8mm

适用螺钉：M1-M5*20mm及以下长度

Applicable screw: M1-M5*20mm and below length

吹加吸式供螺丝 Air-Blow and Suction Screw Feeding

适用深孔螺丝、螺孔周边干涉

Suitable for deep hole screws, screw hole peripheral interference

节拍：约2.5秒/颗（全过程）

Cycle Time: about 2.5 seconds /pcs (whole process)

兼容螺丝帽头最大直径:8mm

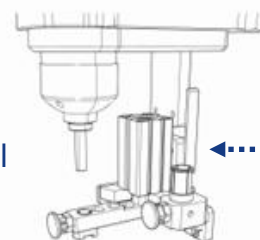
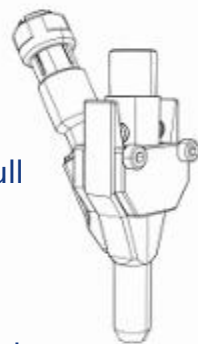
Maximum diameter of compatible screw head :8mm

螺丝长径比满足：1:1.3（帽头/全长）

Screw length-diameter ratio: 1:1.3 (cap/full length)

适用螺钉：M2-M6*20mm及以下长度

Applicable screw: M2-M6*20mm and below length



备注：加长，加粗，非常规类型的螺丝，需提供20颗螺丝和产品实物评估。

Note: For longer, thicker, non-standard screws, please provide 20 screw samples and the actual product for evaluation.



人机交互: Human-Machine Interaction

运行, 暂停, 急停, 待机, 弹出式交互信息
Pop-up interactive messages for Run, Pause, Emergency Stop, Standby, and other system states.
视觉拍照引导定位, 数据交互
Vision-based image capture for guided positioning and data interaction.
耗材寿命预警提示
Consumable life warning.



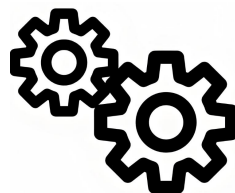
报错信息: Error message

供料器螺丝缺料, 螺丝中途抛料, 取料失败等
Feeder screw shortage, screw dropped during transfer, and pickup failure, etc.
螺丝拧紧结果: OK, 滑牙, 浮高, 认牙失败
Screw tightening results: OK, Stripped, Floating, Thread Recognition Failed.
其他: 真空异常, 螺丝刀异常, X/Y/Z 轴报错等
Others: Vacuum abnormality, screwdriver fault, X/Y/Z axis error, etc.



便捷维护: Convenient Maintenance

模块化设计, 便于升级更换
Modular design, easy to upgrade.
丰富的线上视频教程
Rich online video tutorials.
专业技术人员远程支持
Professional technical personnel remote support.



硬件配置: Hardware Configuration

汇川Ethercat总线伺服高速电机
HuiChuan EtherCAT Servo High-Speed Motor.
台湾上银谐波减速机, 丝杠, 导轨, 亚德客气动部件
HIWIN harmonic reducer, ball screw, and linear guide from Taiwan, with Airtac pneumatic components.
自研开发专用16轴控制系统
Self-developed special 16-axis control system.



设备自检: Equipment self-test

上电检查各轴伺服电机状态
Power on to check the servo motor status of each axis
传感器状态
Sensor status
机械手姿态, 位置区域, 复位状态
Manipulator attitude, position area, reset state



安全防护: Safety protection

机器人: 安全电子围栏, 底座围栏, 关节角度限值
Robot: Safety electronic fence, base fence, joint Angle limit
防护IO端口: 光栅, 门磁, 急停, 暂停, 停止
Protected IO ports: Raster, door sensor, SCram, Pause, Stop

ZMS

在线式机器人
Inline Robot

650

机器人臂展编号
Product SN

X/C/CX

X: 气吸式 Suction feed screw
C: 气吹式 Air blow feed screw
CX: 吹加吸式 Blow and
suction screw supply

30

扭力范围
Torsion range

产品型号 Product model	送钉方式 Locking screw form	臂展 Robot arm range	扭力范围 Torsion range
ZMS-650X-09	气吸式 Suction feed screw	600	1-9kgf.cm
ZMS-650X-30	气吸式 Suction feed screw	600	4-30kgf.cm
ZMS-650C-09	气吹式 Air blow feed screw	600	1-9kgf.cm
ZMS-650C-30	气吹式 Air blow feed screw	600	4-30kgf.cm
ZMS-650CX-09	吹加吸式 Blow and suction screw supply	600	1-9kgf.cm
ZMS-650CX-30	吹加吸式 Blow and suction screw supply	600	4-30kgf.cm

功能介绍: Function introduction

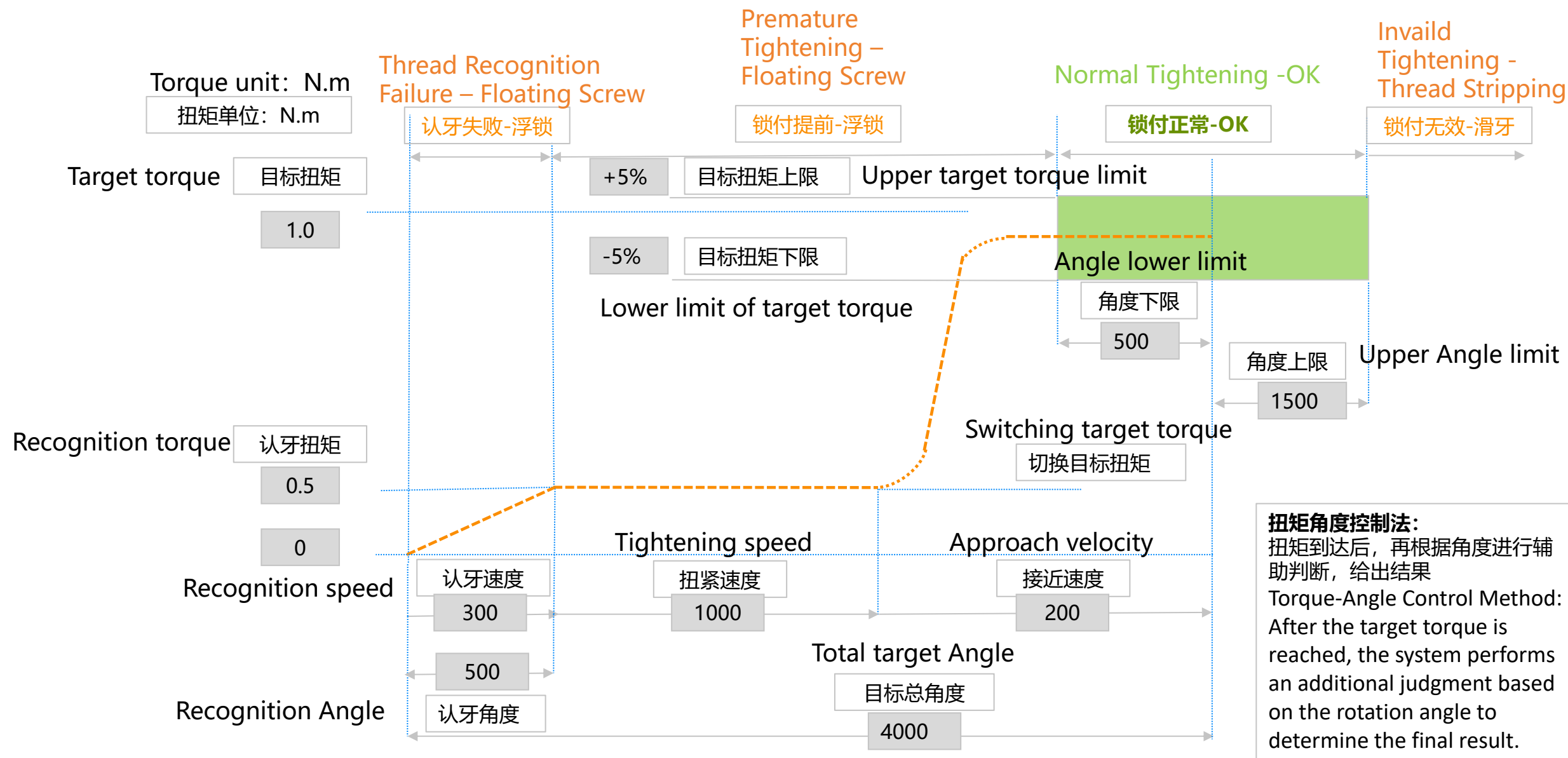
- ✧ SCARA机械手运动控制软件, 支持点, 直线运动。
- ✧ 预置锁螺钉工艺包, 兼容气吸式/气吹式/吹加吸式锁付工艺。
- ✧ 支持复锁, 废料点, 停机点, 路径点, 跟随锁付。
- ✧ 智能伺服拧紧螺丝刀, 支持多扭矩锁付, 扭矩一键校准。
- ✧ 工艺设置, 支持浮锁, 滑牙, OK智能判断。
- ✧ 水平多关节机械手机构, 轻松驾驭各种空间
- ✧ 兼容气吸/气吹式螺钉供料器
- ✧ 支持IO输入、输出、等待、逻辑控制功能;
- ✧ 支持与上位机通讯, 传递生产数据(数据和方式详询)
- ✧ 安全防护接口(急停, 光栅, 门磁, 暂停)
- ✧ 支持相机引导定位(详见第18项)
- ✧ RJ45网口1: 支持Ethercat扩展
- ✧ RJ45网口2: 支持Modbus-RTU(主机)/RS-485
- ✧ RJ45网口3: 支持EthernetTCP
- ✧ 串口: 输入25Pin, 输出15Pin;(IO数量见IO表)
- ✧ USB接口: U盘

