FINGER CNC

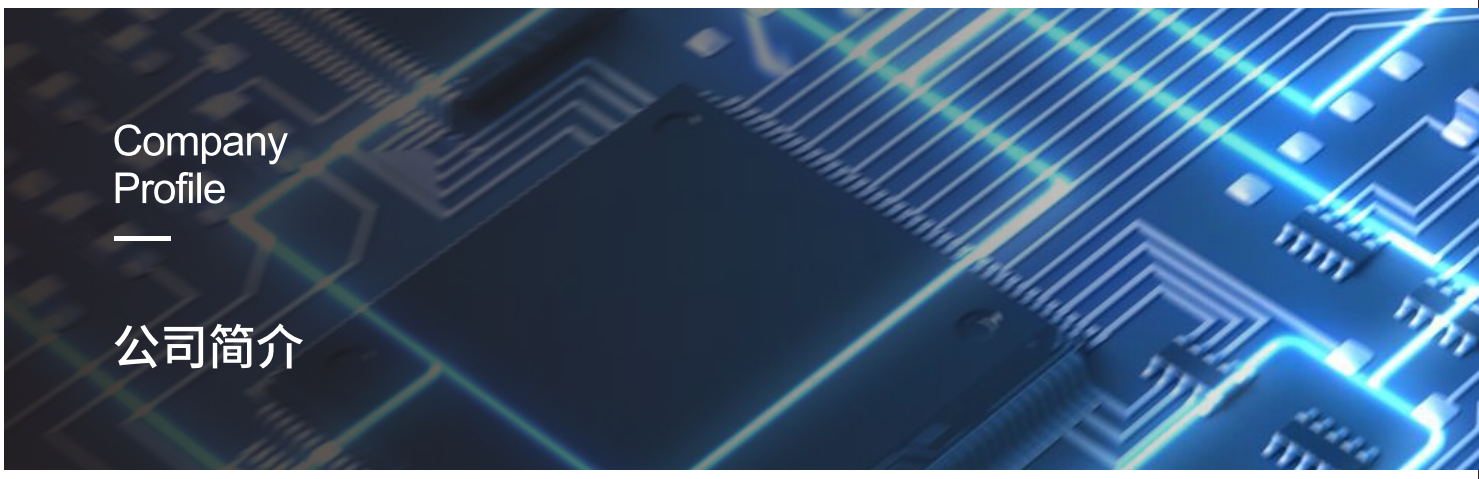
# B SERIES MILLING MACHINE CONTROLLER

—

# B系列铣床控制器

开放设计 无限可能
Open Designs Infinite Possibilities

广州亿达科技有限公司
Guangzhou Finger Technology Co., Ltd



# Company Profile

# 公司简介

广州亿达科技有限公司旨在打造性能卓越的开放式数控系统，让自动化开发变得更简单。 作为中国高性能控制器制造商之一，亿达科技专注于客戶需求，不断突破技术研发边界，形成了完善的自动化关键技术生态系统，以行业广度和专业深度为客戶提供具有差异化的解决方案和便捷服务，竭力让客戶从产品中获得助力，快速成长，产生价值。

亿达科技以技术为本，始于数控，却不止数控。坚定立足于数控技术，积极探究运动控制器、边缘计算控制器、Open CNC开发平台、CAD/CAM技术、机器视觉技术、工业物联网技术等。领先行业的Open CNC开发平台，让机器设备的电控客制化开发变得成本更低、更简单；7个核心技术内嵌（运动控制、HMI、PLC、机器视觉、CAD/CAM、物联网、3D仿真），为客戶提供最佳一站式解决方案。

凭借出色的开放式产品架构和多种技术集成能力，亿达科技在车床、铣床、磨床、弹簧机、刀具机、木工机械、绕线机、弯管机、3C电子等行业，积累了丰富的产品经验和客戶基础，并持续创造卓越。

潜心笃志，匠心创变，厚发求精，共生共赢，崇德守信是亿达科技创立以来所秉持的经营理念和企业价值。一直以来，我们坚持初心，砥砺前行，为成为世界领先的开放式数控系统品牌不断努力。让中国智造，中国服务响彻全球。

Guangzhou Finger Technology Co., Ltd. is committed to creating high-performance open CNC systems, making automation development simpler. As one of China's leading high-performance controller manufacturers, Finger Technology focuses on customer needs and continually pushes the boundaries of technological innovation. The company has built a comprehensive automation ecosystem with key technologies, offering differentiated solutions and convenient services to clients. Finger strives to help customers gain value from its products, accelerate growth, and generate substantial returns.

Finger Technology is fundamentally driven by technology, originating from CNC but not confined to it. Firmly rooted in CNC technology, the company actively explores motion controllers, edge computing controllers, Open CNC development platforms, CAD/CAM technologies, machine vision technologies, and industrial Internet of Things (IoT) technologies. Its industry-leading Open CNC development platform makes the customized development of machine equipment electrical controls more cost-effective and simpler. With seven core technologies embedded (motion control, HMI, PLC, machine vision, CAD/CAM, IoT, and 3D simulation), Finger Technology provides customers with the best one-stop solutions.

Leveraging its outstanding open product architecture and diverse technology integration capabilities, Finger Technology has accumulated extensive product experience and a solid customer base in industries such as lathes, milling machines, grinding machines, spring machines, tool machines, woodworking machinery, winding machines, pipe bending machines, and 3C electronics, continuously achieving excellence.

Devotion to excellence, innovation with craftsmanship, pursuit of precision, symbiosis and win-win, and integrity are the core business philosophy and values upheld by Finger Technology since its establishment. We have always remained true to our original intention, striving forward with determination, and continuously working towards becoming the world’ s leading open CNC system brand, ensuring that Chinese manufacturing and Chinese services resonate globally.

## 企业愿景 Company Vision

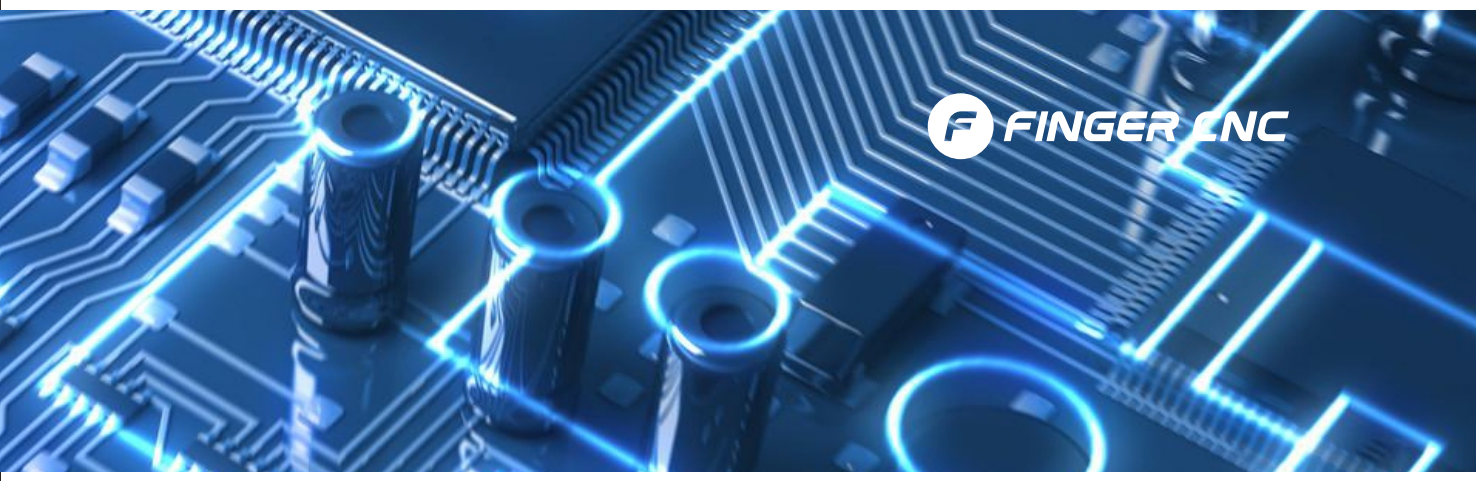
让自动化开发变得更简单　Make automation development simpler.

## 企业使命 Company Mission

构建更开放、更便捷、更包容的控制器产品，竭力让客戶从产品中获得助力，快速成长，产生价值，并成为世界领先的开放式数控系统品牌。
Build more open, convenient, and inclusive controller products. Strive to help customers gain support from products, grow rapidly, and create value. Become the world's leading brand in open CNC systems.

