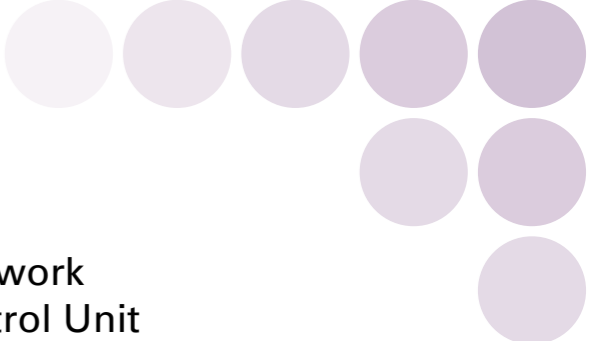# New!

OMRON

SYSMAC CS/CJ-Series
Position Control Units

CJ1W-NCF71
CS1W-NCF71 *NEW*

Transforming Devices with Motion Field Network
MECHATROLINK-II-compatible Position Control Unit

MECHATROLINK-II

Printed on 100% Recycled Paper

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Note: Do not use this document to operate the Unit.

realizing

Quick and Simple Multi-axis System Implementation

Introducing a Position Control Unit that can control up to 16 axes across a MECHATROLINK-II* high-speed field network. With it, every aspect of multi-axis systems from machine design to future expansions can be changed quickly and simply.

Before

After

SYSMAC CS/CJ-series
Programmable Controller

CX-One

CJ1W-NCF71
Position Control Unit

CS1W-NCF71
Position Control Unit

MECHATROLINK-II

W-series
Servo Driver

W-series
Servomotor
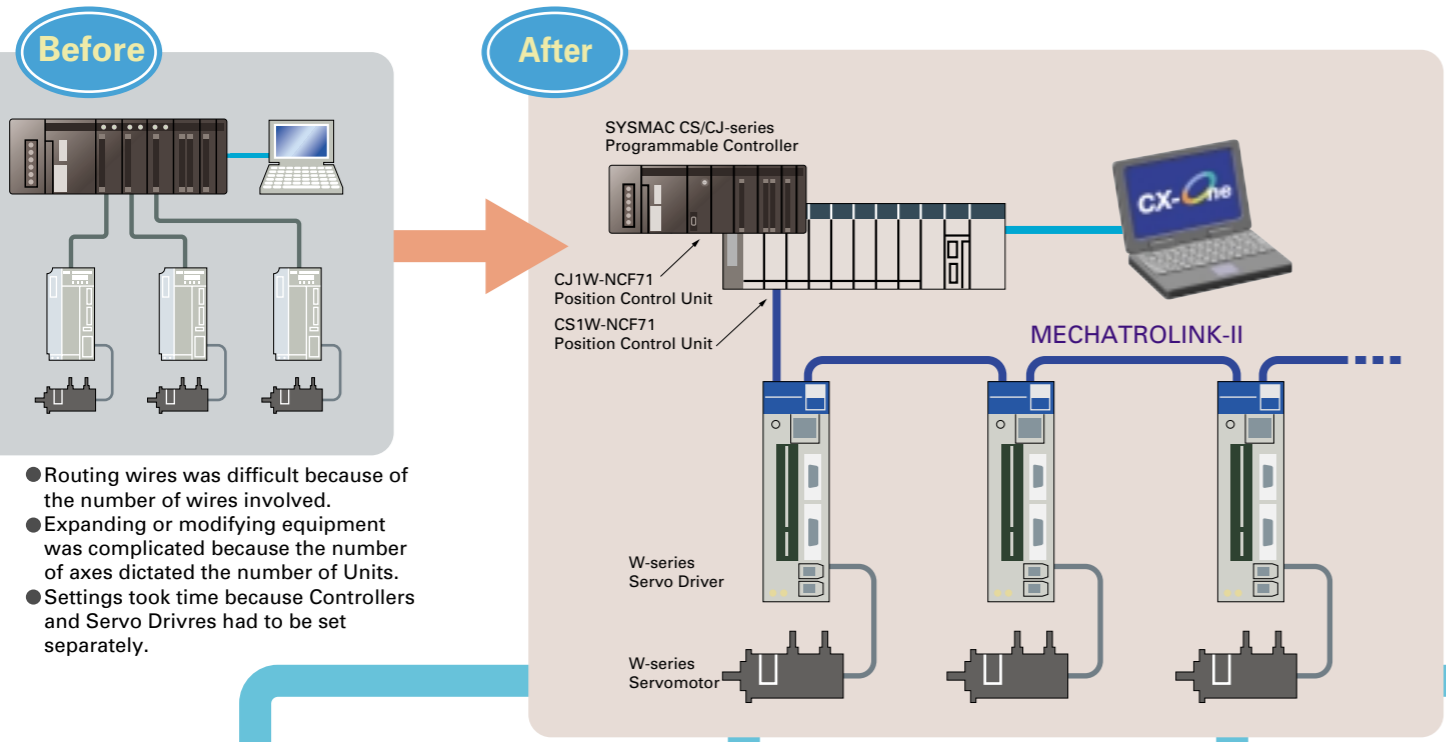
- Routing wires was difficult because of the number of wires involved.
- Expanding or modifying equipment was complicated because the number of axes dictated the number of Units.
- Settings took time because Controllers and Servo Drivres had to be set separately.

More Compact

Small

● Servo Driver (100 W)

160 mm
130 mm
75 mm

150 mm
130 mm
45 mm

Volume reduced to 56%

● Positioning Unit

90 mm
65 mm
31 mm

90 mm
65 mm
31 mm

4 axes max.

Many more axes for the same size.

Up to 16 axes.

Even smaller

Previously, W-series Units had to be connected to a MECHATROLINK-II Module. Now, OMNUC W-series AC Servo Drivers with built-in MECHATROLINK-II communications are available. This reduces the volume to 2/3 or more of previous models.

Less Wiring

Simple

Overall length: 50 m

One cable

Single-cable connection offers wiring flexibility

Servo Driver connection was greatly simplified: just one shielded twisted-pair cable is needed with a MECHATROLINK-II network. The overall cable length is 50 m (30 m max. with 16 axes connected) and there is less wiring and more flexibility in device arrangement.

