GOOGOLTECH

OPEN AND CONFIGURABLE CNC PLATFORM

Fully Interconnected Intelligent Manufacturing Core Technology Platform

Googol Technology's CNC development platform consists of an open hardware platform and a software platform. The development platform is based on the Windows operation system and meets the needs of real-time control, security and stability. The platform aims at machine tool manufacturers, system integrators and research institutes with development capabilities, and uses an architec ture that supports secondary development for customized manufacturing engineering technique and UI.

The CNC system development platform supports G-codes generated by a wide range of CAD/CAM software such as UG, MasterCam and AutoCAD, and is now widely used on machine tools such as carving and milling machines, drilling and tapping centers, polishing machines and machining centers.

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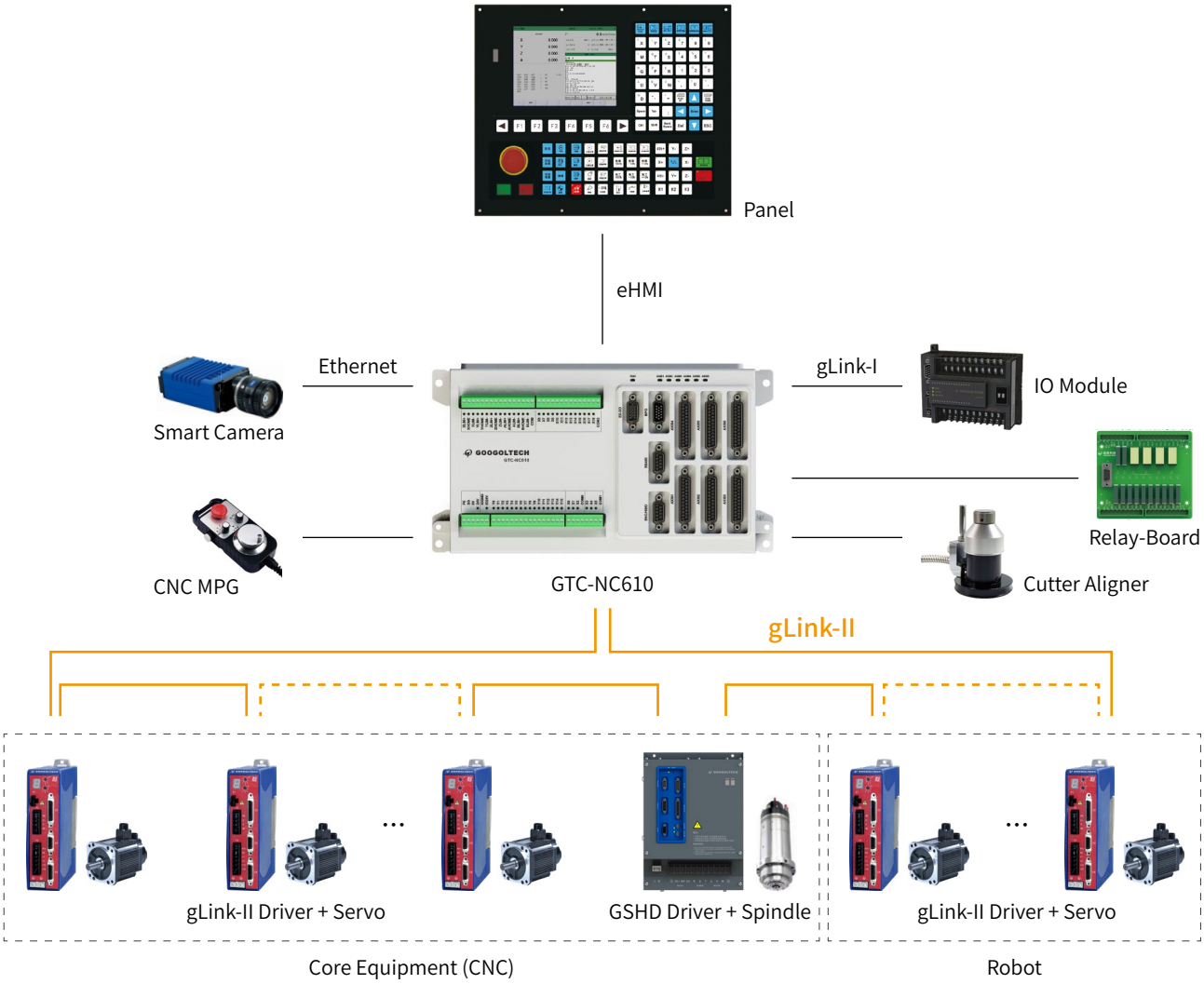
01 Features