## 核心价值观 Core Values

| 求实诚信<br>Practical Integrity | 坚持初心<br>Stay True to the Original Intention | 破旧立新<br>Break Tradition, Embrace Newness | 追求卓越<br>Pursue Excellence | 携手并进<br>Progress Together |
|---|---|---|---|---|




# 目录
# DIRECTORY

# High-Performance CNC Controller Architecture

# 高性能CNC控制器架构


## 更先进 More Advanced

- 集成重量级或轻量级CAD/CAM图形插件
  Integrated heavyweight or lightweight CAD/CAM graphical plugins
- 全方位开放的CNC客制化设计理念
  All-round open CNC customization design concept
- 集成基于脚本的开放式机器视觉系统
  Integrated script-based open machine vision system
- MECHATROLINK-III /EtherCAT总线
  MECHATROLINK-III / EtherCAT Bus Support

## 更强大 More Powerful

- RT-Linux嵌入式控制系统平台
  RT-Linux Embedded Control System Platform
- 全编译执行模块
  Fully Compiled Execution Module
- 组态型物联网开发平台
  Configurable IoT Development Platform
- 远程协助故障诊断与升级
  Remote Assistance for Fault Diagnosis and Upgrades

## 更高效 More Efficient

- 平台化设计理念
  Platform-based Design Concept
- 64 Bit高速高精轮廓控制
  64-Bit High-Speed High-Precision Profile Control
- PREFETCH 20000节/秒
  PREFETCH 20000 blocks/second
- 对话式辅助程序编辑
  RDialog-based Assistant Program Editing

## 更泛用 More Versatile

- 支持SSI绝对型编码器
  Support for SSI Absolute Encoders
- 泛用+数控专有HMI功能
  Universal + CNC-Specific HMI Functionality
- 总线轴与泛用轴混合控制
  Hybrid Control of Bus Axes and Universal Axes
- 模块化软件设计
  Modular Software Design

## 更标准 More Standardized

- 全新Macro脚本编程IDE
  Brand new Macro scripting IDE
- 基于Java Script标准HMI脚本语言
  Based on the standard HMI scripting language of JavaScript
- 基于ModBus和OPC-UA标准外设通讯模块
  Based on the ModBus and OPC-UA standard peripheral communication modules
- 符合PLC Open IEC61131-3国际标准
  Compliance with PLC Open IEC61131-3 International Standard

## 更完善 More Comprehensive

- 最大16通道组合技术
  Maximum 16-channel combination technology
- 指令在线帮助
  Online instruction assistanc
- 全面自动化解决方案
  Comprehensive automation solutions
- 高速通道同步技术
  High-speed channel synchronization technology

# Milling Machine CNC Series Products

# 铣床系列产品

| | 400M系列 400M Series | 600M系列 600M Series |
|---|---|---|
| 产品效果<br>Product Benefits |  |  |
| 安装方式<br>Installation Method | 横式/立式<br>Horizontal/Vertical Installation | |
| 产品定位<br>Product Positioning | 标准铣床<br>Standard Milling Machine CNC | 功能型标准铣床<br>Functional Standard Milling Machine CNC |
| 适用机型<br>Applicable Machine Models | XYZ+主轴<br>XYZ+Spindle<br>XYZ+第四轴+主轴<br>XYZ+4th-Axis+ Spindle<br>XYZ+第四轴+主轴+刀库<br>XYZ+4th-Axis+ Spindle+Tool magazine | XYZ+主轴+刀库<br>XYZ+ Spindle+Tool magazine<br>XYZ+第四轴+主轴+刀库<br>XYZ+4th-Axis+Spindle+Tool magazine<br>XYZ+第四+第五轴+主轴+刀库<br>XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) |
| 常用配置<br>Common Configurations | 1通道3轴、4轴、5轴、6轴<br>1-Channel, 3-Axis,4-Axis, 5-Axis, 6-Axis | 1通道4轴、5轴、6轴、7轴<br>1-Channel, 4-Axis, 5-Axis, 6-Axis, 7-Axis |
| 最大扩展<br>Maximum Expansion | 最大扩展至32点IO<br>Expandable up to 32 I/O Points | 最大扩展至64点IO<br>Expandable up to 64 I/O Points |
| 标准配件<br>Standard Accessories | 标配5米线材，标配16输入/16输出IO板 (IO板料号：ESC-IO16)<br>Standard 5-meter Wiring, Standard 16-input/16-output I/O Module(I/O Module Part Number: ESC-IO16) | |
| 常用型号<br>Common Models | 400MA1-H、400MA2-H(V)、400MA3-H(V)、400MA4-V | 600MB2-H(V)、600MB3-H(V)、600MB4-V |

| | 600M系列 600M Series | 800M系列 800M Series |
|---|---|---|
| 产品效果<br>Product Benefits |  | |
| 安装方式<br>Installation Method | 横式/立式<br>Horizontal/Vertical Installation | |
| 产品定位<br>Product Positioning | 双通道铣床、铣床+机械手<br>Dual-Spindle Milling Machine CNC, Milling Machine with Robotic Arm | 多通道铣床、五轴加工中心<br>Multi-Channel Milling Machine CNC, Five-Axis Machining Center |
| 适用机型<br>Applicable Machine Models | 【XYZ+主轴+刀库 】*2 、【XYZ+第四轴+主轴+刀库】*2<br>(XYZ+ Spindle+Tool magazine) *2 , (XYZ+4th-Axis+Spindle+Tool magazine) *2<br>【XYZ+第四、五轴+主轴+刀库】*2<br>(XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) *2<br>XYZ+第四、五轴+主轴+刀库+机械手<br>XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine+ Robotic Arm | 【XYZ+第四、五轴+主轴+刀库】*1，含RTCP<br>(XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) *1, Contain RTCP<br>【XYZ+第四、五轴+主轴+刀库】*2，含RTCP<br>(XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) *2, Contain RTCP<br>【XYZ+第四、五轴+主轴+刀库】*3，选配RTCP<br>(XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) *3, Optional RTCP<br>【XYZ+第四、五轴+主轴+刀库】*4，选配RTCP<br>(XYZ+4th-Axis+5th-Axis + Spindle+Tool magazine) *4, Optional RTCP |
| 常用配置<br>Common Configurations | 2通道14轴<br>2-Channel, 14-Axis | 单通道6轴/7轴、2通道12轴/14轴、3通道18轴/21轴、4通道24轴/28轴<br>Single-Channel 6-Axis/7-Axis,2-Channel 12-Axis/14-Axis,3-Channel 18-Axis/21-Axis,4-Channel 24-Axis/28-Axis |
| 最大扩展<br>Maximum Expansion | 最大扩展至64点IO<br>Expandable up to 64 I/O Points | 最大扩展至128点IO<br>Expandable up to 128 I/O Points |
| 标准配件<br>Standard Accessories | 标配5米线材，标配16输入/16输出IO板 (IO板料号：ESC-IO16)<br>Standard 5-meter Wiring, Standard 16-input/16-output I/O Module(I/O Module Part Number: ESC-IO16) | |
| 常用型号<br>Common Models | 600MB2-H(V)、600MB3-H(V)、600MB4-V | 800MC2-H(V)、800MC3-H(V)、800MC4-V |

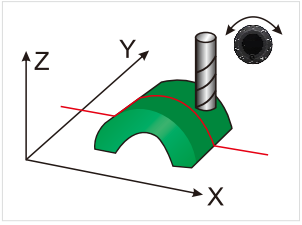
# Special Features

# 特色功能

## 手轮预测功能 Handwheel Prediction Functionality

试加工过程中，可使用手轮前进后退控制机台加工的速度与方向，回退功能有效避免因编程错误而导致的撞机。

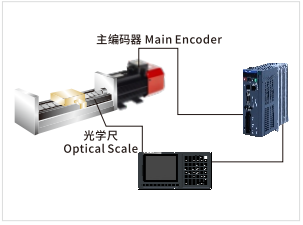
During the trial machining process, the handwheel can be used to control the speed and direction of the machine's operation by moving it forward or backward. The ability to move the machine in reverse effectively prevents collisions caused by programming errors.




## 全闭环控制 Closed-Loop Control

由系统整合电机编码器回授信号和光栅尺回授信号进行实时补偿，降低机械间隙的影响，确保机械终端定位精度。

Closed-Loop Control is achieved by integrating real-time compensation using feedback signals from motor encoders and linear scales. This compensation reduces the impact of mechanical backlash and ensures precise positioning accuracy at the machine's end point.




