CJ-series Position Control Units with EtherCAT interface

# CJ1W-NC□81/□82

CSM_CJ1W-NC_81_E_4_1

## Preeminent control performance and easy operation feature of EtherCAT improve the production efficiency.

The EtherCAT communications with 100Mbps baud rate enables fast and accurate position control.
A wide range of position control functions are available with this position control unit.

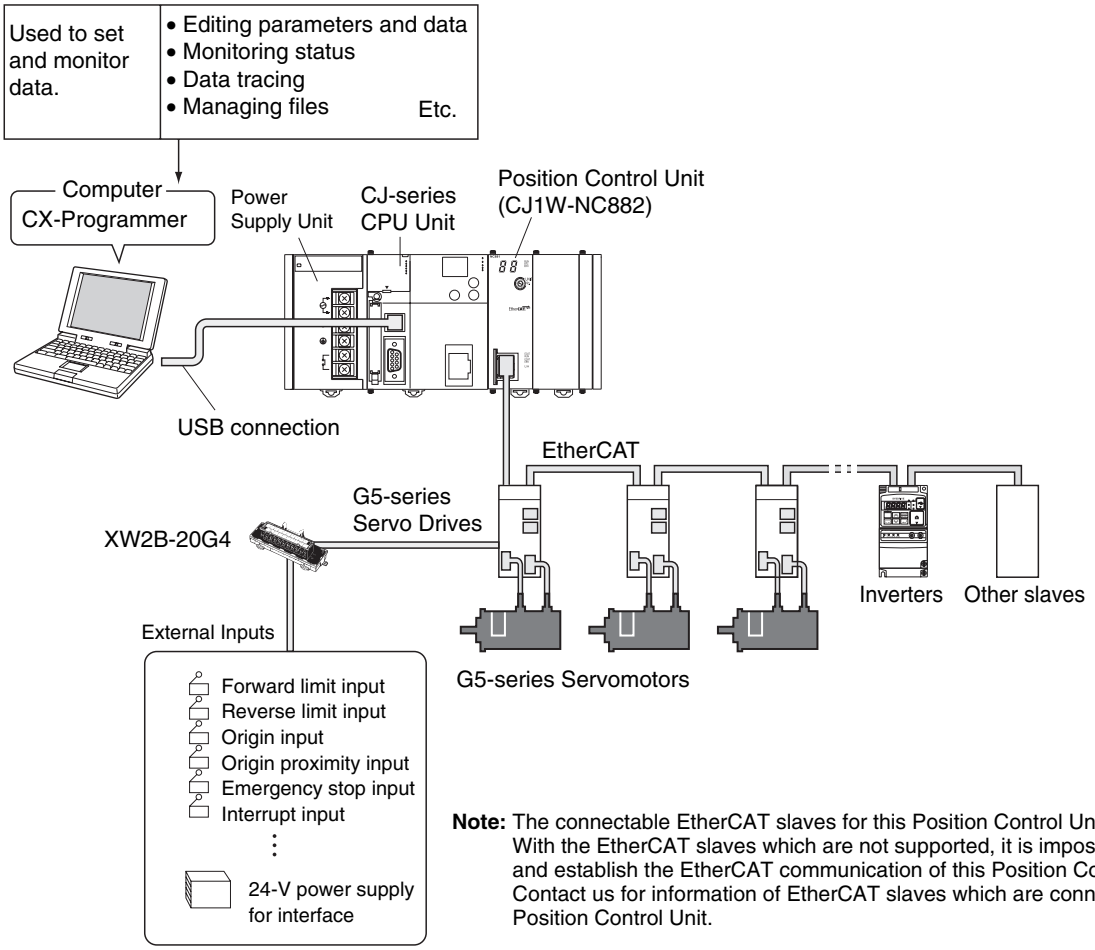
CJ1W-NC881 CJ1W-NC882



## Features

- Fast positioning operation: taking from 0.15 to 0.4ms (min.) to start servo operation from PLC start command.
- Support for Servomotors with Absolute Encoders
- Monitor the Deviation between Axes during Linear Interpolation
- A Wide Range of Positioning Operations
- Comes with Memory Operation function.
- Common control interface with pulse-train type position control unit (CJ1W-NC□□4).
- Fast communication of EtherCAT (250μs min. communications cycle).
- In addition to servo control, inverters, vision sensors, and other I/O devices that support EtherCAT can be connected.
- Support for Servomotors Speed Control and Torque limit outputs.

