

X7000 控制器

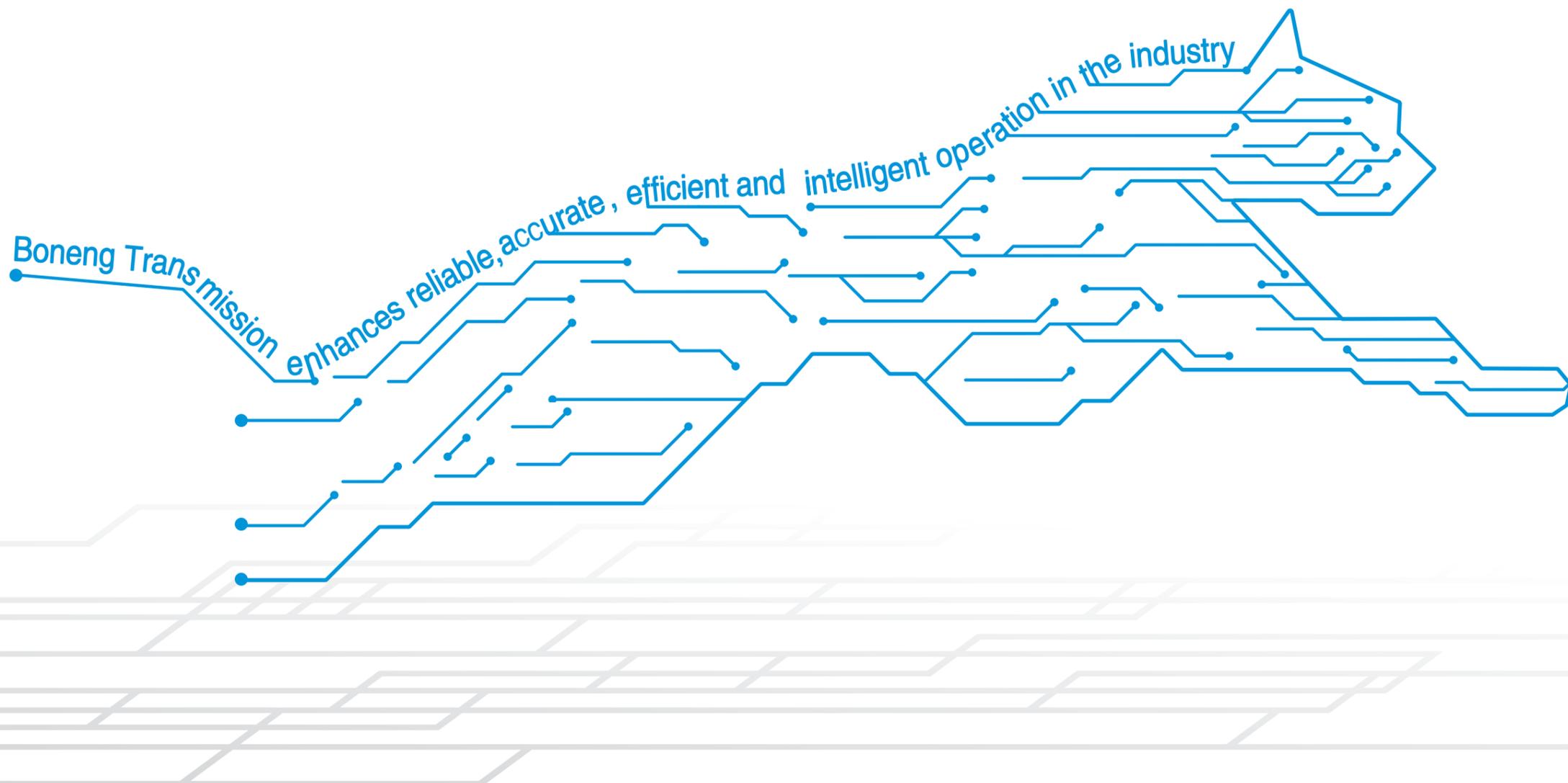
X7000 controller



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Edit date 03/2026  
Selection Catalogue



控制器/驱动器/马达/  
齿轮马达/齿轮箱

Controller/ Drive/ Motor/  
Gearmotor/ Gearbox

# 目 录

# Contents

<b>1 概述</b> .....	01	<b>1 Overview</b> .....	01
<b>2 产品特点</b> .....	04	<b>2 Product Features</b> .....	04
2.1 用户友好,易于使用 ..		2.1 User-Friendliness,	
.....	04	Easy to Use .....	04
2.2 性能卓越,功能丰富 ..		2.2 Excellent performance	
.....	04	abundant function .....	04
<b>3 型号及订货号</b> .....		<b>3 Selection ordering</b>	
.....	07	<b>data</b> .....	07
<b>4 应用场景</b> .....	07	<b>4 Application scenarios</b> .....	07
<b>5 技术数据</b> .....	09	<b>5 Technical parameters</b> .....	10
<b>6 外形尺寸及安装注意事</b>		<b>6 Dimensions and</b>	
<b>项</b> .....	11	<b>installation precautions</b> ..	11