## 多样化刀库模块 Diversified Tool Magazine Module

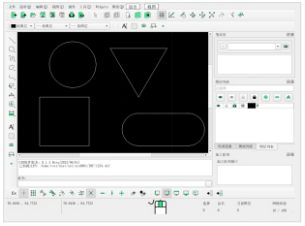
控制器可对接多种型号刀库，完成各种不同加工需求，大幅缩短加工时程，提高加工效率。

The controller can interface with various types of tool magazines, catering to different machining requirements. This significantly reduces machining time and improves machining efficiency.

## CAD智能绘图模块 CAD Intelligent Drawing Module

可进行CAD图形绘制，绘制图形快捷方便，操作简单，同时对接CAM模块可以完成各类加工任务，提高编程效率。

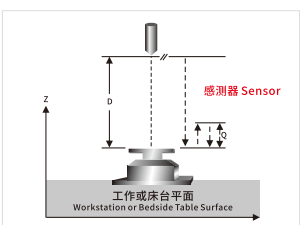
The system allows for CAD graphic drawing, making the process quick and convenient with simple operations. Additionally, by interfacing with the CAM module, it can complete various machining tasks, thereby improving programming efficiency.



## 自动刀长测量 Automatic Tool Length Measurement

通过G31功能并搭配外部传感器实现刀长自动测量，通过模板程序补偿到刀长补正。频率响应速度高达20kHz，为高速检测功提供解决方案，大幅减少因响应速度慢、重复精度低导致的检测误差。

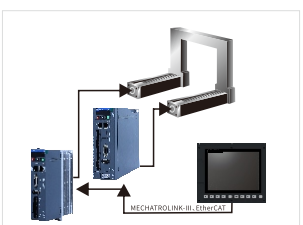
By utilizing the G31 function along with external sensors, automatic tool length measurement can be achieved. The measured data is then used to compensate for tool length through template program adjustment. With a high-frequency response speed of up to 20kHz, it provides an effective solution for high-speed detection applications, significantly reducing measurement errors caused by slow response speed and low repeatability accuracy.




## 龙门同步轴控制 Gantry Synchronous Axis Control

龙门同步轴功能可同时进行多对进给轴无机械偏差的位移，系统能快速处理同步轴的闭回路控制，同时支持SSI等绝对值串列总线编码器，提高龙门同步控制的性能和效率。

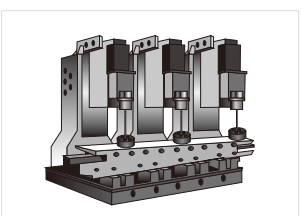
Gantry synchronous axis functionality allows for simultaneous displacement of multiple pairs of feed axes without mechanical deviation. The system can quickly handle closed-loop control of synchronous axes and also supports absolute serial bus encoders such as SSI, which enhances the performance and efficiency of gantry synchronous control.




## 多主轴攻牙 Multi-Spindle Tapping

高阶型控制器最大可以支持到10个高速攻牙模组，达到单机多产的效果。对应相同程序，根据需求可以指定攻牙主轴，以及组合攻牙，从而提高生产效率。

The advanced-type controller supports up to 10 high-speed tapping modules, enabling the capability of multi-tasking on a single machine. With the same program, it is possible to specify the tapping spindle and combine tapping operations based on specific requirements, thereby enhancing production efficiency.



## CAM智能编程模块 CAM Intelligent Programming Module

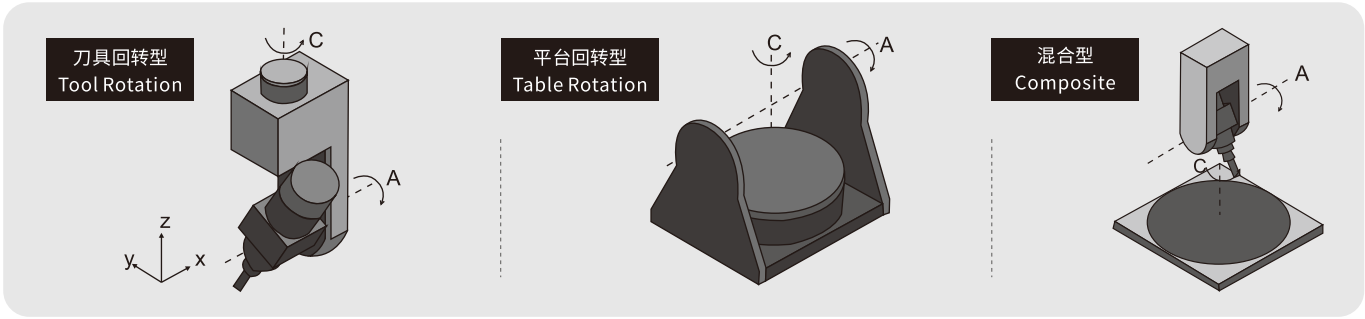
可通过CAD图形与机床系统互连，并能以对话式对图形进行编辑。将2D图形导入系统，通过一定的编辑后生成相应的G代码从而达到铣形、铣槽、钻孔、攻牙的目的。

The system can be linked to the machine tool system through CAD graphics and enables interactive editing of the graphics using dialog-based tools. 2D graphics can be imported into the system, and after appropriate editing, the system generates corresponding G-codes for milling, slotting, drilling, and tapping operations.

# Five-Axis Simultaneous Machining

# 五轴五联动

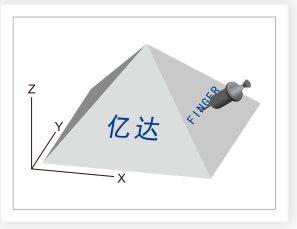
## ▶▶ 支持各种类型的五轴补正机构 Support for various types of five-axis compensation mechanisms




## ▶▶ 倾斜平面加工 Tilted Plane Machining

针对模具与工作台不平导致的工件倾斜，或者在倾斜平面上直接加工规划路径等。按照平面加工设计程序，通过参数设置倾斜角度，即可完成倾斜平面加工。以方便在倾斜平面上加工平面CNC程序，或者解决因为机台装配、装夹倾斜带来的加工程序无法共用的问题。

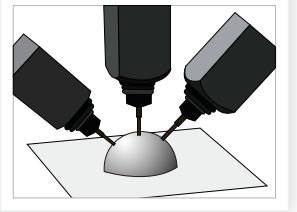
For addressing workpiece inclination caused by unevenness between the mold and the worktable, or for directly planning paths for machining on tilted planes. By following the design program for plane machining and setting the tilt angle as a parameter, tilted plane machining can be achieved. This facilitates the creation of CNC programs for machining on tilted planes or resolves the issue of incompatible machining programs due to machine assembly or tilted workpiece clamping.




## ▶▶ 刀尖点控制——RTCP Tool Center Point Control - RTCP

控制器提供三维刀长补偿，客户只需在CAM软件上计算工件轮廓坐标点，系统会自动计算刀尖点位置，保证刀尖点在加工轮廓曲面上。

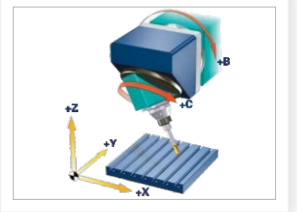
The controller provides three-dimensional tool length compensation, where the customer only needs to calculate the coordinates of the workpiece contour points in CAM software. The system will automatically calculate the tool center point position to ensure that the tool center point remains on the machining contour surface.



## ▶▶ 五轴机床自动测量 Five-Axis Machine Automatic Measurement

1. 配合对刀仪，自动测量刀长；
2. 配合触发式测头，自动测量旋转中心，旋转矢量；
3. 配合五轴RTCP功能的旋转矢量补偿，能有效解决旋转轴倾斜导致的加工精度不足。

1. In conjunction with a tool presetter, automatic measurement of tool length can be performed.
2. With a trigger-based probe, automatic measurement of rotation center and rotation vector can be achieved.
3. With the combination of five-axis RTCP functionality and rotation vector compensation, it effectively addresses the issue of inadequate machining accuracy caused by the inclination of the rotary axis.