## System Configuration




**Note:** The connectable EtherCAT slaves for this Position Control Unit are limited. With the EtherCAT slaves which are not supported, it is impossible to configure and establish the EtherCAT communication of this Position Control Unit. Contact us for information of EtherCAT slaves which are connectable with this Position Control Unit.

# Ordering Information

**International Standards**

- The standards are abbreviated as follows: U: UL, U1: UL(Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
- Contact your OMRON representative for further details and applicable conditions for these standards.

## Position Control Units with EtherCAT interface

| Unit type | Product Name | Specifications | | No. of unit numbers allocated | Current consumption (A) | | Model | Standards |
|---|---|---|---|---|---|---|---|---|
| | | Control output interface | No. of axes | | 5 V | 24 V | | |
| CJ1 CPU Bus Units | Position Control Units with EtherCAT interface | Control commands executed by EtherCAT communications. Positioning functions: Memory operation, Direct operation by ladder programming | 2 axes | 1 | 0.46 | – | CJ1W-NC281 | UC1, CE |
| | | | 4 axes | | | | CJ1W-NC481 | |
| | | | 8 axes | | | | CJ1W-NC881 | |
| | | | 16 axes | | | | CJ1W-NCF81 | |
| | | Control commands executed by EtherCAT communications. Positioning functions: Memory operation, Direct operation by ladder programming I/O communications: 64 nodes | 4 axes | 1 | 0.46 | – | CJ1W-NC482 | |
| | | | 8 axes | | | | CJ1W-NC882 | |
| | | | 16 axes | | | | CJ1W-NCF82 | |

**Note: 1.** There is no accessory for the CJ-series Position Control Unit with EtherCAT interface.
**2.** This unit cannot be used, with the Machine Automation Controller NJ-series.

## Recommended EtherCAT Communications Cables

Category 5 or higher (100BASE-TX) straight cable with double shielding (aluminum tape and braided shielding) is recommended.

## Cabel with Connectors

### Wire Gauge and Number of Pairs: AWG22, 2-pair Cable

| Item | Appearance | Recommended manufacturer | Cable length(m) | Model |
|---|---|---|---|---|
| Cable with Connectors on Both Ends (RJ45/RJ45) |  | OMRON | 0.3 | XS5W-T421-AMD-K |
| | | | 0.5 | XS5W-T421-BMD-K |
| | | | 1 | XS5W-T421-CMD-K |
| Cable with Connectors on Both Ends (M12/RJ45) |  | OMRON | 2 | XS5W-T421-DMC-K |
| | | | 5 | XS5W-T421-GMC-K |
| | | | 10 | XS5W-T421-JMC-K |

**Note:** The cable length 0.3, 0.5, 1, 2, 3, 5, 10 and 15m are available. For details, refer to Cat.No.G019.

## Cables / Connectors

### Wire Gauge and Number of Pairs: AWG24, 4-pair Cable

| Item | Appearance | Recommended manufacturer | Model |
|---|---|---|---|
| Cables | – | Tonichi Kyosan Cable, Ltd. | NETSTAR-C5E SAB 0.5 × 4P |
| | – | Kuramo Electric Co. | KETH-SB |
| | – | SWCC Showa Cable Systems Co. | FAE-5004 |
| RJ45 Connectors | – | Panduit Corporation | MPS588 |

### Wire Gauge and Number of Pairs: AWG22, 2-pair Cable

| Item | Appearance | Recommended manufacturer | Model |
|---|---|---|---|
| Cables | – | Kuramo Electric Co. | KETH-PSB-OMR * |
| RJ45 Assembly Connector |  | OMRON | XS6G-T421-1 * |

* We recommend you to use above cable and connector together.