- ✧ SCARA manipulator motion control software, support points, linear motion.
- ✧ Preset lock screw process package, compatible with air suction/air blow/blow plus suction lock process.
- ✧ Support multiple locks, scrap points, stop points, waypoints, follow the lock payment.
- ✧ Intelligent servo screw screwdriver, support multi-torque lock, torque one-button calibration.
- ✧ Process settings support intelligent detection of floating screws, thread stripping, and OK status.
- ✧ Horizontal multi-joint manipulator mechanism for easy control of various Spaces.
- ✧ Compatible with air suction/air blow screw feeder.
- ✧ Support IO input, output, waiting, logic control functions.
- ✧ Support communication with host computer, transfer production data (data and methods for details).
- ✧ Safety interface (SCram, raster, door sensor, pause).
- ✧ Support camera guided positioning (see page 18 of ppt).
- ✧ RJ45 Network port 1: Supports Ethercat extension.
- ✧ RJ45 Network port 2: Supports Modbus-RTU(host) or RS-485.
- ✧ RJ45 Network port 3: Supports EthernetTCP.
- ✧ Serial port: Input 25Pin, output 15Pin; (See IO table for the number of IO).
- ✧ USB interface: U disk.

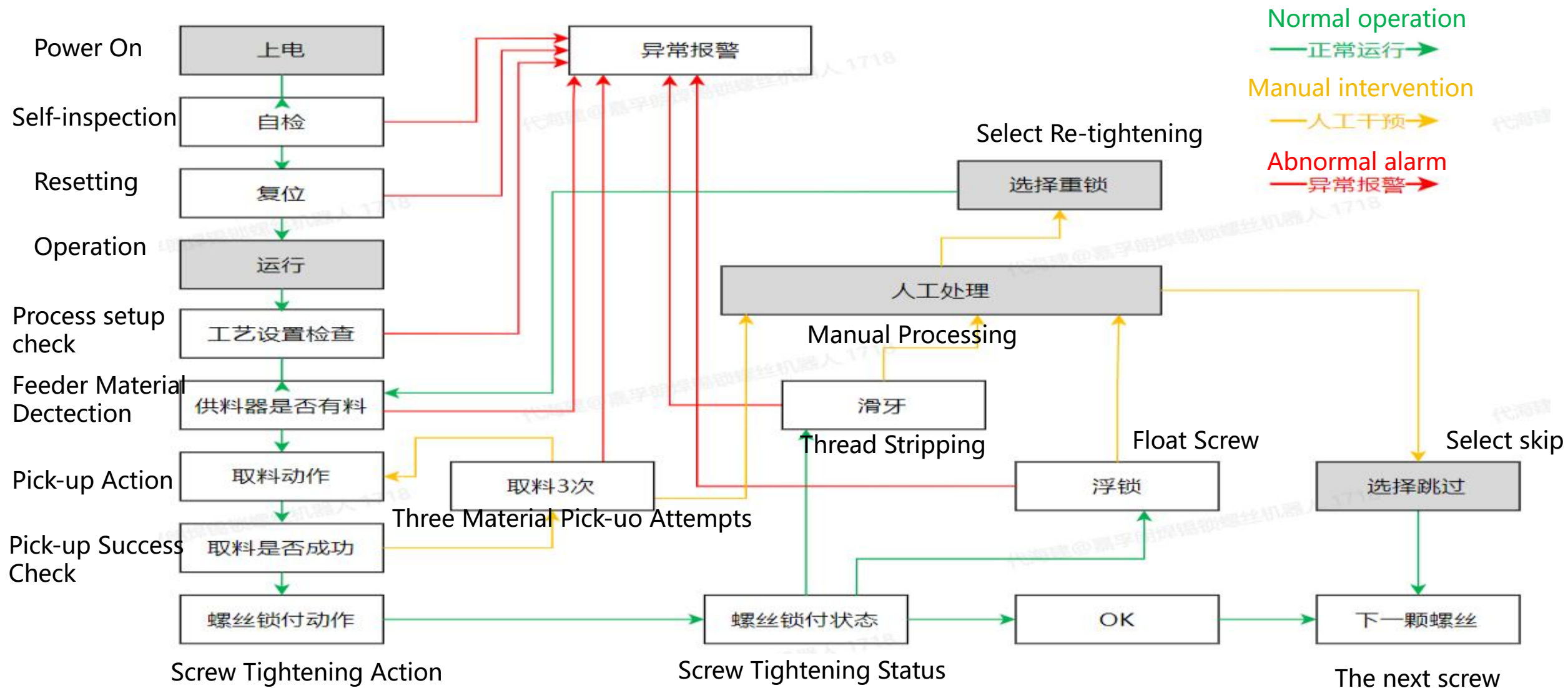
备注: *1 不同螺钉会有差异

*2 每组程序可编辑2000颗螺钉点位/Note: *1 Different screws may vary *2 Each program can edit 2000 screw points

