



Automation for a Changing World

Delta CNC Solution



Delta CNC Solution: an integrated system that provides flexibility and completeness, and fulfills all the significant requirements of the machining industry

Delta Electronics Inc., a leading professional manufacturer of industrial automation products, is pleased to announce the launch of the innovative CNC Solution that offers an outstanding integrated system for the CNC machine tools industry.

The CNC machine tools industry in Taiwan and the rest of the world has relied heavily on European and Japanese brands which usually offer less flexibility, high maintenance costs and additional expenses for more functions, hardware, and software. As a result, for Taiwan's machine tool manufacturers costly and time consuming "Mix-and-Match components" have been the default option to satisfy their customers' needs.

The Delta CNC Solution is the first complete total solution developed and made by a Taiwanese company to assist customers in the CNC machine tool fields that are facing an advanced phase of global market competition.

Key to Success - The Delta CNC Solution includes CNC controllers, multi-axis servo drives and up to 20-bit high resolution servo motors, and permanent magnet (PM) spindle drives and motors that provide an embedded system with multiple CPUs to distribute multitasking and raise the operating performance of controllers. Combined with Delta's high speed motion control system DMCNET, the Delta CNC Solution delivers a high speed, high precision system for excellent performance while helping enterprises succeed in business with enhanced productivity and efficiency.

Win-win Opportunity - The Delta CNC Solution features high speed, high precision and superior surface finishing to enhance the speed, quality and stability of CNC machine tools. It is suitable for high-speed tapping, engraving and milling processes, tooling machine manufacturing, component processing as well as other manufacturing and related industries. With increasing challenges in the changing global market, the Delta CNC Solution delivers the ultimate in performance to help the machine tools industry excel and stay competitive through continuous innovation and customization.



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Ethernet

High Performance

CNC Controller NC300 Series



DMCNET

**High Speed
Communication
Protocol**

Optional Accessories



Operation Panels

Optional Accessories



**I/O Boards
(Max. 256 Inputs, Max. 256 Outputs)**

Optional Accessories



Manual Pulse Generator (MPG)



Analog Voltage Output Signal

Drives

ASDA-A2-NN Series
ASDA-A2-FN Series
ASDA-A2-F Series
AC Servo Drives



ASDA-M-F Series
AC Servo Drives



ASDA-S-N Series
Spindle Motor Drives



VFD Series
AC Motor Drives



Motors

ECMC Series Servo Motors (for ASDA-A2-NN/FN/F)
ECMA Series Servo Motors (for ASDA-M-F)



ECMS Series
Permanent Magnet (PM)
Spindle Motors



Induction
Spindle Motors



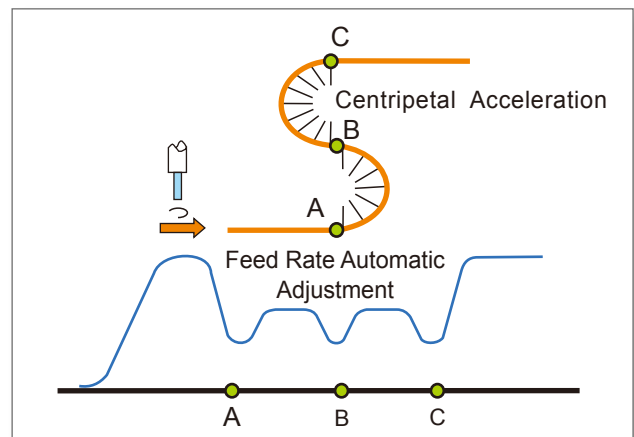
Induction
Spindle Motors



Features - Long Precision Life

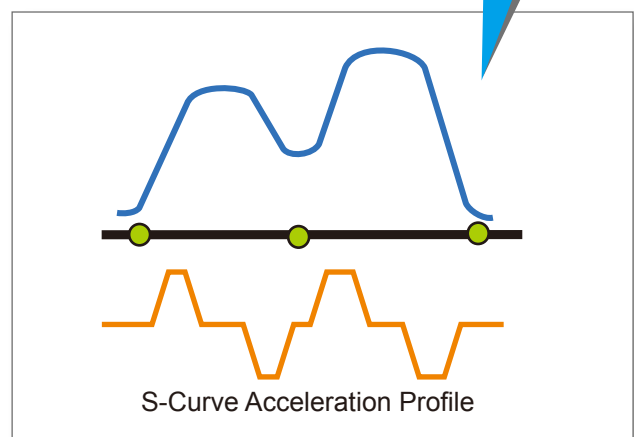
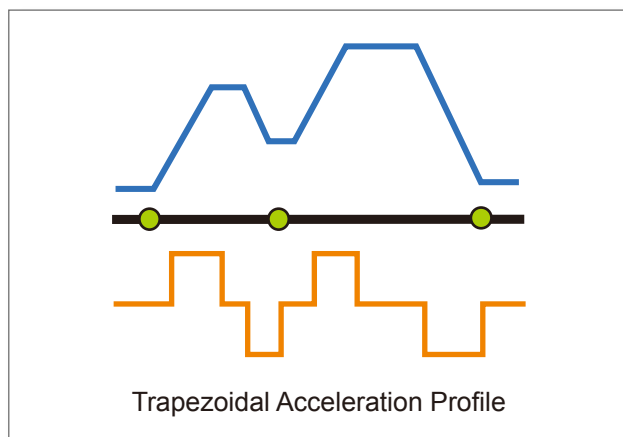
Jerk Control

- When acceleration changes significantly, or the cutting path changes from a straight line to curve, the Jerk Control decelerates speed to suppress machine vibration and shock, and maintain stability and precision for long term operation.



S-Curve Smoothing

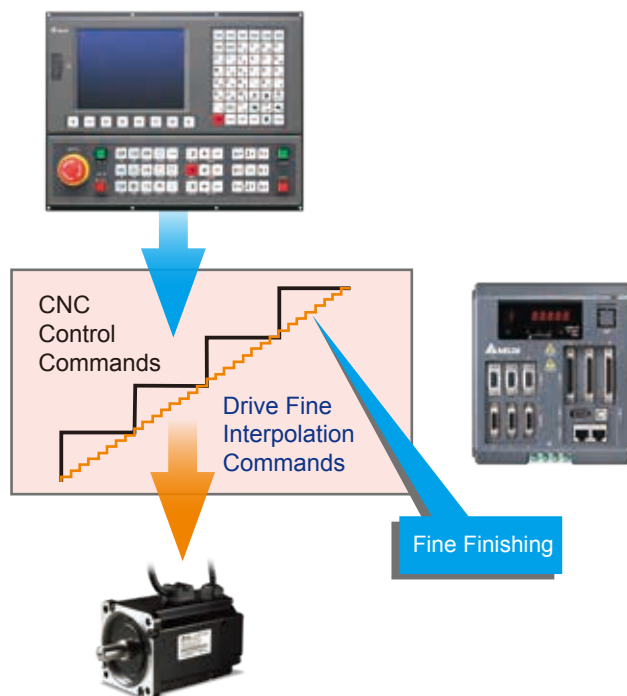
- The S-curve acceleration profile for smooth acceleration and deceleration before interpolation minimizes vibration and offers a stable and high precision machining process.



Features - High Machining Precision

Fine Interpolation Commands

- Delta's AC servo drives execute a high sampling interpolation function which smooths the internal drive commands and controls the operation of servo motors with more precision and stability.



High Speed Motion Control System - DMCNET

- The DMCNET provides fast communication, simple wiring, seamless commands, and solves high speed pulse command loss problems.

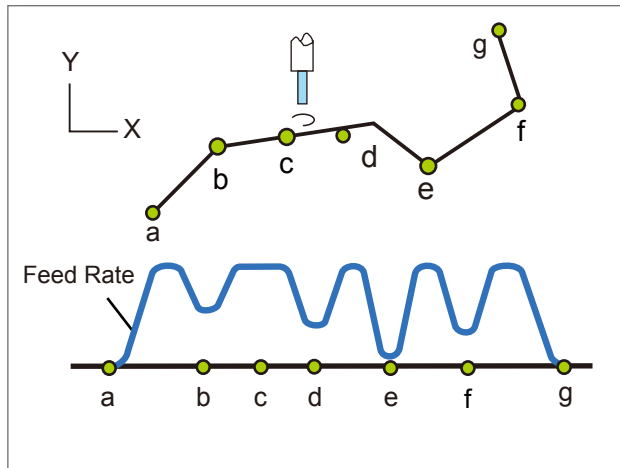


Delta's DMCNET motion control system is a high speed and real time communication system that offers excellent performance and safety with features such as easy installation, high stability and flexible extension.

Features - High Machining Precision

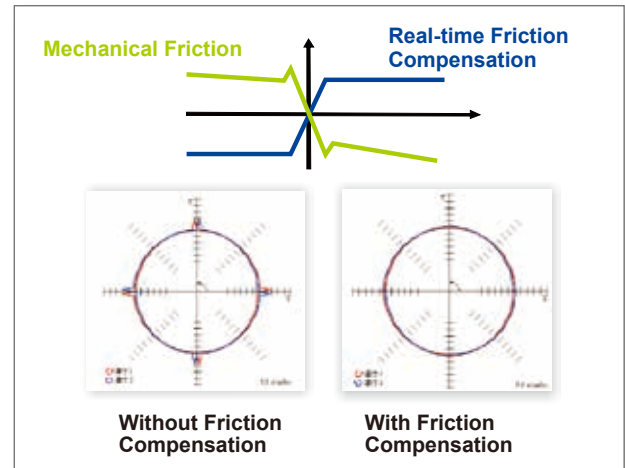
Automatic Corner Deceleration

- During machining processes, corner deceleration is automatically calculated to help each axis maintain its precision and speed at corners and effectively smooth the process.



Friction Compensation

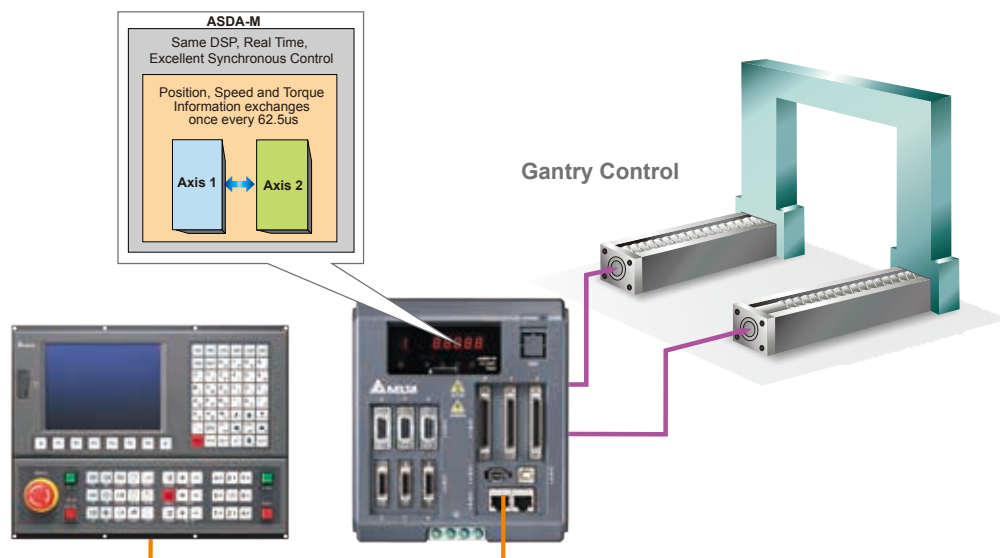
- The servo drives provide real-time and smooth friction compensation with a high sampling speed control loop for correcting the torque.