## Support Software

| Product name | Specifications | | | Model | Standards |
|---|---|---|---|---|---|
| | | Number of licenses | Media | | |
| **FA Integrated Tool Package CX-One Ver. 4.□** | The CX-One is a comprehensive software package that integrates Support Software for OMRON PLCs and components. CX-One runs on the following OS. OS: Windows XP (Service Pack 3 or higher), Vista or 7 Note: Except for Windows XP 64-bit version. CX-One Version 4.□ includes CX-Programmer Ver.9.□. For details, refer to the CX-One catalog (Cat. No. R134). | 1 license *1 | DVD *2 | **CXONE-AL01D-V4** | – |

*1. Multi licenses are available for the CX-One (3, 10, 30 or 50 licenses).
*2. The CX-One is also available on CD (CXONE-AL□□C-V4).

## Interpreting Model Numbers

You can identify the number of axes and output pattern from the model number.

**CJ1W-NC 2 8 1**

(1) (2) (3) (4)

| No | Item | Symbol | Specifications |
|---|---|---|---|
| (1) | CJ-series Position Control Unit | | |
| (2) | Number of axes | 2 | 2 axes |
| | | 4 | 4 axes |
| | | 8 | 8 axes |
| | | F | 16 axes |
| (3) | Output pattern | 8 | EtherCAT |
| (4) | Development number | 1 | Servo control only |
| | | 2 | Servo control + I/O communications |

## Mountable Racks

| Model | NJ system | | CJ system (CJ1, CJ2) | | CP1H system | NSJ system | |
|---|---|---|---|---|---|---|---|
| | CPU Rack | Expansion Rack | CPU Rack | Expansion Backplane | CP1H PLC | NSJ Controller | Expansion Backplane |
| **CJ1W-NC281<br>CJ1W-NC481<br>CJ1W-NC881<br>CJ1W-NCF81<br>CJ1W-NC482<br>CJ1W-NC882<br>CJ1W-NCF82** | Not Supported | | 16 Units max. (10 per Rack) | | Not Supported | Not Supported | 10 Units |

## General Specifications

| Item | CJ1W-NC281/-NC481/-NC881/-NCF81/-NC482/-NC882/-NCF82 |
|---|---|
| **Dimensions** | 90 × 65 × 31 mm (H × D × W) |
| **Weight** | 110 g max. |
| **Internal current consumption** | 460 mA max. at 5 VDC |
| **Ambient operating temperature** | 0 to 55°C |
| **Applicable standards** | Conforms to cULus and EC Directives. |