### 1 概述

X7000控制器是基于工控机，最大可支持256个EtherCAT轴的大型运动控制器，其符合IEC61131-3标准，支持5种PLCopen标准的编程语言，最小PLC扫描周期可以达到250us，实时性非常高。

X7000控制器包含两个型号，分别为X7050和X7030，此系列控制器支持一路EtherCAT主站，多路Ethernet接口(可支持Modbus-TCP，UDP，OPCUA)，1路通用Ethernet接口(可联网)。支持4个USB接口，1个DP显示器接口，1个HDMI显示器接口，及1个可接外部启动开关的IO端口。主要区别在于X7030支持16路DI和16路DO，X7050不支持本地IO。

X7000控制器除了支持标准PLC功能外，还支持EtherCAT单轴定位，速度及扭矩控制功能，也支持MC块，电子齿轮同步，凸轮同步，轴组等运动控制功能。

### 1 Overview

The X7000 controller is a large-scale motion controller based on industrial computer, capable of supporting up to 256 EtherCAT axes. It complies with the IEC61131-3 standard, supports five PLCopen-standard programming languages, achieves a minimum PLC scan cycle of 250us, offering very high real-time performance.

The X7000 controller series includes two models, the X7050 and X7030, they supports one EtherCAT master, multiple Ethernet interfaces (supporting Modbus-TCP, UDP, OPC UA), 1 general-purpose Ethernet interface (for network connectivity). Supports 4 USB interfaces, 1 DP display interface, 1 HDMI display interface, and 1 I/O port for connecting an external start switch. The main difference is that the X7030 supports 16 DI and 16 DO, while the X7050 does not support local I/O.

In addition to supporting standard PLC functions, the X7000 controller also supports EtherCAT single-axis positioning, speed and torque control functions, as well as motion control functions such as MC blocks, electronic gear synchronization, cam synchronization, and axis groups.

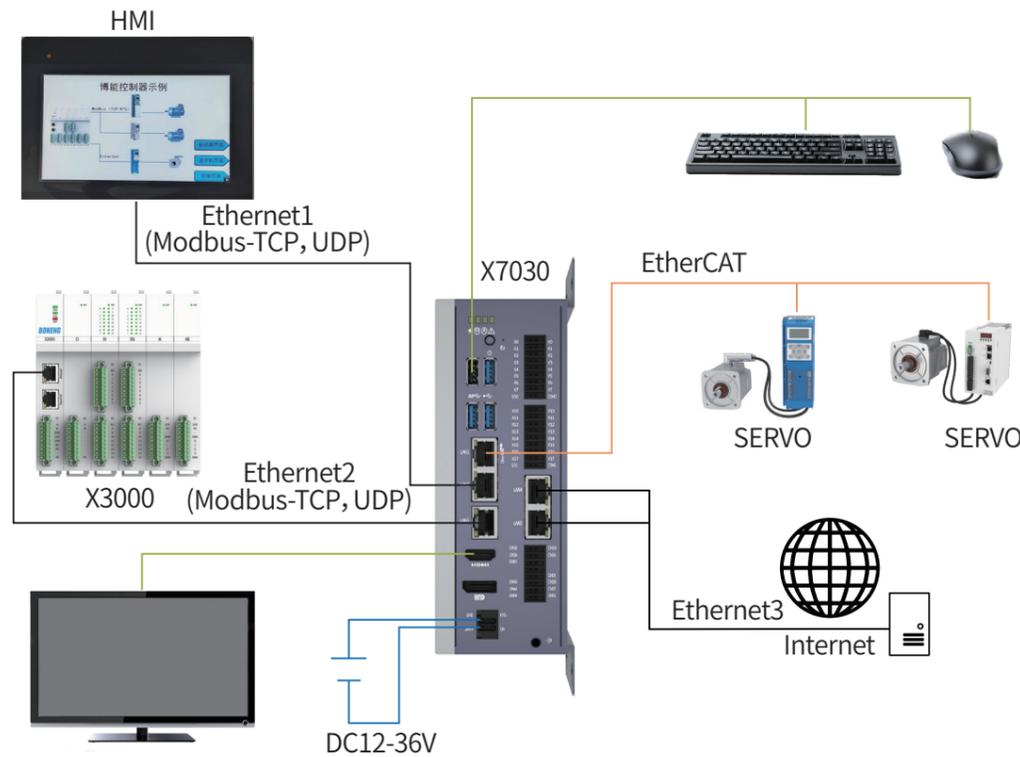
		X7030	X7050
CPU	CPU	N97	i3
CPU计算能力	CPU computation capacity	0.5ns	0.28ns
PLC基本功能	Basic functions of PLC	√	√
最小扫描周期	Minimum scanning period	0.25ms	0.25ms
EtherCAT	EtherCAT	√	√
Modbus-TCP	Modbus-TCP	√	√
UDP	UDP	√	√
OPC UA	OPC UA	√	√
Ethernet	Ethernet	√	√
最大EtherCAT轴数	Maximum number of EtherCAT axis	256	256
本体DI	Number of local DI	16	0
本地DO	Number of local DQ	16	0
速度控制	Speed control	√	√
扭矩控制	Torque control	√	√
定位控制	Position control	√	√
PID控制器	PID controler	√	√
MC标准功能块	MC Standard Function Block	√	√
编码器轴	Encoder axis	√	√
虚拟编码器轴	Virtual encoder axis	√	√
伺服轴	Servo axis	√	√
虚拟轴	Virtual axis	√	√
电子齿轮同步	Electronic gear synchronization	√	√
电子凸轮同步	Electronic cam synchronization	√	√
轴组(点到点运动)	Group of Axes(PTP)	√	√
轴组(空间直线插补)	Group of Axes(Spatial linear interpolation)	√	√
轴组(空间圆弧插补)	Group of Axes(Spatial arc interpolation)	√	√
轴组(龙门主从同步)	Group of Axes(Gantry master-slave synchronization)	√	√
轴组(姿态控制)	Group of Axes(Posture control)	√	√
壁挂式安装	Wall-mounted installation	√	-
桌面式安装	Desktop installation	√	√