Three-in-One Servo Drive with Synchronous Control

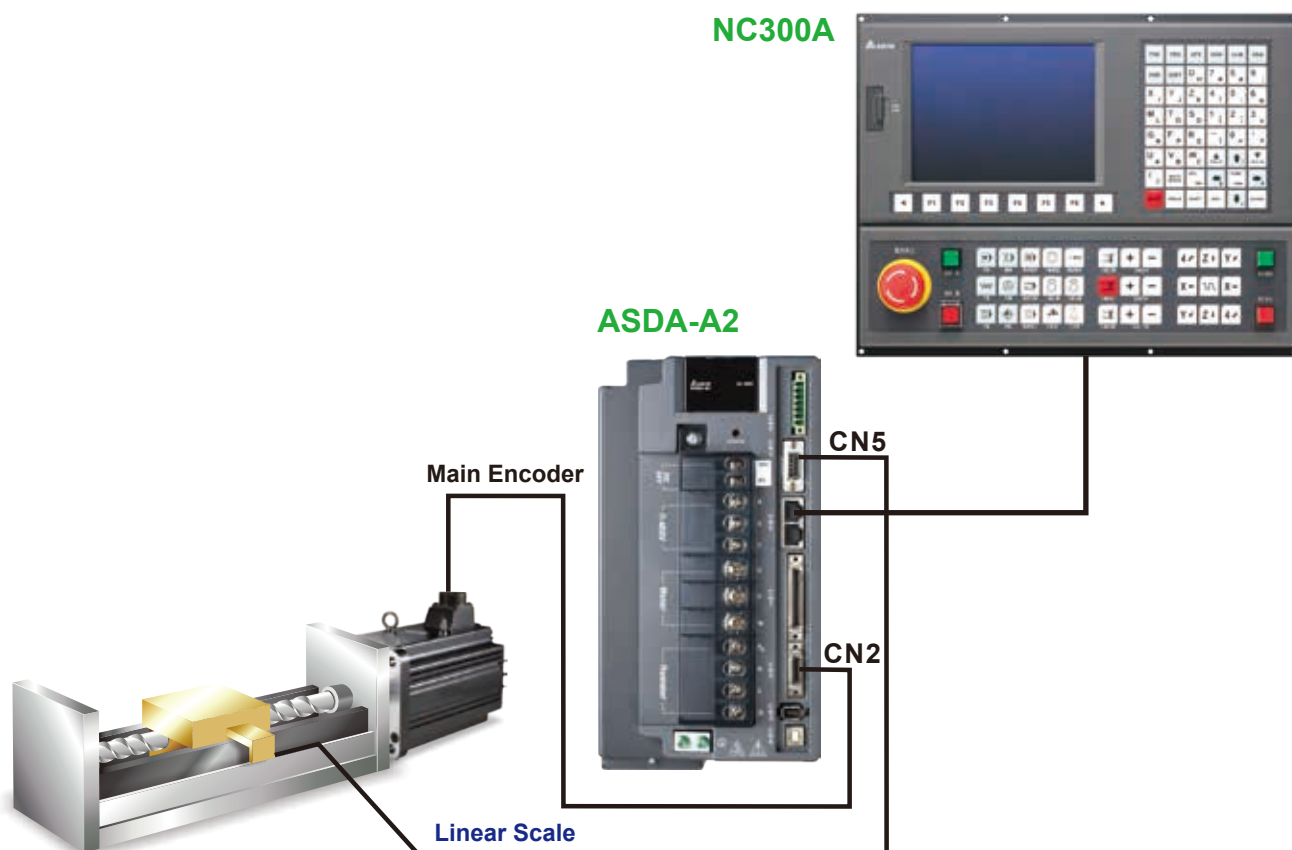
Advanced Gantry Control

- A large amount of data and calculations among the 3 axes motors can be completed with the same DSP (Digital Signal Processor), which achieves precise synchronization and greatly increases the efficiency and performance of gantry control.
- In rigid or general mechanical systems, whether with equal loading on multiple axes or not, the ASDA-M-F series servo system performs precise and simultaneous motion control.



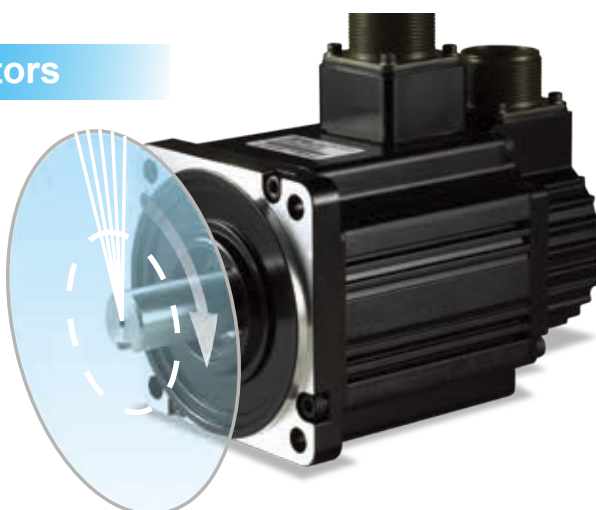
High Precision Full-closed Loop Control

- The servo drives feedback signals from the main encoders and linear scales to perform real-time compensation, while reducing the effect of backlash and flexibility from the machine and ensures the accuracy of positioning.



High Resolution Feed Axis Servo Motors

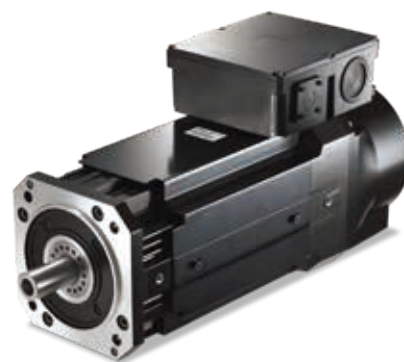
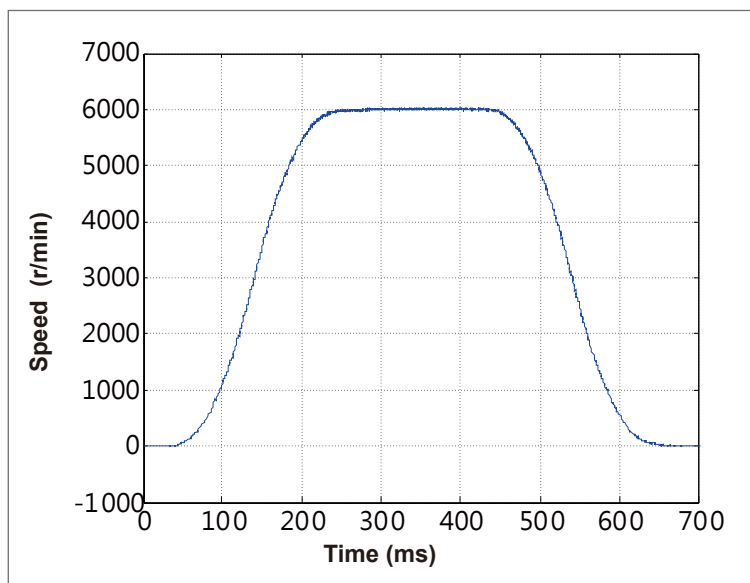
- Delta's ECMC series servo motors are with a 22-bit high resolution encoder to enhance positioning precision and stability during lower speed operation.



Features - Fast Processing Time

High Speed Permanent Magnet (PM) Spindle Motors

- Delta's ECMS series servo spindle motors are designed for CNC tapping machinery, with rated speed of 6000 r/min and rigid tapping operations speed that reaches a maximum of 12000 r/min. It provides excellent acceleration performance that goes from 0r/min to 6000 r/min in just 250 ms and significantly shortens the processing time.



Automatic Tool Length Measurement

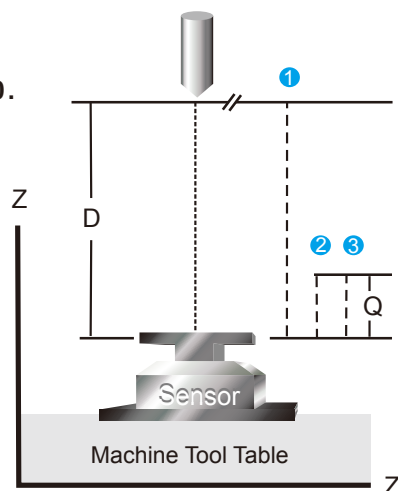
- By applying the G31 command skip function and sensors, the tool length can be measured automatically: with program editing, the G31 command lowers the Z-Axis and stops while it reaches the sensor on the machine. Then the moving distance is counted as the compensation value for the tool length. The G31 command can also stop the motion path immediately and simultaneously execute the motion for the next block.

G90 G00 Z0.

G01 G31 Z-80.0 F200.

G91 Z10. F400.

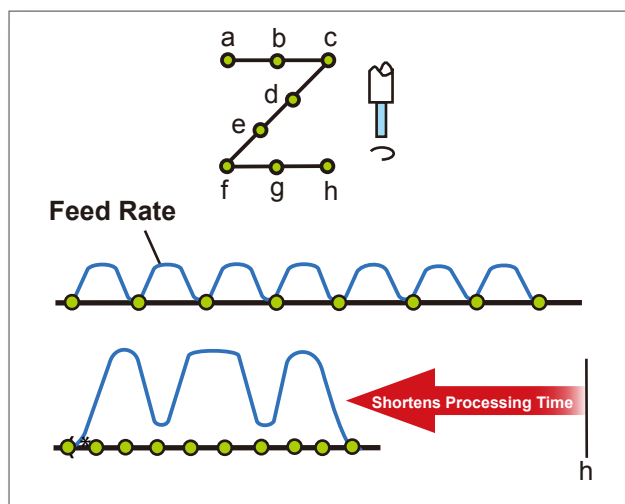
G31 Z-10. F50.



- 1 Reaches sensor with a medium or low speed of 200 feed rate
- 2 Pulls up Distance Q with a speed of 400 feed rate
- 3 Slowly reaches sensor with a speed of 50 feed rate
- 4 Updates measured deviation value to tool table

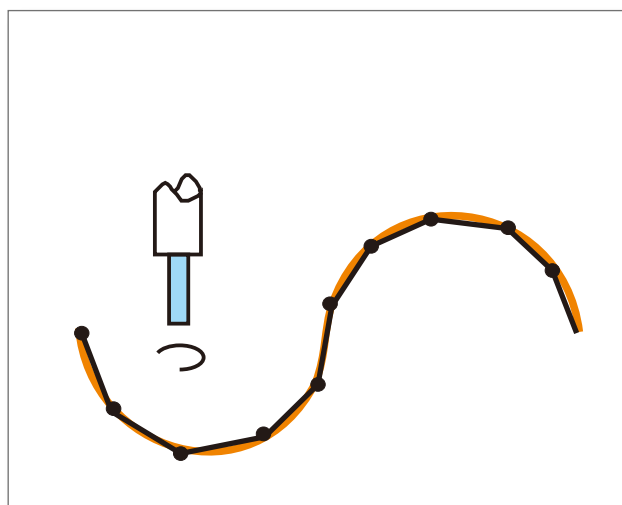
High Speed Multi-Block Look-Ahead

- The high speed multi-block look-ahead function performs a processing operation according to the preset feed rate and path. This can efficiently reduce unnecessary deceleration and effectively increase production speed.



Curve Fitting

- The curve fitting function smooths the motion of the processing axis to avoid a noncontinuous turn speed, and enhances the precision and speed of the processing operation while the processing can be evenly applied as well.



Breakpoint Search

- Through an internal program with breakpoint line number information, users can search breakpoint line numbers, label blocks from previous program executions, and restart its normal execution from the desired breakpoint. This greatly shortens the time for repetitive program execution and applies to searching for large files.

G-CODE Program

- Current executing program

Coordinate Information / Feed Axis Information

- Mechanical coordinate
- Absolute coordinate
- Cutting feed / Spindle speed / Tool number

Search Function

PROGRAM(Search)		Q3333.NC	NC	SFT
03333				
G40G80				
N4G54G90G0X0Y0				
N6Z3.000				
N7F2000				
N8G1X50.294Y-37.881				
N9X50.501Y-38.036Z2.966				
N10X50.694Y-38.181Z2.866				
N11X50.859Y-38.306Z2.707				
N12X50.986Y-38.402Z2.500				
MECH	ABS	M00	G00	G17
X	5.942	X	-4354.680	G23
		G40	G49	G80
		G15	G54	G98
		G50	G64	G69
Break Line Num		1		
Search Line Num/Label				
F 0	S 0	T 0		
AUTO	RPD 100%	F 30%	S 110%	Ready
RUN				

Program Breakpoint Information / Search Setup

- Program breakpoint
- Restarts line number/ Label number
- Searches single block's Line number / Inputs specified label number

Features - Easy Design and Installation

Workpiece Coordinate / Tool Length Automatic Setup

- Users no longer need to manually input mechanical coordinate values, but simply use various input functions and G54 commands or other workpiece coordinates for setup. This user-friendly design applies to setting up tool length for more convenience.