**Note:** All other specifications conform to the general specifications of the CJ Series.

# Characteristics

| Item | | | Models | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Servo control only | | | | Servo control + I/O communications | | |
| | | | CJ1W-NC281 | CJ1W-NC481 | CJ1W-NC881 | CJ1W-NCF81 | CJ1W-NC482 | CJ1W-NC882 | CJ1W-NCF82 |
| Applicable PLCs | | | CJ Series | | | | | | |
| Settable unit numbers | | | 0 to F (unit number as a CPU Bus Unit) | | | | | | |
| Maximum number of Units | | | 10 Units per Rack, 16 Units per PLC (Can be used on Expansion Racks.) | | | | | | |
| Allocated I/O words | Position Control Unit Control Memory Areas | | 25 words in CPU Bus Unit Area | | | | | | |
| | Axis Operation Memory Areas | | 43 words for each control axis (2 + 12 output words and 13 + 16 input words) in specified words in the CIO, Work, DM, or EM Area. | | | | | | |
| | Memory Operation Memory Areas | | 7 words for each task (3 output words and 4 input words) in specified words in the CIO, Work, DM, or EM Area | | | | | | |
| | I/O Memory Areas | | --- | | | | 1,300 words maximum (Outputs: 640 words, inputs: 640 words, communications status: 20 words) in specified words in the CIO, Work, DM, or EM Area | | |
| Controllable Servo Drives *1 | | | OMNUC G5-series Servo Drives with Built-in EtherCAT Communications | | | | | | |
| Control method | | | Control commands using EtherCAT communication | | | | | | |
| Number of controlled axes | | | 2 axes | 4 axes | 8 axes | 16 axes | 4 axes | 8 axes | 16 axes |
| Maximum command output speed | | | 104 Mpps *2 | | | | | | |
| Control units | Setting unit | | Pulses, millimeters, inches, or degrees | | | | | | |
| | Unit multiplier *3 | | ×1, ×10, ×100, ×1,000, or ×10,000 | | | | | | |
| | Electronic gear ratio *3 | | Unit version 1.1 or earlier: 1/1 to 1,048,576/1,048,576<br>Unit version 1.3 or later: 1/1 to 4,294,967,295/4,294,967,295 | | | | | | |
| Positioning functions | | | Memory operation or direct operation | | | | | | |
| | Single axis control | Position control | 2 axes | 4 axes | 8 axes | 16 axes | 4 axes | 8 axes | 16 axes |
| | | Speed control | 2 axes | 4 axes | 8 axes | 16 axes | 4 axes | 8 axes | 16 axes |
| | Interpolated control | Linear interpolation | 2 axes max. | 4 axes max. | 4 axes max. | 4 axes max. | 4 axes max. | 4 axes max. | 4 axes max. |
| | | Circular interpolation | 2 axes | 2 axes | 2 axes | 2 axes | 2 axes | 2 axes | 2 axes |
| | Memory operation | Maximum number of tasks | 2 | 4 | 4 *4 | 4 *4 | 4 | 4 *4 | 4 *4 |
| | | Sequence functions | JUMP, FOR-NEXT (50 layers/task), PSET, and PRSET | | | | | | |
| | | Dwell timers | 500/task, 0 to 10.00 s (Set in increments of 0.01 s.) | | | | | | |
| Position command values | Data | | -2,147,483,648 to 2,147,483,647 command units *5 | | | | | | |
| | Number of position command values | | 500/task | | | | | | |
| Speed command values | Data *6 | | Position control: 1 to 2,147,483,647 command units/s<br>Speed control : -2,147,483,648 to 2,147,483,647 command units/s | | | | | | |
| | Number of speed command values | | 500/task | | | | | | |
| Acceleration times | Data | | 0 to 250,000 ms | | | | | | |
| | Number of acceleration times | | 500/task | | | | | | |
| Deceleration times | Data | | 0 to 250,000 ms | | | | | | |
| | Number of deceleration times | | 500/task | | | | | | |
| Auxiliary functions | Overrides | | 0.01% to 500.00% (Can be set for each axis.) | | | | | | |
| | Software limits | | -2,147,483,647 to 2,147,483,646 command units (Can be set for each axis.) | | | | | | |
| | Backlash compensation | | Backlash compensation is performed using the compensation function in the Servo Drive. The setting range depends on the specifications of the Servo Drive. | | | | | | |
| | Torque Limits | | Unit version 1.1 or earlier: Supports only the ability to enable or disable the torque limits by turning ON or OFF the command bits.<br>Unit version 1.3 or later: Supports the ability to change the torque limit data via the Memory Area / Synchronous Data Link in addition to the ability to enable or disable the torque limits by turning ON or OFF the command bits. | | | | | | |
| Synchronous Data Link function | | | None | | | | Unit version 1.1 or earlier: None.<br>Unit version 1.3 or later: Provides command support for velocity command data, torque command data, torque feedforward data, torque limit data, and velocity limitation value when used in conjunction with a CJ2H-CPU (unit version 1.4 or later). | | |