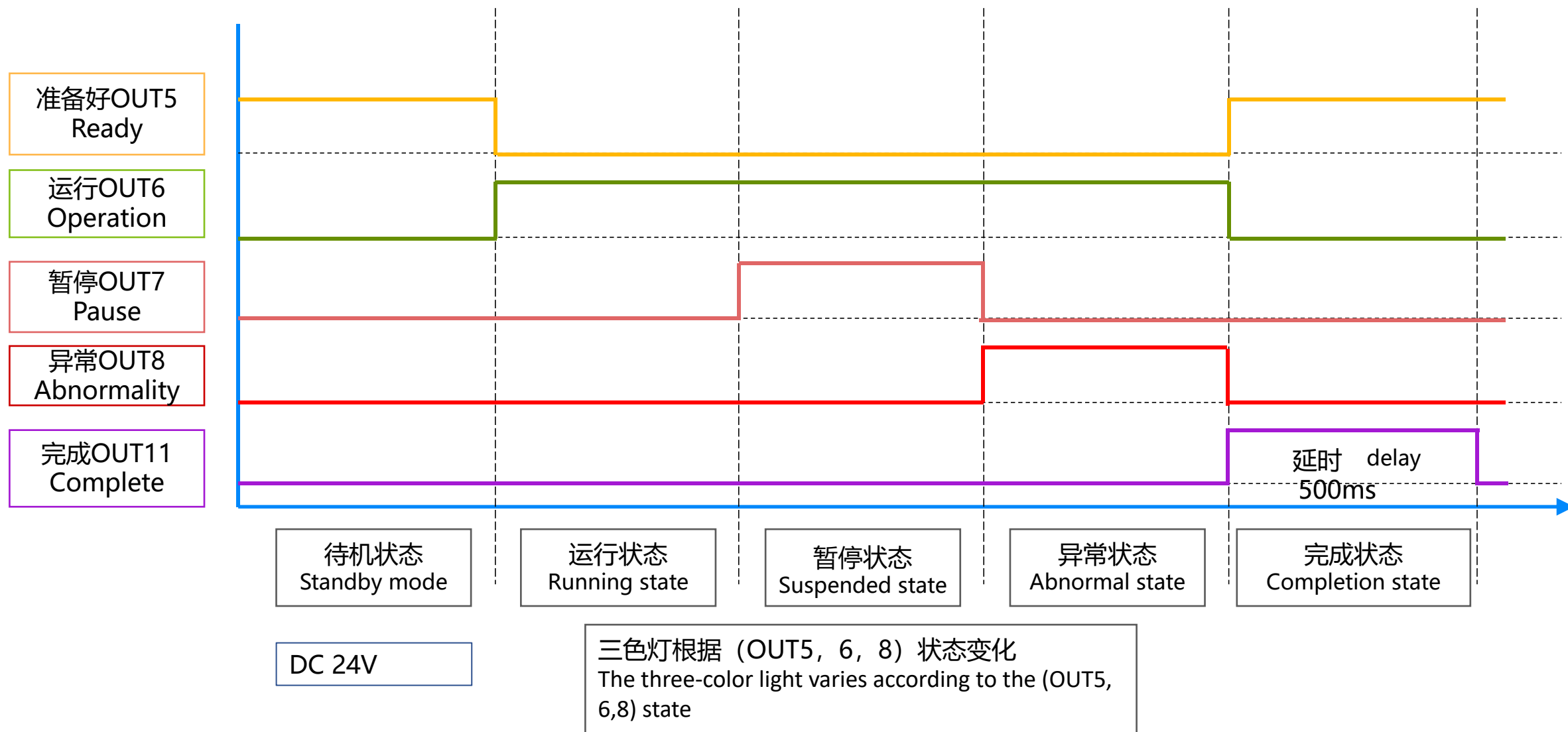
产品型号: Product model	ZMS-650X/C/CX		臂 展: Robot arm range	600mm
工作气压: Working air pressure	4-8kg/cm²		最大速度: Maximum speed	轴1/2: 350°/S、Z轴: 500mm/s
工作电压: Operating voltage	AC 210~230V		锁付效率: Lock efficiency	1.2~4.5秒/pcs*1
示教方式: Teaching mode	使用编程器示教 Teaching using a programmer		文件容量: File capacity	可预存1000组程序*2 Can prestore 1000 groups of programs *2
工作范围: Scope of work	轴 1: Axis 1	±135°	Z 轴行程: Z-axis travel	120mm
	轴 2: Axis 2	±135°	重复精度: repeatability	± 0.02mm
伺服螺丝刀参数: Servo screwdriver parameters	转 速: Spin speed	1-3000/rpm		
	扭力范围: Torsion range	1-60kgf.cm （需更换伺服螺丝刀 The servo screwdriver needs to be replaced） 扭矩精度 Torque accuracy: ±5%		
适用螺钉: Applicable screw	供螺钉方式: Screw feeding mode	X 气吸式 Suction feed screw / C 气吹式 Air blow feed screw CX 吹加吸式 Blow and suction screw supply		
	适用螺钉规格: Applicable screw specification	M0.8-M6.0 （需更换螺钉供料器 Screw feeder needs to be replaced）		
设备重量: Equipment weight	单独机器人重量≈35kg，电控箱重量≈19kg Robot unit weight: approx. 35 kg; electrical control box weight: approx. 19 kg			



08 工艺流程/Process flow

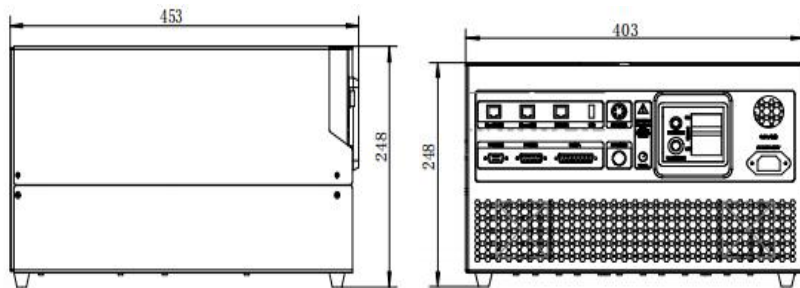


09 信号交互逻辑/interaction logicSignal





外形尺寸: W403XH248XD453mm
Boundary Dimension: W403XH248XD453mm



电控箱接口说明

Electrical control box interface description

1	Ethercat总线 EtherCAT bus	7	DO/输出(15Pin) DO / Digital Output (15-pin)
2	EthernetTCP网口 Ethernet TCP/IP port	8	DI/输入(25Pin) DI / Digital Input (25-pin)
3	Modbus-RTU/RS-485 (主机模式 Host Mode)	9	ATP2/航插2(备用) ATP2 / Aviation Connector 2 (Spare)
4	USB接口 USB interface	10	电控箱电源开关盒 Electrical control box power switch box
5	ATP1/航插1(供料器) ATP1 / Aviation Connector 1 (Screw Feeder)	11	Cable电缆口 Cable / Cable Port
6	示教器接口 (TP) Teach pendant interface (TP)	12	电源接口 (AC200V-235V) Power Input (AC200V-235V)