Centralized Data Control

Accessible

All parameters can be set from one location

MECHATROLINK-II

Less Time Spent on Startup and Maintenance

Servo Driver parameters can be set from the PLC. This means that settings and adjustments can be performed from one location r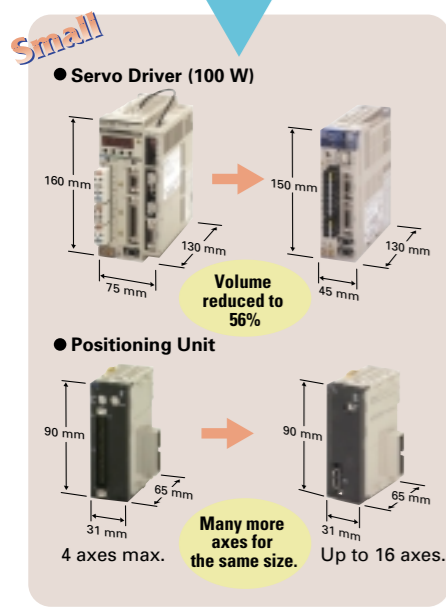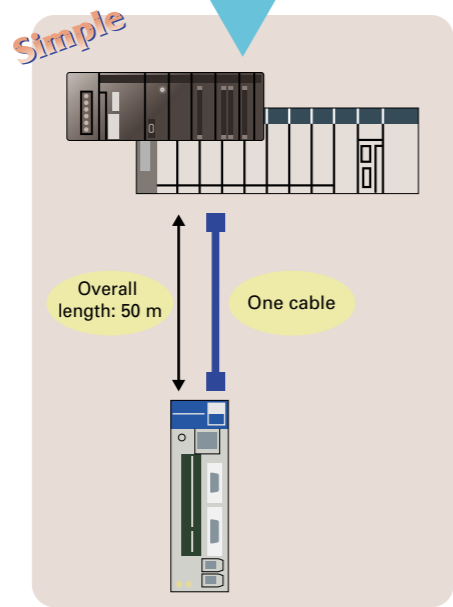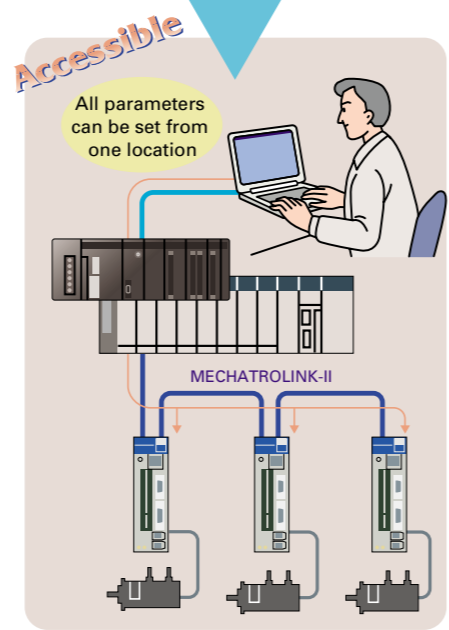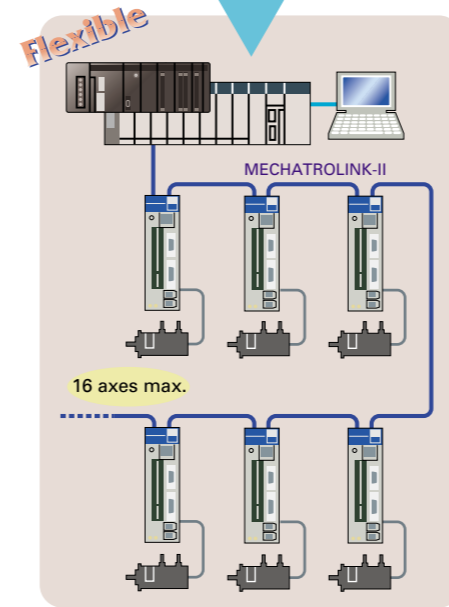ather than having to connect a Programming Device to each Servo Drive individually. Servo Drive alarm status and other information, such as speed and torque, can also be monitored from the PLC.

*MECHATROLINK and MECHATROLINK are registered trademarks of Yaskawa Electric Corporation.

Multi-axis Control

Flexible

MECHATROLINK-II

16 axes max.

Simple Expansion

An easily expandable system can be constructed that is just as efficient now with a few axes or later with up to 16 axes.

---

A Whole New World of Machine Control from OMRON

OMRON has developed a whole new environment that seamlessly integrates different control devices and networks over the entire life cycle of equipment and machines, ranging from design and startup to operation and maintenance. The system will still be viable as new systems are developed and new control devices and controllers become available. It all begins with OMRON Standard Libraries.

OMRON Standard Libraries

OMRON Standard Libraries are software applications that customers can load into their system and use without modification. The OMRON FB Library and Smart Active Parts (SAPs) Library are available now. These libraries simplify the software developed for interface components between Programmable Controllers (PLCs) or Programmable Terminals and various other control devices. They also improve the quality of the software by using standardized software components.

OMRON FB Library

The OMRON FB Library contains functional components for Programmable Controllers (PLCs). These components can be used by customers to produce finished programs that interface with various control devices in much less time. Since the components are standardized, they also improve the quality of the finished programs.
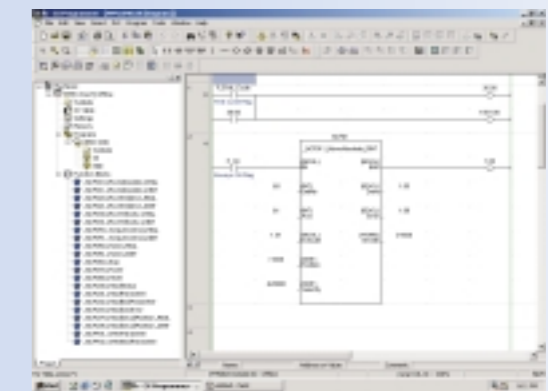
Frequently used ladder programming is provided in each function block. Several function blocks form a library that facilitates program and program asset development.

Smart Active Parts (SAPs) Library

The Smart Active Parts (SAPs) Library, formerly known as the Device Library, consists of screens with functions for Programmable Terminals. SAPs can be used on screens developed by customers to produce finished screens that interface with various control devices in much less time. Since the components are standardized, they also improve screen quality.
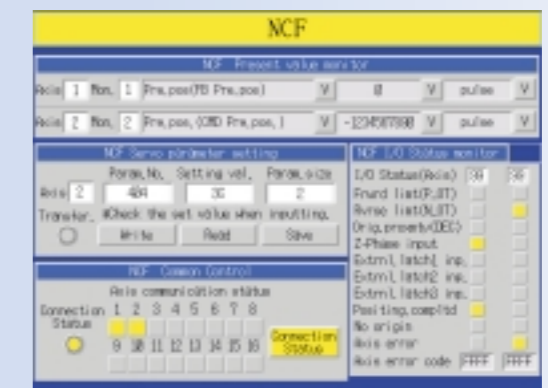
The SAPs include various operating screens for Position Control Units. Simply paste SAPs to simplify design work and eliminate unnecessary user programming.