- Supports secondary development of machining techniques and UI.
- Platform is modular and configurable via parameters.
- Customer-defined codes to do specified work.
- Supports both CNC and loading/unloading robot arms and anti-collision protection safe zone function.
- Intelligent network and tuning debugging function.
- Supports 5-axis and RTCP functions.
- Probe detection of workpiece contours for machining error compensation.
- PLC and macro program function.
- Tool path simulation and real-time machining path display.
- Tool length compensation, tool radius compensation and tool life management.
- Pitch error compensation, backlash error compensation, friction compensation,vibration suppression and path optimization.
- MPG test machining, breakpoint continuation and jump section machining.
- Supports synchronous control of gantry machine tool's drivers.
- Supports linear encoder, linear motor and absolute encoder control.
- Supports CCD cameras for visual positioning of workpiece.

02 System Architecture



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03 Software Platform

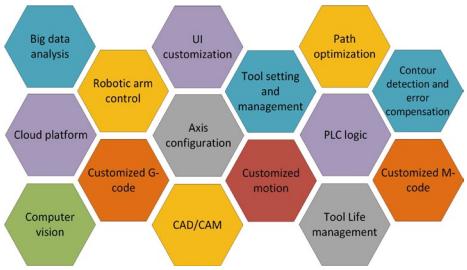
CNC OtoStudio Development Environment Features

- 6 Programming languages available including visual programming language,also supports high level languages such as C or C++
- Easy to implement intelligent manufacturing and production management
- Remote access and maintenance support via network
- Multiple encryption and access authorization to secure user's intellectual property
- Customizable code and motion functions
- Flexible UI configuration

OpenCNC Secondary Development

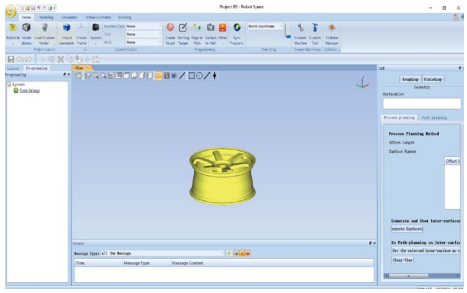
The OpenCNC platform integrates CNC, PLC, computer vision, robotic arm control and cloud platform to provide a complete solution for customization of machining engineering. The platform can also provide a library of function modules with C language interface,and support customers to use VC++, C#, VB, QT and other high-level languages for secondary development of the UI and machining engineering to quickly customize special CNC systems.

- Modular functions with the ability for customers to reconfigure modules
- Rapid customization of specified machining technique
- Customizable human-machine interface
- Convenient extensions of robotics, vision, automation, etc.
- Intelligent networking for customized big data analysis

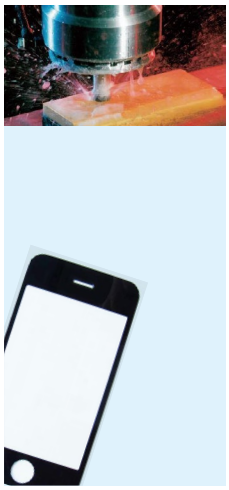


CAD/CAM Integrated Software

- 2D CAD function
- CAM manufacturing path code generation
- Supports graphics library management, machining technique processing based on graphic layers, path entry line setting and other functions
- Convenient extensions of robotics, vision, automation, etc.
- Can be applied to laser, water jet, plasma, glass and other cutting systems



