AM600 Motion Controller

High performance controller with EtherCAT interface and PLC functionality
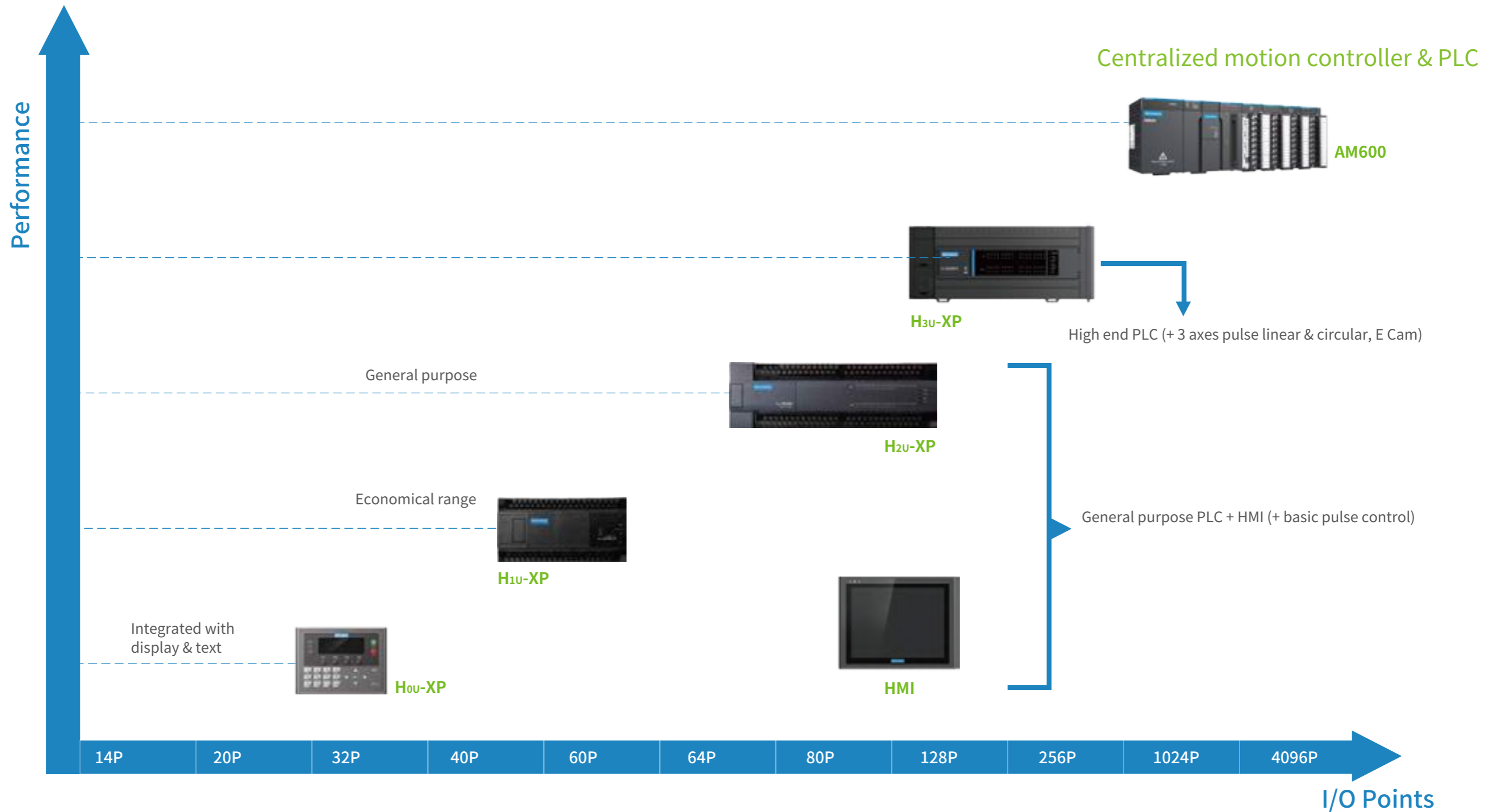
· Can be easily expanded to meet customer requirements
· Able to control up to 32 axes
· PLCopen library available for motion control functionality
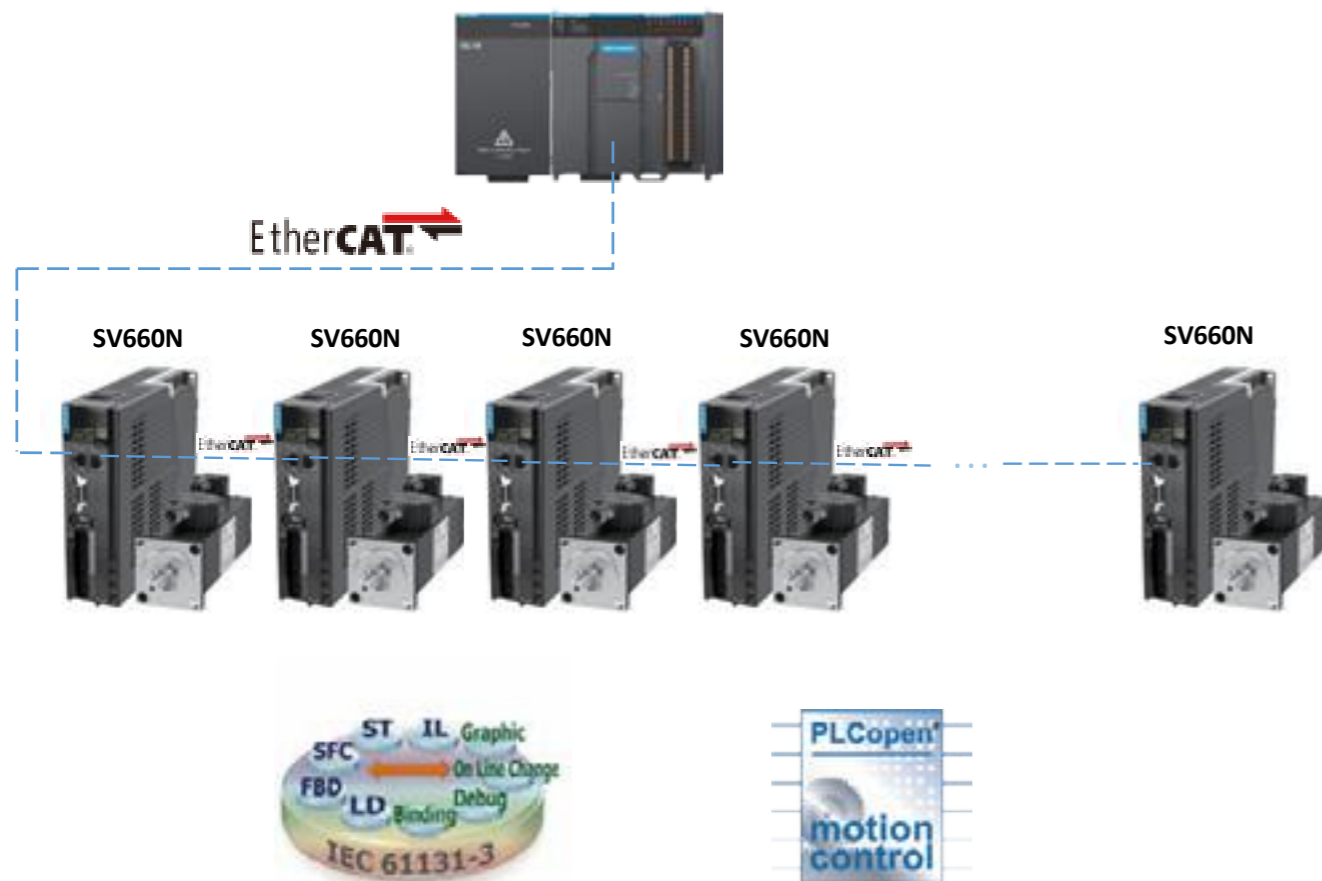· InoProShop programming environment (IEC 61131-3)