注：√(支持);-(不支持)

Note: √ (Supported); - (Not Supported)

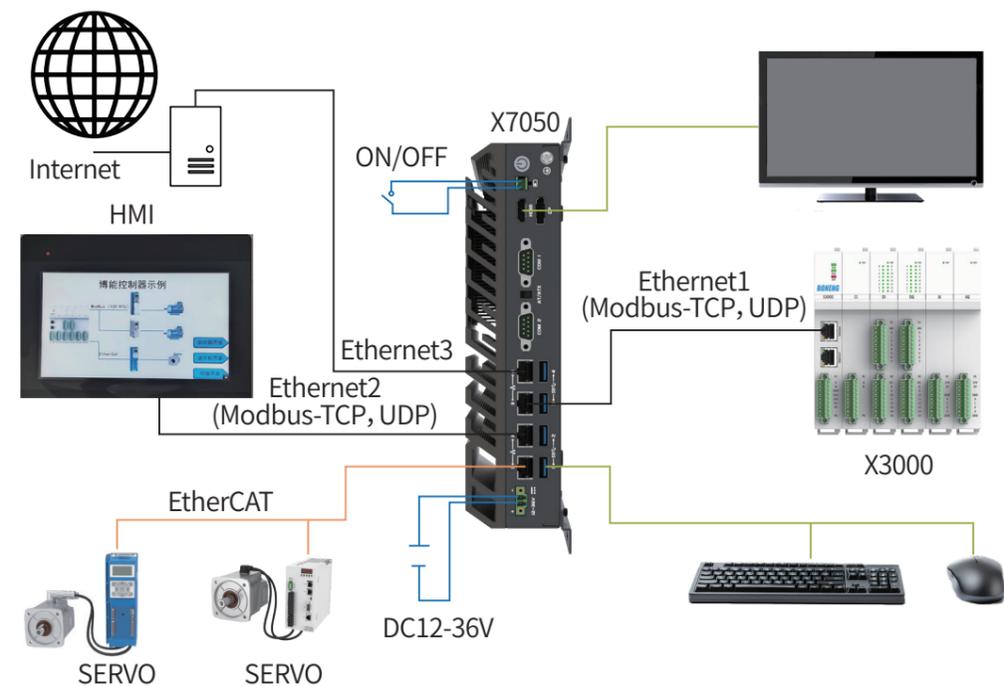
X7000控制器典型应用拓扑如下所示:

The typical application topology of X7000 controller is as follows:



X7030典型应用拓扑

X7030 Typical Application Topology



X7050典型应用拓扑

X7050 Typical Application Topology

## 2 产品特点

### 2.1 用户友好,易于使用

- ◆支持LD, ST, FBD, SFC, IL五种PLCopen标准编程语言,符合IEC61131-3标准
- ◆控制器内置编程软件,无额外电脑也可轻松应对
- ◆梯形图功能块变量自动定义,提高编程效率
- ◆结构化文本编程支持变量自动检索提示,快速编程

## 2 Product Features

### 2.1 User-Friendliness, Easy to Use

- ◆ Supports five PLCopen standard programming languages: LD, ST, FBD, SFC, and IL, in compliance with the IEC61131-3 standard
- ◆ The controller is equipped with built-in programming software, making it easy to handle without an additional computer
- ◆ Automatic definition of variables for ladder diagram function blocks to improve programming efficiency
- ◆ Structured text programming supports automatic variable retrieval prompts for fast programming