04 Industry Applications



Glass processing

Grinding machine

Drilling center

Milling machine

Woodworking machine

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05 Technical Specifications

Technical specifications	
System interpolation cycle	0.25ms
Code lines read in advance	1000 Lines
Max rapid feed rate	100m/min
Axis control bus	gLink-II
Peripheral devices & IO bus	gLink-I
PMC command execution speed	0.1ms/1000 lines
Minimum distance of execution	0.1um
Minimum distance of internal control	10nm
File operation	
Read G-code	Reads international standard G-code generated by MasterCam, Type3, Ucancam and other softwares
G-code type identification	Identifies different kinds of G-code
Interpolation	
Multi-axis interpolation	Supports 3-axis, 4-axis and 5-axis interpolation
Interpolation types	Linear interpolation, Circular interpolation, Helical interpolation, B-spline interpolation
Program pre-reading & preprocessing	Increases speed and efficiency during the machining of small line segments
RTCP function	Tool center point control function
Feed rate planning in corner milling	Automatic feed rate planning in corner milling and circular milling to ensure machining precision
S-shape feed rate planning	S-shape feed rate planning to ensure the smoothness of motion
High-speed machining	Supports High-speed and high precision machining
Multi-channel & multi-axis	
Number of channels	4 Channels
Number of axes	32 Axes
Multi-axis control	5-axis
Exchange axis	Supports exchange of two axes
Axis synchronization	Synchronous control of multi-axis when executing motion
Virtual axis	Virtual axis serves as a master axis that other axes gear to
High speed and high precision machining	
Software kits	Software kits for high precision surface, high speed & high precision machining
Five-axis functions	
Length compensation	Tool tip speed control
RTCP function	Tool center point control function
Tool entry and exit along the tool axis	Send and retract tool along the tool axis
Beveled surface machining	Machining strategy specially designed for beveled surface machining
Tool tip speed control	Control of tool tip motion feed rate to execute smooth movement
Compensation functions	
Tool length compensation	Automatic tool length compensation
Tool radius compensation	Automatic tool radius compensation
Contour error compensation	Uses probe to detect the machined workpiece' s contours and compensate the machining errors
Pitch error compensation	Regular measurement of screw errors and wear for compensation and correction
Backlash error compensation	Compensation for reducing errors caused by screw backlash
Machine axis deviation compensation	Trajectory compensation for special non-orthogonal axis machining machines
WCS offset compensation	Compensation according to the 5-axis machine structure and workpiece coordinate system offsets.
Friction compensation	Eliminates the influence of quadrant protrusion errors caused by friction
Trajectory optimizaiton functions	
Trajectory preprocessing	Removal of noisy points in trajectories such as tiny line segments, jagged trajectories, etc.
Arc blending	Makes motion and transition smoother in chamfering to eliminate marks on the machined surface
Spline curve fitting	Fits data points into a spline that is more approximate to the original path than the pre-optimization curve
Arc fitting	Uses arcs to approximate the original path, avoiding errors and unevenness due to small line segments
Tool direction following	Calculates following angle for line/arc segments; Tangential/normal follow, absolute/relative angle follow
Non-linear error correction	Automatic calculation of non-linear errors and densification of trajectory points to restrict non-linear errors
Jitter suppression	Motion jitter suppression by controlling the rate of change of acceleration
Feed rate planning in corner milling	Automatic feed rate planning in corner milling and circular milling to ensure machining precision

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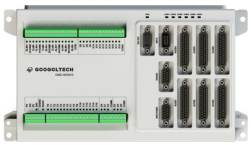
Special functions	
User rights management	Rights management for manufacturers and technicians to prevent operational errors or business secrets leak
Machining simulation	During test machining, the MPG can be used to control the machining speed of test cuts
Remote diagnosis and monitoring	Remote diagnostics and monitoring, error troubleshooting, remote system update and backup
Vibration suppression	Reduces vibration and improve machined surface quality
Robotic arm control	Supports Cartesian coordinate robots control with playback function
Synchronous control of multi-drivers	Synchronous control of double drivers on Gantry machining center
CCD camera positioning	The workpiece rotation and transition can be positioned by a CCD camera before machining.
Five-axis machine configurations	User-configurable five-axis machine types and structure parameters
Secondary development API	Customized plug-ins available for customers through secondary development of machining techniques & UI
Intelligent network	Smart industry 4.0 manufacturing through intelligent network