Workpiece Coordinate System - Automatic Setup

- Deletes specified workpiece coordinate data
- Single axis automatic setup (L input)
- Single axis distance / 2 automatic setups (L/2 input)
- Multi-axes setup (P input)

OFFSET(Cutter register)					
Num	Length	Radius	Len wear	Rad wear	LIFE
1	0.000	0.000	0.000	0.000	0
2	0.000	0.000	0.000	0.000	0
3	0.000	0.000	0.000	0.000	0
4	0.000	0.000	0.000	0.000	0
5	0.000	0.000	0.000	0.000	0
6	0.000	0.000	0.000	0.000	0
7	0.000	0.000	0.000	0.000	0
8	0.000	0.000	0.000	0.000	0
9	0.000	0.000	0.000	0.000	0
10	0.000	0.000	0.000	0.000	0
11	0.000	0.000	0.000	0.000	0
12	0.000	0.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0

OFFSET(Set coord system)					
OFFSET	G54	MECH	REL		
X	4360.623	X	0.000	X	5.942
Y		Y		Y	
Z		Z		Z	

G55 G56					
X	0.000	X	0.000		
Y		Y			
Z		Z			

OFFSET					
X1	0.000	X2	0.000		
Y1	0.000	Y2	0.000		

Tool Registration - H Setup

- Tool length automatic setup (H setup)

Direct Program Execution and Data Storage on USB Disk

- Equipped with a USB interface that allows high-speed data transferring and large program processing instantly, this feature smartly integrates Motion Logic Control (MLC) software and CNC controller for excellent operation while maintaining high efficiency (AUTO mode).

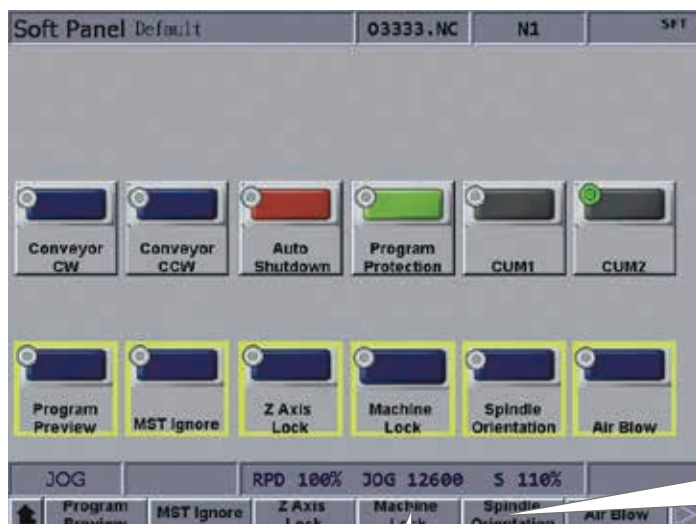


PROGRAM(Program execute)					
PROGRAM	N1				
03333	F.act 0	F 0			
G40G80	S.act 0	S 0			
N4G54G90G0X0Y0	D 0	H 0			
N6Z3.000	T 0	t 0			
N7F2000	CYC	00:00:00			
N8G1X50.294Y-37.881	M00	G00	G17	G90	G23
N9X50.501Y-38.036Z2.966	G94	G21	G40	G49	G80
N10X50.694Y-38.181Z2.866	G98	G50	G64	G69	G15
N11X50.859Y-38.306Z2.707	G54				
N12X50.986Y-38.402Z2.500					

MECH	ABS	RESIDUAL	G54
X	5.942	X -4354.680	X 0.000
Y	0.000	Y 177.027	Y 0.000
Z	0.000	Z 15.470	Z 0.000
A	0.000	A 0.000	A 0.000

Software Panel

- By connecting a second operation panel to a CNC controller, the operation system is able to be built via PC software and its functions performed by MLC programming, allowing users to design a variety of shortcut icons for different applications to meet the machining requirements.



Shortcut Icons for Each Key:

- Each shortcut icon on the software panel can correspond to the real keys and be displayed on the second panel, allowing flexible arrangements based on users' needs.

System Status Information

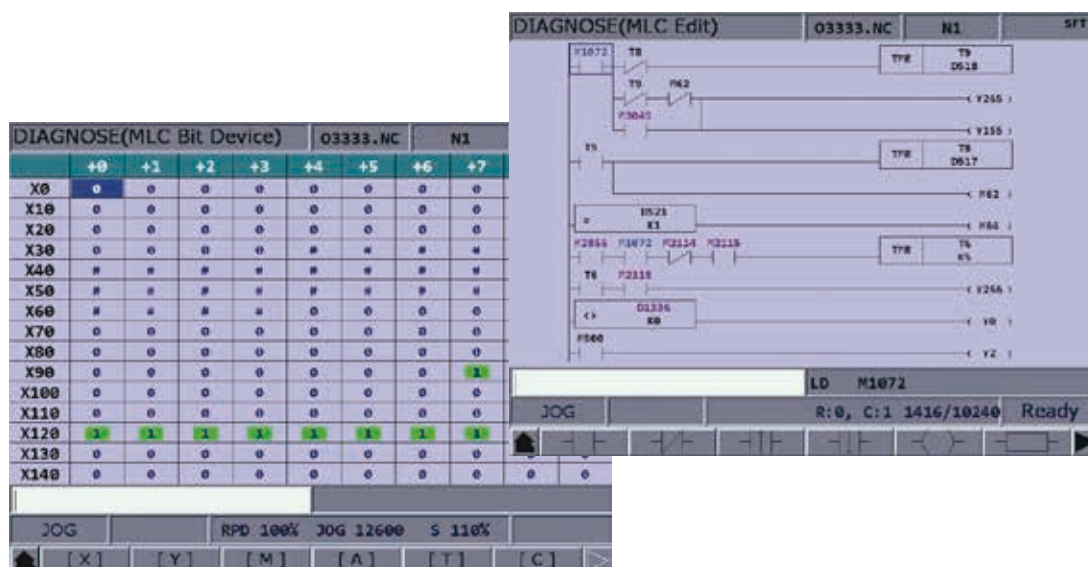
- Current system mode
- ALARM messages
- Magnification status : Cutting feed, high-speed feed, spindle speed, JOG speed, MPG magnification
- Current system time

Function Keys:

- Relative component index
- Moves cursor for switching the function display

MLC Online Editing and Monitoring

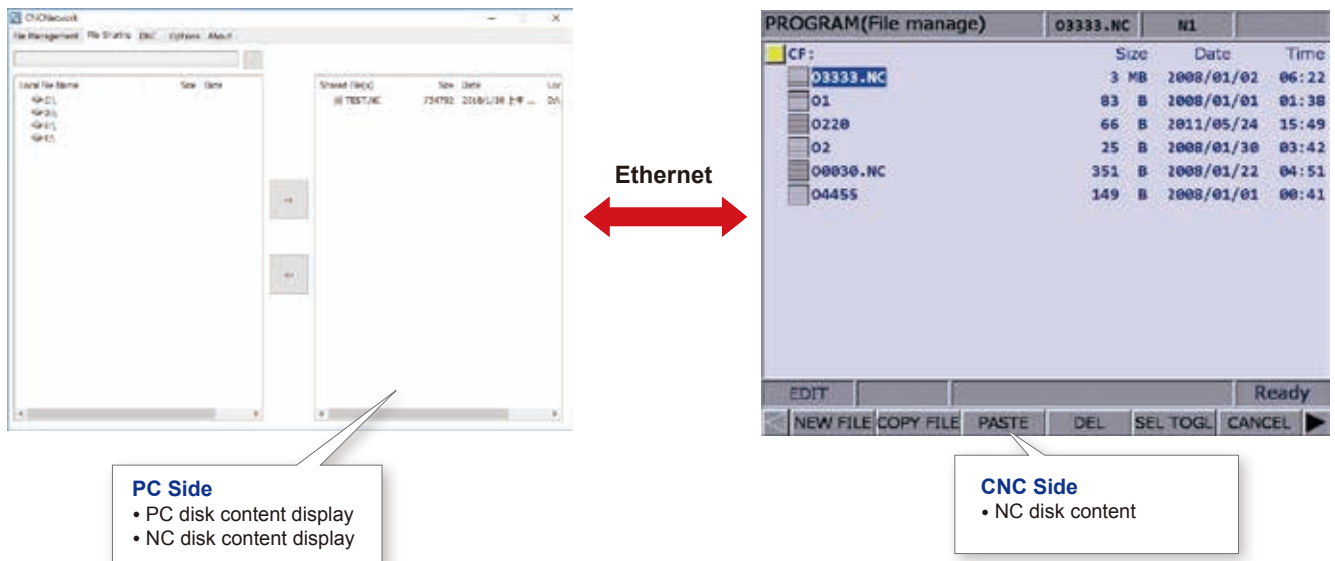
- Displays the changes of I/O points to improve process development and debug maintenance errors.



Features - Easy Design and Installation

Data Alignment

- Connecting a Personal Computer (PC) with a Numerical Controller (NC) through an Ethernet communication network, users are able to access and manage files of the NC via PC, while the disk space of the PC can also be accessed, stored and utilized in the NC. This enhances efficiency of data alignment and backup management.



Tool Management Function

- The tool management function provides functions including setting tool numbers, resetting tool indexes, locking the desired tools, and setting numbers of the required cutters to prevent repeated usage and selecting the incorrect tool. The built-in carousel and armless modules also help speed up tool function setup.

Tool Indexes Setup

- Tool number setup
- Tool number reset

Maga No.	CMD T	STDBY T	STDBY M
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14

Tool Locked Function

- Lock setup for unused tool position

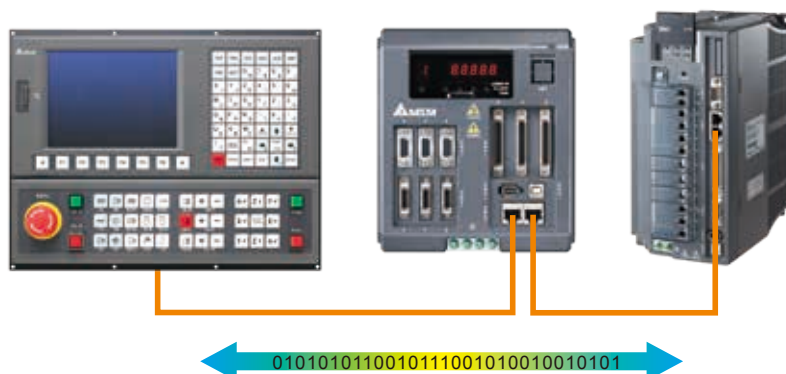
Spindle cutter num 0

JOG RPD 100% JOG 12600 S 11000

SET RST ALL LOCK

Servo Parameters Backup and Import

- The NC 300 Series can backup servo parameters for fast import when changing a new servo drive, making replacement and maintenance easier and more convenient.



Auto-Gain Tuning for Servo System

- The gain adjustment offers the best motion control during machine tuning. Through mechanical inertia and system bandwidth data, the gain parameters can be automatically calculated and downloaded into servo drives for the ultimate system performance.

Servo Drive Status Display

- Servo drive status
- Servo drive alarm message

Motion Control Testing Items

- Acceleration/Deceleration constant
- S-curve time constant
- Sentinel moving speed
- Job moving speed
- Time interval

Servo Parameters Display

Test Stroke Setup

- Start and end point input

Before/After Gain Parameter Value

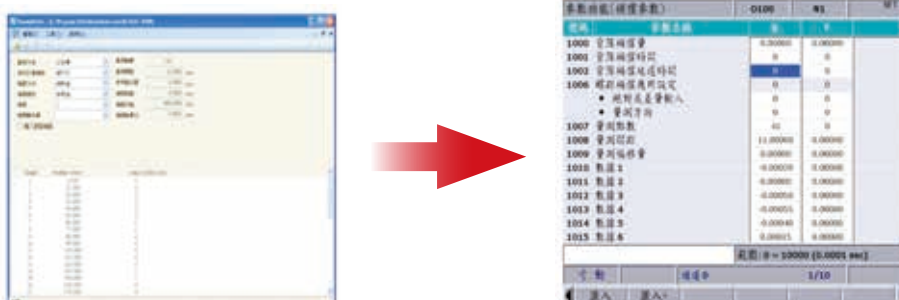
- Compares calculated result and parameter value of the servo drive

Automatic Gain Function Key

- Gain adjustment function index

Pitch Error Compensation

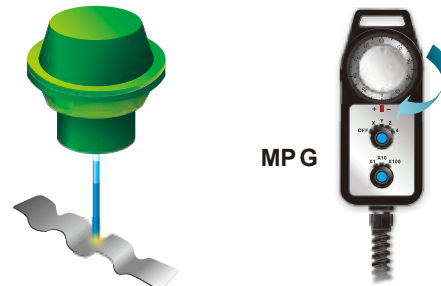
- The pitch error information detected by laser interferometers is transferred into CNC parameter through ParamEditor. The parameters are imported to the CNC controller for pitch error compensation.