The OMRON FB Library and Smart Active Parts Library can be used with CS/CJ-series Programmable Controller CPU Units version 3.0 or later and NS-series Programmable Terminals version 6 or later, respectively.

Simplifying the Task of Designing Various Types of Control

Assembly Equipment

Absolute and relative positioning of multiple axes can be performed by manipulating bits directly from the PLC. The target position and target speed can be changed instantly even while the positioning operation is in progress simply by sending another command.

Axis 1 operating condition

MOV
Axis 1 target position
Axis 1 position command units

MOV
Axis 1 target position
Axis 1 position command units

Axis 1 operating condition — Axis 1 busy — Axis 1 start

Axis 1 start

MOV
Axis 2 target position
Axis 2 position command units

MOV
Axis 2 target position
Axis 2 position command units

Axis 2 operating condition — Axis 2 busy — Axis 2 start

Axis 2 start

Speed

Time

Start bit

Processing Equipment

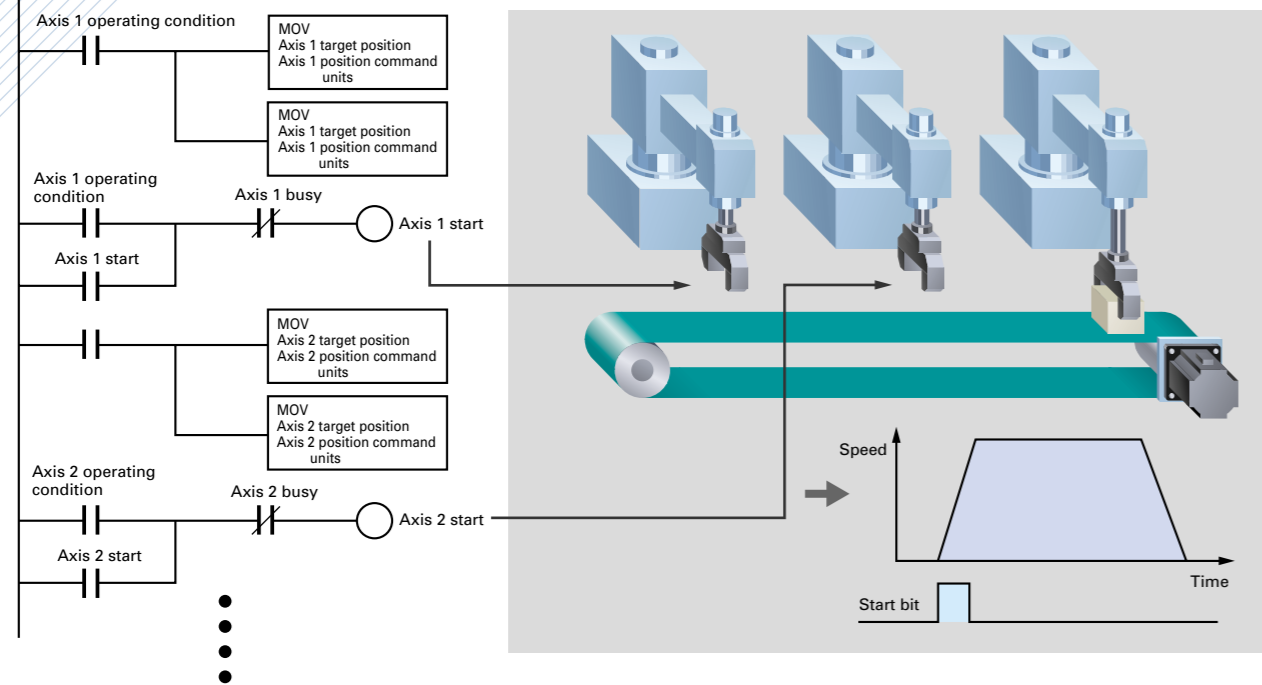Position, speed, and torque can be controlled using a torque limit. The torque limit can be enabled or disabled and a new torque limit can be written while the axis is operating.

Speed

Torque limit enabled

Time

Start bit

Specified torque limit

Servomotor

Pressing with constant torque

Pressing with constant torque

Feeding

Servomotor
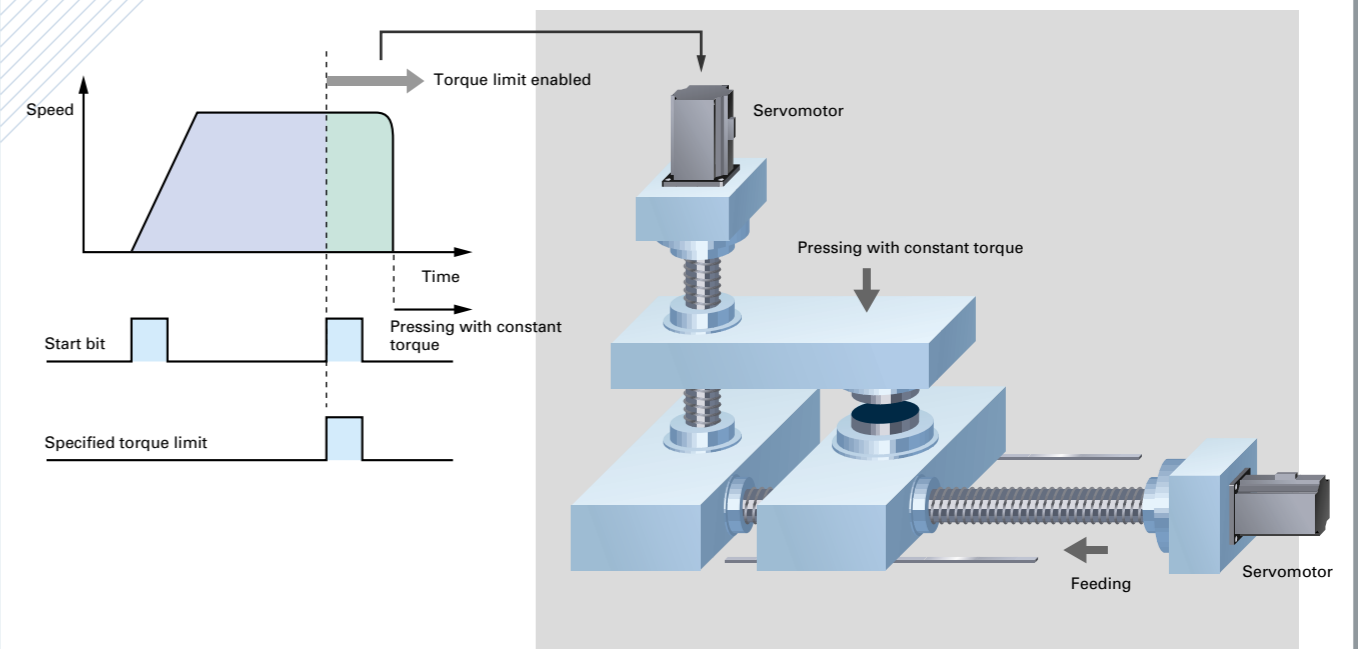
Feeders

Just as with position control, speed and torque can also be controlled by operating bits directly from the PLC. The position, speed, and torque can be changed while the axis is operating simply by turning ON individual control bits.