06 Hardware Platform



Controller specifications		GNS	GTC-NC610
Computer	CPU	1.46GHz,Single-core	1.99GHz,Quad-core
	RAM	2GB	2GB
	DOM	8GB/16GB/32GB	8GB/32GB
	OS	WinCE 6.0/Win 10	WinCE 6.0/Win 7/Win 10
PC Connector	DP	1*DP	-
	VGA	-	1*VGA
	eHMI connector	1*eHMI	1*eHMI
	USB	3*USB2.0	2*USB2.0, 1*USB3.0
	gLink-II	2*gLink-II	2*gLink-II
	LAN	1*RJ45, 10M/100M self-adaptive	2*RJ45, 10M/100M self-adaptive
	Multifunctional communication connector	1*RS232/RS485	
Motion Control Connector	MPG connector	1 channel MPG, A and B phase signals, 7 channels of optoisolated inputs	
	General purpose input/output	48DI;32DO	19DI;16DO
	Extended IO module connector	1*gLink-I	
Others	Power supply	Voltage: DC 24V±10% Minimum current: 3A	
	Working temperature	0° C-55° C	
	Storage temperature	-10° C-70° C	
	Working humidity	5% - 90% (non-condensing)	
	Storage humidity	10% - 5% (non-condensing)	
	Anti-vibration	Sinusoidal vibration: GB/T 2423.10;Random Vibration: GB/T 2423.56	
	Impact resistance	Mechanical impact: GT/T 2423.5;Crash: GB/T 2423.6	
	Drop test standard	Pass 1.5m drop test	
	EMC standards	Industrial level 3 standard (ESD Contact discharge 6kV, EFT Power cable 2kV, Signal cable 1kV)	
	Certification	CE Marking	
	Dimensions(W*H*D)	224mm*145mm*77.8mm	287mm*160mm*78mm
	Installation	Horizontal installation	
	Ingress Protection rating	IP30	
	Auxiliary encoder connector	-	1 Channel Auxiliary encoder; A,B phase signal
	Axis connector	-	6*Axis Connector, support gLink-II bus control and 6-axis pulse/analog control
	Extended output	-	14 channels
	Origin signal	-	5 channels
	Limit signal(+/-)	-	10 channels

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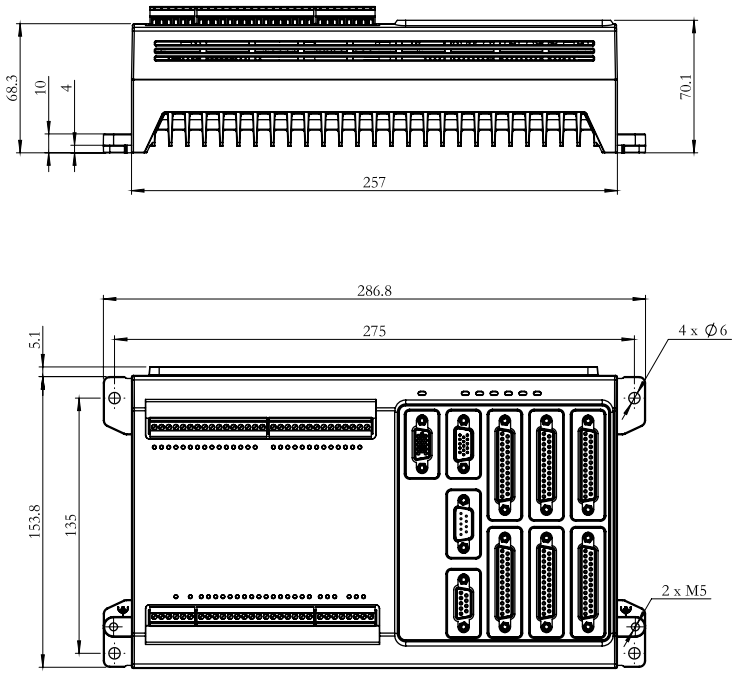
07 Order Information