## ▶▶ 加工产品展示 Product Showcase



# High-Speed High-Precision Motion Control

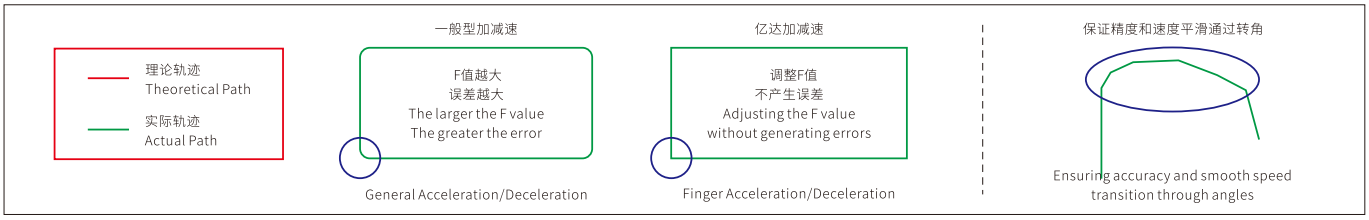
# 高速高精运动控制

精 准 PRECISION | 稳 定 STABILITY | 智 能 INTELLIGENT | 先 进 ADVANCED

## ▶▶精准的转角控制 Precise Angle Control

在插补运动中，系统使用HLAT速度前瞻技术，对转角进行前瞻关联型的速度控制，选取最合理转角速度，保证精度的同时也保证了速度的平稳性，减少对机台的冲击。

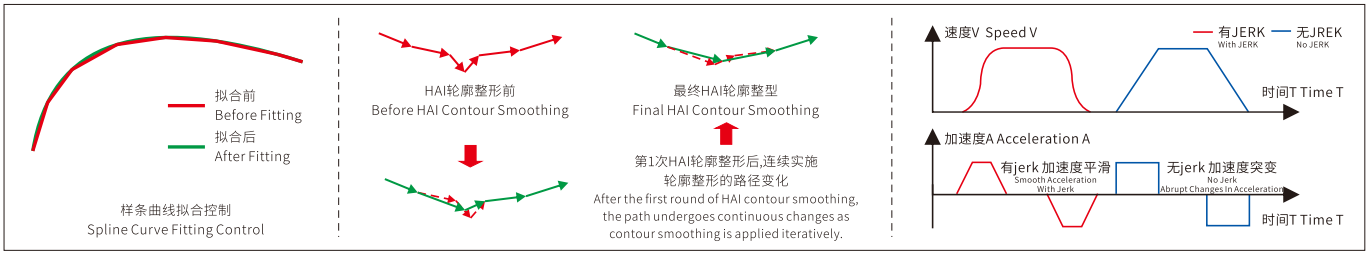
In interpolation motion, the system utilizes HLAT (High-Level Accuracy Tracking) velocity lookahead technology to implement lookahead-based velocity control for angles. By selecting the most suitable angular velocity, it ensures both accuracy and smooth speed characteristics, thereby reducing impact on the machine and minimizing disturbances.




## ▶▶HAI轮廓整型 HAI (High-Accuracy Interpolation) Contour Smoothing

CAM软件产生NC文件时，由于计算精度误差，会产生一些极其微小的单节，HAI轮廓整型会根据线段特性，自动进行策略选择，重新整理轮廓，直到符合插补的要求，并且保证精度。

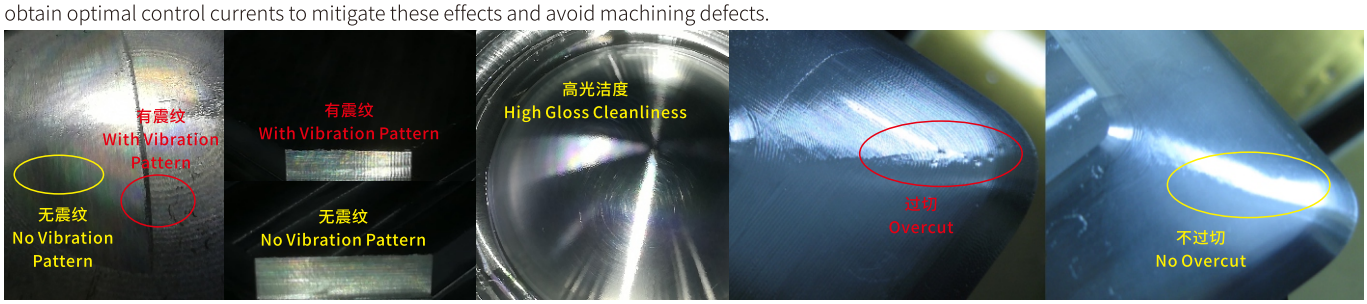
During the generation of NC files by CAM software, due to computational precision errors, there may be extremely small line segments. HAI contour smoothing automatically selects strategies based on the characteristics of the line segments, reorganizes the contour, and ensures compliance with interpolation requirements while maintaining precision.




## ▶▶智慧型解决震纹、过切、鱼尾纹 Intelligent Solution for Chatter, Overcut, and Fish-scale Marks

由于机床装配精度、热变形、伺服响应、NC指令等等，其中一项或几项会导致震纹、过切、鱼尾纹等现象，通过系统和驱动器混合计算，可以获得最优控制电流，避免加工缺陷。

Due to factors such as machine tool assembly precision, thermal deformation, servo response, NC instructions, and others, one or several of these factors can lead to phenomena such as chatter, overcut, and fish-scale marks. Through a combination of system and driver calculations, it is possible to obtain optimal control currents to mitigate these effects and avoid machining defects.




## ▶▶NURBS样条曲线拟合 NURBS curve fitting

在微小线段轮廓控制时，自动对符合条件的微小线段进行NURBS样条拟合，提高插补速度和工件表面品质。

During small line segment contour control, automatically perform NURBS spline fitting on eligible small line segments to enhance interpolation speed and workpiece surface quality.

## ▶▶恒JERK加速度平滑 Smooth Acceleration with Constant JERK

在加减速控制中，对加减速进行恒JERK控制，减少因为加减速对机台造成的冲击，对改善工件表面加工发挥关键作用。

In acceleration and deceleration control, applying constant JERK control helps minimize the impact on the machine caused by acceleration and deceleration, playing a key role in improving the surface quality of the workpiece during machining.

# Application Examples

# 应用案例

## ▶标准铣床方案 Standard milling machine solution


01

※ 400M高速高精控制器
400M High-Speed High-Precision Controller

※ 亿达全总线伺服主轴
Finger CNC All-Bus Servo Spindle

※ 亿达24bit高性能伺服驱动
Finger CNC 24-Bit High-Performance Servo Drive

※ 高速主轴定位、高速刚性攻牙
High-Speed Spindle Positioning,High-Speed Rigid Tapping

※ 攻牙在线监控与调谐
Online Monitoring and Tuning of Tapping Process

## ▶功能型铣床方案 Functional Milling Machine Solution


02

※ 600M高速高精控制器
600M High-Speed High-Precision Controller

※ 高度整合周边伺服
Highly Integrated Peripheral Servos

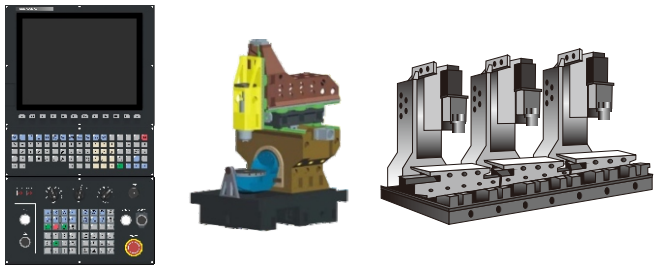
※ 支持速度控制全闭环、总线控制全闭环
Support speed control full closed loop, bus control full closed loop

※ 兼容第四轴、第五轴DD马达
Compatibility with Fourth and Fifth Axis DD Motors

※ 高速高精功能
High-Speed High-Precision Functionality

※ 轴向光学尺、倾斜平面功能
Axial Optical Scale, Tilted Plane Functionality

## ▶五轴加工中心、多通道多主轴方案 Five-axis Machining Center, Multi-Channel Multi-spindle Solutions



03

※ 800M高速高精控制器
800M High-Speed High-Precision Controller

※ RTCP功能、支持扩展到4通道4组RTCP
RTCP Functionality, Support expansion to 4 channels and 4 groups of RTCP

※ 各通道独立编程、独立加工、独立调试
Independent Programming, Processing, and Debugging for Each Channel

※ 通道交互功能
Channel Interchangeability Function

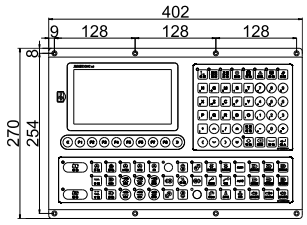
※ 高速高精功能
High-Speed High-Precision Functionality

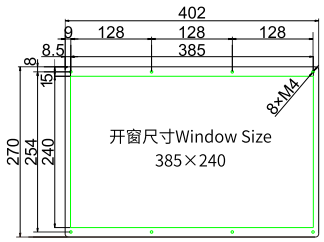
# Appearance Display
# Installation Dimensions

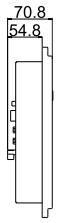
# 外观展示及安装尺寸

## ▶7寸铣床控制器 7-inch Milling Machine Controller

产品型号：400MA1-H（7寸横式） Product Model: 400MA1-H (7-inch Horizontal Type)