Speed change

Speed

Speed control

Position control

Time

Speed control start bit

Positioning start bit

External interrupt signal

Film feed Servo

Interrupt feeding can be performed according to the designation when a positioning command is sent.
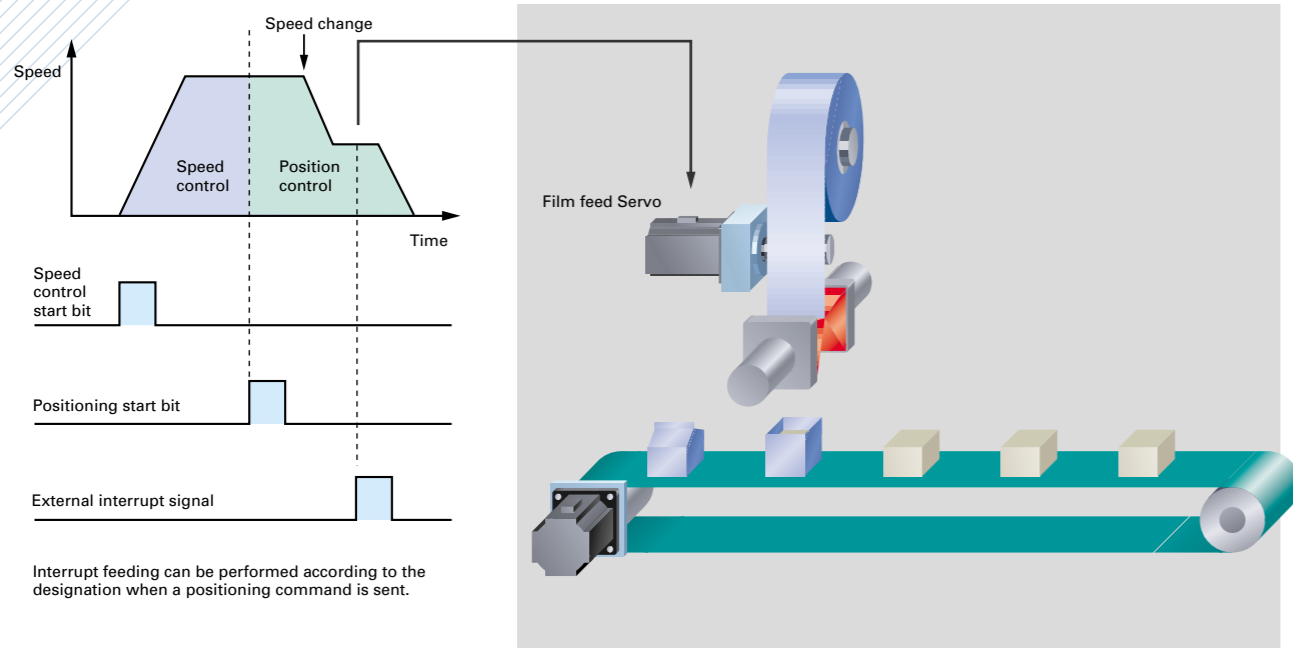
Conveyors

This example uses a W-series Servomotor with an Absolute Encoder.
This eliminates establishing the origin each time the equipment is started up.

Establish the origin and set the offset the first time only.

After that, just turn ON the power to start operation.

This simplifies standby and recovery processing when faults such as a power interruptions occur.

Up/down axis

In/out axis

Travel axis
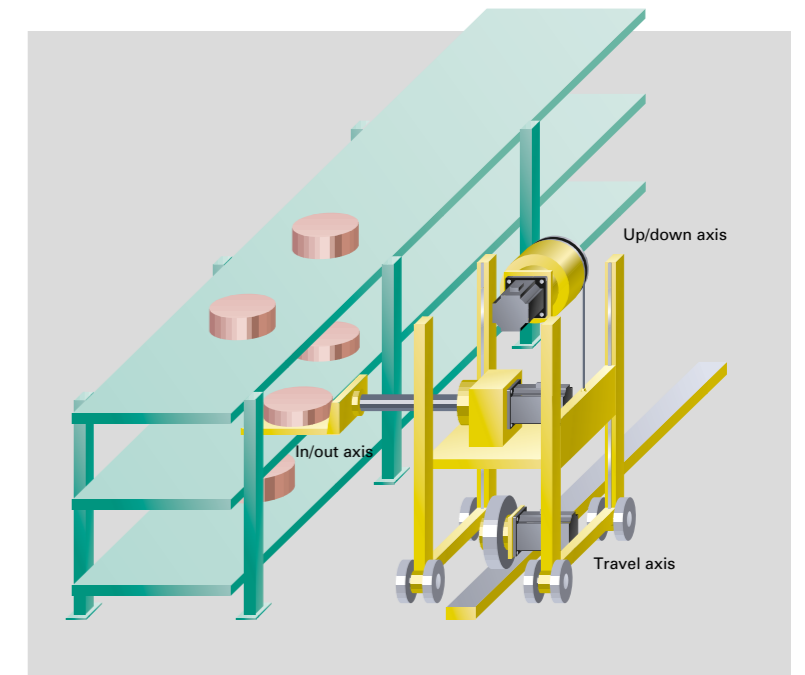
Full advantage can be taken of more advanced Servo Drivers and Servomotors to meet customer needs thanks to motion field network capabilities that include monitoring functions for various Servo Driver status conditions and a wide speed command range.

■System Configuration Examples

The Support Software for the NCF71 allows all parameters, including Servo Driver parameters, to be sent at one time.

NS-series Programmable Terminals

RS-232C Communications (NT Link)

SYSMAC CS/CJ-series Programmable Controller

CS1W-NCF71 Position Control Unit

CJ1W-NCF71 Position Control Unit

16 axes max., overall cable length: 50 m (30 m max. with 16 axes connected)

OMNUC W-series AC Servo Driver supporting MECHATROLINK-II communications

Sensors (limit inputs, origin proximity input, etc.)