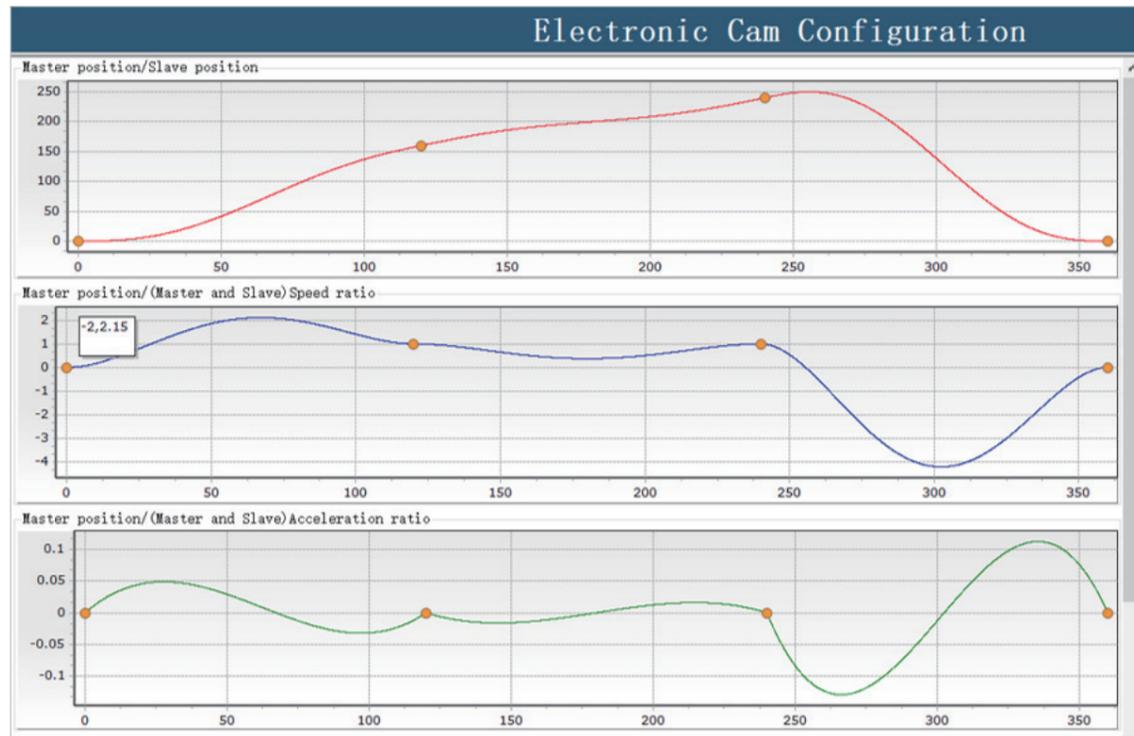
Name	Type	Address	Array	Init value
a	BOOL	Auto	No	
b	UINT	Auto	No	
c	REAL	Auto	No	

### 2.2 性能卓越,功能丰富

- ◆支持EtherCAT主站,最大轴数可达256个工艺轴或伺服轴
- ◆PLC扫描周期最快可达250us,抖动控制在10us以内,性能强悍
- ◆支持Modbus-TCP, OPC-UA, UDP通讯
- ◆除支持PLC基本功能外,还支持单轴位置,速度,扭矩控制及多轴齿轮同步,凸轮同步功能
- ◆支持轴组功能,空间点到点,空间直线插补,空间圆弧插补,龙门主从同步,姿态控制等

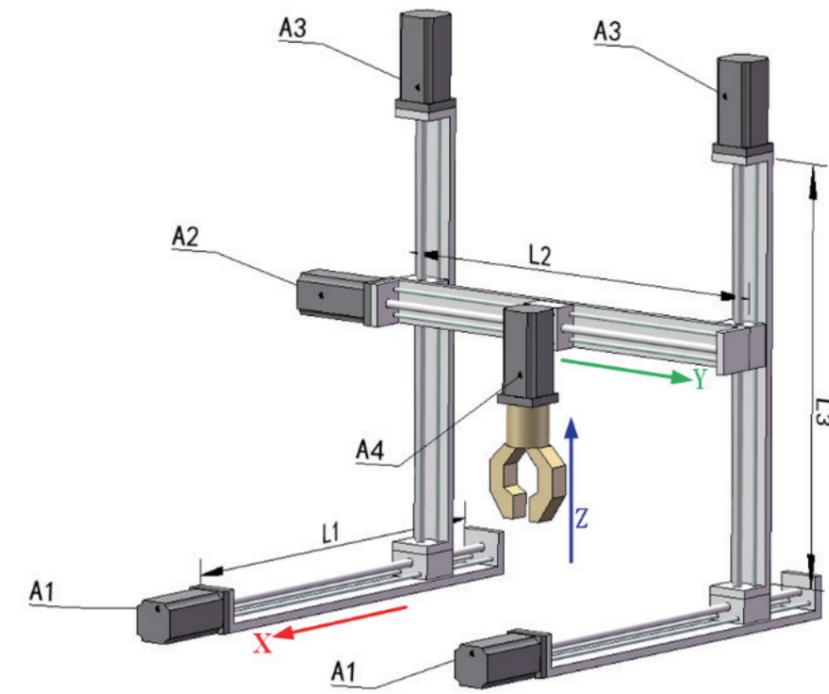
### 2.2 Excellent performance abundant function