EtherCAT®

INOVANCE
AM600
Risk of electric shock

ST IL Graphic
SFC
FBD
LD Analog
IEC 61131-3

PLCopen
motion
control

AM600 hardware overview

INOVANCE

Inovance PLC range

Performance ↑

Centralized motion controller & PLC

AM600

H3U-XP

High end PLC (+ 3 axes pulse linear & circular, E Cam)

General purpose

H2U-XP

Economical range

General purpose PLC + HMI (+ basic pulse control)

H1U-XP

Integrated with display & text

H0U-XP

HMI

| 14P | 20P | 32P | 40P | 60P | 64P | 80P | 128P | 256P | 1024P | 4096P |

I/O Points

2   3

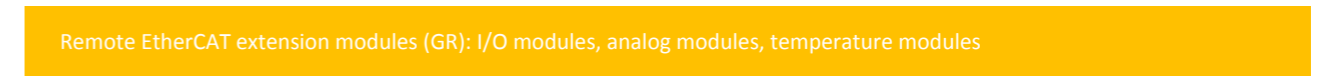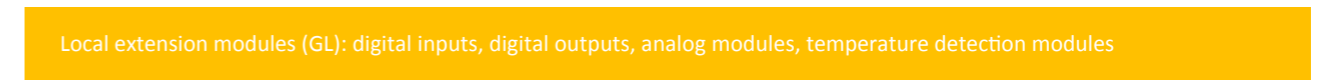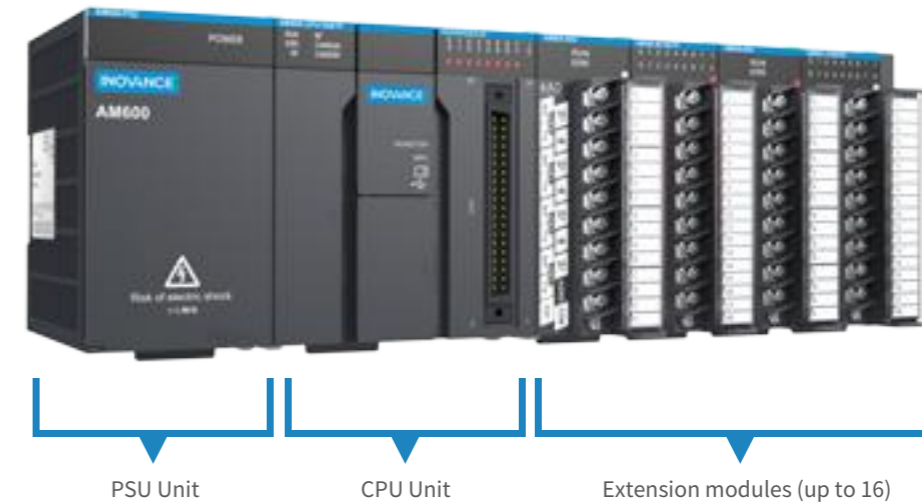## AM600 motion controller overview

- The EtherCAT bus of the AM600 main module supports 32 servo drives with a refresh time of 4 ms (for PTP positioning)
- It can realize CAM control of up to 16 axes and offers a synchronization period of 2 ms

AM600 EtherCAT topology

AM600 is a centralized motion controller with built-in PLC functionality. It has a standard EtherCAT port to control up to 32 axes with point-to-point positioning. A PLCopen library for single axis and interpolation movement is a standard feature. Every axis can be programmed to move using linear, circular or electronic cams (up to eight simultaneously). IEC 61131-3 programming is part of the InoProShop software tool. Additional modules can be added to the main CPU module to be able to manage different I/O input types. CANopen functionality and an Ethernet port also come as standard. AM600 also supports EtherCAT connections to third party devices.

AM600 system setup

| PSU Unit | CPU Unit | Extension modules (up to 16) |

Power supply module GL10-PS2	AM600 CPUs	EtherCAT coupler GL10-RTU-ECTA	CANopen coupler GL10-RTU-COP

Local extension modules (GL): digital inputs, digital outputs, analog modules, temperature detection modules

Remote EtherCAT extension modules (GR): I/O modules, analog modules, temperature modules

AM600 features & functions

- Up to 32 axes for point-to-point positioning (up to eight for interpolation motion)
- ARM-Cortex A8 1 GHz
- Operates with mathematical precision – IEEE 754 double
- Built-in EtherCAT port
- Up to 16 additional I/O modules for every CPU
- Linear, circular and spherical interpolation (up to eight axes)
- CAM functionality
- Built-in Ethernet interface
- Modbus TCP/IP
- CANopen/Modbus RTU interface
- IEC 61131-3 programming languages
- Encoder input
- Simulated encoder output
- Multitasking functionality
- RoHS, CE certified