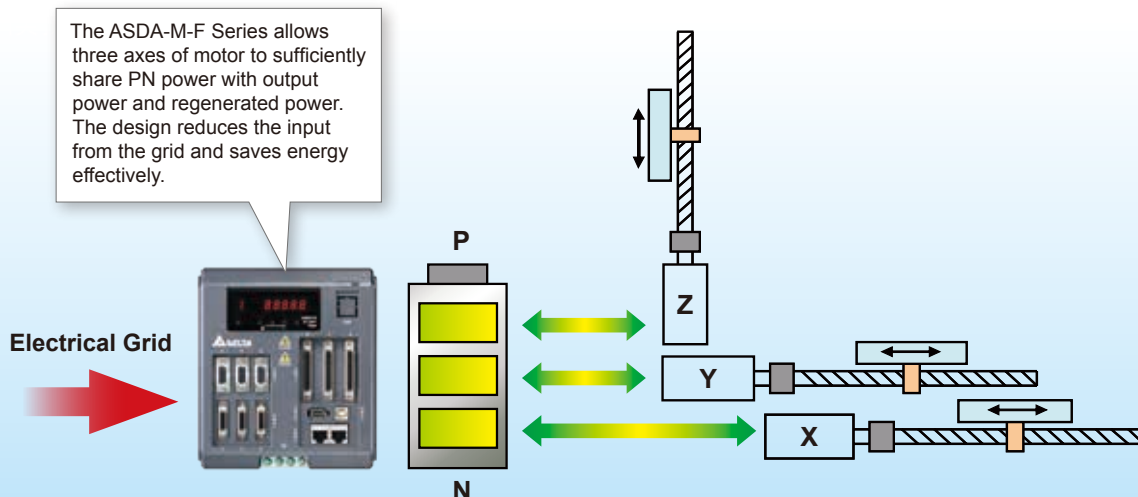
Features - Safe and Energy Saving

Manual Pulse Generator (MPG) Simulation

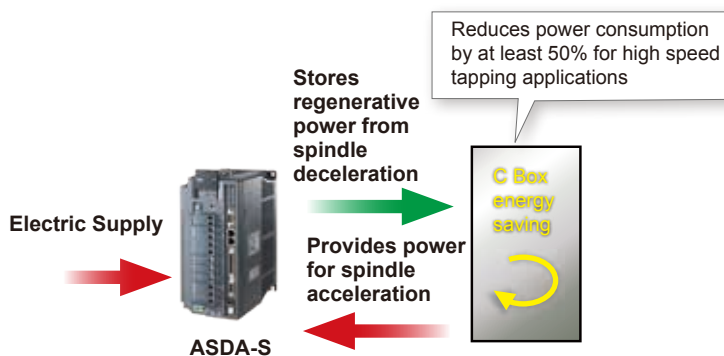
- For first time CNC machining, the MPG simulation function is able to perform an exact simulation of the desired machining process under all operating conditions. It guarantees processing stability and eliminates problems with execution error or cutter / tool crashing, while making processing safer and more accurate.



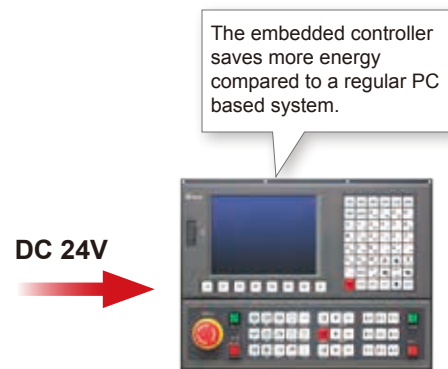
PN Power Sharing for Multiple Axes



Capacitor Box (C Box) for Spindle System

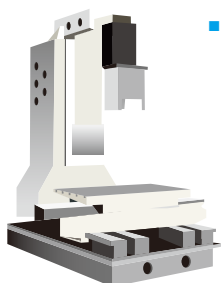


Embedded Controller with Low Power Consumption



Applications

Engraving and Milling Machines



- By integrating Delta's all-in-one CNC controller with high resolution servo drives and motors, the Delta CNC Solution provides practical and user-friendly operation, and is perfect for high speed engraving and milling machines for complex geometric contours processing.

NC300



ASDA-A2

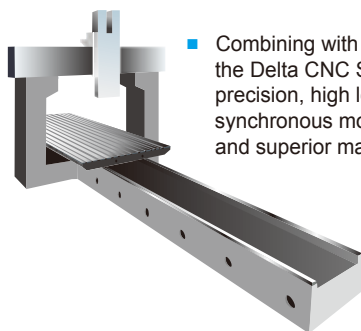


VFD



ECMC

Gantry Milling Machines



- Combining with a three-in-one AC servo drive, the Delta CNC Solution achieves high precision, high loading, multi-axes and synchronous motion control that offers smooth and superior machining quality.

NC300



Operation Panel

ASDA-M



ASDA-A2



ASDA-S



ECMC

ECMS

Woodworking Machine



- It can be utilizes CAD / CAM software to design stile and rail pattern; the processing of door component is performed by G-code to increase accuracy and production efficiency
- Supports EtherCAT system and Delta's AC Motor Drive VFD Series which allows to use multi-axis high speed spindles for stiles and rails processing

NC200A



ASDA-A2

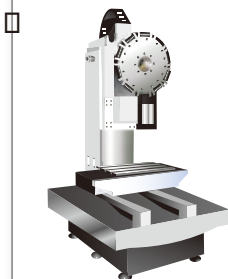


VFD



ECMC

High Speed Tapping Machines / Machining Centers



- The Delta CNC Solution employs a numerical control interface with tool editing and management functions which is effectively suited for a variety of machine centers and composite processing.

NC311



Operation Panel

ASDA-M



C-Box



ASDA-S



ECMC

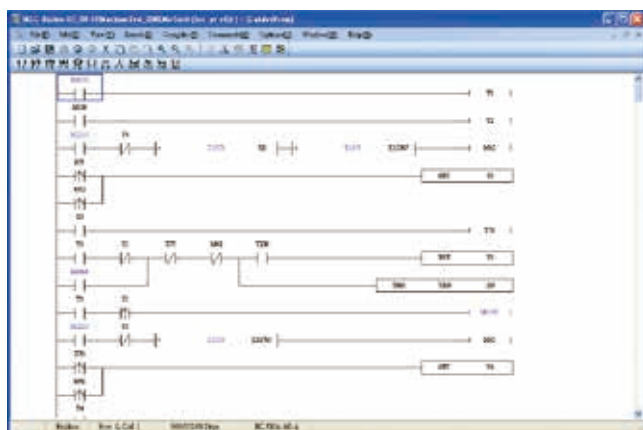
ECMS



Software Tools

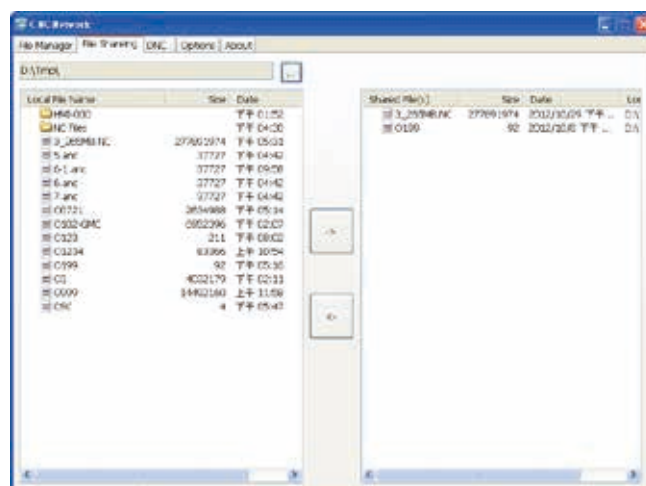
MLC Editor

- The MLC editor features a user-friendly interface and complete functions for users to design user-defined programs according to their needs.



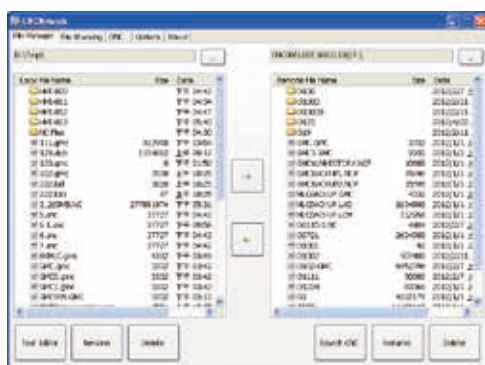
Direct Files Access from PC Side

- The data and files for NC control and machine operation can be directly edited and executed via a PC.



Files and Data Management

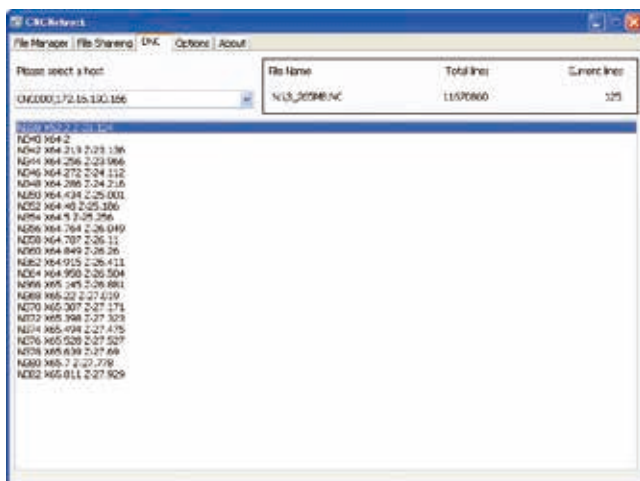
- By connecting a PC and an NC with a simple setup, users are able to manage files and backup data on a PC and an NC simultaneously.





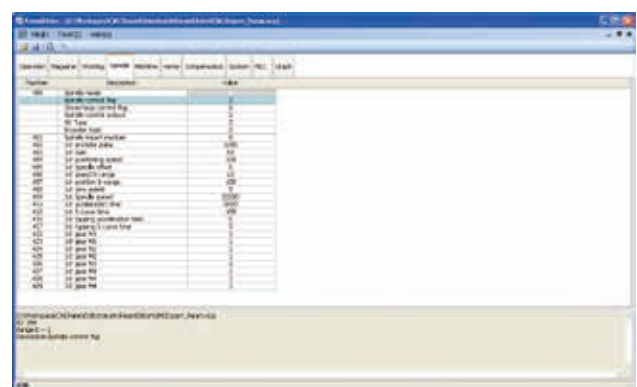
DNC Monitoring

- When executing and sharing files on an NC (DNC mode), users can monitor the desired machine operation via the DNC screen.



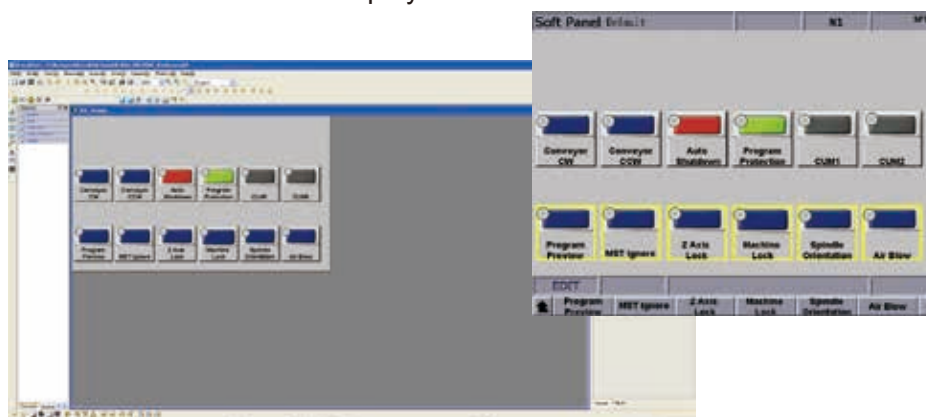
Parameters Editor

- The parameter editor provides accessing, editing, and storing functions to adjust and backup parameters.

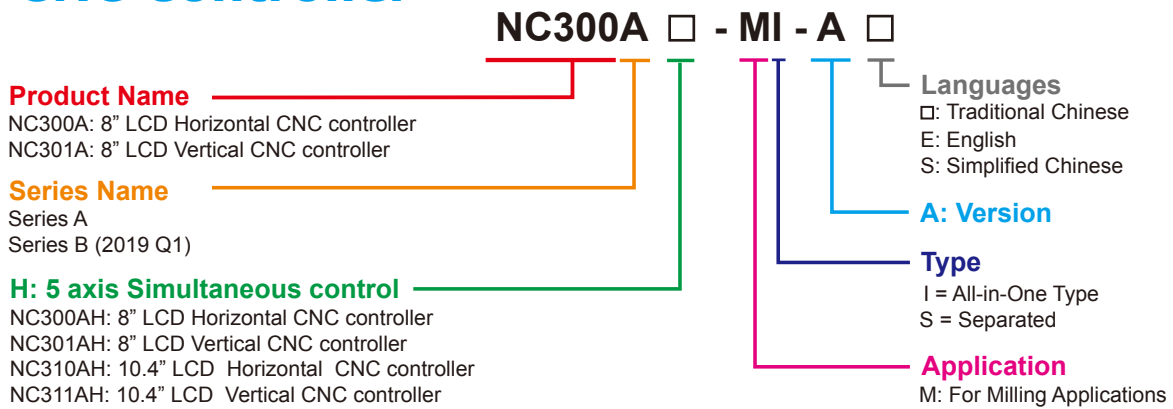


Software Screen Editor

- The software screen editor provides a user-friendly interface and a gallery that allows a user to self-design the desired functions and screen displays.