- ◆ Supports EtherCAT master station, with a maximum of 256 process axes or servo axes
- ◆ PLC scan cycle can reach as fast as 250us, with jitter controlled within 10 us, featuring strong performance and high real-time performance
- ◆ Supports Modbus-TCP, OPC-UA, and UDP communication
- ◆ In addition to supporting the basic functions of PLC, it also supports single axis position, speed, torque control, multi axis gear synchronization, and cam synchronization functions
- ◆ Support axis group function, spatial point-to-point, spatial linear interpolation, spatial arc interpolation, gantry master-slave synchronization, attitude control, etc



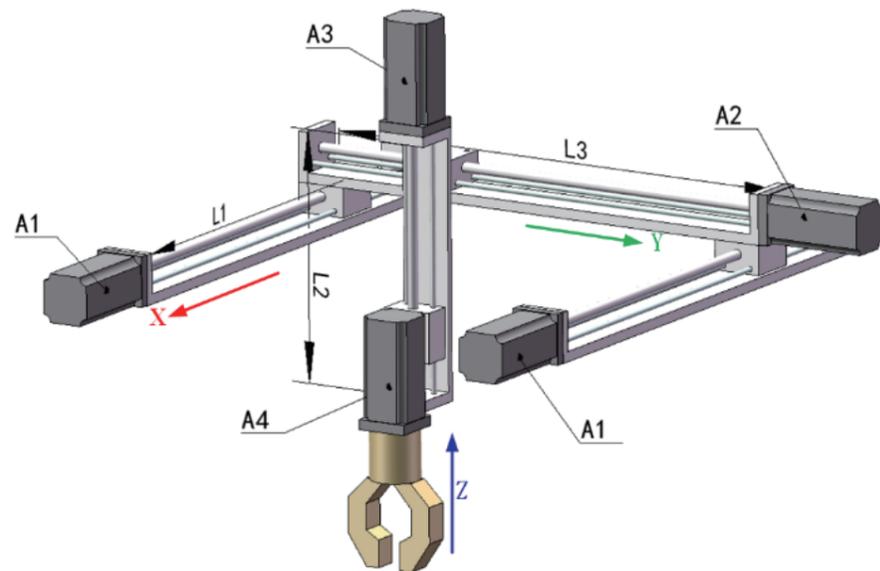
电子凸轮曲线

Electronic Cam Configuration



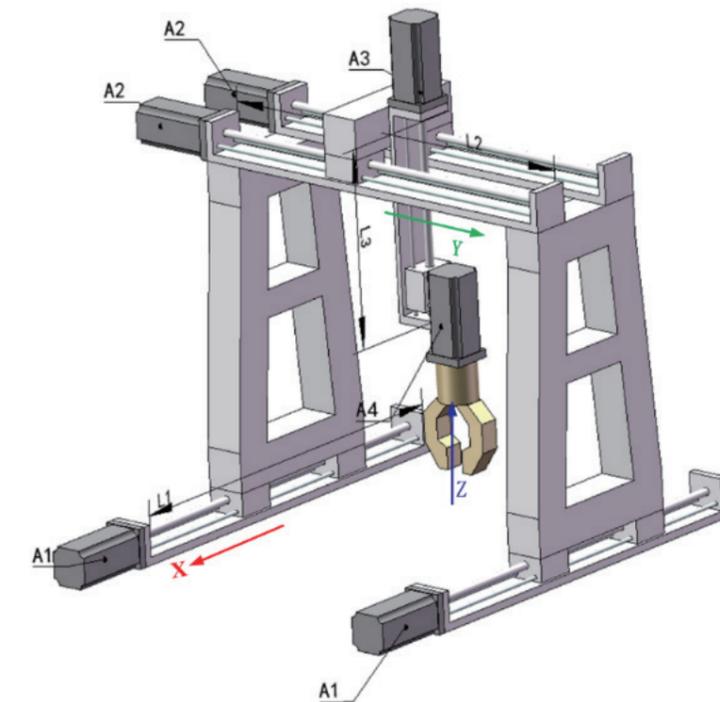
动梁龙门

Moving-beam



桥式龙门

Bridge-type



定柱龙门

Fixed-column

### 3 选型及订货号

### 3 Selection ordering data

订货号 Order Number	描述	Description
X7030-EC-32-S	支持EtherCAT, Motion, 轴组功能的大型运动控制器, 支持本体IO	Large motion controller supporting EtherCAT multi axis and Motion functions, with built-in I/O support.
X7050-EC-00-S	支持EtherCAT, Motion, 轴组功能的大型运动控制器	Large motion controller supporting EtherCAT multi axis and Motion functions

### 4 应用场景

X7000运动控制器可广泛应用于3C电子, 半导体, 光伏设备, 汽车制造, 电池制造, 包装机械, 手机制造, 玻璃木材加工等各个行业的主机设备, 具有强实时性、多协议兼容, 高可靠性、简易互联等特性, 致力于为客户解决各种复杂场景的技术痛点。