W-series Servomotor (R88M-W□)

R88D-WT□ OMNUC W-series Servo Driver + MECHATROLINK-II Application Module (JUSP-NS115)

Install the JEPMC-W6022 Terminating Resistor on the final MECHATROLINK-II device in the network.

■Ordering Information

Name	Model	Standards
Position Control Unit	CJ1W-NCF71	CE, UL
	CS1W-NCF71	CE, UL

■Related Products

Name	Yaskawa model number	OMRON model number	Remarks
MECHATROLINK-II Application Module	JUSP- NS115	FNY-NS115	――
MECHATROLINK-II Cable	JEPMC-W6003-A5	FNY-W6003-A5	0.5 m
	JEPMC-W6003-01	FNY-W6003-01	1.0 m
	JEPMC-W6003-03	FNY-W6003-03	3.0 m
	JEPMC-W6003-05	FNY-W6003-05	5.0 m
	JEPMC-W6003-10	FNY-W6003-10	10 m
	JEPMC-W6003-20	FNY-W6003-20	20 m
	JEPMC-W6003-30	FNY-W6003-30	30 m
MECHATROLINK-II Terminating Resistor	JEPMC-W6022	FNY-W6022	――

The MECHATROLINK-II Application Module, Cables, and Terminating Resistor (all made by Yaskawa Electric Corporation) can be ordered from OMRON using our model numbers in the table above.

■Support Software

Name		Specification	Model	Standards
CX-One FA Integrated Tool Package version 1.1		The CX-One is an integrated tool package that provides programming and monitoring software for OMRON PLCs and components. The CX-One runs on any of the following operating systems: Windows 98 SE, Me, NT 4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP The CX-One includes CX-Motion-NCF Ver 1.□. Refer to the CX-One Catalog (R134) for details.	One license	CXONE-AL01C-E	――
			Three licenses	CXONE-AL03C-E	
			Ten licenses	CXONE-AL10C-E	
			Thirty licenses	CXONE-AL30C-E	
			Fifty licenses	CXONE-AL50C-E	
CX-Motion-NCF Ver. 1.□		The CX-Motion-NCF can also be ordered individually using the following model number.			
		Support Software for Position Control Units with MECHATROLINK-II communications. Operating system: Windows 98 SE, Me, NT 4.0 (Service Pack 6a), 2000 (Service Pack 3 or higher), or XP	One license	WS02-MNTC1	――

Site-licensed products are available for users who will run CX-One onmultiple computers. Ask your OMRON sales representative for details.

■Specifications

Item		Specification	
Model		CJ1W-NCF71	CS1W-NCF71
Unit classification		CPU Bus Unit	
Applicable PLCs		CJ Series	CS Series
Unit number settings		0 to F	
I/O allocations	Common Operating Memory Area	Words allocated in CPU Bus Unit Area: 25 words (15 output words, 10 input words)	
	Axis Operating Memory Area	Allocated in one of the following areas (user-specified): CIO, Work, Auxiliary, Holding, DM, or EM Area Number of words allocated: 50 words (25 output words, 25 input words) x Highest axis number used	
Compatible devices		OMRON W-series Servo Drivers equipped with MECHATROLINK-II Application Module	
Control method		Control commands executed using MECHATROLINK-II synchronous communications	
Maximum number of controlled axes		16 axes	
Control commands	Position commands	–2,147,483,648 to 2,147,483,647 (command units) (The command unit depends on the Electronic Gear Settings in the Servo Parameter	
	Speed commands for position control	0 to 2,147,483,647 (command units/s)	
	Acceleration/deceleration for position control	1 to 65,535 (10,000 command units/s²)	
	Speed commands for control	–199.999 to 199.999% (0.001% units) The upper limit of the speed command range is a percentage (%) of the maximum speed and depends on the specifications of the Servo Driver.	
	Torque commands for torque control	–199.999 to 199.999% (0.001% units) The upper limit of the torque command range is a percentage (%) of the maximum torque and depends on the specifications of the Servo Driver.	
Control functions	Servo lock/unlock	Locks and unlocks the Servo Driver.	
	Position control	Performs absolute or relative positioning according to the target position and target speed specified by the ladder program. (Linear interpolation for up to 4 axes is possible with appropriate settings.)	
	Establishing the origin	Origin search: Establishes the origin using the specified search method. Present position preset: Changes the present position to a specified position to establish the origin. Origin return: Returns the axis from any position to the established origin. Absolute encoder origin: Establishes the origin using a Servomotor that has an absolute encoder, without having to use an origin search.	
	Jogging	Outputs pulses at a fixed speed in the CW or CCW direction.	
	Interrupt feeding	Performs positioning by moving the axis a fixed amount when an external interrupt input is received while the axis is moving.	
	Speed control	Performs speed control by sending a command to the Servo Driver speed loop.	
	Torque control	Performs torque control by sending a command to the Servo Driver current loop.	
	Stop functions	Deceleration stop: Decelerates the moving axis to a stop. Emergency stop: Positions the moving axis for the number of pulses remaining in the error counter and then stops the axis.	
	Acceleration/deceleration curves	Any of the following can be set: a trapezoidal (linear) curve, an exponential curve, or an S-curve (moving average).	
	Torque limit	Restricts the output torque during axis operation.	
	Override	Multiplies the axis command speed by a specified ratio. Override: 0.01% to 327.67%	
	Servo parameter transfer	Reads and writes the Servo Driver parameters from the ladder program in the CPU Unit.	
	Monitoring function	Monitors the control status of the Servo Driver, such as the command coordinate positions, feedback position, current speed, and torque.	
	Software limits	Sets limits on the software level applied to the positioning range of axis operations.	
	Backlash compensation	Compensates for the amount of play in the mechanical system according to a set value.	
External I/O	Position Control Unit	One MECHATROLINK-II interface port	
	Servo Driver I/O	CW/CCW limit inputs, origin proximity inputs, external interrupt inputs 1 to 3 (can be used as external origin inputs)	
Self-diagnostic functions		Watchdog, flash memory check, memory corruption check	
Error detection functions		Overtravel, Servo Driver alarm detection, CPU error, MECHATROLINK communications error, Unit setting error	
Internal current consumption		360 mA max. at 5 V DC	360 mA max. at 5 V DC
Dimensions		31 x 90 x 65 mm (W x H x D)	35 x 130 x 101 mm (W x H x D)
Weight		95 g max.	188 g max.
Ambient operating temperature		0 to 55°C	0 to 55°C

●When a MECHATROLINK-II Application Module must be mounted to a W-series Servo Driver, use the following device versions.