Specifications - Model Name Explanation of CNC Controller



Note: 1. The B Series is the subsequent model of A Series. It offers the same motion control function, more flexible HMI editing and better display quality.
 2. Hardware: Two more sets of DA terminals and pulse output terminals for dual-axis control. And it supports USB backup on backplane.

Specifications - CNC Controller

Type	Max. NC Axes	Synchronous Interpolation Axes	Max. Total Axes
NC300A	5	Fast positioning / Linear interpolation / Circular interpolation 4/4/2	6
NC301A	5	Fast positioning / Linear interpolation / Circular interpolation 4/4/2	6
NC300AH	5	Fast positioning / Linear interpolation / Circular interpolation 5/5/2	6
NC301AH	5	Fast positioning / Linear interpolation / Circular interpolation 5/5/2	6
NC310AH	5	Fast positioning / Linear interpolation / Circular interpolation 5/5/2	6
NC311AH	5	Fast positioning / Linear interpolation / Circular interpolation 5/5/2	6

Control

Least Input Increment	0.001mm / 0.001 deg.
Max. command value	±99999.999mm (±9999.999in)
Acceleration / Deceleration Control	Acceleration / Deceleration before interpolation, S-shaped curve Acceleration / Deceleration
Metric Size	Std. (G21)
Machine Lock	All Axes
Emergency Stop	Standard function
Over-travel	Standard function
DMCNET	Standard function (DMCNET supports up to 6 axes)

Operation

Automatic Operation	Standard function
MDI Operation	Standard function
USB Memory	USB Memory Attachment is Required
Symbol Search	Standard function
Sequence Number Search	Standard function
Dry Run	Standard function
MPG Simulation	Standard function
Single Block	Standard function

JOG Feed	Standard function
Return to Origin Point (Reference) Position	Standard function
Manual Handle Feed	1 Unit / Each Path
Manual Handle Feed Rate	x1, x10, x100
Program Protect	Standard function

Interpolation

Positioning	G00
Exact Stop Mode	G61
Exact Stop	G09
Linear Interpolation	G01
Circular Interpolation	G02, G03 (multi-quadrant is possible)
Dwell	G04
Skip Function	G31
Reference Position Return	G28
Reference Position Return Check	G27
2ND Reference Position Return	G30

Feed Functions

High Speed Moving Override	F0, 25%, 50%, 100%
Cutting Feed Rate Per Minute	F (mm / min)
Cutting Feed Rate Per Minute	Max. Cutting Feed Rate mm / min
Cutting Feed Override	0 ~ 150% (Can be defined)
Jog Override	0 ~ 100%
Preview Control	500 blocks

Programs and Data Port Input

Optional Dwell	M01
Absolute / Gain Program	G90 / G91
Automatic Coordinate Setup System	Automatic Coordinate Setup System
Workpiece Coordinate System	G52 ~ G59
Sub-program Call	Max. 8 layers embedded
Program Start / Program End	M00 / M01 / M02 / M30
Code Format	Standard ISO G, M, S, T codes
Program Flow Control	Internal / External program call, program cycle
Fixed Cycle	Rigid tapping, boring and drilling
Reset	Standard function
On Board I/O	I/O Port 1: 16 in / out ; I/O Port 2: 12 in / out
MPG I/O Port	1 set of hand - wheel pulse input
USB Port / RS485 / Ethernet	Standard function
Origin Point Limit Port	1 ~ 4 AXIS + - hardware limit and origin point input
Spindle Port	1 set of analog output DC-10V ~ +10V / G31 / 1 set of spindle feedback input
High Speed Serial I/O Port	Max. 32 in / out. Extension available for up to 8 sets of 256 in / out

Specifications - CNC Controller

Spindle Speed and Tool Functions

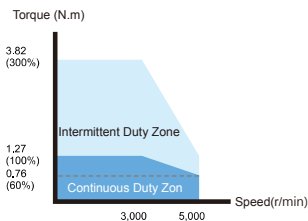
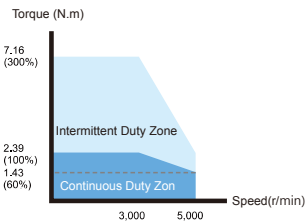
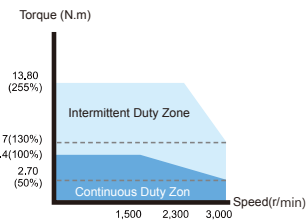
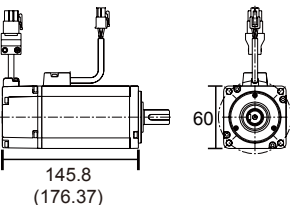
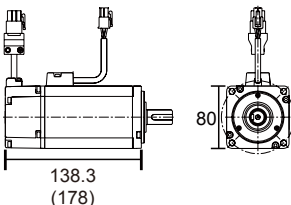
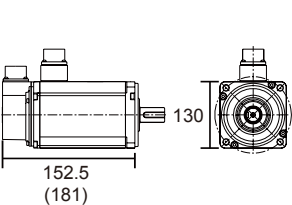
MST Overpass	Standard function
MST Control	Standard function
Spindle Speed Function	S RPM (revolutions per minute)
Spindle Override	50 ~ 120%
M Code Function	M3 digit (e.g. M003)
S Code Function	S5 digit (e.g. S10000)
T Code Function	T2 digit (e.g. T01)
Tool Capacity	Max. 100 tools
Tool Length Compensation	G43, G44, G49
Tool Radius Compensation	G41, G42, G40

Setup and Display Functions

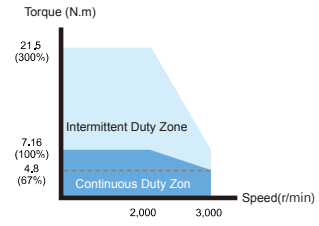
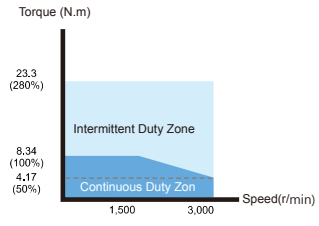
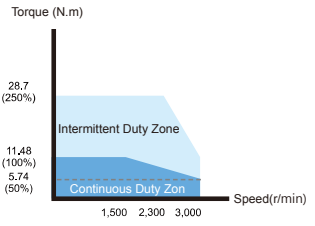
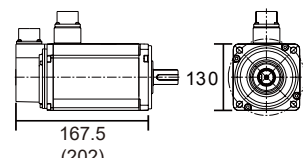
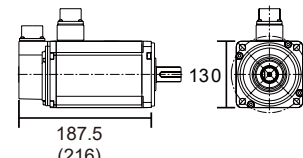
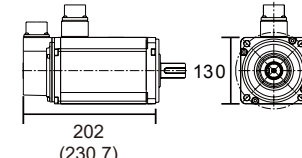
Mode Display	Automation / Edit / MDI / Hand-wheel / Jog / Origin point
Current Position Display	Program coordinate, mechanical coordinate, remain coordinate, relative coordinate
Software Operation Display	Standard function
G Code Group Display	Standard function
Customized Screen Display	PC editing software needed
Parameters Display Setup	Standard function
Self-diagnosis Function	Standard function
Alarm Display	Standard function
Alarm History Display	512 records
Actual Cutting Feed Speed Rate Display	Standard function
Spindle Speed and T Code Display	Standard function
Parameters Setup Screen	Standard function
Servo Tuning Screen	Standard function
System Information Display	Standard function
Multi-language Display	Standard function (switch between Mandarin and English available)
Password Setup	Standard function
Servo Load Rate Display	Standard function
Tool Path Graphics Function	Standard function
Color LCD Display	8" LCD display / 10.4" LCD display

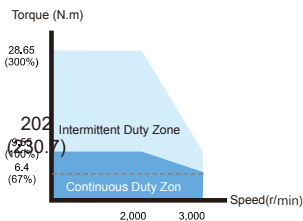
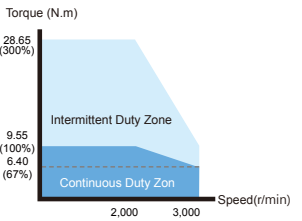
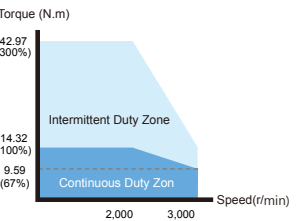
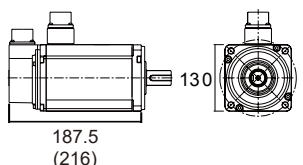
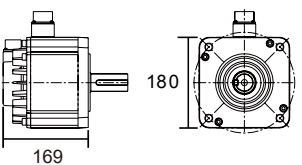
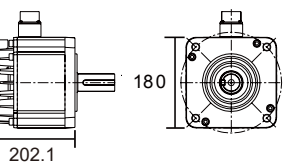


Specifications - Servo Motor (Incremental Type)

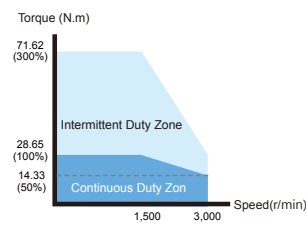
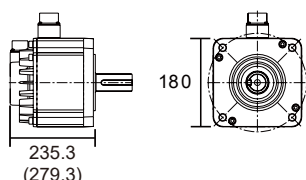
Power Range	400 W	750 W	850 W									
Model	ECMC-C10604 HS	ECMC-C10807 □ S	ECMC-F1 1308 □ S									
Rated Torque (N·m)	1.27	2.39	5.41									
Max. Torque (N·m)	3.82	7.16	13.8									
Rated Speed (r/min)	3000	3000	1500									
Max. Speed (r/min)	5000	5000	3000									
Encoder Type	20-bit											
Max. Current (A)	7.8	15.3	19.4									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	0.743 / 0.751	2.91 / 2.96	13.6 / 14.8									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	60	80	130									
Shaft Diameter (mm)	14	19	22									
Brake Holding Torque [Nt·m(min)]	1.3	2.5	10									
Brake Power Consumption (at 20°C) [W]	6.5	8.2	19									
Weight (with brake; kg)	1.8 / 2.2	3.4 / 3.9	8.6 / 10									
Drives	ASD-A2-0421-NN/FN/F	ASD-A2-0721-NN/FN/F	ASD-A2-1021-NN/FN/F									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

Specifications - Servo Motor (Incremental Type)

Power Range	1.5 kW	1.3 kW	1.8 kW									
Model	ECMC-E1 1315 □ S	ECMC-F1 1313 □ S	ECMC-F1 1318 □ S									
Rated Torque (N·m)	7.16	8.34	11.48									
Max. Torque (N·m)	21.48	23.3	28.7									
Rated Speed (r/min)	2000	1500	1500									
Max. Speed (r/min)	3000	3000	3000									
Encoder Type	20-bit											
Max. Current (A)	24.9	38.6	36									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	11.18 / 11.9	20 / 21.3	24.9 / 26.2									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	130	130	130									
Shaft Diameter (mm)	22	22	22									
Brake Holding Torque [N·m(min)]	10	10	10									
Brake Power Consumption (at 20 °C)[W]	19	19	19									
Weight (with brake; kg)	7.5 (8.9)	9.4 (10.8)	10.5 (11.9)									
Drives	ASD-A2-1521-NN/FN/F	ASD-A2-2023-NN/FN/F	ASD-A2-2023-NN/FN/F									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