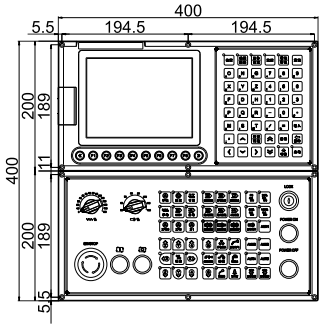


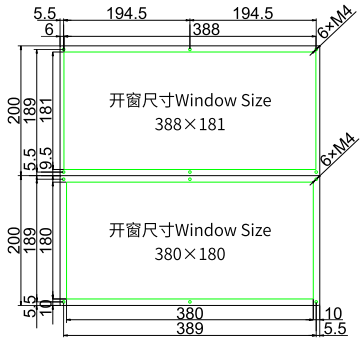



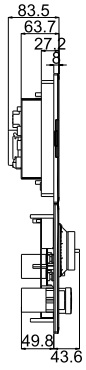




## ▶8寸铣床控制器 8-inch Milling Machine Controller

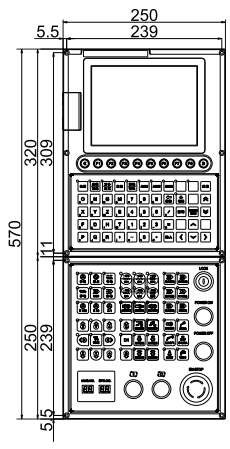
产品型号：400MA2-H/600MB2-H/800MC2-H（8寸横式） Product Model: 400MA2-H/600MB2-H/800MC2-H (8-inch Horizontal Type)

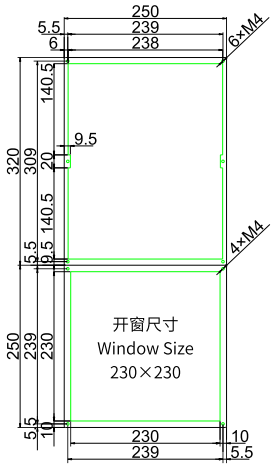


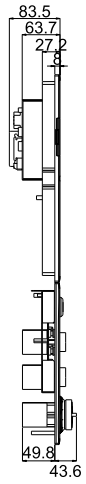




产品型号：400MA2-V/600MB2-V/800MC2-V（8寸立式） Product Model: 400MA2-V/600MB2-V/800MC2-V (8-inch Horizontal Type)

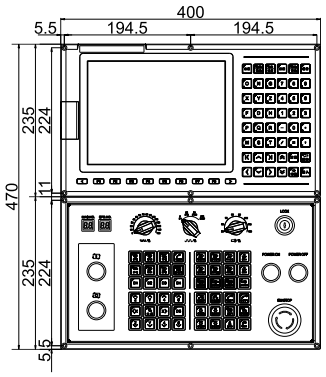


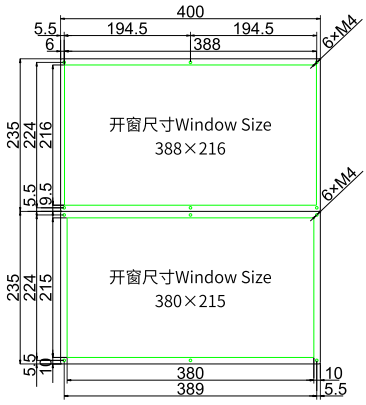



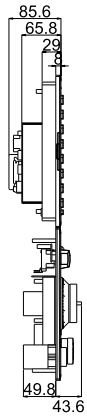



## ▶10.4寸铣床控制器 10.4-inch Milling Machine Controller

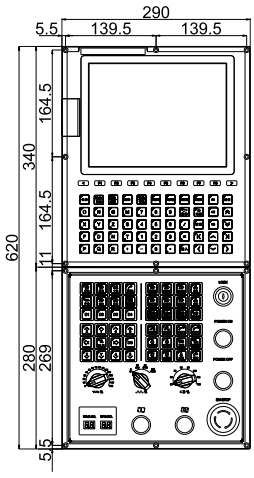
产品型号：400MA3-H/600MB3-H/800MC3-H（10.4寸横式）Product Model: 400MA3-H/600MB3-H/800MC3-H (10.4-inch Horizontal Type)

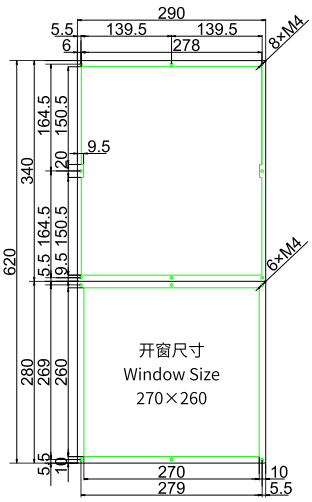


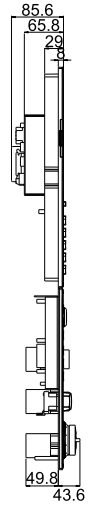




产品型号：400MA3-V/600MB3-V/800MC3-V（10.4寸立式）Product Model: 400MA3-V/600MB3-V/800MC3-V (10.4-inch Horizontal Type)

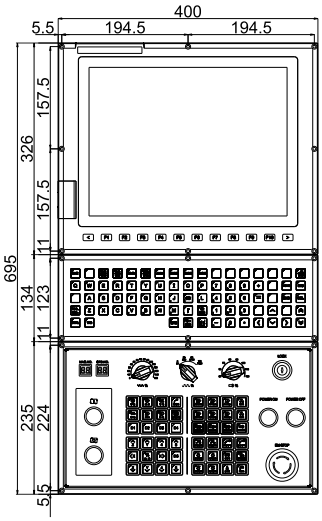


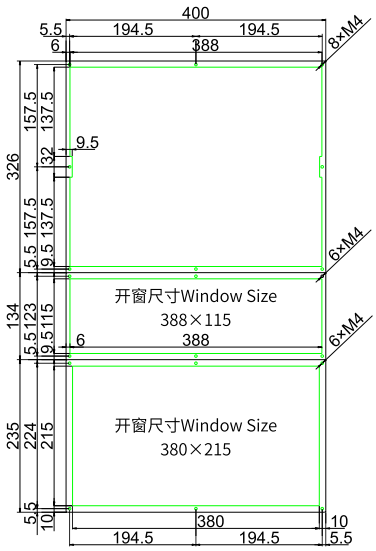



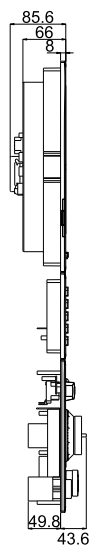




## ▶15寸铣床控制器 15-inch Milling Machine Controller

产品型号：400MA4-V/600MB4-V/800MC4-V（15寸立式）Product Model: 400MA4-V/600MB4-V/800MC4-V (15-inch Horizontal Type)



# Product Naming Rules and Accessory Specifications

# 产品命名规则及配件规格

## ▶▶产品料号 Product Part Number

**B**[1] **0x**[2] – **T**[3] **X3**[4] **A**[5] **H**[6] – **M**[7] **200**[8] – **F0**[9] **A**[10] **A1**[11] **P0**[12]