Device	Compatible versions
R88D-WT□ W-series Servo Driver	Version 39 or later
JUSP-NS115 MECHATROLINK-II Application Module	Version□□□03 or later

The versions of both the W-series Servo Driver and MECHATROLINK-II Application Module can be found on the nameplate on the side of each device. If an earlier version of the device is used, it will not function properly. Always use products with versions listed in the table (or later versions).

■Dimensions (Unit: mm)
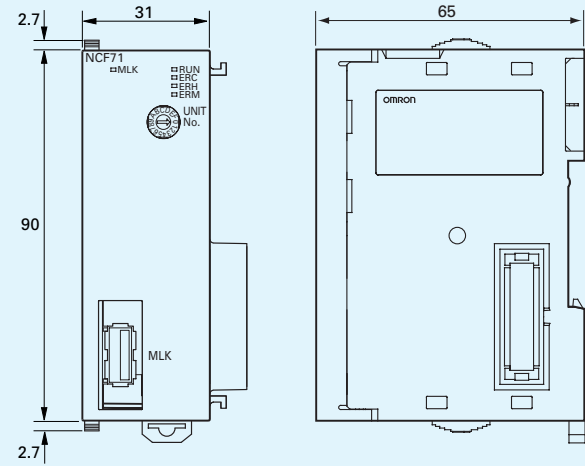
CJ1W-NCF71

CS1W-NCF71
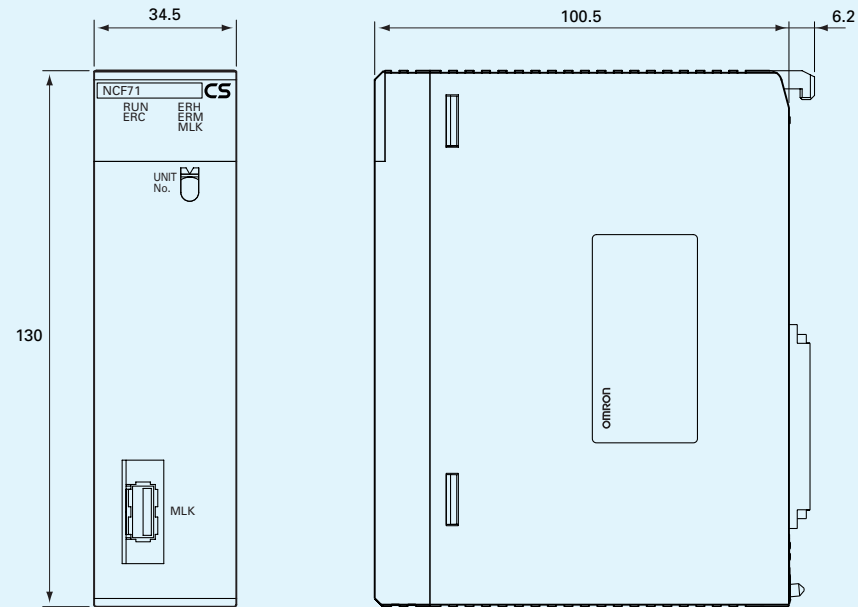
■AC Servo Driver and Servomotor Selection

●The following combinations of Servo Drivers and Servomotors can be connected to Position Control Units.

Combination	Servo Driver	AC Servomotor
①	R88D-WN□□□-ML2 OMNUC W-series AC Servo Driver supporting MECHATROLINK-II communications	OMNUC W-series AC Servomotor Use a 200-V AC Servomotor for both 100-V and 200-V Servo Drivers.
②	R88D-WT□□□ OMNUC W-series AC Servo Driver with MECHATROLINK-II Interface Unit	OMNUC W-series AC Servomotor

### ●Servo Driver and Servomotor Combinations

		Servomotors R88M- [ ]				① R88D-□-ML2 Servo Drivers with MECHATROLINK-II Communications			② Servo Drivers R88D- [ ]			Application
Type	Rated speed (maximum number of rotations)	Capacity	International standards CE, UL/cUL	Shaft end (not using decelerator)	Enclosure rating	100 V	200 V single phase	200 V three phase	100 V	200 V single phase	200 V three phase	
Cylinder	3000 r/min (5000 r/min)	30 W	Approved	Straight With key With key and tap Straight with tap	IP55 (excluding shaft opening)	—	—	—	WTA3HL	WTA3H	—	●Low-inertia machines ●Machines with fast tact time Robots Assembly machines Conveyors
		50 W				WNA5L	WNA5H	—	WTA5HL	WTA5H	—	
		100 W				WN01L	WN01H	—	WT01HL	WT01H	—	
		200 W				WN02L	WN02H	—	WT02HL	WT02H	—	
		400 W				WN04L	WN04H	—	—	WT04H	—	
		750 W				—	WN08H	—	—	WT08H*	WT08H	
		1 KW		With key and tap Straight	IP67 (excluding shaft opening)	—	—	WN10H	—	—	WT10H	
		1.5 KW				—	—	WN15H	—	—	WT15H	
		2 KW				—	—	WN20H	—	—	WT20H	
		3 KW				—	—	WN30H	—	—	WT30H	
		4 KW				—	—	—	—	—	WT50H	
		5 KW				—	—	—	—	—	WT50H	
	1500 r/min (3000 r/min)	450 W	Approved	With key and tap Straight	IP67 (excluding shaft opening)	—	—	WN05H	—	—	WT05H	●Machines requiring high torque Simple processing machines Assembly machines Transfer machines
		850 W				—	—	WN10H	—	—	WT10H	
		1.3 KW				—	—	WN15H	—	—	WT15H	
		1.8 KW				—	—	WN20H	—	—	WT20H	
		2.9 KW				—	—	—	—	—	WT30H	
		4.4 KW				—	—	—	—	—	WT50H	
		5.5 KW				—	—	—	—	—	WT60H	
		7.5 KW				—	—	—	—	—	WT75H	
	1500 r/min (2000 r/min)	11 KW				—	—	—	—	—	WT150H	
		15 KW				—	—	—	—	—	WT150H	
	1000 r/min (2000 r/min)	300 W	Approved	With key and tap Straight	IP67 (excluding shaft opening)	—	—	WN05H	—	—	WT05H	●Machines requiring high torque Simple processing machines Assembly machines Transfer machines
		600 W				—	—	WN10H	—	—	WT08H	
		900 W				—	—	WN10H	—	—	WT10H	
		1.2 KW				—	—	WN15H	—	—	WT15H	
		2 KW				—	—	WN20H	—	—	WT20H	
		3 KW				—	—	—	—	—	WT30H	
		4 KW				—	—	—	—	—	WT50H	
		5.5 KW				—	—	—	—	—	WT60H	
Slim profile	3000 r/min (5000 r/min)	100 W	Approved	Straight With key With key and tap Straight with tap	IP55 (excluding shaft opening) IP67	WN01L	WN01H	—	WT01HL	WT01H	—	●Machines with limited motor depth ●Machines requiring water-resistant motors Semiconductor manufacturing machines Food-processing machines AGVs
		200 W				WN02L	WN02H	—	WT02HL	WT02H	—	
		400 W				WN04L	WN04H	—	—	WT04H	—	
		750 W				—	WN08H	—	—	WT08H*	WT08H	
		1.5 KW				—	—	WN15H	—	—	WT15H	