- EtherCAT CiA 402 motion profile supported
  - ◎ CSP
  - ◎ CSV
  - ◎ CST
  - ◎ HM
  - ◎ PP
  - ◎ PV
  - ◎ PT
- PLCopen functionality
  - ◎ PTP
  - ◎ Interpolated motion
  - ◎ CAM generator
  - ◎ Homing function
- Up to 125 slave stations can be added
- InoProShop software with IEC61131-3 programming languages

PLCopen library for point-to-point positioning and interpolation

InoProShop software tools
Based on IEC 61131-3

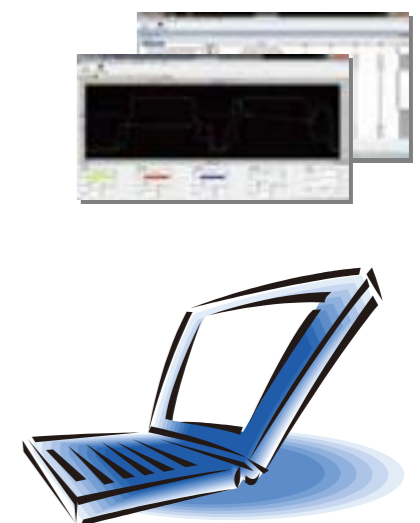EtherCAT slave extension modules for additional I/Os

EtherCAT CiA 402 profile

DIN rail mounting

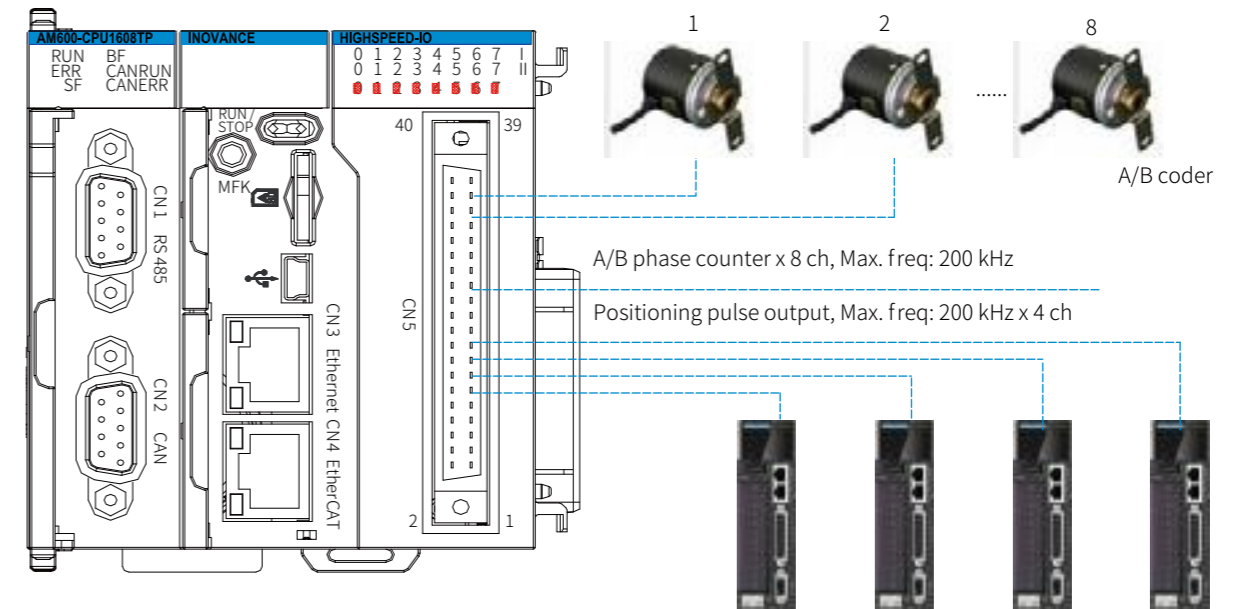PC-based software InoProShop

AM600 – CPU1608TP EtherCAT

Main features:
- 24 VDC voltage input
- SD memory card
- Built-in EtherCAT port
- Two RS485 interfaces, supporting Modbus protocol
- CANopen slave protocol
- MODBUS TCP master/slave
- 16-point high-speed input
- 8-point high-speed output
- 4 Mbytes user program storage
- Standard Ethernet cable for programming
- Programming software tools: InoProShop
- Physical dimensions: W x H x D = 80 x 90 x 95 mm
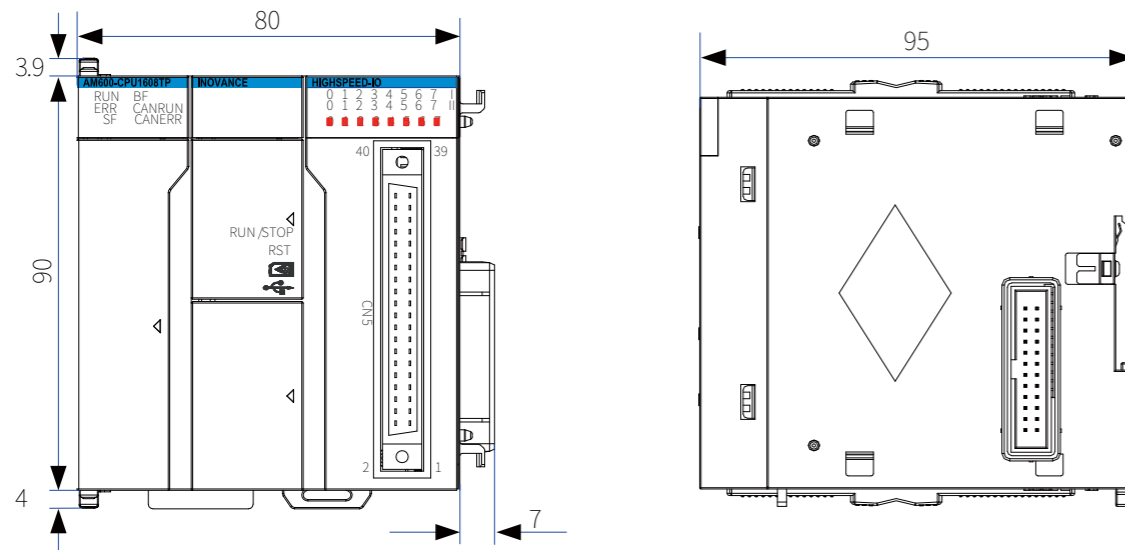- CANlink
- Ethernet/IP scanner/adapter

Dimensions:

AM600 CPU module is equipped with:
- 8-channel A/B phase pulse counter; each channel offers a maximum of 200 kHz
- Pulse frequency/width measure, ±2 μs accuracy
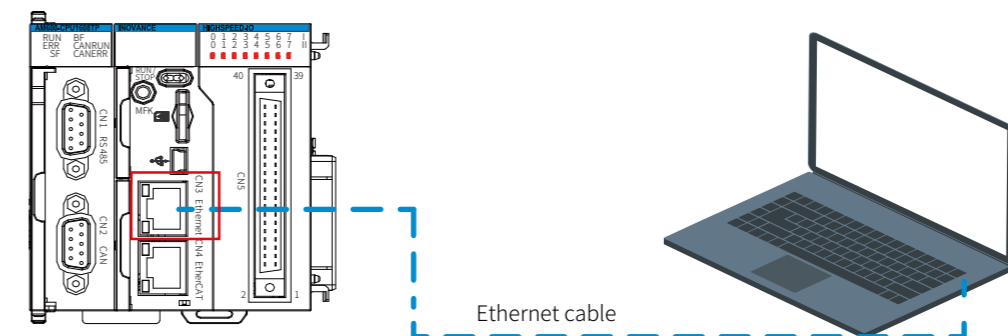- Ethernet communication cable for commissioning and service

A/B coder

A/B phase counter x 8 ch, Max. freq: 200 kHz

Positioning pulse output, Max. freq: 200 kHz x 4 ch
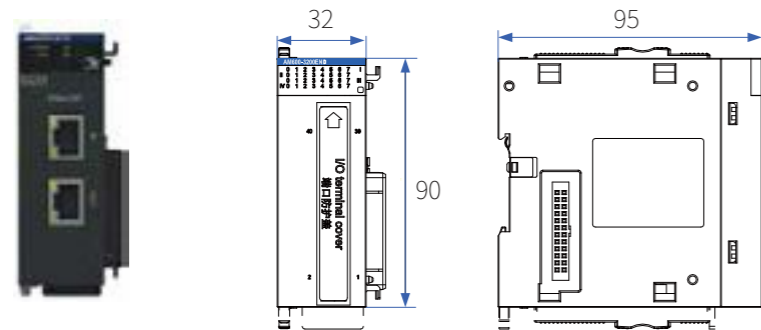
Monitoring via Ethernet connection
- Network diagram: The Ethernet interface of the CPU module can perform point-to-point connections to computers, HMIs and equivalent devices via an Ethernet connection

Ethernet cable

AM600 EtherCAT bus coupler slave module (GL10-RTU-ECTA-INT)

■ EtherCAT bus slave coupler extension (requires an AM600 master system)
■ Up to 16 DI/DO modules or up to eight AI/AO modules can be added for each RTU-ECTA
■ Supported services: CoE (PDO, SDO)
■ Baud rate: 100 Mbit/s (100 Base-TX)
■ Up to 125 modules can be added

Dimensions:

32
95
90

AM600 system (master)

Up to 125 modules

Power supply module (GL10 PS2 INT) (2)
+
EtherCAT bus coupler slave module (GL10 RTU ECTA INT) (1)
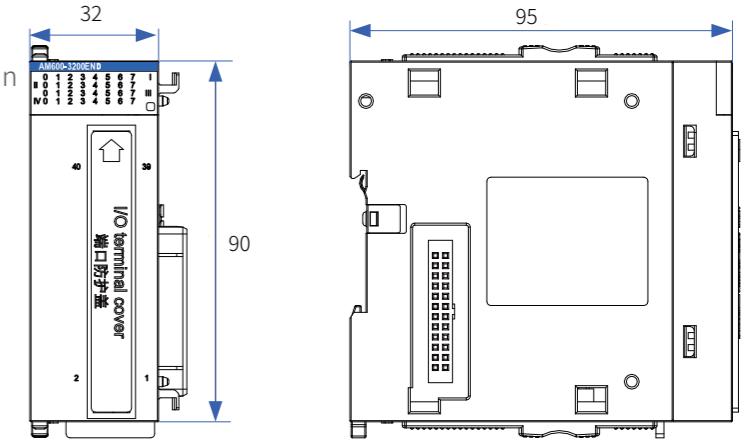**+**
Local extension modules (GL10 YYYY INT) (3)

② ① ③

CE

Local extension modules (GL10 modules)

■ AM600 extension modules are compact (32 mm thick) and can be added to the main CPU or to an EtherCAT Slave Bus Coupler
■ Many different extension modules can be added (e.g. DIs, DOs, AIs, AOs, relays, temperature detectors)
■ Physical dimensions:
   W x H x D = 32 x 90 x 95 mm