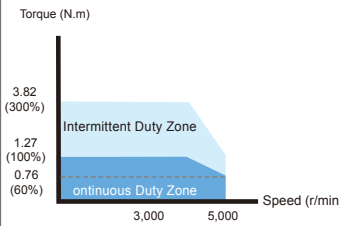
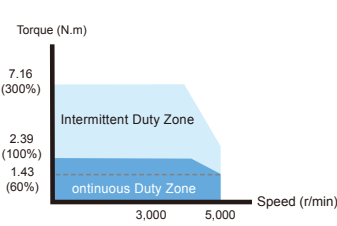
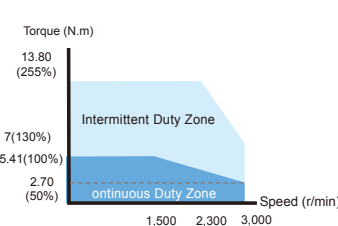
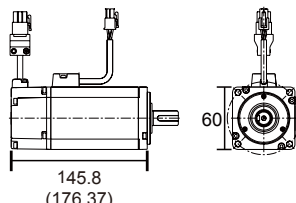
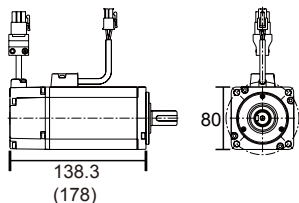
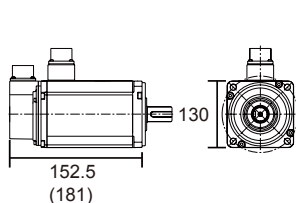
Power Range	2 kW	2 kW	3 kW									
Model	ECMC-E1 1320 □ S	ECMC-E1 1820 □ S	ECMC-F1 1830 □ S									
Rated Torque (N·m)	9.55	9.55	19.1									
Max. Torque (N·m)	28.65	28.65	57.29									
Rated Speed (r/min)	2000	2000	1500									
Max. Speed (r/min)	3000	3000	3000									
Encoder Type	20-bit											
Max. Current (A)	33.0	33.66	58.2									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	14.59 / 15.88	34.68 / 37.86	54.95 / 57.06									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	130	130	180									
Shaft Diameter (mm)	22	22	35									
Brake Holding Torque [N·m(min)]	10	10	25									
Brake Power Consumption (at 20 °C)[W]	19	19	20.4									
Weight (with brake; kg)	7.5 (8.9)	7.5 (8.9)	18.5 (22.5)									
Drives	ASD-A2-2023-NN/FN/F	ASD-A2-2023-NN/FN/F	ASD-A2-3023-NN/FN/F									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

Specifications - Servo Motor (Incremental Type)

Power Range	4.5 kW									
Model	ECMC-F1 1845 □ S									
Rated Torque (N-m)	28.65									
Max. Torque (N-m)	71.62									
Rated Speed (r/min)	1500									
Max. Speed (r/min)	3000									
Encoder Type	20-bit									
Max. Current (A)	81.3									
IP Rating	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg-m ²)	77.75 / 80.24									
Speed-Torque Curves (T-N Curves)										
Motor Size (with brake; mm)										
Motor Frame (mm)	180									
Shaft Diameter (mm)	35									
Brake Holding Torque [Nt-m(min)]	25									
Brake Power Consumption (at 20°C)[W]	20.4									
Weight (with brake; kg)	23.5 (29)									
Drives	ASD-A2-4523-F									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>	Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal								
Round shaft (with screw holes)	C	D								
Keyway (with screw holes)	R	S								



Specifications - Servo Motor (Absolute Type)

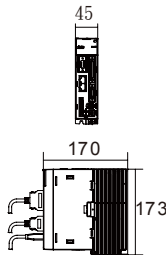
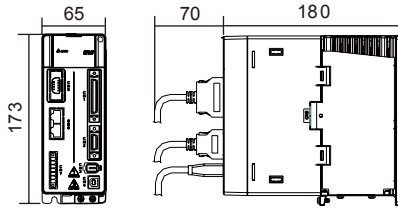
Power Range	400 W	750 W	850 W									
Model	ECMC-CW 0604 □ S	ECMC-CW 0807 □ S	ECMC-FW 1308 □ S									
Rated Torque (N·m)	1.27	2.39	5.41									
Max. Torque (N·m)	3.82	7.16	13.8									
Rated Speed (r/min)	3000	3000	1500									
Max. Speed (r/min)	5000	5000	3000									
Encoder Type	Single turn: 20-bit Multiple turn:16-bit											
Max. Current (A)	7.8	15.3	19.4									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	0.743 / 0.751	2.91 / 2.96	13.6 / 14.8									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	60	80	130									
Shaft Diameter (mm)	14	19	22									
Brake Holding Torque [N·m(min)]	1.3	2.5	10									
Brake Power Consumption (at 20 °C)[W]	6.5	8.2	19									
Weight (with brake; kg)	1.8 (2.2)	3.4 (3.9)	8.6 (10)									
Drives	ASD-A2-0421-NN /FN	ASD-A2-0721-NN /FN	ASD-A2-1021-NN /FN									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

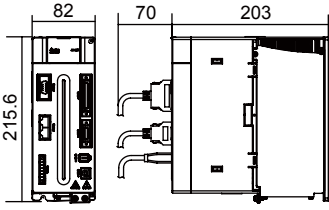
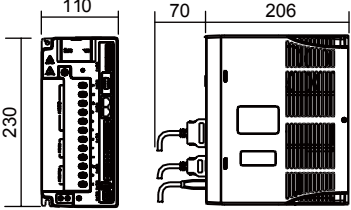
Specifications - Servo Motor (Absolute Type)

Power Range	1.5 kW	1.3 kW	1.8 kW									
Model	ECMC-EW 1315 □ S	ECMC-FW 1313 □ S	ECMC-FW 1318 □ S									
Rated Torque (N·m)	7.16	8.34	11.48									
Max. Torque (N·m)	21.48	23.3	28.7									
Rated Speed (r/min)	2000	1500	1500									
Max. Speed (r/min)	3000	3000	3000									
Encoder Type	Single turn: 20-bit Multiple turn:16-bit											
Max. Current (A)	24.9	38.6	36									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	11.18 / 11.9	20 / 21.3	24.9 / 26.2									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	130	130	130									
Shaft Diameter (mm)	22	22	22									
Brake Holding Torque [N·m(min)]	10	10	10									
Brake Power Consumption (at 20 °C)[W]	19	19	19									
Weight (with brake; kg)	7.5 (8.9)	9.4 (10.8)	10.5 (11.9)									
Drives	ASD-A2-1521-NN/FN	ASD-A2-2023-NN/FN	ASD-A2-2023-NN/FN									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

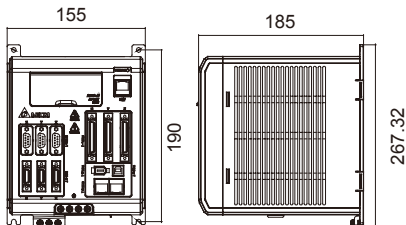
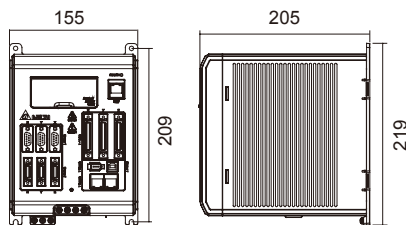
Power Range	2 kW	2 kW	3 kW									
Model	ECMC-EW 1320 □ S	ECMC-EW 1820 □ S	ECMC-FW 1830 □ S									
Rated Torque (N·m)	9.55	9.55	19.1									
Max. Torque (N·m)	28.65	28.65	57.29									
Rated Speed (r/min)	2000	2000	1500									
Max. Speed (r/min)	3000	3000	3000									
Encoder Type	Single turn: 20-bit Multiple turn:16-bit											
Max. Current (A)	33.0	33.66	58.2									
IP Rating	IP65	IP65	IP65									
Rotor Inertia/ With Brake (x10 ⁻⁴ kg·m ²)	14.59 / 15.88	34.68 / 37.86	54.95 / 57.06									
Speed-Torque Curves (T-N Curves)												
Motor Size (with brake; mm)												
Motor Frame (mm)	130	180	180									
Shaft Diameter (mm)	22	35	35									
Brake Holding Torque [Nt·m(min)]	10	25	25									
Brake Power Consumption (at 20 °C)[W]	19	20.4	20.4									
Weight (with brake; kg)	7.5 (8.9)	18.5 (22.5)	18.5 (22.5)									
Drives	ASD-A2-2023-NN / FN	ASD-A2-2023-NN / FN	ASD-A2-3023-NN / FN									
□ Description for Optional Selection	<table><tr><td>Shaft type and oil seal</td><td>Without brake/ with oil seal</td><td>With brake/ with oil seal</td></tr><tr><td>Round shaft (with screw holes)</td><td>C</td><td>D</td></tr><tr><td>Keyway (with screw holes)</td><td>R</td><td>S</td></tr></table>			Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal	Round shaft (with screw holes)	C	D	Keyway (with screw holes)	R	S
Shaft type and oil seal	Without brake/ with oil seal	With brake/ with oil seal										
Round shaft (with screw holes)	C	D										
Keyway (with screw holes)	R	S										

Specifications - Servo Drive (ASDA-A2 Series)

Model	ASD-A2-0421-NN		ASD-A2-0721-NN		ASD-A2-1021-NN		ASD-A2-1521-NN	
Phase / Voltage	Three-phase or one phase 220VAC							
Permissible Voltage Range	Three-phase/one phase 200 ~2 30VAC, -15% ~ 10%							
Continuous Output Current	2.6 Arms		5.1 Arms		7.3 Arms		8.3 Arms	
Cooling System	Natural Cooling			Fan Cooling				
Feedback Resolution	1280000p/rev							
Main Circuit Control	SVPWM control							
Regenerated Brake	N/A			Built-in				
Size (mm)								
Weight (kg)	1.5			2				

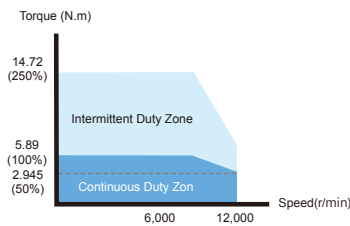
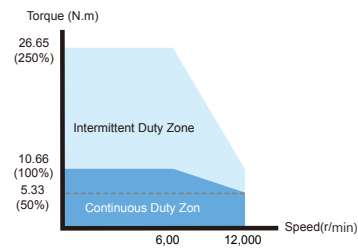
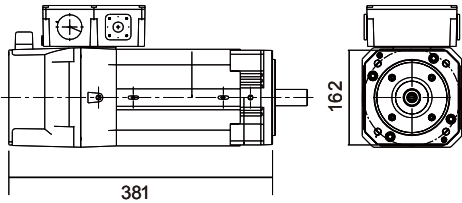
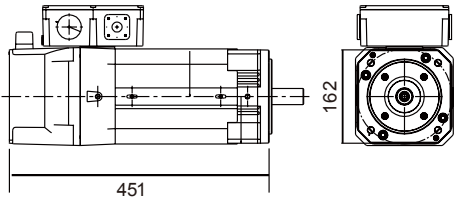
Model	ASD-A2-2023-NN	ASD-A2-3023-NN	ASD-A2-4523-F
Phase / Voltage	Three-phase 220VAC		
Permissible Voltage Range	Three-phase 200 ~ 230VAC, -15% ~ 10%		
Continuous Output Current	13.4 Arms	19.4 Arms	32.5 Arms
Cooling System	Fan Cooling		
Feedback Resolution	1280000p/rev		
Main Circuit Control	SVPWM control		
Regenerated Brake	Built-in		
Size (mm)			
Weight (kg)	2.89	4.4	

Specifications - Servo Drive (ASDA-M Series)

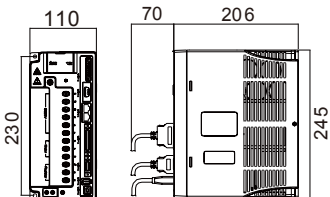
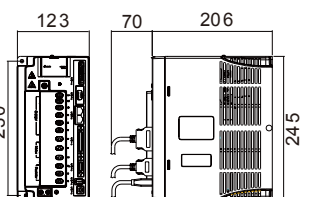
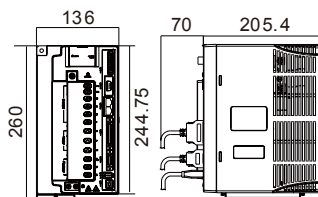
Model	ASD-M-0721-F	ASD-M-1521-F
Phase / Voltage	Three-phase or one phase 220VAC	
Permissible Voltage Range	Three-phase or one phase 200 ~ 230VAC, -15% ~ 10%	
Continuous Output Current	5.1 Arms	8.3 Arms
Cooling System	Fan Cooling	
Feedback Resolution	1280000p/rev	
Main Circuit Control	SVPWM control	
Regenerated Brake	Built-in	
Size (mm)		
Weight (kg)	1.5	2.0



Specifications - PM Spindle Motor (ECMS Series)