| | | | |
|---|---|---|---|
| 1 | 产品系列 Product Series | B: B系列 B: B Series | |
| 2 | 通讯方式 Communication Method | 00: N0 00:NO | 01: EtherCAT 01:EtherCAT<br>02: Mechatrolink-III 02:Mechatrolink-III<br>... 05: 移动式EtherCAT控制器 05:Mobile EtherCAT Controller |
| 3 | 触控标示 Touch Control Indication | N: 无触控 N: No Touch Control | T: 电阻屏 T: Resistive Touch Screen<br>C: 电容屏 C: Capacitive Touch Screen |
| 4 | 系统屏幕尺寸 System Screen Size | X0: 无屏幕 X0: No Screen<br>X1: 7寸 X1: 7-inch Screen<br>X2: 8寸 X2: 8-inch Screen<br>X3: 10.1寸 X3: 10.1-inch Screen<br>X4: 10.4寸 X4: 10.4-inch Screen<br>X5: 15寸 X5: 15-incah aScreen<br>X6: 15.6寸 X6: 15.6-inch Screen<br>X7: 17寸 X7: 17-inch Screen<br>X8: 19寸 X8: 19-inch Screen<br>X9: 21.5寸 X9: 21.5-inch Screen | |
| 5 | 系统款式 System Style | A: A系列塑胶面板 A: A Series Plastic Panel<br>B: A系列铁壳 B: A Series Metal Enclosure<br>C: A系列铝合金面板 C: A Series Aluminum Alloy Panel<br>A1:B系列塑胶面板 A1: B Series Plastic Panel<br>B1: B系列铁壳 B1: B Series Metal Enclosure<br>C1: B系列铝合金面板 C1: B Series Aluminum Alloy Panel<br>A2:B系列塑胶面板(车铣新面膜) A2: B Series Plastic Panel (Lathe-Mill New Faceplate)<br>B2:B系列铁壳(车铣新面膜) B2: B Series Iron Shell (Lathe-Mill New Faceplate)<br>C2:B系列铝合金面板(车铣新面膜) C2: B Series Aluminum Alloy Panel (Lathe-Mill New Faceplate) | |
| 6 | 系统按键样式 System Button Style | N: 无按键 N: No Buttons<br>H: 横式 H: Horizontal<br>V: 立式 V: Vertical<br>C: 铁箱 C: Iron Enclosure | |
| 7 | 行业代码 Industry Code | T:车床 T:Lathe<br>M: 铣床 M: Milling<br>W: 木工 W: Woodworking<br>SP: 弹簧机 SP: Spring Machine<br>ST:紧凑型车床 ST:Compact Lathe | |
| 8 | 行业子代码 Industry Subcode | T2: 200车床 T2: 200 Lathe<br>M2:200铣床 M2: 200 Milling Machine<br>SP1:弹簧机 SP1: Spring Machine<br>ST4:紧凑型400车床 ST4: Compact 400 Lathe | |
| 9 | 泛用轴数量 General Axis Quantity | F0:无泛用轴(ECAT) F0: No General-Purpose Axis (ECAT)<br>F1: F1:<br>F2:含2个泛用轴(MIII) F2: Includes 2 General-Purpose Axes (MIII) | |
| 10 | 通道数 Number of Channels | A: 1通道 A: 1-Channel<br>B: 2通道 B: 2-Channel<br>C: 3通道 C: 3-Channel<br>D: 4通道 D: 4-Channel<br>E: 5通道 E: 5-Channel<br>F: 6通道 F: 6-Channel<br>G: 7通道 G: 7-Channel<br>H: 8通道 H: 8-Channel<br>L: 9通道 L: 9-Channel<br>J: 10通道 J: 10-Channel<br>K: 11通道 K: 11-Channel<br>... Z: 26通道 Z: 26-Channel | |
| 11 | 轴数 Number of Axes | A1: 1轴 A1: 1-Axes<br>A2: 2轴 A2: 2-Axes<br>...<br>B0: 10轴 B0: 10-Axes<br>B1: 11轴 B1: 11-Axes<br>C0: 20轴 C0: 20-Axes<br>C1: 21轴 C1: 21-Axes<br>M0: 120轴 M0: 120-Axes<br>M1: 121轴 M1: 121-Axes<br>...<br>M8: 128轴 M8: 128-Axes<br>... | |
| 12 | 辅助面板信息 Auxiliary Panel Information | P0:不带辅助面板 P0: Without Auxiliary Panel<br>P1:带辅助面板 P1: With Auxiliary Panel | |

## ▶▶产品型号 Product Model

**400 M A 1 - H**

- 【产品规格】H:横式 V:立式 [Product Specifications] H: Horizontal V: Vertical
- 【屏幕大小】1:7寸 2:8寸 3:10.4寸 4:15寸 [Screen Size] 1: 7-inch 2: 8-inch 3: 10.4-inch 4: 15-inch
- 【功能类型】A:标准 B:增强 C:特殊 [Function Type] A: Standard B: Enhanced C: Special
- 【行业类型】M:铣床 T:车床 [Industry Type] M: Milling Machine T: Lathe
- 【产品系列】400系列 600系列 800系列 [Product Series] 400 Series 600 Series 800 Series

### EtherCAT/16IN_16OUT/IO模块 EtherCAT/16IN_16OUT/IO Module

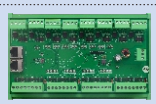
**▶ESC-IO16**

※ 长105*宽122*高55(mm)
※ (L)105mm*(W)122mm*(H)55mm

※ DC24V 电源输入(5.08 PITCH)
※ 提供电源反接保护
※ 16 INPUT / 16 OUTPUT
※ 单点最大输出2A
※ 可拆卸式欧规5.08 PITCH接线端子
※ INPUT(8PIN)/OUTPUT(4PIN) 防呆设计

※ DC24V power supply input (5.08 PITCH)
※ Provides reverse power protection
※ 16 INPUT / 16 OUTPUT
※ Single-point maximum output of 2A
※ Removable European standard 5.08 PITCH terminal block
※ INPUT (8PIN) / OUTPUT (4PIN) foolproof design

### EtherCAT/32IN_32OUT/IO模块 EtherCAT/32IN_32OUT/IO Module



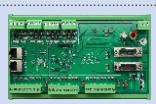
**▶ESC-IO32**

※ 长210*宽122*高55(mm)
※ (L)210mm*(W)122mm*(H)55mm

※ DC24V 电源输入(5.08 PITCH)
※ 提供电源反接保护
※ 32 INPUT / 32 OUTPUT
※ 单点最大输出2A
※ 可拆卸式欧规5.08 PITCH接线端子
※ INPUT(8PIN)/OUTPUT(4PIN) 防呆设计

※ DC24V power supply input (5.08 PITCH)
※ Provides reverse power protection
※ 32 INPUT / 32 OUTPUT
※ Single-point maximum output of 2A
※ Removable European standard 5.08 PITCH terminal block
※ INPUT (8PIN) / OUTPUT (4PIN) foolproof design

### EtherCAT 24点输入/16点输出(晶体管)/2轴控制 IO运动模块 EtherCAT 24-point input / 16-point output (transistor) / 2-axis control IO Motion Module



**▶ESC-I24O16A2**

※ 长136*宽124*高41(mm)
※ (L)136mm*(W)124mm*(H)41mm

※ DC24V 电源输入(5.08 PITCH)
※ 提供电源反接保护
※ 24 INPUT / 16 OUTPUT
※ 2轴泛用型轴向控制
※ 支持DC时钟同步 / 支持Repeat
※ 单点最大输出2A
※ 可拆卸式欧规5.08 PITCH接线端子
※ INPUT(8PIN)/OUTPUT(4PIN) 防呆设计

※ DC24V power input (5.08 PITCH)
※ Provides reverse power protection
※ 24 INPUT / 16 OUTPUT
※ 2-axis general-purpose axis control
※ Supports DC clock synchronization / Supports Repeat
※ Single-point maximum output of 2A
※ Removable European-style 5.08 PITCH terminal block
※ INPUT (8PIN) / OUTPUT (4PIN) foolproof design

### EtherCAT 6轴控制(脉冲/模拟量)运动模块 EtherCAT 6-axis control (Pulse/Analog) Motion Module

**▶ESC-AXES6**

※ 长153*宽121*高42(mm)
※ (L)153mm*(W)121mm*(H)42mm

※ DC24V 电源输入(5.08 PITCH)
※ 提供电源反接保护
※ 6轴控制
※ 输出点光耦隔离, FET输出, 单点最大1A 持续输出(瞬间最大允许9A)
※ 单点最大输出100mA
※ 可拆卸式欧规5.08 PITCH接线端子

※ DC24V power input (5.08 PITCH)
※ Provides reverse power protection
※ 6-Axis control
※ Output points optically isolated, FET output, maximum continuousoutput of 1A per point (maximum instantaneous allowable 9A)
※ Single-point maximum output of 100mA
※ Removable European-style 5.08 PITCH terminal block

Product Feature Configuration
Parameter Specifications

# 产品功能配置参数规格



| 系列Series | 400M系列 400M Series | | 600M系列 600M Series | | 800M系列 800M Series | |
|---|---|---|---|---|---|---|
| 常用下单型号<br>Commonly Ordered Models | 400MA1-H | 400MA2-H(V)<br>400MA3-H(V)<br>400MA4-V | 600MB2-H(V) | 600MB3-H(V)<br>600MB4-V | 800MC2-H(V) | 800MC3-H(V)<br>800MC4-V |