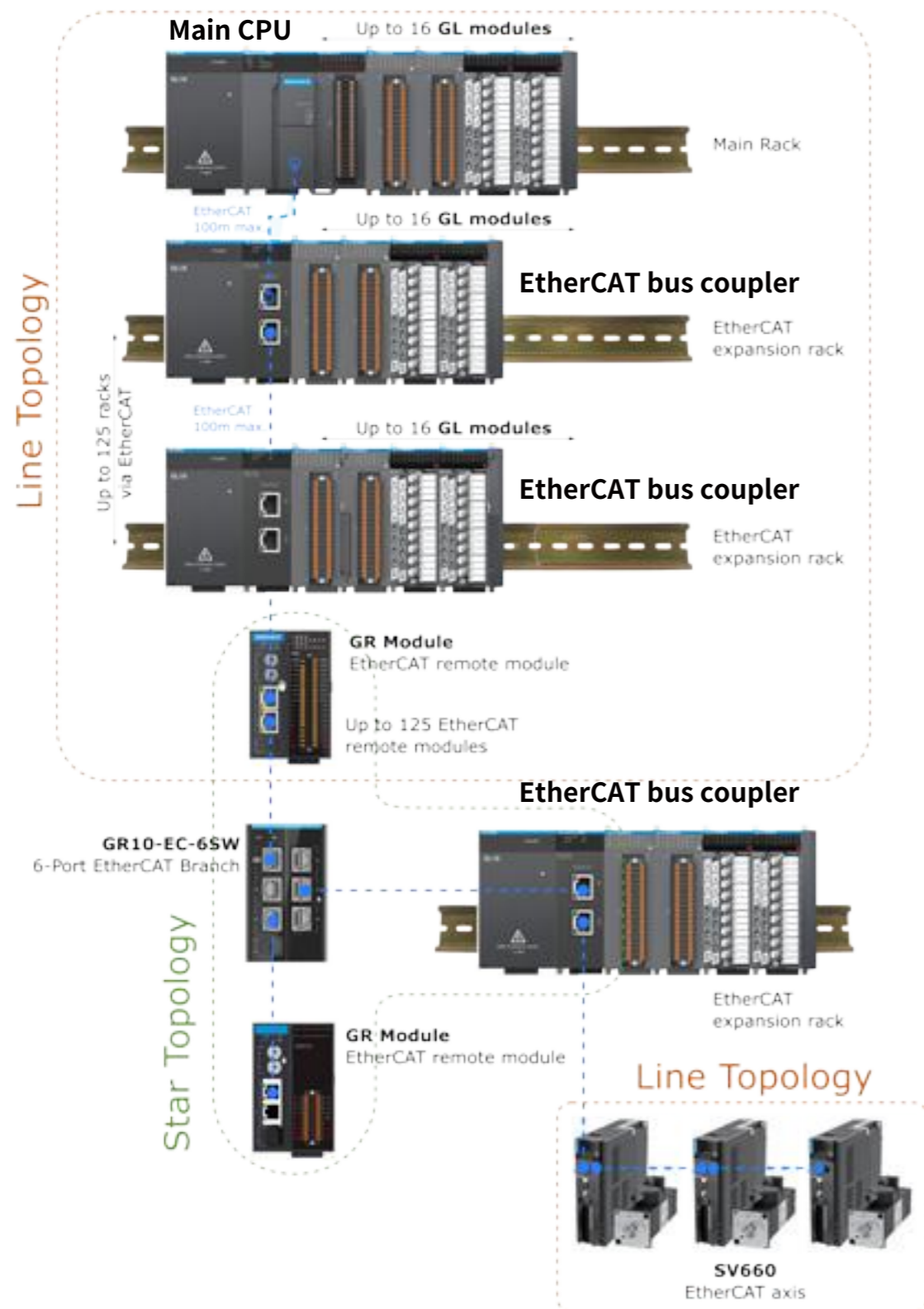32
95
90

EtherCAT remote slave modules (GR10 modules)

■ Up to 125 slave modules can be connected
■ Supported services: CoE (PDO, SDO)
■ Baud rate: 100 Mbit/s (100 Base-TX)
■ Requires an external 24 VDC power supply
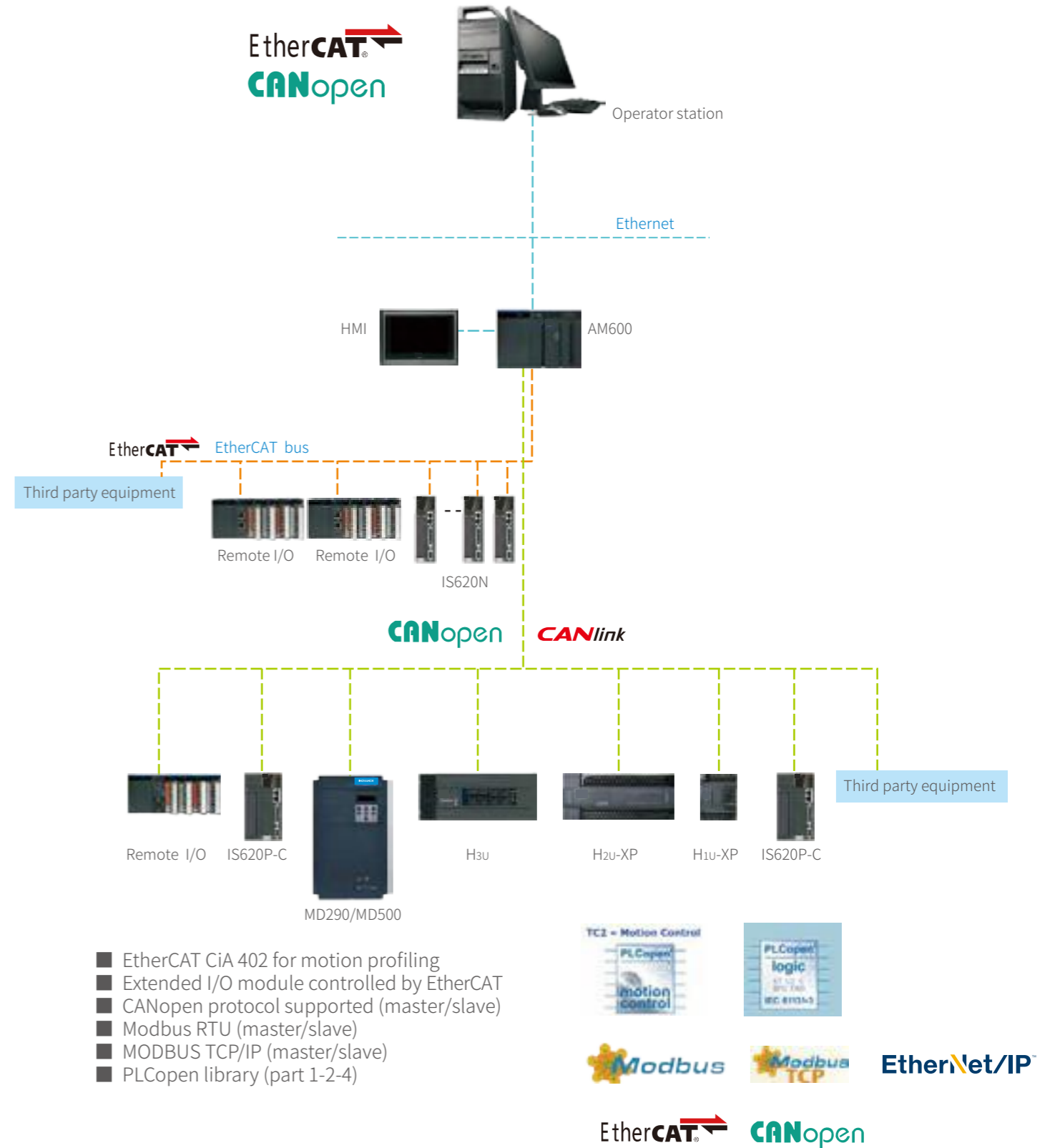
AM600 system (master)

EtherCAT

Up to 125 EtherCAT remote modules (slave)