Power Range	3.7 kW	6.7 kW
Model	ECMS-AM1540 ☐ S	ECMS-AM1570 ☐ S
Rated Torque (N-m)	5.89	10.22
Max. Torque (N-m)	14.72	26.65
Rated Speed (r/min)	6000	6000
Max. Speed (r/min)	12000	12000
Encoder Type (A)	Incremental 17-bit	
Rated Current	16.52	27.47
Max. Current (A)	41.3	68.68
IP Rating	IP55	IP55
Rotor Inertia/ With Brake ($\times 10^{-4}$ kg-m ²)	12.3	19.2
Speed-Torque Curves (T-N Curves)	 Speed-Torque Curve for ECMS-AM1540. The graph shows Torque (N.m) on the y-axis (0 to 14.72) and Speed (r/min) on the x-axis (0 to 12,000). The curve is divided into an Intermittent Duty Zone (top) and a Continuous Duty Zone (bottom). Key points on the y-axis are 14.72 (250%), 5.89 (100%), and 2.945 (50%). The x-axis has markers at 6,000 and 12,000 r/min.	 Speed-Torque Curve for ECMS-AM1570. The graph shows Torque (N.m) on the y-axis (0 to 26.65) and Speed (r/min) on the x-axis (0 to 12,000). The curve is divided into an Intermittent Duty Zone (top) and a Continuous Duty Zone (bottom). Key points on the y-axis are 26.65 (250%), 10.66 (100%), and 5.33 (50%). The x-axis has markers at 6,00 and 12,000 r/min.
Motor Size (with brake; kg)	 Motor Size Diagram for ECMS-AM1540. The diagram shows a side view and a front view of the motor. The side view indicates a total length of 381 mm. The front view shows a shaft diameter of 162 mm.	 Motor Size Diagram for ECMS-AM1570. The diagram shows a side view and a front view of the motor. The side view indicates a total length of 451 mm. The front view shows a shaft diameter of 162 mm.
Motor Frame (mm)	155	155
Shaft Diameter (mm)	28	28
Weight (with brake; kg)	20	27.4
Drives	ASD-S-4523-N	ASD-S-5523-N
☐ Description for Optional Selection	A (Round Shaft) B (Round Shaft with Coolant Through Spindle)	

Specifications - Spindle Motor Drive (ASDA-S Series)

Model	ASD-S-4523-N	ASD-S-5523-N	ASD-S-7523-N
Supported Motors	Delta ECMS-AM1540□S / Induction motors sold on the market (4.5 kW, 32.5 Arms and under)	Delta ECMS-AM1570□S / Induction motors sold on the market (5.5 kW, 40.0 Arms and under)	Induction motors sold on the market (7.5 kW, 47.5 Arms and under)
Permissible Voltage Range	Three-phase 220VAC		
Allowable Voltage Change Rate	Three-phase 200 ~ 230VAC, -15% ~ 10%		
Continuous Output Current	32.5 Arms	40.0 Arms	47.5 Arms
Cooling System	Fan Cooling		
Main Circuit Control	SVPWM control		
Regenerated Brake	Built-in	Break resistor needed or select Delta C-BOX (ASD-MDCP2016)	
Size (mm)			
Weight (kg)	4.4	5.5	5.9

Specifications



Energy Saving Capacitor Box (C Box)

Features

■ Energy Regeneration

Along with servo drives, the C Box is able to regenerate power during deceleration of the servo drives. The generated energy can be stored in the C Box and reused for the later acceleration of the servo drives.

■ Cost Reduction

Due to the fact that the servo system needs brake resistors to dissipate extra energy and heat caused by sudden acceleration and deceleration, the C Box is able to replace traditional brake resistors to decrease the cost of applying multiple brake resistors and reduce heat efficiently.

Specification

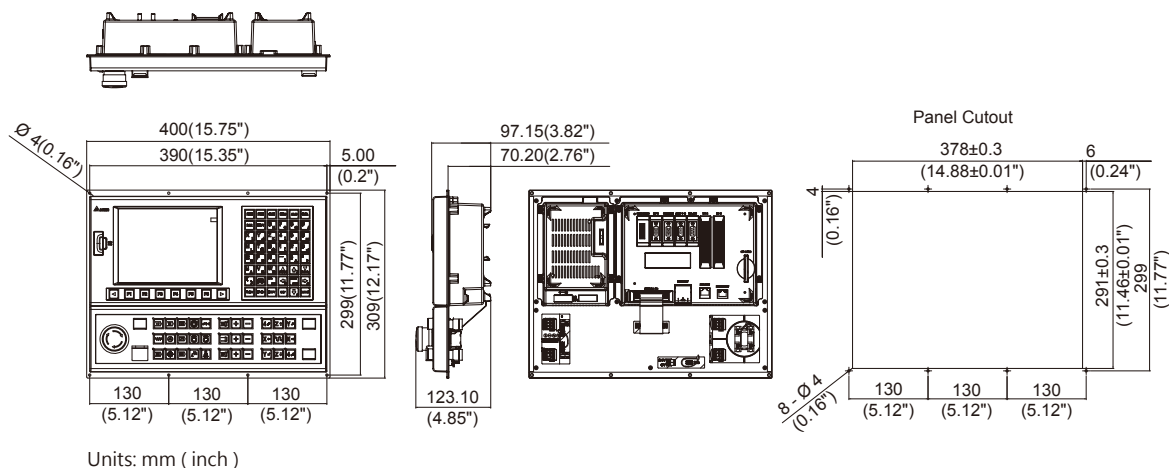
Model	ASD-MDCP2016
Voltage	250V~370V DC
Permissible Voltage Range	450V DC
Power Consumption	10W
Input / Output Current	60A (rms)
Capacitance	40000uF
Storage Limitation	Depends on different motor load inertia

Electrical Specifications

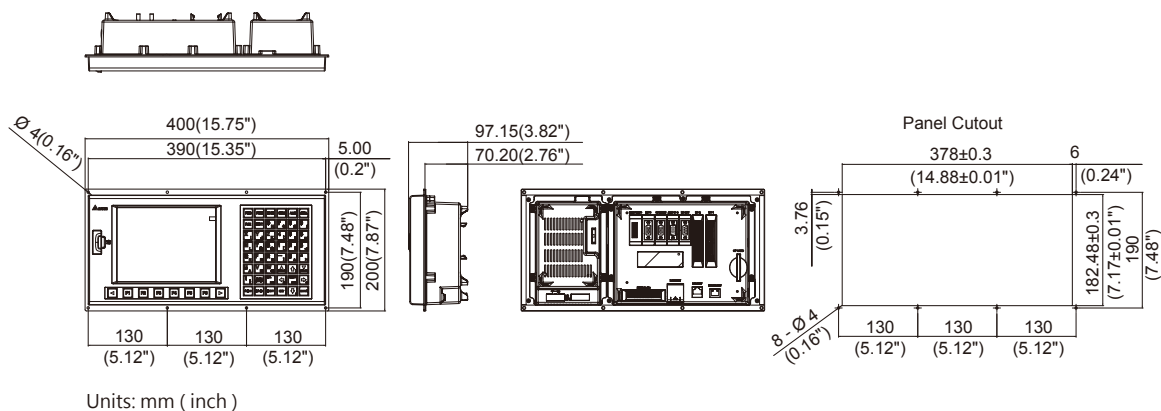
Model	NC300A / NC301A	NC311A	NC310A
Operation Environment	10% ~ 95% RH 【0 ~ +55 °C】		
Storage Environment	10% ~ 95% RH 【-20 ~ +60 °C】		
Cooling Method	Natural Cooling		
Safety Approval	CE		
Operation Voltage	DC +24V (-10% ~ +15%) (with built-in isolated power circuit)		
Voltage Endurance	AC500V for 1 minute (between charging DC24V terminal and FG terminals)		
Power Consumption	24V 0.6A 15W	24V 0.8A 20W	24V 0.8A 20W
Backup Battery	3V lithium manganese battery CR2032 x 1		
Backup Battery Life	Depends on the working environment, about 3 years or more at 25 °C		
Weight (kg)	MI : 4.16 ; MS : 3.1 ; NC301A : 3.4	3.8	

Dimensions - CNC Controllers

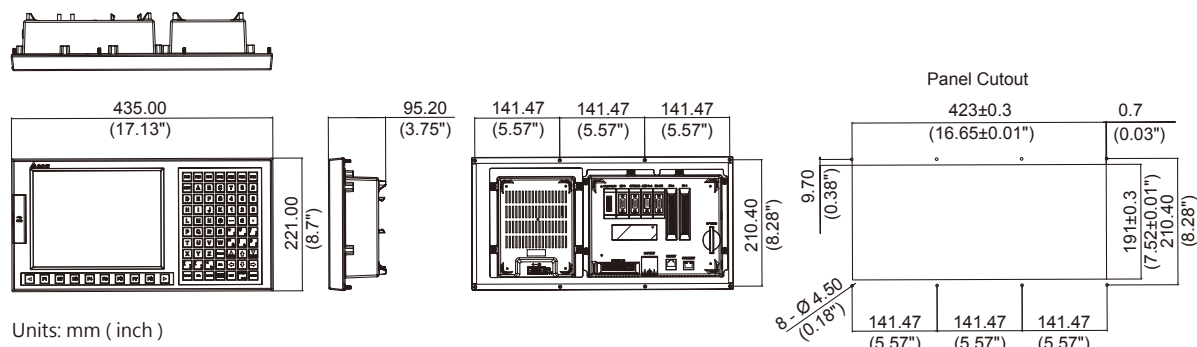
NC300A/AH-MI-A



NC300A/AH-MS-A

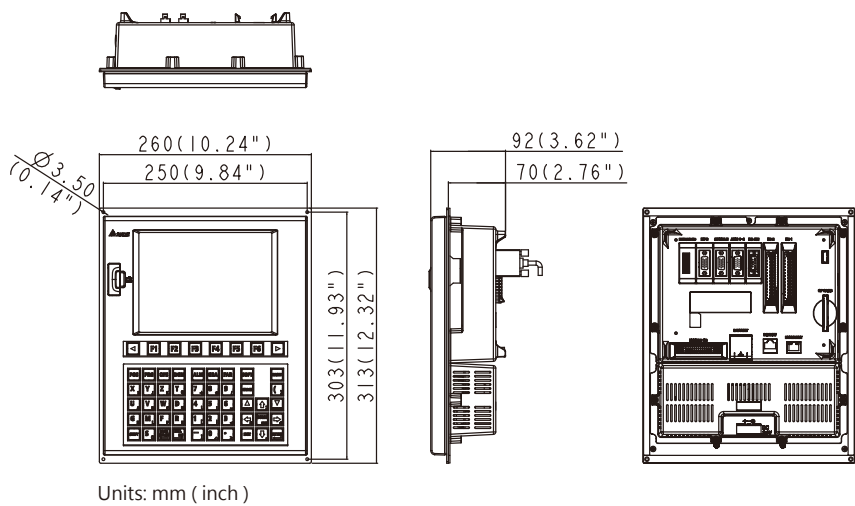


NC310AH-MS-A

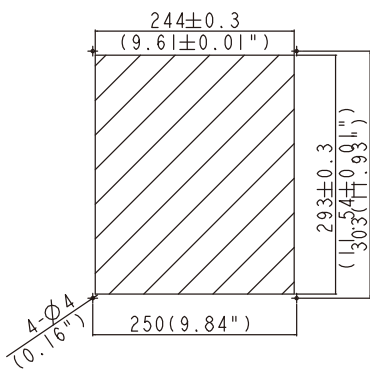


Dimensions - CNC Controllers

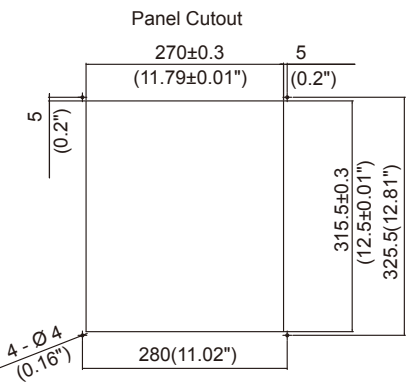
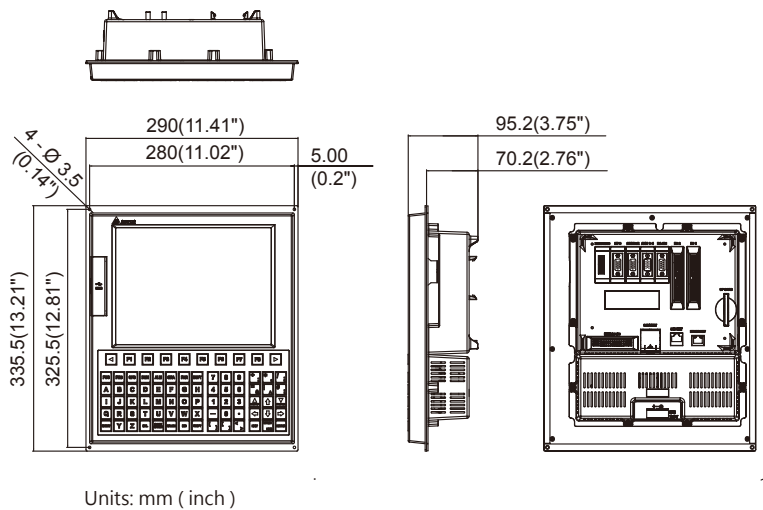
NC301A/AH-MS-A