＊Power supply wiring must be partly changed when using 200-V single-phase Servo Drivers.
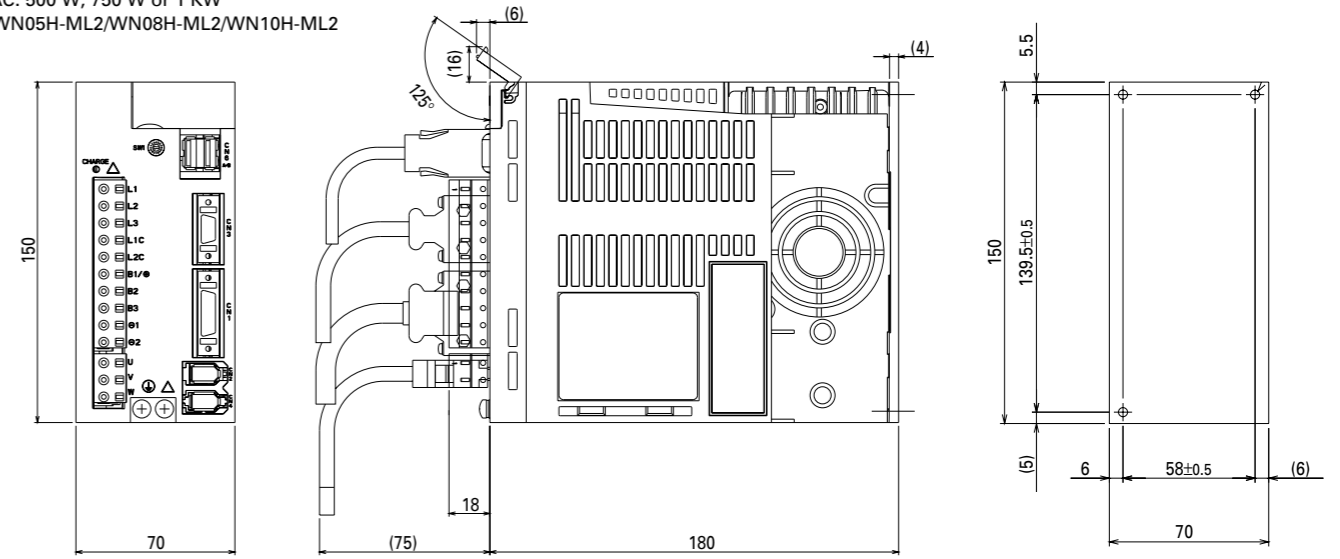The power supply input specifications are 220 to 230 VAC (+10% to −15%).

■Dimensions of AC Servo Driver with MECHATROLINK-II Communications
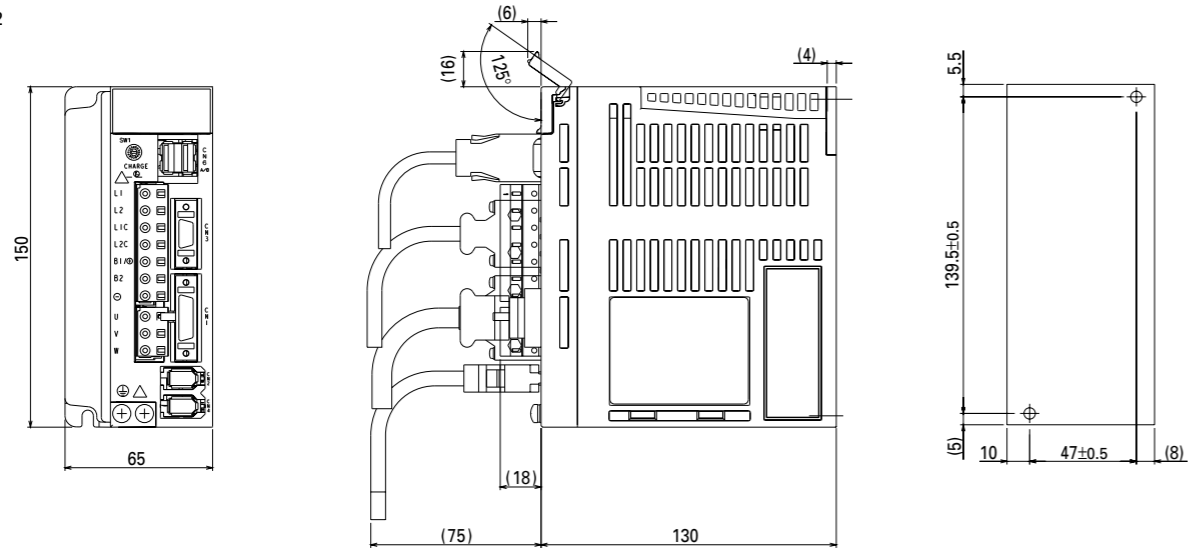
● AC Servo Drivers