**机床行业: 高精度轨迹控制系统, 如点胶机, 激光切割等**

机床行业有多轴协同, 控制精度高, 复杂图形路径时轮廓偏差大, 实时调节路径等应用特点, X7000可实现微秒级响应, 可实现高精度位置控制, 内置插补算法, 精准实现空间直线, 圆弧等复杂运动。

**舞台行业: 数量庞大的伺服轴控制系统, 如舞台灯光控制, 音响控制, 特效控制等**

### 4 Application scenarios

The X7000 motion controller is widely applicable to host equipment across various industries such as 3C electronics, semiconductors, photovoltaic equipment, automotive manufacturing, battery production, packaging machinery, mobile phone manufacturing, and glass and wood processing. With features like strong real-time performance, multi-protocol compatibility, high reliability, and simple interconnection, it is dedicated to addressing technical pain points in complex scenarios for customers.

**Machine Tool: High-Precision Trajectory Control Systems, Such as Dispensing Machines, Laser Cutting, etc**

The machine tool industry has the characteristics of multi axis collaboration, high control accuracy, large contour deviation in complex graphic paths, and real-time adjustment of paths. The X7000 can achieve microsecond level response, high-precision position control, built-in interpolation algorithm, and accurately realize complex movements such as spatial lines and arcs.

**Stage applications: A vast number of servo axis control systems, such as stage lighting control, sound control, and special effects control**

舞台行业中普通PLC控制系统响应慢, 灯光音乐不同步, 系统配置复杂, 人工调试时间长。X7000控制器应用于舞台, EtherCAT主站可实现256个灯具的微秒级同步控制, 可提前预制场景特效, 一键切换场景等。

In the stage industry, ordinary PLC control systems have slow response, asynchronous lighting and music, complex system configuration, and long manual debugging time. The X7000 controller is applied to the stage, and the EtherCAT main station can achieve microsecond level synchronous control of 256 lighting fixtures. It can pre fabricate scene effects and switch scenes with one click.



**包装行业: 纸尿裤生产线**

纸尿裤需经过550+工艺节点, 从原料配送, 到装袋封箱都可以用X7000来控制。X7000针对纸尿裤生产线瑕疵检出率低, 裁边精度不高, 数据要求追溯等特点提供强有力支撑。搭配高清摄像头, 实时监测瑕疵, 微妙级同步实现精准裁边, 动态实时调整腰围及张力控制。

**Packaging industry: Diaper production line**

Diapers need to go through 550+process nodes, from raw material distribution to bagging and sealing, all of which can be controlled with X7000. X7000 provides strong support for the low defect detection rate, low cutting accuracy, and data traceability requirements of the diaper production line. Paired with high-definition cameras, real-time monitoring of defects, subtle synchronization for precise edge cutting, dynamic real-time adjustment of waist circumference and tension control.

**汽车行业: 汽车生产线**

X7000适用于控制汽车生产线的工艺流程, 从柔性生产线, 冲压车间, 焊接车间, 涂装车间, 总装, 质检等都可以轻松应对。汽车行业生产线传统pc控制机器人, 焊接精度波动大, 换型时间长。X7000应用于汽

**Automotive Industry: Automotive Production Lines**

X7000 is suitable for controlling the process flow of automotive production lines, including flexible production lines, stamping workshops, welding workshops, paint-

车生产线，通过EtherCAT总线毫秒级同步机器人动作，避免抖动，可提前预制多种车型工艺库，一键切换参数，大大减少换型时间，实时采集震动，电流，温度等数据，减少故障率。

ing workshops, final assembly, quality inspection, etc. It can be easily handled. Traditional PC controlled robots in the automotive industry production line have large fluctuations in welding accuracy and long changeover times. X7000 is applied to automotive production lines, synchronizing robot actions in milliseconds through EtherCAT bus to avoid shaking. It can pre fabricate multiple vehicle model process libraries, switch parameters with one click, greatly reduce changeover time, and collect real-time vibration, current, temperature and other data to reduce failure rates.



### 5 技术数据

处理器	X7030	N97
	X7050	i3
编程语言	LD	√
	ST	√
	IL	√
	FBD	√
	SFC	√
内存	8GB	
存储	128GB	
显示接口	• 1个HDMI	
	• 1个DP	
网络	• LAN1: EtherCAT (4KV浪涌防护) :	
	• LAN2, LAN3, LAN4, LAN5: Ethernet (4KV浪涌防护)	
USB	• 4个USB2.0/USB3.0	
GPIO	X7030	16个DI, 16个DQ, 凤凰端子
	X7050	无

操作系统	Win10 x64	
电源类型	• 12VDC~36VDC (端子)	
储存条件	-30℃~80℃	
工作条件	-20~60℃, 相对湿度 10%~85%, 无凝结	
抗冲击	With SSD: 15G, IEC 60068-2-27, half sine, 11ms duration	
	With SSD: 2Grms, IEC 60068-2-64, random, 5~500Hz, 1 hr/axis	
安装方式	桌面式(宽体)安装, 壁挂式(窄体)安装	
重量	X7030	2.0kg
	X7050	2.3kg
尺寸 (L*W*H)	X7030	180mm(L) × 165mm(W) × 67mm(H)
	X7050	240mm(L) × 166mm(W) × 60mm(H)