Cut-outs and Mounting Dimensions



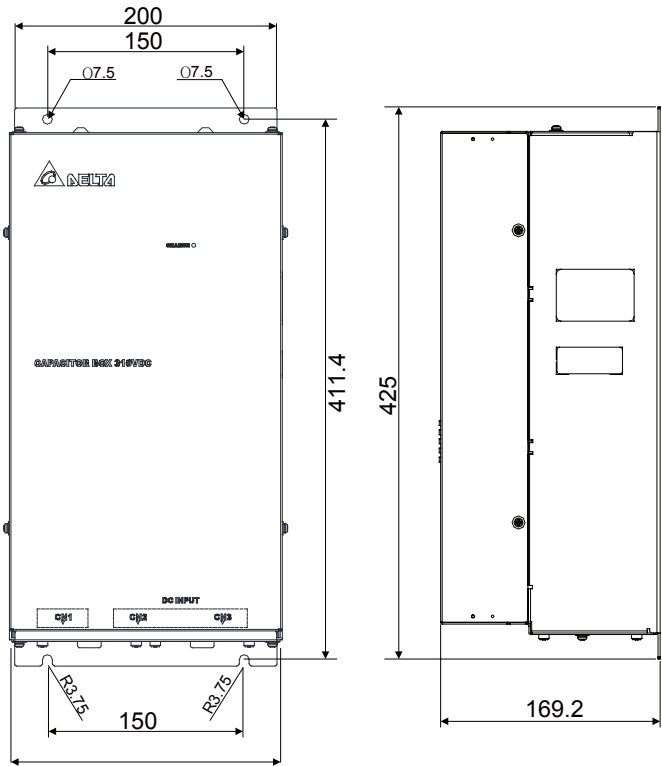
NC311AH-MS-A



Dimensions - Capacitor Box 310VDC

Weight
10 (22)

Note:
 1) Dimensions are in millimeters (inches)
 2) Weights are in kilograms (kg) and pounds (lbs)



Optional Accessories - CNC Second Operation Panel

Units: mm (inches)

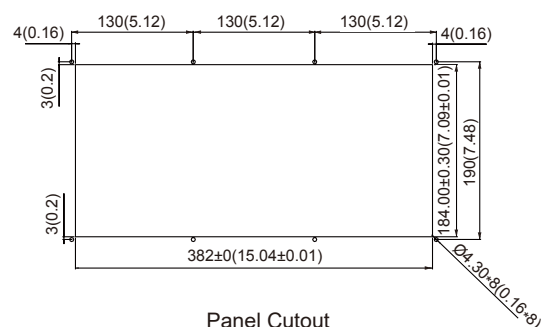
Membrane Type Operation Panel for Milling Machines

NC-PAN-300AM-F □

□ : E English Panel



- Size:
400 x 200 x 92.16 mm (Length x Width x Total Height)



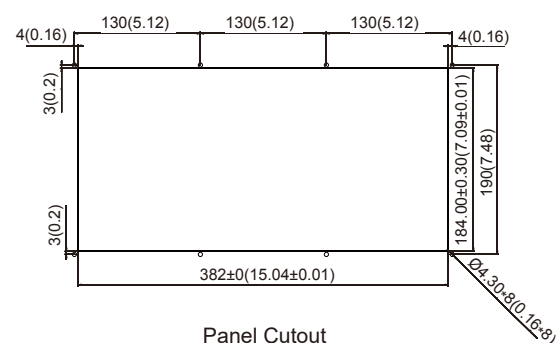
Key Type Operation Panel for Milling Machines

NC-PAN-300AM-P □

□ : E English Panel



- Size:
400 x 200 x 92.16 mm (Length x Width x Total Height)



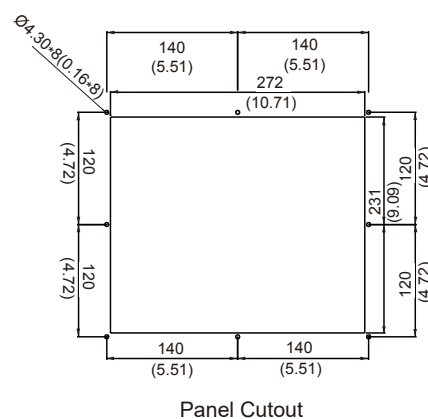
Key Type Operation Panel for High Speed Tapping Machines

NC-PAN-311AM-P □

□ : E English Panel



- Size:
290 x 250 x 92.23 mm (Length x Width x Total Height)



Optional Accessories - CNC Second Operation Panel

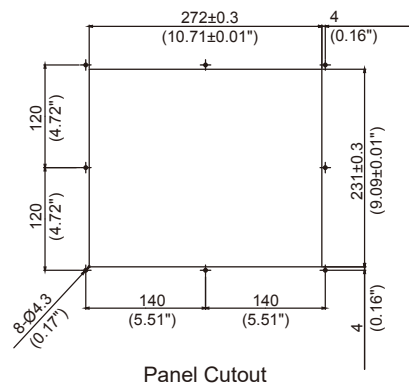
Membrane Operation Panel for High Speed Tapping Machines

NC-PAN-311AM-F □

□ : E English Panel



- Size:
290 x 250 x 75.62 mm (Length x Width x Total Height)



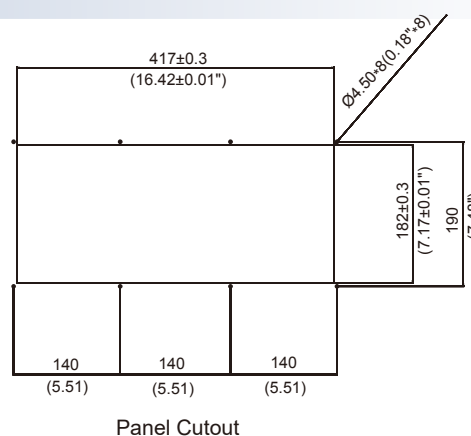
Key Type Operation Panel for Milling Machines

NC-PAN-310AM-P □

□ : E English Panel



- Size:
435 x 200 x 89.06 mm (Length x Width x Total Height)



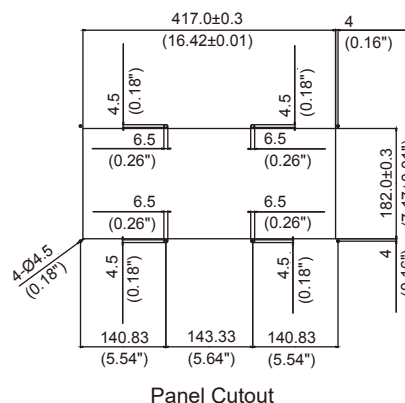
Membrane Type Operation Panel for Milling Machines

NC-PAN-310AM-F □

□ : E English Panel



- Size:
435 x 200 x 76.05 mm (Length x Width x Total Height)



CNC Second Panel I/O Transit Card

I/O Transit Card



- **Supports** 32I/32O
- **Part No.**
NC-EIO-T3232A
- **Size:**
121.78 x 92.5 x 53 mm
(Length x Width x Total Height)

Optional Accessories - Cables and Terminal Blocks

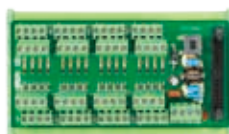
Local I/O

I/O Cable



- **Supports** 1.5/3.0/5.0/10 m
- **Part No.**
1.5 m, NC-CAB-TBM015
3.0 m, NC-CAB-TBM030
5.0 m, NC-CAB-TBM050
10 m, NC-CAB-TBM100

Photocoupler Type



- **Supports** 16IN/16OUT
- **Part No.**
NC-TBM-T1616
- **Size:**
146.25 x 86.71 x 52.81 mm
(Length x Width x Total Height)

Relay Type



- **Supports** 16IN/16OUT
- **Part No.**
NC-TBM-R1616
- **Size:**
286 x 121.78 x 54.73 mm
(Length x Width x Total Height)

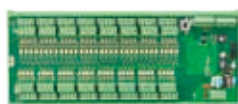
High Speed Serial I/O

Serial Cable



- **Supports** 1.5/3.0/5.0/10 m
- **Part No.**
1.5 m, NC-CAB-EIO015
3.0 m, NC-CAB-EIO030
5.0 m, NC-CAB-EIO050
10 m, NC-CAB-EIO100

Photocoupler Type



- **Supports** 32IN/32OUT
- **Part No.**
NC-EIO-T3232
- **Size:**
286 x 121.78 x 51.01 mm
(Length x Width x Total Height)

Relay Type



- **Supports** 32IN/16OUT
- **Part No.**
NC-EIO-R3216
- **Size:**
286 x 121.7 x 54.73 mm
(Length x Width x Total Height)

Relay Type



- **Supports** 20IN/10OUT
- **Part No.**
NC-EIO-R2010
- **Size:**
217 x 121.79 x 60.56 mm
(Length x Width x Total Height)

Optional Accessories - Cables and Terminal Blocks

High Speed Serial I/O

DA converter Analog Output Type (4 channel DAC)



- Part No. NC-EIO-DAC04
- Size:
146.25 x 86.78 x 51.05 mm
(Length x Width x Total Height)

AD converter Analog Input Type (4 channel ADC)



- Part No. NC-EIO-ADC04
- Size:
146.25 x 86.78 x 51.05 mm
(Length x Width x Total Height)

Terminal Blocks

DMCNET Cable



- Supports
0.3/1.5/3.0/5.0/10m
- Part No.
0.3 m, NC-CAB-DMC003
1.5 m, NC-CAB-DMC015
3.0 m, NC-CAB-DMC030
5.0 m, NC-CAB-DMC050
10 m, NC-CAB-DMC100

Spindle and 1~4 Axes Terminal Block

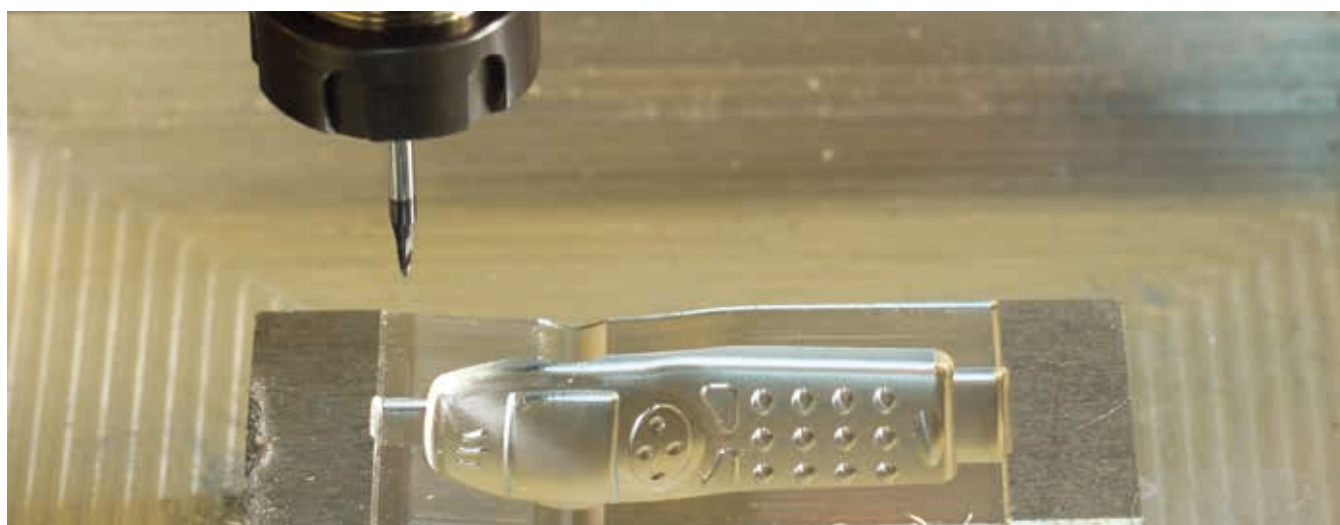


- Part No.
NC-EXM-S01
- Size:
146.25 x 86.78 x 51.05 mm
(Length x Width x Total Height)

MPG Terminal Block



- Adaptor for MPG
- Part No. NC-EXM-M01
- Size:
62.50 x 86.78 x 51.05 mm
(Length x Width x Total Height)



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Taoyuan Technology Center (Green Building)



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Tainan Plant (Diamond-rated Green Building)

ASIA (China)



Wujiang Plant 3



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(Green Building)

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