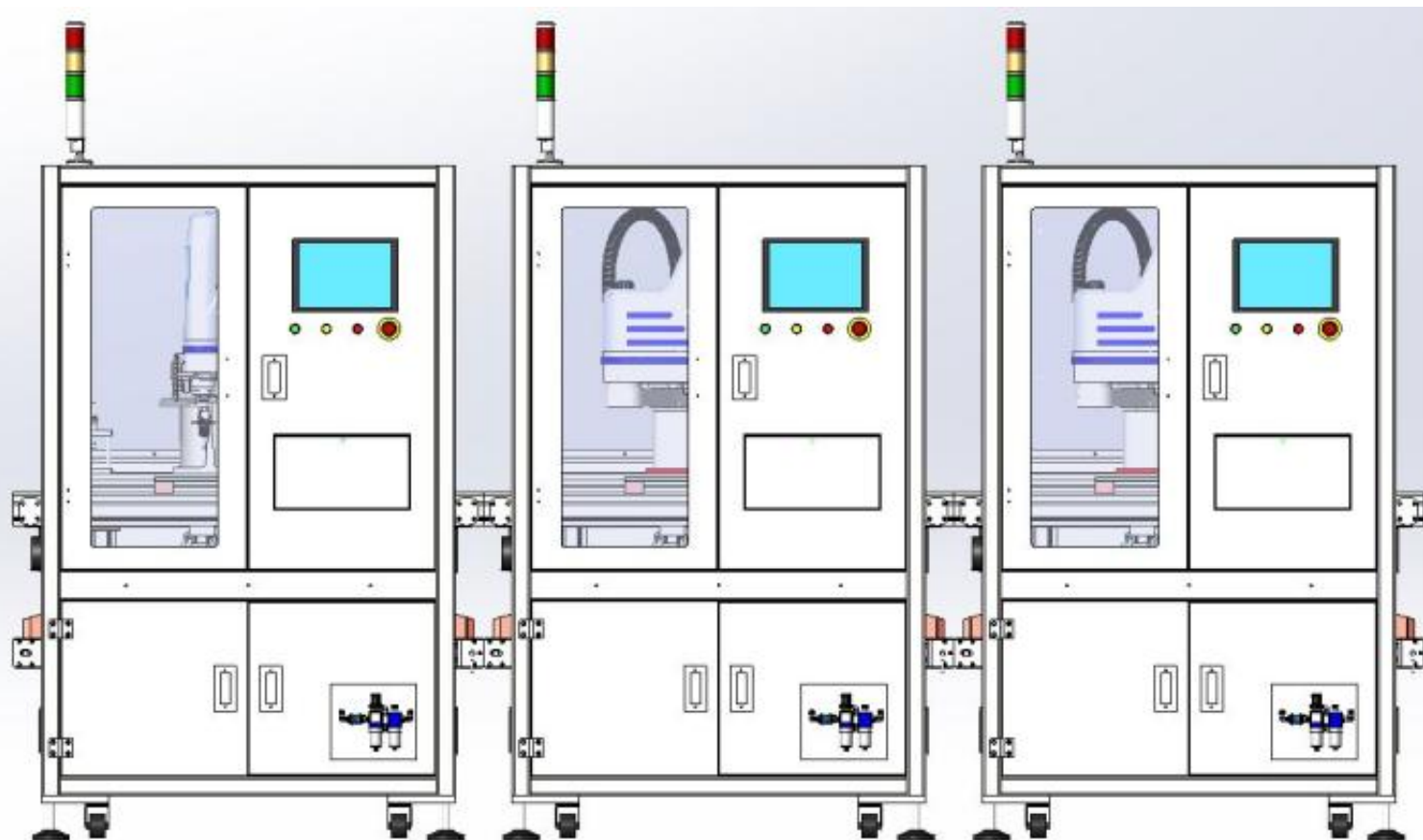
标配线束清单 Standard Wiring Harness List

序号 No	名称 Name	订货号 Order Number	数量 QTY	图片 Image
1	连接主电缆 Connecting main cable 3M	BZ230612004	1PCS	
2	25Pin线缆 25Pin cable 2M	HC3210716	1PCS	
3	15Pin线缆 15Pin cable 2M	HC3210715	1PCS	
4	电源线 Power cord 1.5M	DL3070960	1PCS	
5	示教器及连接线 Demonstrator and connecting cable	BZ2210517	1PCS	
6	供料器信号线 Screw feeder signal line 2M	/	1PCS	/

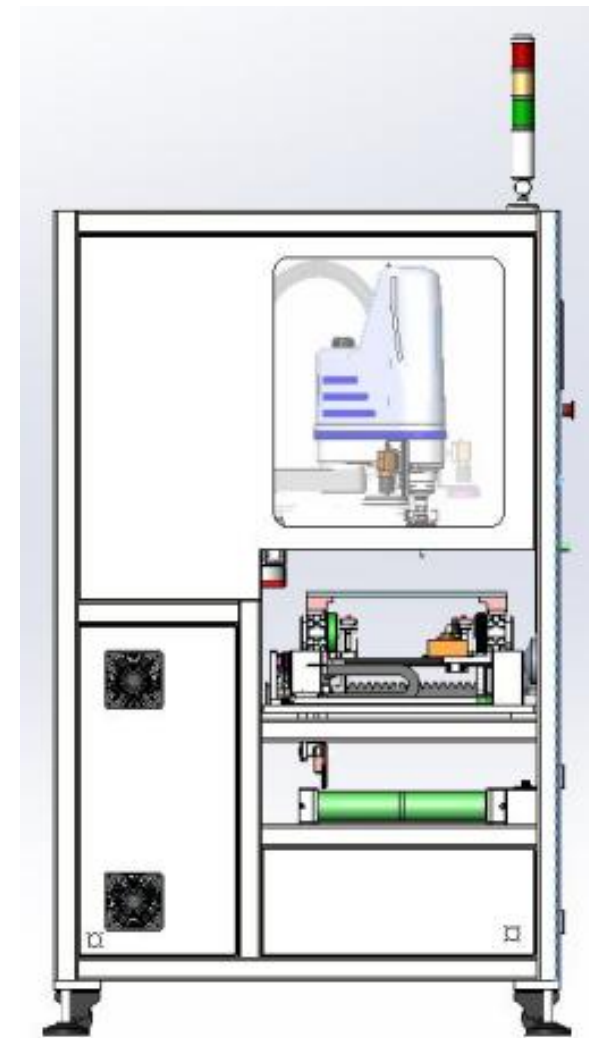
说明: 机箱电缆接口端最大直径为: 40mm, 设备电缆过孔建议开孔直径 > 45mm

Note: The maximum diameter of the cable interface port on the control cabinet is 40mm. It is recommended that the cable entry hole on the equipment be larger than 45mm in diameter.