### 5 Technical parameters

processor	X7030	N97
	X7050	i3
programming language	LD	√
	ST	√
	IL	√
	FBD	√
	SFC	√
RAM	8GB	
Storage	128GB	
Display interface	• one HDMI 2.0 interface	
	• one DP interface	
Network	• LAN1: EtherCAT (4KV surge protection)	
	• LAN2, LAN3, LAN4, LAN5: Ethernet (4KV surge protection)	
USB	• 4个USB2.0/3.0	
GPIO	X7030	16 digital inputs and outputs, Phoenix terminal
	X7050	without build-in I/O
Operating system	Win10 x64	
Power type	• 12VDC~36VDC (Two pin Phoenix terminal)	
Storage conditions	-30℃~80℃	
Working conditions	-20~60℃, relative humidity of 10% to 85%, and no condensation	
Impact-resistant	With SSD: 15G, IEC 60068-2-27, half sine, 11ms duration	

Anti-vibration	With SSD: 2Grms, IEC 60068-2-64, random, 5~500Hz, 1 hr/axis	
Installation type	desktop installation, wall mounted installation	
Weight	X7030	2.0kg
	X7050	2.3kg
Size (L*W*H)	X7030	180mm (L) × 165mm (W) × 67mm (H)
	X7050	240mm (L) × 166mm (W) × 60mm (H)

## 6 外形尺寸及安装注意事项 6 Dimensions and installation precautions

规划项目时，应考虑以下条件：

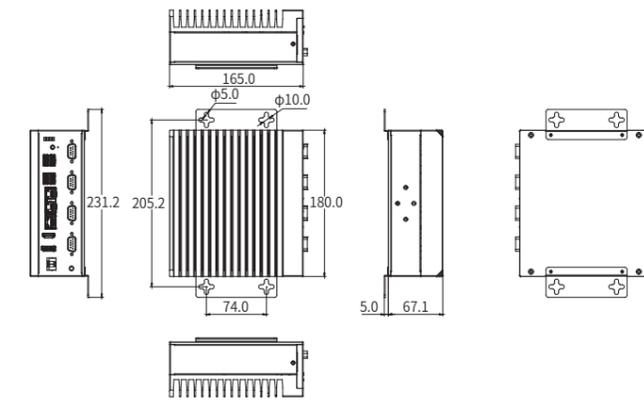
- 操作说明提供的规范中所指定的气候和机械环境条件。
- 请避免极端环境条件，设备应注意防尘、防潮及防热，请勿使设备受到阳光直射。
- 请确保其它组件或机柜侧面距设备接线侧的距离至少为 50mm。X7050 风扇侧的通风间距至少30mm。
- 所连接或安装的 I/O 不得在设备中生成大于 0.5V 的反向电压，否则易损坏设备。
- 在寒冷天气状况下运输设备时，应注意温度的极端变化。这种情况下，请确保设备上或设备内部没有形成水滴（凝露）。如果设备上形成了凝露，请至少等待 12 个小时后才能接通电源。

模块外形及安装尺寸如下图所示。X7030有2种安装方式，壁挂式(窄体)和桌面式(宽体)，而X7050仅支持桌面式(宽体)一种安装方式。

When planning a project, the following conditions should be considered:

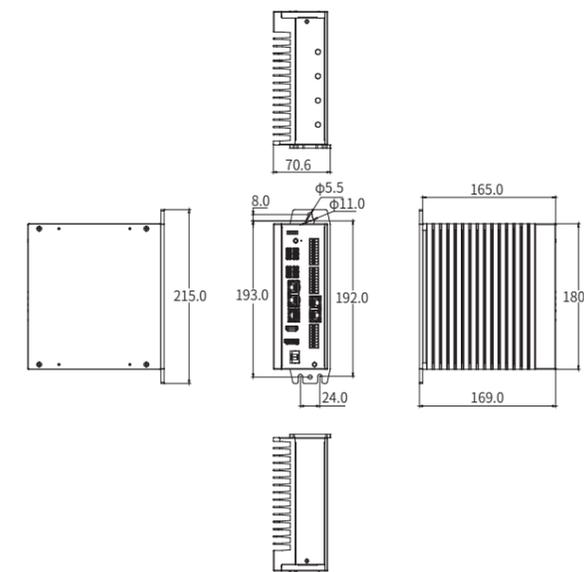
- The climate and mechanical environmental conditions specified in the specifications provided in the operating instructions.
- Please avoid extreme environmental conditions, and the equipment should be protected from dust, moisture, and heat. Do not expose the device to direct sunlight.
- Please ensure that the distance between other components or cabinet sides and the equipment wiring side is at least 50mm. On the side of X7050's fan, keep a 30mm cooling air clearances.
- The connected or installed I/O must not generate reverse voltage greater than 0.5V in the device.
- When transporting equipment in cold weather conditions, attention should be paid to extreme temperature changes. In this case, please ensure that no water droplets (condensation) have formed on or inside the device. If condensation forms on the device, please wait for at least 12 hours before connecting the device.