## ▶系统规格 System Specifications

| | | | | | | |
|---|---|---|---|---|---|---|
| 安装方式<br>Installation Method | 横式<br>Horizontal | 横式/立式<br>Horizontal/Vertical | 横式/立式<br>Horizontal/Vertical | | 横式/立式<br>Horizontal/Vertical | |
| 标准轴数（最大扩展，选配）<br>Standard Number of Axes (Maximum Expansion, Optional) | 6 (6) | | 7 (14) | | 7 (28) | |
| 标准通道（最大通道，选配）<br>Standard Channel (Maximum Channel, Optional) | 1 (1) | | 1 (2) | | 1 (4) | |
| 单个通道最大联动轴数<br>Maximum Number Of Linked Axes Per Single Channel | 4 (XYZA) | | 5 (XYZAB或XYZAC或XYZBC)<br>5 (XYZAB or XYZAC or XYZBC) | | 5 (XYZAB或XYZAC或XYZBC)，带RTCP<br>5 (XYZAB or XYZAC or XYZBC), with RTCP | |
| 单个通道最大主轴数量<br>Maximum Number Of Spindles Per Single Channel | 标准1（最大1）<br>Standard 1 (Maximum 1) | | 标准1（最大3）<br>Standard 1 (Maximum 3) | | 标准1（最大6）<br>Standard 1 (Maximum 6) | |
| 显示屏尺寸<br>Display Screen Size | 7寸<br>7 inch | 8寸/10.4寸/15寸<br>8 inch/10.4 inch/15 inch | 8寸<br>8 inch | 10.4寸/15寸<br>10.4 inch/15 inch | 8寸<br>8 inch | 10.4寸/15寸<br>10.4 inch/15 inch |
| 应用场合（轴向分布）<br>Application Scenarios (Axis Distribution) | 经济型铣床、简易铣床、炮塔铣、桌面铣床、钻攻机：<br>XYZ+第4轴+主轴+刀库<br>Economical Milling Machine, Simple Milling Machine, Turret Milling Machine, Desktop Milling Machine, Drilling & TappingMachine:<br>XYZ + Fourth Axis + Spindle + Tool Magazine | | 加工中心、钻攻机：<br>【XYZ+主轴+刀库】*通道<br>【XYZ+第四轴+主轴+刀库】*通道<br>【XYZ+第四、五轴+主轴+刀库】*通道<br>Machining Center, Drilling & Tapping Machine:<br>【XYZ + Spindle + Tool Magazine】* Channel<br>【XYZ + Fourth Axis + Spindle + Tool Magazine】* Channel<br>【XYZ + Fourth & Fifth Axes + Spindle + Tool Magazine】* Channel | | 五轴五联动加工中心(带RTCP)<br>多通道铣床（三通道及以上）：<br>【XYZ+第四、五轴+主轴+刀库】*通道<br>Five-Axis Five-Linkage Machining Center (with RTCP)<br>Multi-Channel Milling Machine (Three Channels and Above):<br>【XYZ + Fourth & Fifth Axes + Spindle + Tool Magazine】* Channel | |
| DA/AD | 选配拓展<br>Optional Expansion | | | | | |
| 操作系统<br>Operating System | RT Linux | | | | | |
| 内存<br>Memory | 1GB | 2GB | 2GB | | 2GB | |
| 程式容量<br>Program Capacity | 4GB | | 8GB | | 8GB | |
| 预读单节数<br>Number Of Pre-read Units | 1000 Block/S | | 2000 Block/S | | 8000 Block/S | |
| 最小控制单位<br>Minimum Control Unit | 0.00001mm | | | | | |
| 最大刀具补偿组数<br>Maximum Number Of Tool Compensation Groups | 160组<br>160 Groups | | | | | |
| 传输<br>Transmission | USB/RS485/LAN/WIFI | | | | | |
| 总线功能<br>Bus Functionality | EtherCAT总线<br>EtherCAT Bus | MECHATROLINK-III（选配）、EtherCAT<br>MECHATROLINK-III (Optional), EtherCAT | | | | |
| 标准I/O<br>Standard I/O | I16/O16 | | | | | |
| 最大拓展I/O<br>Maximum Expandable I/O | I32/O32 | | I64/O64 | | I128/O128 | |
| 绝对值功能<br>Absolute Value Function | EtherCAT | MECHATROLINK-III、EtherCAT、MODBUS 485、SSI绝对值<br>MECHATROLINK-III, EtherCAT, MODBUS 485, SSI Absolute Value | | | | |

## ▶程序功能 Program function

| | | | |
|---|---|---|---|
| 编程指令（G代码）<br>Programming instructions (G-codes) | 遵循国际规范<br>Complies with international standards | | |
| 宏程序编程标准<br>Macro programming standards | 支持(Macro B、Macro C)<br>Supports (Macro B, Macro C) | | |
| 背景编程<br>Background programming | ● | ● | ● |
| 对话式智能<br>Conversational intelligence | ● | ● | ● |
| 程序U盘传输<br>Program transfer via USB drive | ● | ● | ● |
| 程序自动检错<br>Automatic program error checking | ● | ● | ● |
| 程序锁功能<br>Program lock function | 限制程式编辑（选配）<br>Program Editing Limitation (Optional) | | |

## ▶五轴功能 Five-Axis Functionality

| | | | |
|---|---|---|---|
| 五轴刀尖点控制（RTCP）<br>Five-Axis Tool Center Point Control (RTCP) | ○ | ○ | ● |
| 平滑刀尖功能（Smooth TCP）<br>Smooth Tool Center Point Functionality (Smooth TCP) | ● | ● | ● |

● 支持　○ 不支持

Product Feature Configuration
Parameter Specifications

# 产品功能配置参数规格

| 系列Series | 400M系列 400M Series | | 600M系列 600M Series | | 800M系列 800M Series | |
|---|---|---|---|---|---|---|
| 常用下单型号<br>Commonly Ordered Models | 400MA1-H | 400MA2-H(V)<br>400MA3-H(V)<br>400MA4-V | 600MB2-H(V) | 600MB3-H(V)<br>600MB4-V | 800MC2-H(V) | 800MC3-H(V)<br>800MC4-V |
| **▶补偿功能 Compensation function** | | | | | | |
| 锥度补偿<br>Taper compensation | ● | | ● | | ● | |
| 反向间隙补偿<br>Backlash compensation | ● | | ● | | ● | |
| 圆弧尖角补偿<br>Corner radius compensation | ● | | ● | | ● | |
| 双向螺杆误差补偿<br>Bidirectional screw error compensation | ● | | ● | | ● | |
| 前馈补偿<br>Feedforward compensation | ● | | ● | | ● | |
| 双电机驱动消隙<br>Double-Motor Anti-Backlash | ○ | ● | ○ | ● | ○ | ● |
| 滑枕挠度补偿<br>Deflection Compensation of Ram | ○ | ● | ○ | ● | ○ | ● |
| **▶G码指令 G-Code Instructions** | | | | | | |
| 高精轨迹控制模式<br>High-Precision Trajectory Control Mode | ● | | ● | | ● | |
| 路径平滑模式<br>Path Smoothing Mode | ● | | ● | | ● | |
| NURBS曲线插补<br>NURBS Curve Interpolation | ● | | ● | | ● | |
| 螺牙切削<br>Thread Cutting | ● | | ● | | ● | |
| 刀具偏置<br>Tool Offset | ● | | ● | | ● | |
| 高速啄式钻孔循环<br>High-Speed Peck Drilling Cycle | ● | | ● | | ● | |
| 左手攻牙循环<br>Left-Hand Thread Milling Cycle | ● | | ● | | ● | |
| 精细搪孔循环<br>Fine Boring Cycle | ● | | ● | | ● | |
| 钻孔循环<br>Drilling Cycle | ● | | ● | | ● | |
| 孔底暂停钻孔循环<br>Deep Hole Peck Drilling Cycle | ● | | ● | | ● | |
| 啄式钻孔循环<br>Peck Drilling Cycle | ● | | ● | | ● | |
| 攻牙循环<br>Thread Milling Cycle | ● | | ● | | ● | |
| 钻孔循环<br>Drilling Cycle | ● | | ● | | ● | |
| 高速钻孔循环<br>High-Speed Drilling Cycle | ● | | ● | | ● | |
| 半自动精细搪孔循环<br>Semi-Automatic Fine Boring Cycle | ● | | ● | | ● | |
| 孔底暂停搪孔循环<br>Deep Hole Peck Boring Cycle | ● | | ● | | ● | |
| 多组高速高精参数<br>Multiple Sets of High-Speed High-Precision Parameters | ○ | | ● | | ● | |
| **▶高速高精 High-Speed High-Precision** | | | | | | |
| 主轴 (C) 轴动态定位<br>Dynamic Positioning of Spindle (C-Axis) | 无需停止切换 可直接执行定位 (需伺服主轴)<br>No need to stop switching, direct positioning execution (requires servo spindle) | | | | | |
| 单节间不停顿模式<br>Non-Stop Mode between Tool Sections | ● | | ● | | ● | |
| CONSTANT JERK控制<br>CONSTANT JERK Control | ● | | ● | | ● | |
| 自动转角控制<br>Automatic Corner Control | ● | | ● | | ● | |
| 圆弧半径速度限制<br>Circular Arc Radius Speed Limitation | ● | | ● | | ● | |
| NURBS拟合<br>NURBS Fitting | ● | | ● | | ● | |
| 全闭环控制功能<br>Closed-Loop Control Functionality | ○ | ● | 速度控制全闭环、总线控制全闭环<br>Speed Control Closed Loop, Bus Control Closed Loop | | | |