Cat.	Items	Types	Remarks
Required	Controllers	GTC-NC600-03	GTC-NC600 6-axis motion control
		GNS-024-G31-G2H01	GNS series motion controller
		GNC-024-VT30-G2H60	NC610 series motion controler, Win 7+OpenCNC+32GB disk
		GNC-024-T30-G2H62	NC610 series motion controler, Win 10+OpenCNC+32GB disk
	Panels (Choose one from two)	GTC-DOP-04A-HC	10 inches CNC vertical display board
		GTC-EP-01A	Operation panel
		GTC-DOP-05C	8 inches CNC all-in-one machine
	Ethernet HMI cables	CABLE-eHMI/RJ45-DB9F-6M	Controller to panel connection cable, 6m
Optional	Extended IO module	HCB3-1616-DTD01	16DI/16DO, low level input effective, sinking output
		HCB3-1616-DTS01	16DI/ 6DO, high/low level input selectable, sourcing output
		HCB3-3200-DXX01	32DI, high/low level input selectable
		HCB3-0604-A12WL	6AI/4AO, 12-bit accuracy
	Extended IO module connection cable	DB9P F/M L=0.3m	IO module connection cable, 0.3m
		DB9P F/M L=1.5m	IO module connection cable, 1.5m
		DB9P F/M L=5m	IO module connection cable, 5m
	CNC relay boards	CNC-TER-02A	15-channel relay output board
		HCS3-3216-DRA01	32-channel digital inputs, 16-channel relay outputs
	CNC relay board cables	GTC-DB15/M-DB15/M-0.5M	CNC relay board cables
	MPG	N-230A4X5P1C-10	SaiYang MPG
	Driver connection cable	ACC5-D01005/10/15/20	Panasonic series driver connection cable, 0.5m/1.0m/1.5m/2.0m
		ACC5-D01005/15-01 (brake)	Panasonic series driver connection cable, brake, 0.5/1.5m
		ACC5-SP01015	Sanyo series driver connection cable, 1.5m
		ACC5-D03015/30	Yaskawa series driver connection cables, 1.5m/3.0m
		ACC5-D03015/30 (brake)	Yaskawa series driver connection cables, brake,1.5m/3.0m
		ACC5-D2005	Fuji series driver connection cables, 0.55m

08 Dimensions



GTC-NC600/GTC-NC610

* Same mounting dimensions for NC600 and NC610
* Vertical installation

Unit: mm

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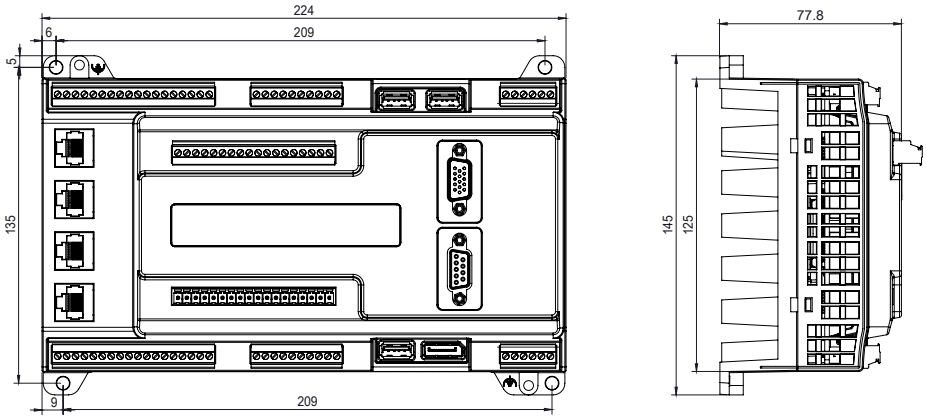
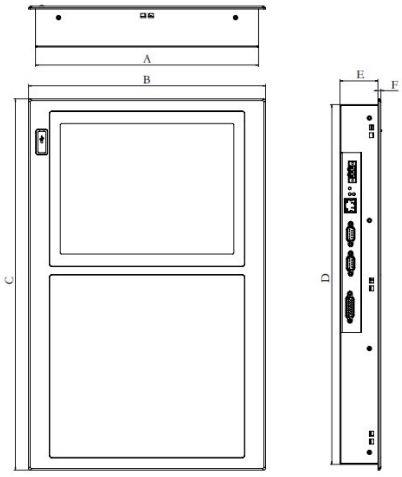