| Item | | | Models | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Servo control only | | | | Servo control + I/O communications | | |
| | | | CJ1W-NC281 | CJ1W-NC481 | CJ1W-NC881 | CJ1W-NCF81 | CJ1W-NC482 | CJ1W-NC882 | CJ1W-NCF82 |
| Control performance | Control cycle | | 0.5 ms | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes<br>2 ms when using 5 to 8 axes | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes<br>2 ms when using 5 to 16 axes | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes<br>2 ms when using 5 to 8 axes | 0.5 ms when using 1 to 2 axes<br>1 ms when using 3 to 4 axes<br>2 ms when using 5 to 16 axes |
| | Communications cycle | | 250 µs | | 250 µs when using 1 to 4 axes<br>500 µs when using 5 to 8 axes | 250 µs when using 1 to 4 axes<br>500 µs when using 5 to 10 axes<br>1.0 ms when using 11 to 16 axes | 250 µs | 250 µs when using 1 to 4 axes<br>500 µs when using 5 to 8 axes | 250 µs min. when using 1 to 4 axes<br>500 µs min. when using 5 to 10 axes<br>1.0 ms when using 11 to 16 axes |
| | Starting time *7 | Direct operation (high-speed PTP) *8 | 0.15 to 0.4 ms | | 0.15 to 0.4 ms when using 1 to 4 axes<br>0.15 to 0.8 ms when using 5 to 8 axes | 0.15 to 0.4 ms when using 1 to 4 axes<br>0.15 to 0.8 ms when using 5 to 10 axes<br>0.15 to 1.2 ms when using 11 to 16 axes | 0.15 to 0.4 ms | 0.15 to 0.4 ms when using 1 to 4 axes<br>0.15 to 0.8 ms when using 5 to 8 axes | 0.15 to 0.4 ms when using 1 to 4 axes<br>0.15 to 0.8 ms when using 5 to 10 axes<br>0.15 to 1.2 ms when using 11 to 16 axes |
| | | Direct operation (bits) *9 | 0.75 to 1.25 ms | 1.25 to 2.25 ms | 2.5 to 4.5 ms | 3.0 to 5.0 ms | 1.25 to 2.25 ms | 2.5 to 4.5 ms | 3.0 to 5.0 ms |
| | | Memory operation (linear interpolation) *9 | 1.75 to 2.25 ms | 3.25 to 4.25 ms | 6.5 to 8.5 ms | 7.0 to 9.0 ms | 3.25 to 4.25 ms | 6.5 to 8.5 ms | 7.0 to 9.0 ms |
| Control I/O | Servo Drive interface | Communications port | EtherCAT port × 1 | | | | | | |
| | | Output signals | There are no external output signals for external outputs.<br>The following command bits are provided for each axis for Servo Drive control: Deviation Counter Reset Bit, Alarm Reset Bit, Servo Lock Bit, Servo Unlock Bit, and Torque Limit Bits. | | | | | | |
| | | Input signals | There are no external input signals for external inputs.<br>The following status flags are provided for each axis for Servo Drive control: Origin Input Flag, Servo Drive Alarm Input Flag, and Positioning Completed Input Flag. | | | | | | |
| | | External interface signals *10 | 6 signals (external origin signal, origin proximity signal, forward limit signal, reverse limit signal, emergency stop signal, and interrupt input signal) for each axis | | | | | | |

*1. A controllable Servo Drive is Servo Drive for which you can use the position control functions of the Position Control Unit.
*2. This is the maximum speed command when converted to pulses.
*3. Command units can be set for each axis according to the electronic gear ratio and unit multiplier.
*4. Up to four axes can be controlled by each task.
*5. Setting is possible between -2,147,483,648 and 2,147,483,647 pulses.
*6. The command can be set to up to 104,857,600 pps when converted to pulses.
*7. This is the time from executing a command at the PLC until the command is output on EtherCAT communications.
Execution for command bits is in the I/O refresh period.
The starting time depends on the control cycle, communications cycle, and operating conditions.
Refer to Position Control Units Operation Manual (Cat. No. W487) for details.
*8. The starting time applies when starting one axis with a special Position Control Unit instruction and a CJ2M or CJ2H CPU Unit with unit version 1.3 or later.
*9. These are the internal Position Control Unit processing times.
*10.Servo Drive inputs are used.