INOVANCE

EtherCAT network topology

Main CPU

Up to 16 **GL modules**

Main Rack

EtherCAT
100m max

Up to 16 **GL modules**

EtherCAT bus coupler

EtherCAT
expansion rack

EtherCAT
100m max

Up to 16 **GL modules**

EtherCAT bus coupler

EtherCAT
expansion rack

Line Topology

Up to 125 racks
via EtherCAT

GR Module
EtherCAT remote module

Up to 125 EtherCAT
remote modules

EtherCAT bus coupler

GR10-EC-6SW
6-Port EtherCAT Branch

Star Topology

GR Module
EtherCAT remote module

EtherCAT
expansion rack

Line Topology

SV660
EtherCAT axis

AM600 motion controller framework overview

EtherCAT
CANopen

Operator station

Ethernet

HMI   AM600

EtherCAT   EtherCAT bus

Third party equipment

Remote I/O   Remote I/O

IS620N

CANopen   CANlink

Remote I/O   IS620P-C   H3U   H2U-XP   H1U-XP   IS620P-C

Third party equipment

MD290/MD500

■ EtherCAT CiA 402 for motion profiling
■ Extended I/O module controlled by EtherCAT
■ CANopen protocol supported (master/slave)
■ Modbus RTU (master/slave)
■ MODBUS TCP/IP (master/slave)
■ PLCopen library (part 1-2-4)

TC2 = Motion Control
PLCopen
motion
control

PLCopen
logic
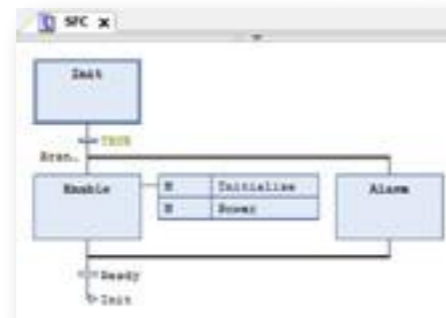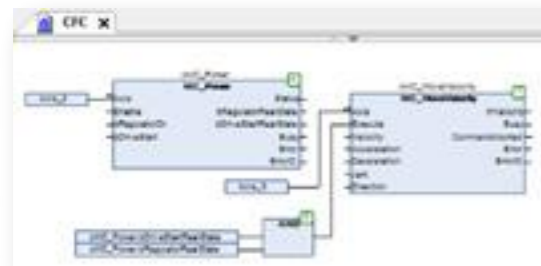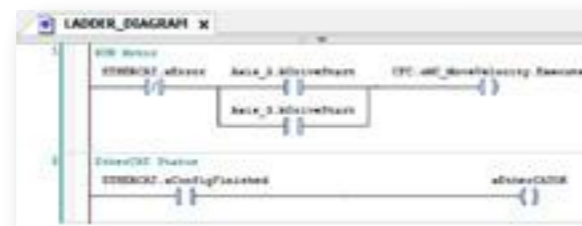
Modbus   Modbus TCP   EtherNet/IP

EtherCAT   CANopen

AM600 software overview

InoProShop software

- CAM tools as standard
- Scope tracing for monitoring and commissioning
- IEC 61131-3 standard programming languages for industrial applications
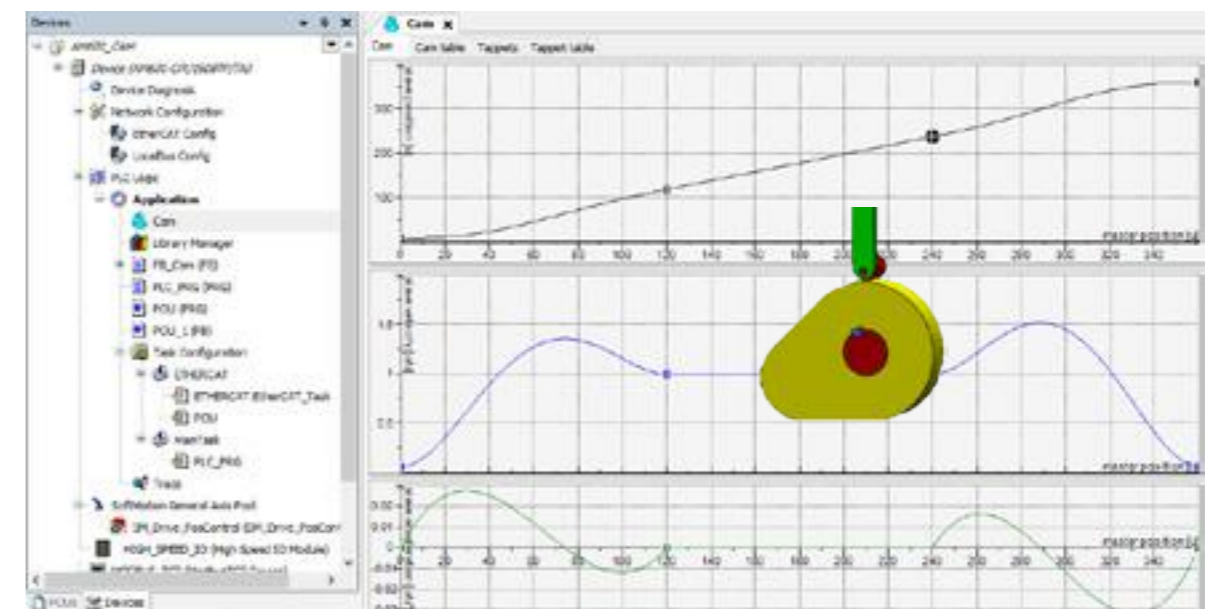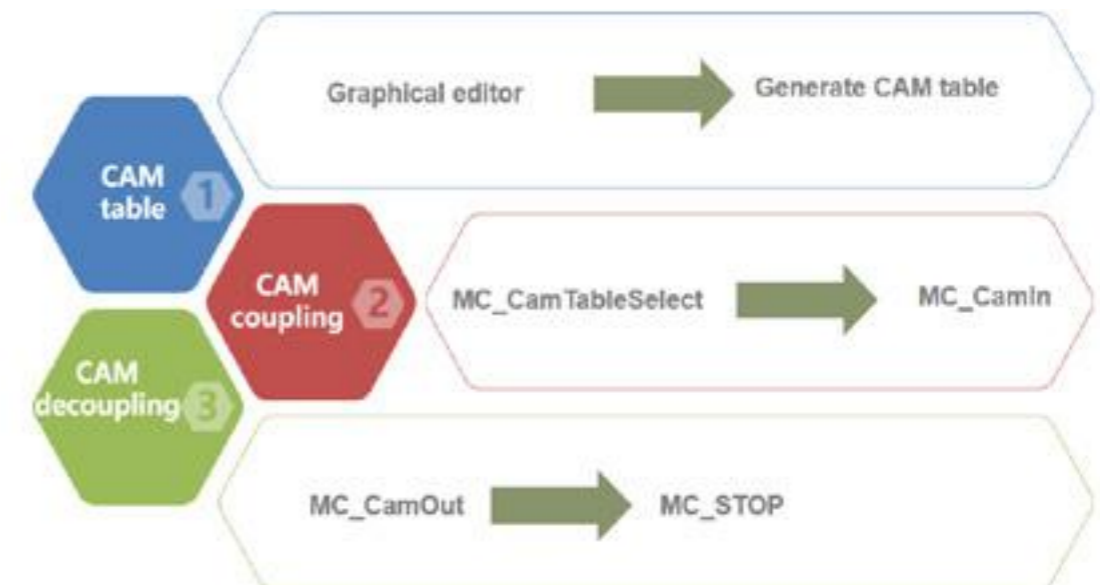- Multi-task functionality