11 外形及尺寸/Shape and size

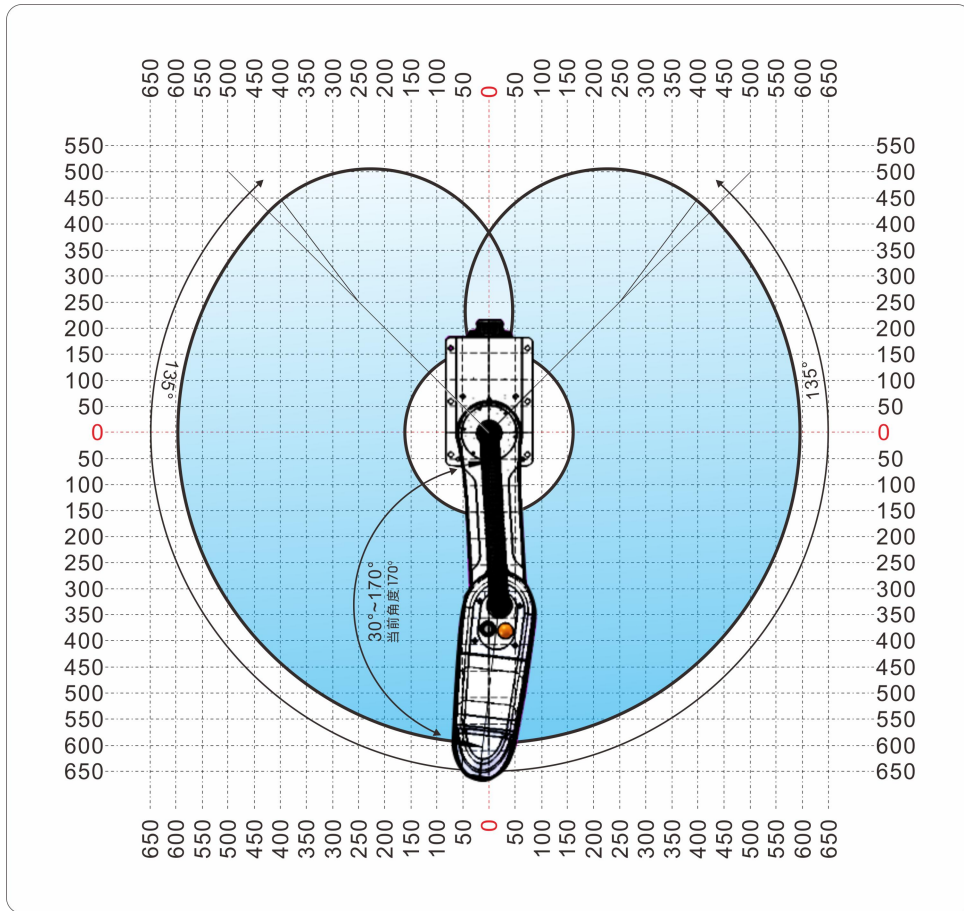


工作区域: 宽400mm, 深350mm, 高120mm
Working area: 400 mm (W) × 350 mm (D) × 120 mm (H)



外形尺寸: 宽1000mm, 深1000, 高1800
Overall dimensions: 1000 mm (W) × 1000 mm (D) × 1800 mm (H)

12 机器人行程图/Robot travel diagram



600mm臂展行程图

具体行程覆盖范围可提供3D图实际模拟

600mm arm span travel diagram

Actual simulation of the specific travel coverage can be provided with 3D maps

600mm臂展工作区域对应表 600mm arm span working area corresponding table		
Length (mm)	Width (mm)	Height (mm)
1000	160	0~120
950	199	
900	230	
850	255	
800	280	
750	300	
700	320	
650	338	
600	352	
550	366	
500	379	
450	390	
400	400	
350	408	

450mm臂展工作区域对应表 450mm arm span working area corresponding table		
Length (mm)	Width (mm)	Height (mm)
700	50	0~120
650	130	
600	150	
550	165	
500	185	
450	205	
400	220	
350	230	
300	240	
250	245	
200	260	
150	265	
100	270	

螺丝机IO端口线功能定义说明 Screw machine I/O port cable function definition

DB25输入接口/线缆定义(NPN型,共地有效) DB25 Input interface/Cable definition (NPN type, common ground valid)				DB15输出接口/线缆定义(NPN型,共地有效) DB15 Output interface/Cable definition (NPN type, common valid)				
引脚/线色 Pin/line color	IO功能 IO function	引脚/线色	IO功能 Pin/line color	引脚/线色 Pin/line color	IO功能 IO function	引脚/线色 Pin/line color		IO功能 IO function
1黑(IN1)black	自定义Custom	14棕白(IN14)Brown white	自定义Custom	1黑(OUT5)black	Ready	14浅绿Light green		COM(GND)必接
2棕(IN2)brown	自定义Custom	15 红白(IN15)Red white	自定义Custom	2棕(OUT6)brown	Running	15浅蓝Light blue		内置24V+
3红(IN3)red	自定义Custom	16橙白(IN16)Orange white	默认光栅 Default raster	3红(OUT7)red	Paused	Aviation Connector (GX16-5)		
4橙(IN4)orange	自定义Custom	17绿白(IN17)Greenish white	默认跳过 Skip by default	4橙(OUT8)orange	错误输出 Error output	1	GND	吸式供料器 Suction feeder
5黄(IN5)yellow	自定义Custom	18蓝白(IN18)Blue white	默认重锁 Default relock	5黄(OUT9)yellow	信息组合1 Information combination 1	2	有料信号输入 Feed signal input	
6绿(IN6)green	自定义Custom	19紫白(IN22)Purplish white	启动(固定) Start (fixed)	6绿(OUT10)green	信息组合2 Information combination 2	3	GND	吹式供料器 Blow feeder
7蓝(IN7)blue	自定义Custom	20红黑(IN23)Reddish black	暂停(固定) Pause (fixed)	7蓝(OUT11)blue	信息组合3 Information combination 3	4	吹料信号输出 Blow signal output	
8紫(IN8) The purple	自定义Custom	21橙黑(IN19)orange black	复位(固定) Reset (fixation)	8紫(OUT12) The purple	信息组合4 Information combination 4	5	内置 +24V	

9灰(IN9)grey	自定义Custom	22黄黑(IN24)Yellowish black	紧急停止_1 Emergency stop_1	9灰(OUT13) grey	自定义Custom	485网口(RJ45)			
10白(IN10)white	自定义Custom	23绿黑(IN24)Greenish black	紧急停止_2 Emergency stop_2	10白(OUT14) white	自定义Custom	1		5	485_B
11粉红(IN11) pink	自定义Custom	24灰黑Grayish black	COM(GND)必接	11黑白(OUT15) Black and white	自定义Custom	2		6	
12浅绿(IN12) Light green	自定义Custom	25粉红黑Pinky black	内置24V+	12棕白(OUT16) Brown white	自定义Custom	3	GND	7	
13黑白(IN13) Black and white	自定义Custom			13粉红 pink	悬空Hang in the air	4	485_A	8	

DB15输出默认信息组合(二进制)定义: 0表示OFF,1表示ON The DB15 output default message combination (binary) is defined as 0 for OFF and 1 for ON

引脚编号 Pin number	8	7	6	5	引脚编号 Pin number	8	7	6	5	引脚编号 Pin number	8	7	6	5	引脚编号 Pin number	8	7	6	5
工作完成 Job done	0	0	0	1	X轴报错 X-Axis Error	0	1	0	1	电批报错 Electrical batch error report	1	0	0	1	真空异常 Vacuum anomaly	1	1	0	1
螺钉浮锁 Screw floating	0	0	1	0	Y轴报错 Y-Axis Error	0	1	1	0	数据异常 Data exception	1	0	1	0	自定义 Custom	1	1	1	0
气缸原点 Cylinder origin	0	0	1	1	Z轴报错 Z-axis Error	0	1	1	1	工艺异常 Process anomaly	1	0	1	1	自定义 Custom	1	1	1	1
螺钉OK Screw OK	0	1	0	0	螺钉滑牙 Screw slip	1	0	0	0	供料异常 Feed anomaly	1	1	0	0	自定义 Custom	0	0	0	0