• 200 VAC: 50 W, 100 W or 200 W
R88D-WNA5H-ML2/WN01H-ML2/WN02H-ML2
• 100 VAC: 50 W, 100 W or 200 W
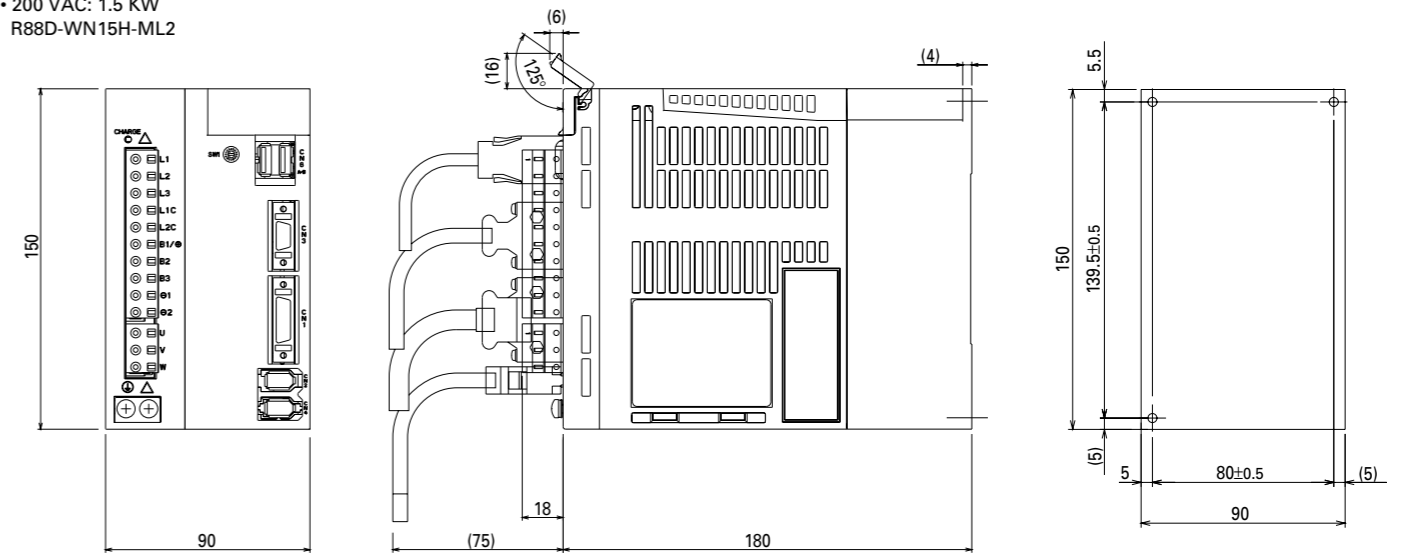R88D-WNA5L-ML2/WN01L-ML2/WN02L-ML2

• 200 VAC: 400 W
R88D-WN04H-ML2

• 100 VAC: 400 W
R88D-WN04L-ML2
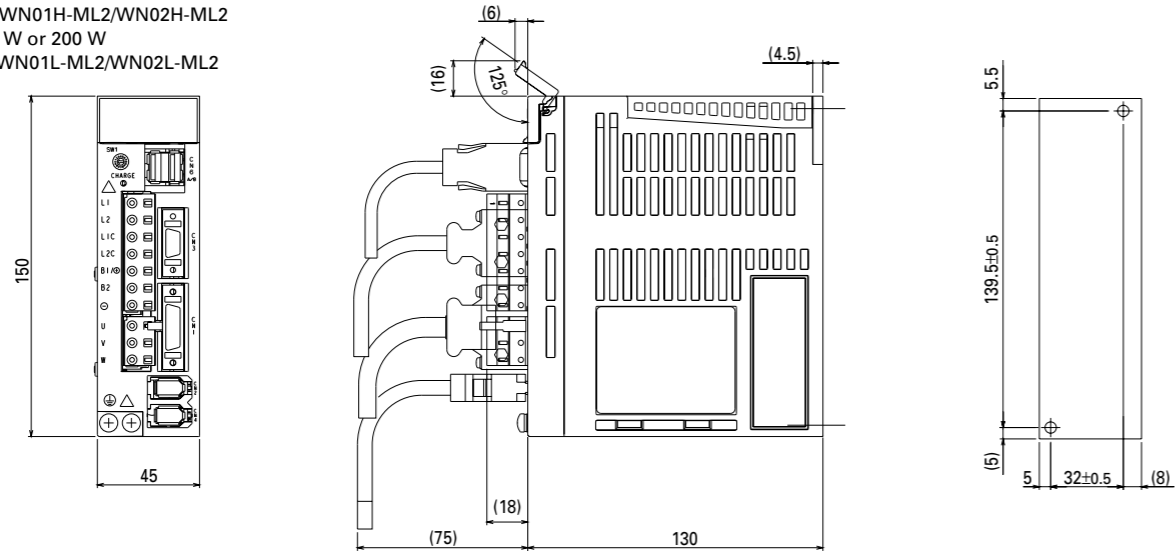
• 200 VAC: 500 W, 750 W or 1 KW
R88D-WN05H-ML2/WN08H-ML2/WN10H-ML2

• 200 VAC: 1.5 KW
R88D-WN15H-ML2
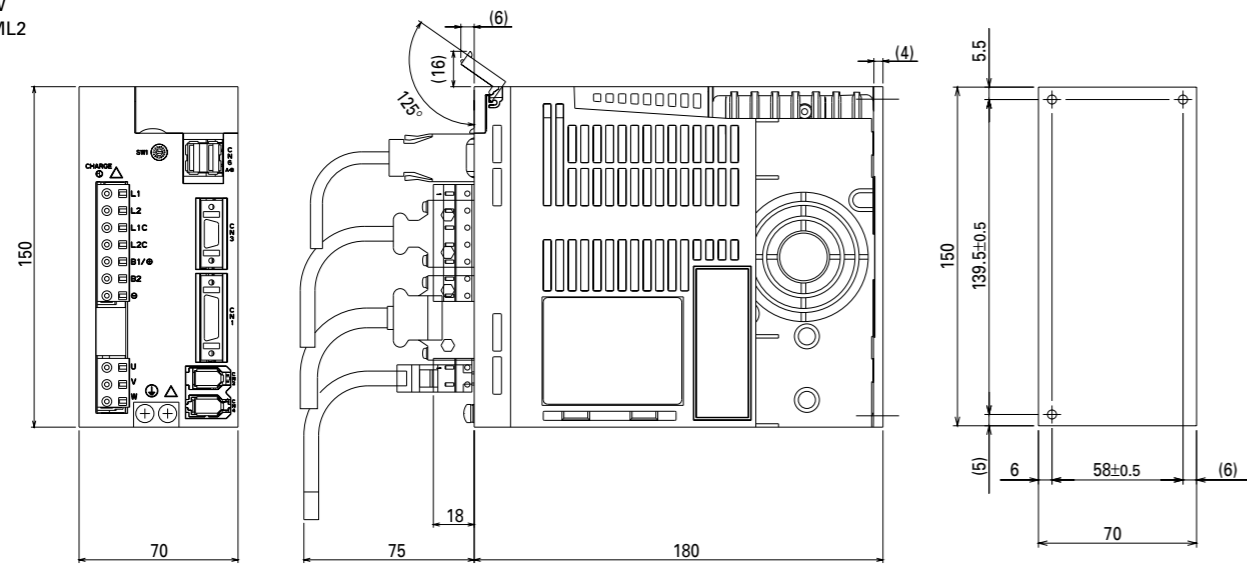
• 200 VAC: 2 KW or 3 KW
R88D-WN20H-ML2/WN30H-ML2