The module shape and installation dimensions are shown in the following figure. The X7030 offers two mounting methods: wall-mounted (narrow body) and desktop (wide body), while the X7050 only supports the desktop (wide body) mounting method.



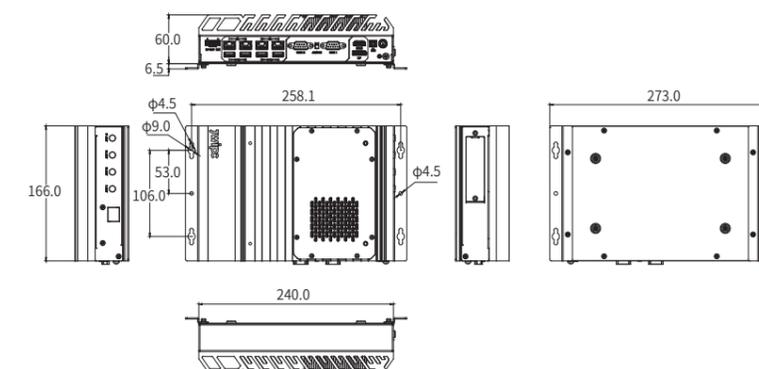
X7030控制器桌面式(宽体)安装

Desktop (Wide Body) Installation of the X7030 Controller



X7030控制器壁挂式(窄体)安装

Wall-Mounted (Narrow Body) Installation of the X7030 Controller



X7050控制器桌面式(宽体)安装

Desktop (Wide Body) Installation of the X7050 Controller

随着技术迭代进步，博能产品样本将会同步更新，请见谅。Along with the technology advancedet.,the product of the manual of Boneng will be changed,please forgive.

控制层 CONTROL

驱动层 DRIVE

马达层 MOTOR

齿轮层 GEAR



**X3010 PLC**  
EtherCAT&Modbus  
24VDC



**X3050 运动控制器**  
Motion Controller  
EtherCAT&Modbus  
24VDC

**C/F/K/S-M  
\* . . . D**  
马达分布式  
变频驱动器  
Integrated  
Gearmotor  
Drive



EtherCAT &  
Modbus  
380~480VAC  
0.25~3kW  
i=4~355

**AM 变频驱动器**  
Variable Frequency Drive



Modbus  
380~480VAC  
0.75~5.5kW

**A1 变频驱动器**  
Variable Frequency Drive



Modbus/CANopen  
/PROFINET  
380~480VAC  
0.75~250kW

**C/F/K/S/R**  
齿轮马达  
Gearmotor



380~480VAC  
0.09~200kW  
i=1.25~500

**MP/MU/MA**  
三相交流异步马达  
Asynchronous Motor



380~480VAC  
0.09~90kW  
960/1450r/min  
1160/1750r/min

**HB/BE/HK**  
齿轮箱  
Gearbox



4.2~15775kW  
i=5.6~450

**P/PK**  
行星齿轮箱  
Planetary  
Gearbox



0.4~14000kW  
i=25~4000

**PW**  
卷扬齿轮箱  
Planetary  
Winch  
Gearbox



1~1810kW  
i=13~940

**PS**  
回转齿轮箱  
Planetary  
Slewing  
Gearbox



1~1626kW  
i=14~947

**J/JB**  
升降机  
Jack



0.35~22.63kW  
i=5~34

**T**  
转向箱  
Spiral Bevel  
Gearbox



0.08~303kW  
i=1:1~3:1

**MX&AX**  
伺服马达&伺  
服驱动器  
Permanent  
Magnet  
Servo Motor  
& Servo Drive



EtherCAT/  
PROFINET  
380~480VAC  
0.28~14kW  
1500/2000r/min  
3000/4500r/min

**C/F/K/S-MX  
& AX 齿轮伺  
服马达&伺  
服驱动器**  
Servo  
Gearmotor  
& Servo Drive



EtherCAT/  
PROFINET  
380~480VAC  
0.28~14kW  
i=1.25~315

**PX-MX&AX**  
行星伺服马达  
& 伺服驱动器  
Planetary  
Precision Gear  
Servo Motor  
& Servo Drive



EtherCAT/  
PROFINET  
380~480VAC  
0.38~14kW  
i=3~100

**PN-MN&AN**  
行星伺服马达  
& 伺服驱动器  
Planetary  
Precision Gear  
Servo Motor  
& Servo Drive



EtherCAT  
PROFINET  
380~480VAC  
0.28~5.03kW  
i=3~100

**ME&AN**  
永磁同步伺服马  
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湖南省长沙市望城经济开发区 普瑞大道1288号 电话: 0731-88386958	No. 1288 Puri Avenue, Wangcheng Economic Development Zone, Changsha City, Hunan Province, China TEL: 0731-88386958
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