15 示教器IO信号接口/Demonstrator IO signal definition

示教器IO信号功能定义 Demonstrator IO signal definition								
IO名称 IO name	锁付定义 Lock definition	端口(引脚) Port (pin)	IO名称 IO name	锁付定义 Lock definition	端口(引脚) Port (pin)	IO名称 IO name	锁付定义 Lock definition	端口(引脚) Port (pin)
IN1	自定义Custom	25PIN(1)	IN19	复位resetting	25PIN(21)	OUT1	吸气 inspiratory	内部使用 Internal use
IN2	自定义Custom	25PIN(2)	IN20	光敏 Photosensitive signal	内部使用 Internal use	OUT2	吹料 blowing	航插1(4)
IN3	自定义Custom	25PIN(3)	IN21		内部使用 Internal use	OUT3	气缸下压 Cylinder downforce	内部使用 Internal use
IN4	自定义Custom	25PIN(4)	IN22	启动activate	25PIN(19)	OUT4	摆料气缸 Swing cylinder	内部使用 Internal use
IN5	自定义Custom	25PIN(5)	IN23	暂停Pause	25PIN(20)	OUT5	Ready	15PIN(1)
IN6	自定义Custom	25PIN(6)	IN24	急停scram	25PIN(22-23)	OUT6	Running	15PIN(2)
IN7	自定义Custom	25PIN(7)	IN25(原点1)	螺丝有料Screw stock	航插1(2)	OUT7	Paused	15PIN(3)
IN8	自定义Custom	25PIN(8)	IN26(原点2)	气缸原点Cylinder origin	内部使用 Internal use	OUT8	报警 Give an alarm	15PIN(4)
IN9	自定义Custom	25PIN(9)	IN27(原点3)	真空信号Vacuum signal	内部使用 Internal use	OUT9	信息组合1 Information combination 1	15PIN(5)
IN10	自定义Custom	25PIN(10)	IN28(原点4)		内部使用 Internal use	OUT10	信息组合2 Information combination 2	15PIN(6)
IN11	自定义Custom	25PIN(11)	IN29(原点5)		内部使用 Internal use	OUT11	信息组合3 Information combination 3	15PIN(7)

16 示教器IO信号接口/Demonstrator IO signal definition

IN12	自定义Custom	25PIN(12)	IN30(origin 6)		内部使用 Internal use	OUT12	信息组合4 Information combination 4	15PIN(8)
IN13	自定义Custom	25PIN(13)	IN31(origin 7)		内部使用 Internal use	OUT13	自定义Custom	15PIN(9)
IN14	自定义Custom	25PIN(14)	IN32(origin 8)		内部使用 Internal use	OUT14	自定义Custom	15PIN(10)
IN15	自定义Custom	25PIN(15)	IN33(origin 9)		内部使用 Internal use	OUT15	自定义Custom	15PIN(11)
IN16	光栅grating	25PIN(16)	IN34(origin 10)		内部使用 Internal use	OUT16	自定义Custom	15PIN(12)
IN17	跳过skip	25PIN(17)	IN35(origin 11)		内部使用 Internal use			
IN18	重锁relock	25PIN(18)	IN36(origin 12)		内部使用 Internal use			

17 信息交互--外部相机/Information interaction - external camera

基本流程: Basic process:

1、相机软件与机器人进行标定

The camera software is calibrated with the robot

2、相机软件为服务端，机械手为客户端，通过IP,端口，建立Socket连接

The camera software is the server side, the manipulator is the client side, and the Socket connection is established through IP and port

3、机械手运动到拍照点后、延时、发送拍照指令

After the manipulator moves to the photo point, delay and send the photo command

4、接收数据，检验数据合法性，并处理数据

Receive data, verify data validity, and process data

例: 数据交互 Example: Data interaction

发送数据: Send data: 2,1,3

接收数据: Receive data: 2,1,1,200,230,2,0,220,230,3,0,240,230.....,3

第一位: 2 开始标识符.

First: 2Start identifier.

第二位: 1为第一颗螺丝位置序号,

Number two:1 is the position number of the first screw.

第三位: 1视觉识别成功, 0视觉识别失败, (0时, 可以跳过, 可以选择原坐标继续, 根据实际情况而定)

Third place: 1 Visual recognition success, 0 visual recognition failure, (0, you can skip, you can choose the original coordinate to continue, depending on the actual situation)

第四位: X坐标

Fourth: X coordinates

第五位: Y坐标

Fifth position: Y coordinate

18 信息交互--外部相机/Information interaction - external camera

第六位：2为第二颗螺丝位置序号，

The sixth position: 2 is the position number of the second screw,

以此类推最后一位：3为结尾标识符

And so on to the last digit: 3 is the ending identifier

例：拍照形式 Example: photo form

模式1：产品整体拍照，然后识别产品螺丝孔位

Mode 1: Take a picture of the whole product, and then identify the screw hole position of the product

模式2：一次拍一个螺丝孔，或多个螺丝孔

Mode 2: Shoot one screw hole at a time, or multiple screw holes

模式3：拍对角螺孔或对角两个Mark点

Mode 3: Tap diagonal screw holes or diagonal two Mark points

满足以下条件，可根据实际需求决定是否使用相机引导： If the following conditions are met, you can decide whether to use the camera boot according to actual needs: ① 载具或产品偏差在此表内 Vehicle or product deviation is in this table ② 对于锁付要求不高产品 [扭矩偏差允许±6%] For products with low locking requirements [torque deviation allowed ±6%]	机牙螺钉规格 Machine screw specification	允许定位偏差 Allowable positioning deviation	自攻牙螺钉规格 Specifications of self tapping screws	允许定位偏差 Allowable positioning deviation
	M1 - M1.9	±0.1mm	ST1 - ST1.9	±0.2mm
	M2 - M2.5	±0.2mm	ST2 - ST2.5	±0.3mm
	M3	±0.3mm	ST3	±0.5mm
	M4	±0.4mm	ST4	±0.6mm
	M5	±0.6mm	ST5	±0.8mm
	M6	±0.8mm	ST6	±1.0mm

PC—交互

支持Scoket通讯
Support Scoket communication
坐标数据交互
Coordinate data interaction

PC - Interactive



锁螺丝机器人数据存储功能:

Locking screw robot data storage function

:数据记录:

Data records:

程序在运行的过程中, 如果有条码, 则按照条码为文件名存储每颗螺丝的锁付记录内容包括日期及时间、条码、螺丝序号、扭矩、数、结果, 当前作业员; 例如123456789.csv。

In the process of running the program, if there is a bar code, the lock record of each screw is stored according to the bar code for the file name, including date and time, bar code, screw serial number, torque, number, result, current operator; Example: 123456789.csv.

如果没有条码, 则按照设备开始启动的时间为文件名存储每颗螺丝的锁付记录, 内容包括日期及时间、条码、螺丝序号、扭矩、圈数、结果、当前作业员。例如:20240606132359.csv。

If there is no bar code, the lock record of each screw is stored in the file name according to the time when the device starts, including date and time, bar code, screw serial number, torque, number of turns, result, and current operator. For example, run 20240606132359.csv.存储格式:CSV

存储位置: **(数据存储需要电脑和对应软件支持)**

Storage location: (Data storage requires computer and corresponding software support)

自定义路径+系统年月日自动生成的文件夹

Custom path + system year, month and day automatically generated folder

MES 交互方式:

MES interaction mode:

不主动上传, 需要 MES 过来抓取。

Do not take the initiative to upload, need MES to come and grab.

抓取的一般方式:

General way to grab:

1 通过有线网络或者无线网络让 MES 系统与本设备的电脑组成局域网。

1 Through the wired network or wireless network, MES system and the computer of the equipment to form a LAN.

2 MES 根据本设备电脑数据文档存储的路径, 获取锁付数据。

2 MES obtains lock payment data according to the path of computer data document storage of the device.

3 解析并存储数据。

3 Parse and store the data.

MES对接 MES docking

数据发送方式:**Data sending method:**

- 1) 上位机为服务端, 机械手为客户端
- 1) The host computer is the server, and the manipulator is the client
- 2) 通过IP,端口, 建立Socket连接。
- 2) Establish a Socket connection through IP and port.
- 3) 发送数据, 发送执行结果记录。
- 3) Send data and send execution result records.