IEC 61131-3 standard – languages supported by InoProShop platform

- Structured Text (ST)
- Ladder Diagram (LD)
- Sequential Function Control (SFC)
- Continuous Function Chart (CFC)

CAM setting

- CAM table can be easily configured by using the graphical editor included in InoProShop PC software
- Linear or polynomial interpolation (5th order polynomial)
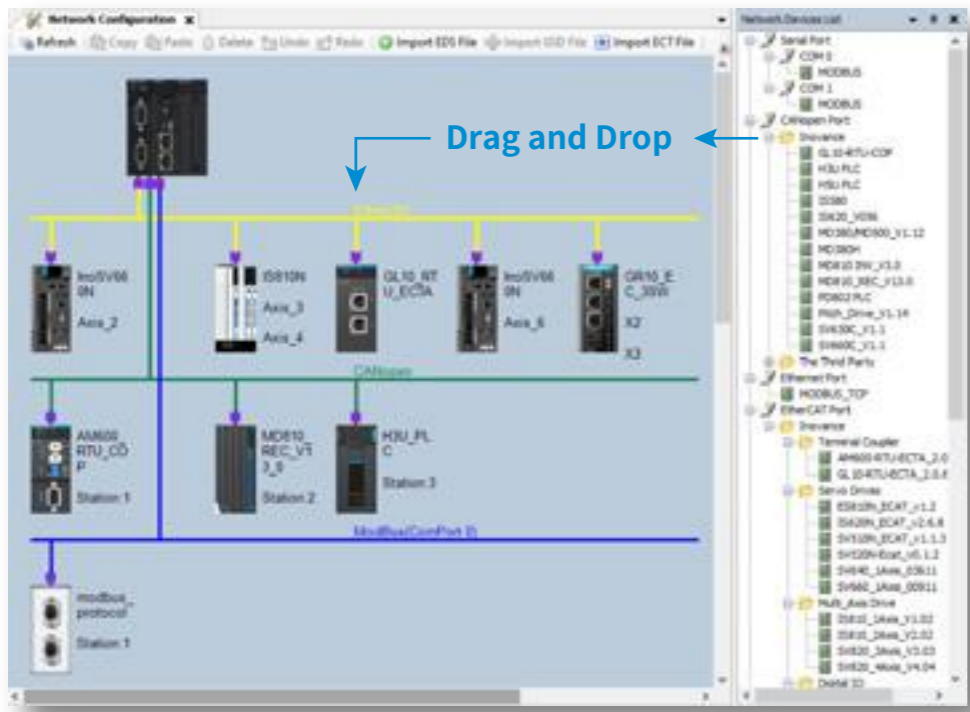- Supports up to 65535 CAM points

AM600 software overview

Network configuration

■ EtherCAT easy axes configuration
■ Diagram view of EtherCAT communications system
■ Overview of all axes parameters by EtherCAT protocol
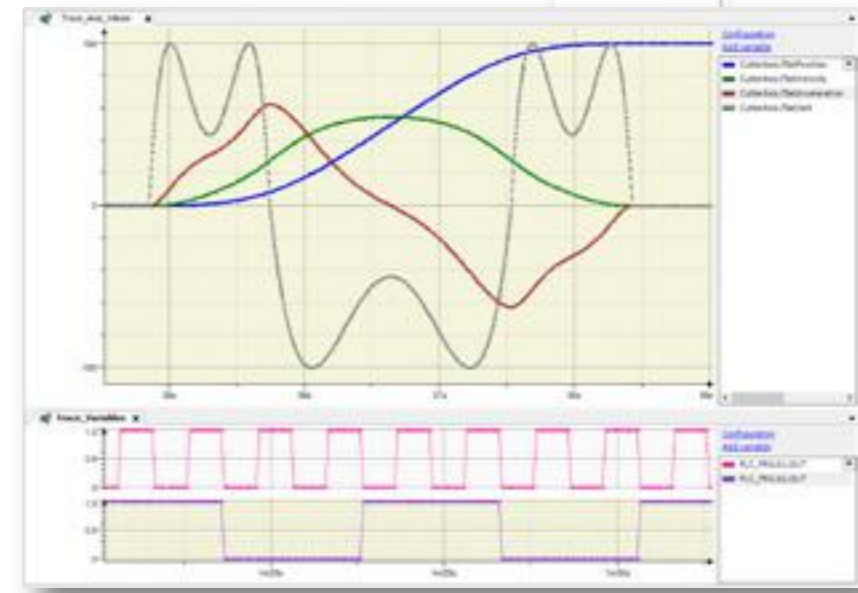

Axes parameters

Axis commissioning and status

Axis status monitoring (for example, by position, velocity, or error information), allows intuitive axis configuration and enables online monitoring of program and axis variables via graphical curves