● 支持 ○ 不支持

Product Feature Configuration
Parameter Specifications

# 产品功能配置参数规格

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|---|---|---|---|---|---|---|
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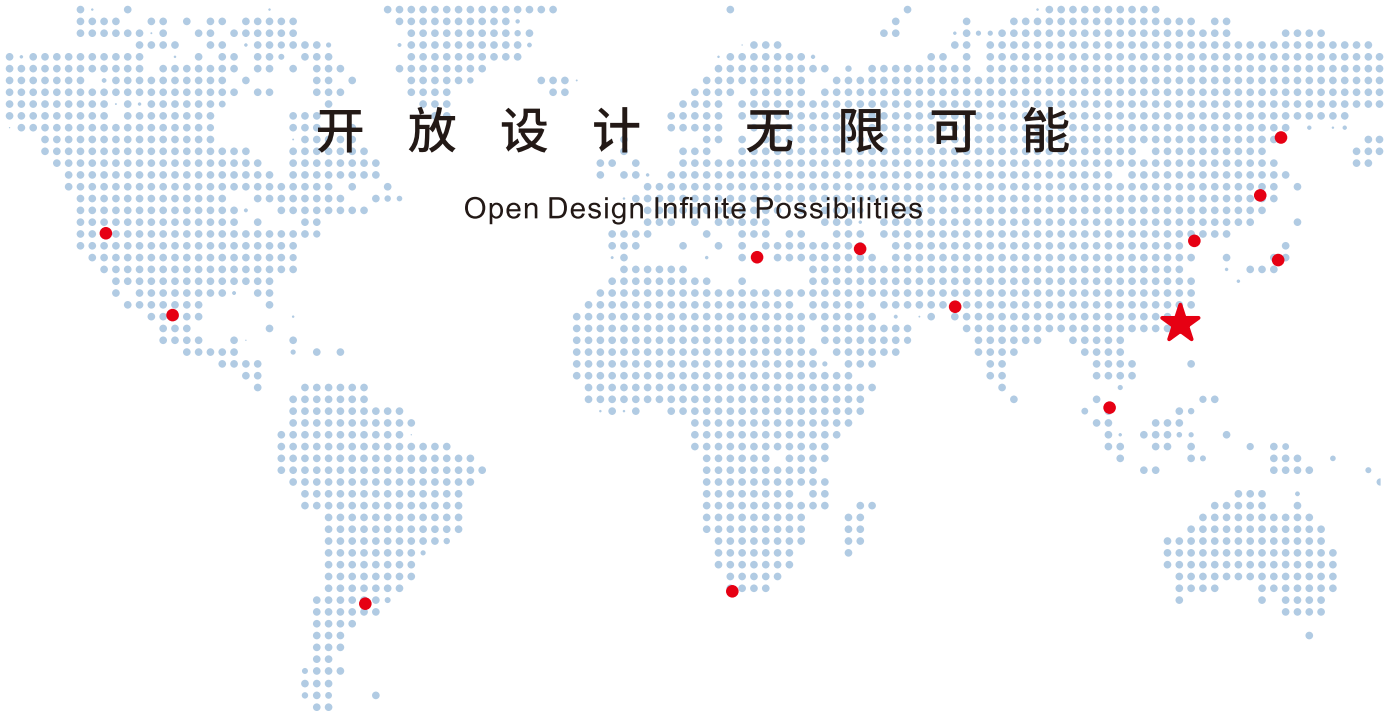
| **▶辅助功能 Auxiliary functions** | | | | | | |
| 自定义开机画面<br>Custom startup screen | ● | | ● | | ● | |
| 自定义M码<br>Custom M-code | ● | | ● | | ● | |
| 自定义G码<br>Custom G-code | ● | | ● | | ● | |
| 总线轴与泛用轴混用<br>Mixing bus axes and generic axes | ○ | ● | ● | | ● | |
| IO重定义功能<br>IO redefinition function | ● | | ● | | ● | |
| 倾斜轴加工<br>Tilted axis machining | ○ | | ● | | ● | |
| 倾斜平面加工<br>Tilted plane machining | ○ | | ● | | ● | |
| DNC加工<br>DNC Machining | ● | | ● | | ● | |
| 比例缩放<br>Proportional scaling | ● | | ● | | ● | |
| 加减速类型<br>Acceleration/Deceleration Type | 直线型（恒A）、S型（恒JERK）<br>Linear Type (Supports JERK), S-Curve Type, Exponential Type | | | | | |
| 刀具寿命管理<br>Tool Life Management | 时间限制/次数限制管理<br>Time Limit/Count Limit Management | | | | | |
| 保护功能<br>Protection Functions | 安全门、硬极限、软极限、夹头未夹紧检测、刀塔换刀检测<br>Safety Door, Hard Limit, Soft Limit, Unclamped Chuck Detection, Tool Change Detection | | | | | |
| 手轮预测<br>Handwheel Prediction | 手轮预测/手轮回退功能<br>Supports Handwheel Prediction/Handwheel Retract Function | | | | | |
| 手轮插断<br>Handwheel Interrupt | ● | | ● | | ● | |
| 再启动功能<br>Restart Function | 程序断点自动寻找再启动、自定义再启动<br>Automatic Program Breakpoint Searching and Restart, Customized Restart | | | | | |
| 多功能手轮<br>Multi-function Handwheel | ● | | ● | | ● | |
| 图形模拟<br>Graphical Simulation | 程式执行前图形预览，程式执行中动态描图<br>Program Preview Before Execution, Dynamic Plotting During Program Execution | | | | | |
| 权限管理<br>Authority Management | ● | | ● | | ● | |
| 万年历锁机<br>Calendar Lock | ● | | ● | | ● | |
| 轴向负载监控<br>Axis Load Monitoring | ● | | ● | | ● | |
| 示波器功能<br>Oscilloscope Monitoring | 实时监控系统命令及伺服回授波形<br>Real-time Monitoring of System Commands and Servo Feedback Waveforms | | | | | |
| 跟随误差检测<br>Following Error Detection | ● | | ● | | ● | |
| 主轴转速到达检测<br>Spindle Speed Reach Detection | ● | | ● | | ● | |
| 数据备份<br>Data Backup | 程式备份、参数备份、刀补备份<br>Program Backup, Parameter Backup, Tool Compensation Backup | | | | | |
| 攻牙快速退刀<br>Rapid Retraction of Tool for Tapping | ● | | ● | | ● | |
| 多样化刀库<br>Diversified Tool Magazine | 圆盘刀库、斗笠式刀库、客制化刀库<br>Disc Tool Magazine, Umbrella-Type Tool Magazine, Customized Tool Magazine | | | | | |
| 自动对刀<br>Automatic Tool Alignment | ● | | ● | | ● | |
| **▶复合功能 Compound Functionality** | | | | | | |
| 多通道功能<br>Multi-Channel Functionality | ○ | | ●（选配）16通道<br>(Optional) 16-Channel Configuration | | | |
| 多主轴攻牙<br>Multi-Spindle Tapping | ○ | | 最大支持10个主轴同时攻牙<br>Support for Simultaneous Thread Milling with up to 10 Spindles | | | |
| 机械手独立通道控制<br>Independent channel control of robotic arm | ○ | | ●（选配）使用G代码规划路径<br>● (Optional) Path Planning using G-Code | | | |
| **▶工具包 Tool Kit** | | | | | | |
| 工业物联网<br>Industrial Internet of Things (IIoT) | 选配<br>Optional | | | | | |
| 视觉检测<br>Vision Inspection | 选配<br>Optional | | | | | |
| CAD/CAM<br>CAD/CAM | 选配<br>Optional | | | | | |

● 支持　○ 不支持




## 服务网点 Service Network

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 广州GuangZhou | 190-6540-9303 | 泉州QuanZhou | 190-6540-9954 | 宁波NingBo | 181-2427-8569 | 温岭WenLing | 181-2490-4248 |
| 玉环YuHuan | 190-6540-9143 | 温州WenZhou | 190-6540-9032 | 杭州HangZhou | 190-6540-9143 | 常州ChangZhou | 181-2794-8586 |
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