上传数据的形式:**Form of upload data:**

- 1) 锁付一颗螺丝, 上传一颗螺丝的数据,
- 1) Lock a screw, upload the data of a screw,
- 2) 全部锁付完成后, 一次上传多颗螺丝的数据 (受Socket传送字节的限制 建议在10颗数据以内)
- 2) After all the locks are completed, upload the data of multiple screws at a time (subject to the limitation of Socket transmission bytes, it is recommended to upload less than 10 data)

PC—交互**PC - Interactive**

支持Socket通讯
Support Socket
communication
螺丝数据上传
Screw data upload
程序切换
Program switching
启动, 复位
Start, reset
暂停, 急停
Time out. Emergency
stop

**PLC—交互****PLC - Interactive**

支持IO握手信号的处理
Supports processing of IO
handshake signals
信号方式: NPN
Signal mode: NPN
电压: DC 24V
Voltage: DC 24V
Modbus-RTU(主机模式)
Modbus-RTU(Host mode)
IO程序切换
IO program switching
启动, 复位
Start, reset
暂停, 急停
Time out. Emergency
stop

**例: 发送数据:****Example: Send data:**

2,NO-1,1,OK,200,230,15,3600,1.5,3

第一位: 2为标识符,

The first digit: 2 is the identifier,

第二位: NO-1为设备编号

Second place: NO-1 indicates the device number

第三位: 1为螺丝位置序号,

The third digit: 1 is the serial number of the screw position.

第四位: OK/NG 螺丝的锁付状态

Fourth: OK/NG screw lock status

第五位: X坐标

Fifth position: X coordinates

第六位: Y坐标

Sixth place: Y coordinate

第七位: 螺丝扭矩(精度是拧紧枪配置而定)/kg

Seventh: screw torque (accuracy is determined by tightening gun configuration)/kg

第八位: 螺丝角度(精度是拧紧枪配置而定)

Eighth: screw Angle (accuracy is determined by tightening gun configuration)

第九位: 单颗螺丝锁付时长/s

Ninth place: Single screw lock payment time /s

最后位: 3结尾标识符

Last bit: 3 end identifier

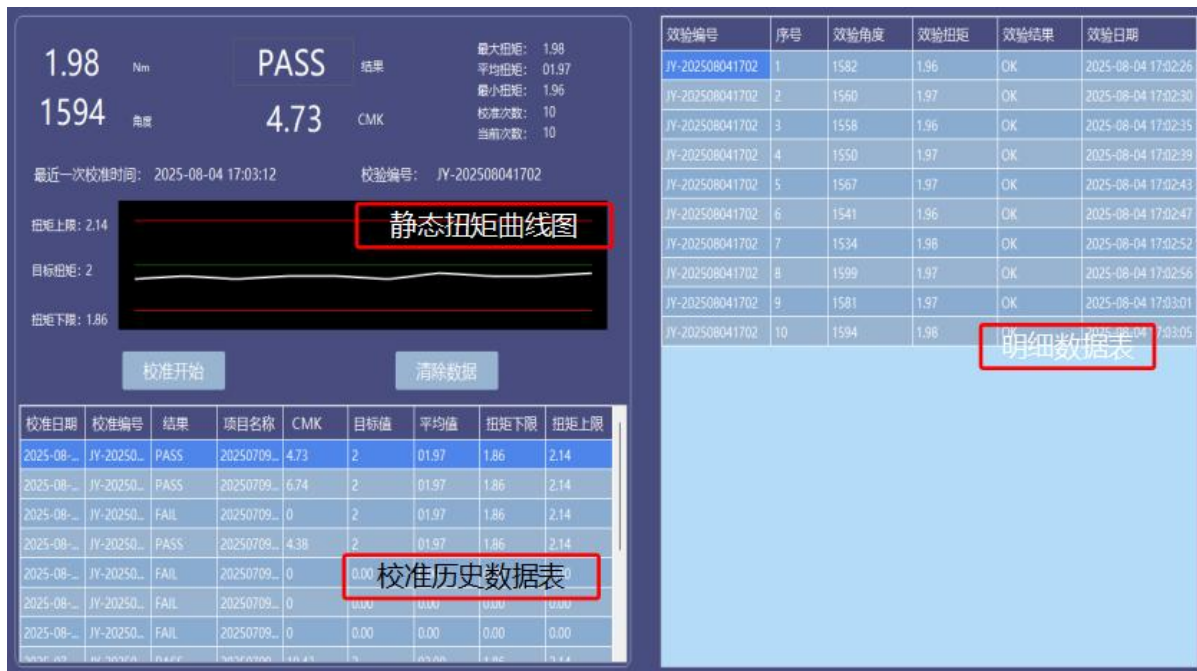
根据实际需求, 可以自定义发送数据, 需要二次开发

According to the actual demand, the data can be customized, which requires secondary development

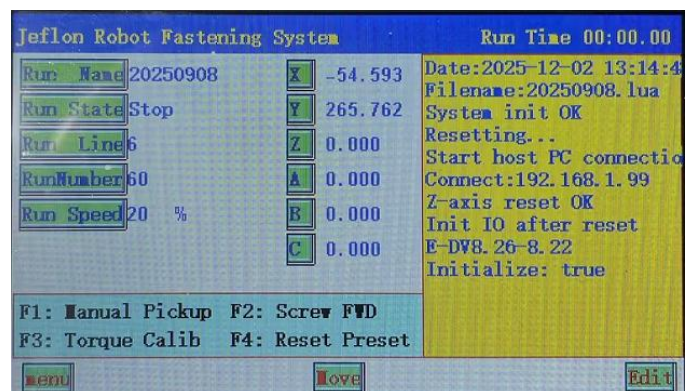
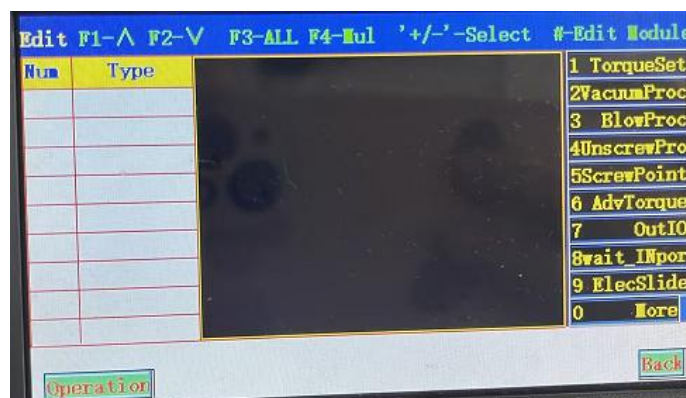
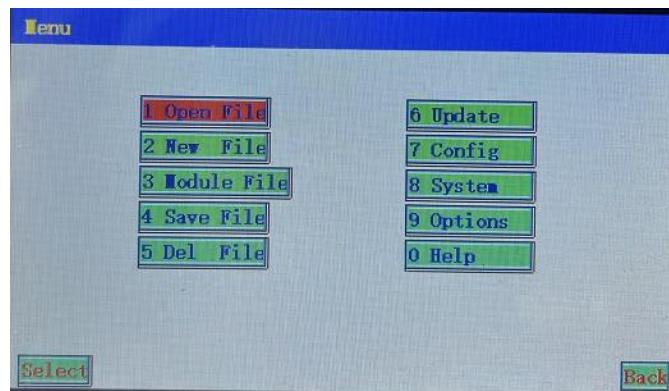
21

扭矩校验/Torque check

- 人工预先编好校准扭矩程序，选择扭矩校准程序按启动，可进行自动扭矩校验。校验后，工作人员可依据精准数据快速调整扭矩设置参数，确保生产作业精度。
- A pre-calibrated torque verification program is manually configured in advance. By selecting the torque calibration program and pressing start, the system performs automatic torque verification. After verification, the operator can quickly adjust the torque setting parameters based on the precise data, ensuring accuracy in production operations.
- 如果通过 485 通讯连接扭力测试仪，上位机上实时呈现扭矩锁付数据曲线与详细记录，便于直观监测与分析，为高效、精准的螺丝锁付作业保驾护航。
- By connecting the torque tester via RS-485 communication, the upper-level system can display real-time torque tightening data curves and detailed records. This enables intuitive monitoring and analysis, providing strong support for efficient and precise screw fastening operations.