INOVANCE

Model number	Item Code	CE	Description
CPUs			
AM401-CPU1608TP-INT	01440170	Yes	16 x high-speed inputs, 8 x high-speed outputs (source/PNP type, requires connector, see below FCN-40), 1 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 4 axes control
AM402-CPU1608TP-INT	01440166	Yes	16 x high-speed inputs, 8 x high-speed outputs (source/PNP type, requires connector, see below FCN-40), 1 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 8 axes control
AM600-CPU1608TP-INT	01440168	Yes	16 x high-speed inputs, 8 x high-speed outputs (source/PNP type, requires connector, see below FCN-40), 2 x RS485, 1 x CAN port,1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 32 axes control
AM401-CPU1608TN	01440032	Yes	16 x high-speed inputs, 8 x high-speed outputs (sink/NPN type, pluggable spring clamp), 1 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 4 axes control
AM402-CPU1608TN	01440031	Yes	16 x high-speed inputs, 8 x high-speed outputs (sink/NPN type, pluggable spring clamp), 1 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 8 axes control
AM403-CPU1608TN	01440126	Yes	16 x high-speed inputs, 8 x high-speed outputs (sink/NPN type, pluggable spring clamp), 1 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 16 axes control
AM600-CPU1608TN	01440064	Yes	16 x high-speed inputs, 8 x high-speed outputs (sink/NPN type, pluggable spring clamp), 2 x RS485, 1 x CAN port, 1 x EtherCAT port, 1 x Ethernet port, 1 x USB, supports 32 axes control
POWER SUPPLY UNIT			
GL10-PS2-INT	01440196	Yes	Power supply module, input: 220 VAC, output: 2 A/ 24 VDC
DIGITAL INPUT MODULES			
GL10-1600END-INT	01440198	Yes	16 x source (PNP)/sink (NPN) digital inputs module, screw terminals
GL10-3200END-INT	01440216	Yes	32 x source/sink digital inputs module, pluggable spring clamp
DIGITAL OUTPUT MODULES			
GL10-0016ER-INT	01440193	Yes	16 x relay outputs module
GL10-0016ETP-INT	01440199	Yes	16 x source/PNP transistor outputs module, screw terminals
GL10-0016ETN-INT	01440195	Yes	16 x sink/NPN transistor outputs module, screw terminals
GL10-0032ETN-INT	01440217	Yes	32 x sink/NPN transistor outputs module, pluggable spring clamp
ANALOG I/Os MODULES			
GL10-4AD-INT	01440197	Yes	4 x analog inputs module, screw terminals
GL10-4DA-INT	01440192	Yes	4 x analog outputs module, screw terminals
TEMPERATURE DETECTION MODULES			
GL10-4PT-INT	01440258	Yes	4 x channel thermal resistance inputs temperature detection module, screw terminals
GL10-4TC-INT	01440263	Yes	4 x channel thermocouple inputs temperature detection module, screw terminals
GL10-8TC-INT	01440261	Yes	8 x channel thermocouple inputs temperature detection module, screw terminals
EtherCAT COUPLER			
GL10-RTU-ECTA-INT	01440194	Yes	EtherCAT (auto scan) communication module, RJ45 LAN port
CANopen COUPLER			
GL10-RTU-COP-INT	01440251	Yes	CANopen communication module, DB9 female
REMOTE MODULES (EtherCAT SLAVE)			
GR10-2HCE-INT	01440206	Yes	Series programmable controller 2 channel ABZ high speed count EtherCAT slave station module, pluggable spring clamp
GR10-0808ETNE-INT	01440249	Yes	8 x digital inputs and 8 x transistor outputs EtherCAT slave station module, pluggable spring clamp
GR10-1616ETNE-INT	01440079	Yes	16 x digital inputs and 16 x transistor outputs EtherCAT slave station module, pluggable spring clamp
GR10-2PHE-INT	01440256	Yes	2 x channel high-speed difference pulse output EtherCAT slave station module, pluggable spring clamp
GR10-4ADE-INT	01440254	Yes	4 x analog inputs EtherCAT slave station module, pluggable spring clamp
GR10-4DAE-INT	01440262	Yes	4 x analog outputs EtherCAT slave station module, pluggable spring clamp
GR10-4PME-INT	01440252	Yes	4 x channel positioning output EtherCAT slave station module, pluggable spring clamp
GR10-8PBE-INT	01440250	Yes	8 x channel capture probe EtherCAT slave station module, pluggable spring clamp
GR10-8TCE-INT	01440257	Yes	8 x channel thermocouple inputs EtherCAT slave station module, pluggable spring clamp
GR10-EC-6SW-INT	01440259	Yes	6 x channel EtherCAT branch module (1 EtherCAT input and 5 EtherCAT outputs), RJ45 LAN port
CONNECTION CABLES (For TP/TN type)			
H2U-USB-CAB	15041200	-	Connection of PC to controller, the connector on the cable is mini USB, length of 1.5 m
S6-L-T04-0.3	15040261	-	Ethernet cable, length of 0.3 M, speed of up to 100 Mbps, STP
S6-L-T04-3.0	15040262	-	Ethernet cable, length of 3 m, speed of up to 100 Mbps, STP
CONNECTION CABLES (Only for TP type)			
Only connector			
FCN-40	15050180	-	40PIN FCN connector (required for TP type)
Alternative with remote screw terminal block			
T024-K	15020452	-	40PIN MIL screw terminal block (required for TP type)
X210-5-0.5	15300119	-	AM600 I/O extension cable - 0.5 m length with 2 FCN connectors (required for TP type)
X210-5-2.0	15300193	-	AM600 I/O extension cable - 2.0 m length with 2 FCN connectors (required for TP type)

Driven by Technology

AC Drives

AC MultiDrives

MV Drives

Single-Axis Servos

Multi-Axes Servos

EtherCAT

Robotics & Motion Controllers

PLCs & HMIs

CNC Machine Tool Solutions

EtherCAT

Electric Vehicle Inverters

INOVANCE
Forward, Always Progressing

International Offices

Germany-Stuttgart
Tel: +49 (0) 7144 8990
sales.de@inovance.eu
www.inovance.eu

Italy-Milano
Tel: +39 (0) 2268 22318
sales.it@inovance.eu

France-Bordeaux
Tel: +33 (0) 5594 01050
sales.fr@inovance.eu

Turkey-Istanbul
Tel: +90 (0) 21 6706 1789
info.turkey@inova-automation.com

India
Head Office Chennai
Tel: +91 (0) 44 4380 0201
Ahmedabad
Tel: +91 (0) 79 4003 4274
Mumbai Tel: +91 (0) 22 4971 5883
Delhi Tel: +91 (0) 11 4165 4524
Sales Network in Kolkata, Bengaluru,
Coimbatore, Hyderabad, Pune
info.inovaindia@inova-automation.com

South Korea-Seoul
Tel: +82 (0) 10 7428 5732
info@inova-automation.com

Hong Kong SAR
Tel: +852 2751 6080
info@inova-automation.com

Inovance Technology Companies
Shenzhen Inovance Technology Co. Ltd.
Suzhou Inovance Technology Co. Ltd.

For other country distributors, contact the Hong Kong office.

INOVANCE
Forward, Always Progressing

Inovance Technology
www.inovance.eu

inova
automation
by INOVANCE