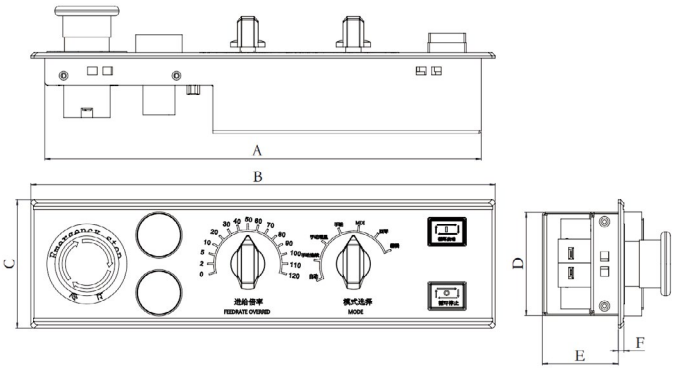
GNS

	A	B	C	D	E	F
GTC-DOP-04A-HC	273	290	454	440	46.5	3.5



GTC-DOP-04A-HC Display Panel

	A	B	C	D	E	F
GTC-EP-01A	272.6	290	80	64.6	47	3.5



GTC-EP-01A Operation Panel

Unit: mm

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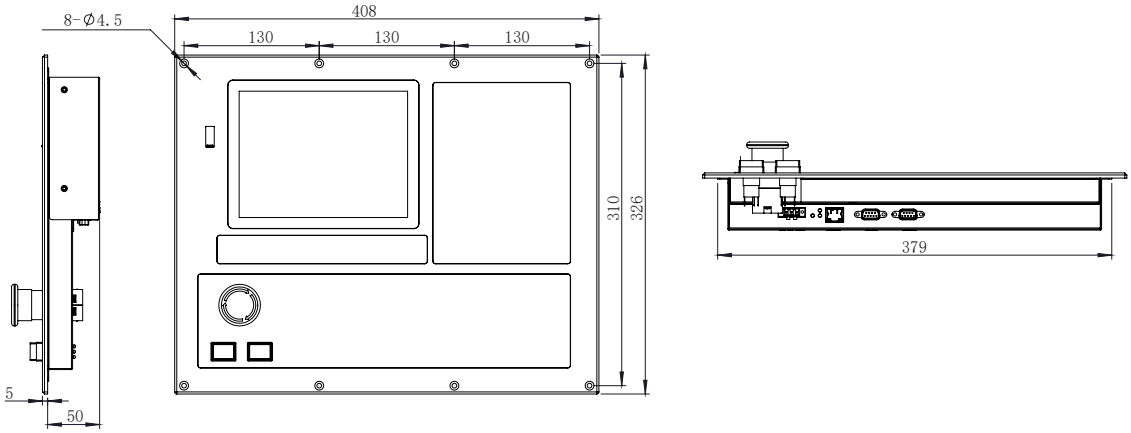
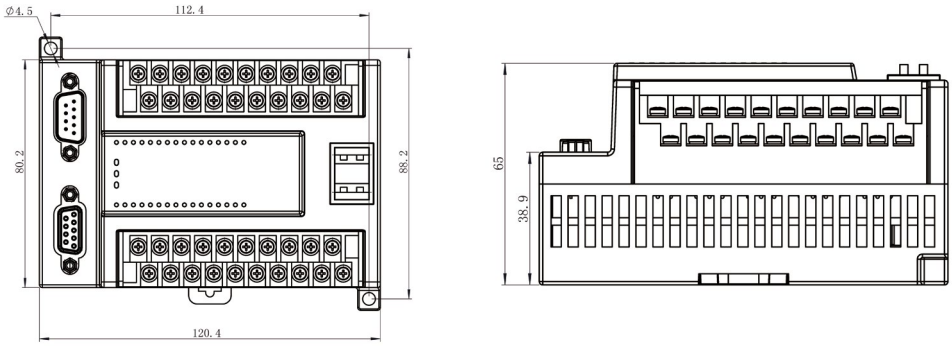
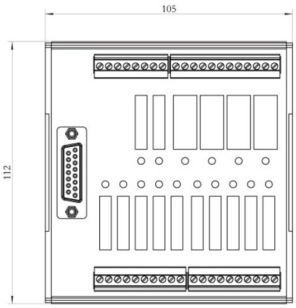


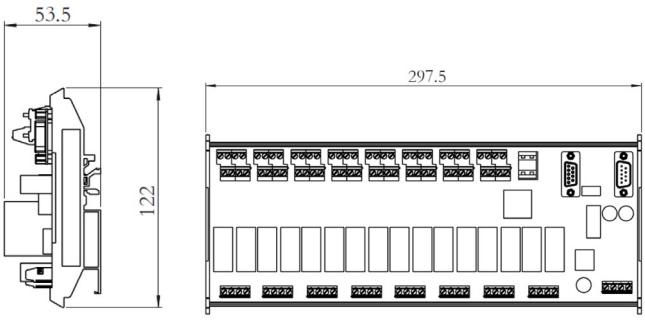
GTC-DOP-05C Operation Panel



Extende IO Module



CNC-TER-02A Relay Board



HCS3-3216-DRA01 Relay Board

* Same mounting dimensions for all extended IO modules

Unit: mm

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