扭力测试仪
Torsion tester



高分辨彩屏、全中文操作界面，易学易用

High resolution color screen, all Chinese operation interface, easy to learn and use

手持式编程示教器，示教轻松，便捷

Handheld programming teaching device, teaching easy, convenient

专业的工艺指令，应对各种锁螺丝需求

Professional process instructions to respond to various lock screw needs

多种指令应对，阵列，复制，平移，批量

Multiple instruction response, array, copy, pan, batch

单步执行，全自动及循环运行

Single step, full automatic and cycle operation

I/O输入输出，条件判断，逻辑

I/O input/output, conditional judgment, logic

产量设定，锁付数据实时显示

Output setting, lock payment data real-time display

脱机，独立运行

Offline, independent operation

大容量储存100个加工文件

Large capacity storage of 100 processing files

23 上位机软件/Upper computer software

上位机软件管理 Upper computer software management



扭力曲线
Torsion curve
点位分布图
Point distribution map
生产报表
Production report
锁付数据
Locked data
实时数据监控
Real-time data monitoring

24 设备应用形式/Type of equipment



开放式锁螺丝机器人
Open-type screw-locking robot



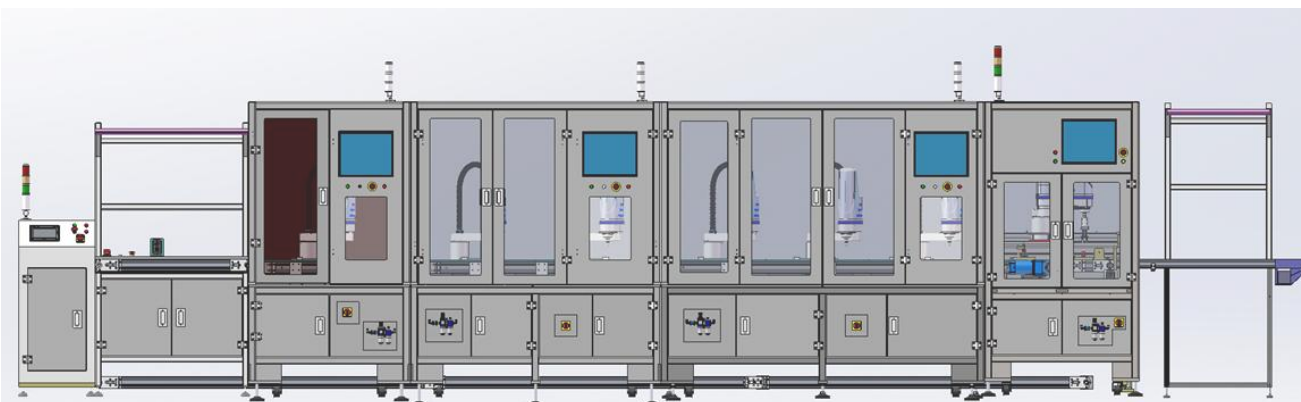
吸式锁螺丝机器人
Suction locking screw robot



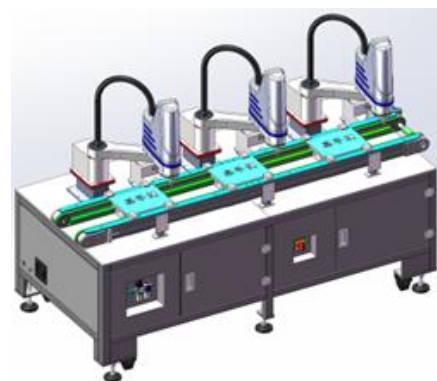
开放式双头锁螺丝机器人
Open-type 2-head screw-locking robot



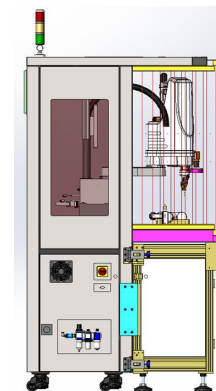
吹式锁螺丝机器人
Blow lock screw robot



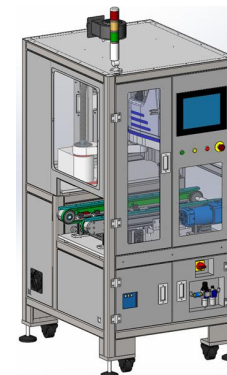
组线式
Built-up line



组合在线式
Combinatorial on-line



立式线边
Vertical edge



立式在线
Vertical on-line

设备工艺调试服务

Equipment process
commissioning services

专业技术团队服务
Professional technical team services
现场及远程技术支持
On-site and remote technical support

模块化设计
Modular design

模块化设计
Modular design
应对柔性生产需求
Responding to flexible
production needs

项目风险控制
Project risk control

协助评估验证工艺难点
Assist in evaluating and
verifying process difficulties
减少项目风险
Reduce project risk

项目周期控制
Project cycle control

方案设计周期短
The scheme design cycle is short
设备制作周期短
The production cycle of the
equipment is short

项目成本控制
Project cost control

设计制作成本节省最高达50%
Design and production cost savings
of up to 50%
售后成本节省最高可达50%
After-sales cost savings of up to
50%



26 项目设计/Project design

专业自动锁螺丝
技术顾问在线售前支持 大量行业成熟案例
提升项目评估准确性

Professional automatic locking screws
Technical advisor online pre-sales support
A large number of industry mature cases
Improve project evaluation accuracy



十余名专业应用工艺工程师，丰富的项目实战经验，提供自动锁螺丝过程的专业分析，为项目调试提供技术支持服务

More than ten professional application process engineers, rich project practical experience, provide professional analysis of automatic locking screw process, and provide technical support services for project debugging

离线、在线等多种形式的样机，随时进行产品测试，出具测试报告，为项目方案设计提供数据支持
Offline, online and other forms of prototype, product testing at any time, issue test reports, to provide data support for project design

多种类锁螺丝机构配件，包含：伺服螺丝刀、挂枪模组、供料器等。
Various kinds of locking screw mechanism accessories, including: servo screwdriver, hanging gun module, feeder, etc.

众多设计工程师
专职设计开发锁螺丝机构
工艺软件、吸嘴夹嘴
Many design engineers
Full-time design and development of lock screw mechanism
Process software, suction nozzle clamp nozzle

27 企业资质/Enterprise qualification



34 National Patented Technologies

国家专利技术34项



质量管理体系认证

软件著作权

Quality Management System Certification

Software Patent



感谢支持

Thanks for the support



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