# EtherCAT Communications Specifications

| Item | Characteristics | | | | | | |
|---|---|---|---|---|---|---|---|
| | Servo control only | | | | Servo control + I/O communications | | |
| | CJ1W-NC281 | CJ1W-NC481 | CJ1W-NC881 | CJ1W-NCF81 | CJ1W-NC482 | CJ1W-NC882 | CJ1W-NCF82 |
| **Communications standard** | IEC 61158 Type12 | | | | | | |
| **Physical layer** | 100Base-TX (IEEE802.3) | | | | | | |
| **Connector** | RJ45 shielded connector × 1 | | | | | | |
| **Communications media** | Category 5 or higher (Recommended: cable with double, aluminum tape and braided shielding) | | | | | | |
| **Communications distance** | 100 m max. between nodes | | | | | | |
| **Topology** | Daisy chain only *1 | | | | | | |
| **EtherCAT Master Specifications** | Class B (minimum master-CoE compatible (no information service for SDO)) | | | | | | |
| **Maximum number of slaves *2** | 2 | 4 | 8 | 16 | 68 | 72 | 80 |
| **Node address setting range** | 1 to 2 | 1 to 4 | 1 to 8 | 1 to 16 | 1 to 4 and 17 to 80 *3 | 1 to 8 and 17 to 80 *3 | 1 to 16 and 17 to 80 *3 |
| **Communications cycle *4** | 250 µs, 500 µs, 1 ms, or 2 ms | | | | | | |
| **Process data** | Fixed PDO mappings specified for the slaves are used (set using Support Software). | | | | | | |
| **Mail box (CoE)** | Emergency messages, SDO requests, SDO responses, and SDO information (Used for Position Control Unit communications control and slave device parameter transfers.) | | | | | | |
| **LED indicators** | ECAT RUN × 1<br>ECAT ERR × 1<br>L/A (Link/Activity) × 1 | | | | | | |
| **CiA402 drive profile *5** | • Cyclic synchronous position mode<br>• Cyclic synchronous velocity mode<br>• Cyclic synchronous torque mode<br>• Touch probe function<br>• Torque limit function | | | | | | |

*1. Ethernet hubs cannot be used.
*2. This is the number of slaves, including Servo Drives and remote I/O slaves. The number of slaves that can be connected is limited. Refer to *Number of Remote I/O Connections* for details.
*3. Node addresses 17 to 80 are reserved for remote I/O slaves.
*4. The setting range depends on the number of slaves that are connected and the slave specifications. Refer to Position Control Units Operation Manual (Cat. No. W487) for details.
*5. This drive profile is used when connected to an OMNUC G5-series Servo Drive.

## Number of Remote I/O Connections

The Position Control Unit has the memory of up to 640 bytes for inputs and 640 bytes for outputs to be used for PDO communications.
The number of slaves that can be connected to the CJ1W-NC482/NC882/NCF82 is determined by the maximum memory size for PDO communications.
The memory of the PDO communication is shared with the Servo Drives; therefore, the number of I/O slaves that can be connected changes with the number of OMNUC G5 Series Servo Drive (number of use axes) that are connected to the Position Control Unit.

| Number of Servo Drive axes | Size used by Servo Drive axes (bytes) * | Remaining PDO communications memory size (bytes) | | Number of slaves that can be connected according to slave I/O size (guidelines) | | | |
|---|---|---|---|---|---|---|---|
| | | IN | OUT | 8 bytes of I/O (4 input and 4 output bytes) | 16 bytes of I/O (8 input and 8 output bytes) | 32 bytes of I/O (16 input and 16 output bytes) | 64 bytes of I/O (32 input and 32 output bytes) |
| 0 axis | 0 | 640 | 640 | 64 | 64 | 40 | 20 |
| 1 axis | 29 | 611 | 611 | 64 | 64 | 38 | 19 |
| 2 axes | 58 | 582 | 582 | 64 | 64 | 36 | 18 |
| 4 axes | 116 | 524 | 524 | 64 | 64 | 32 | 16 |
| 8 axes | 232 | 408 | 408 | 64 | 51 | 25 | 12 |
| 16 axes | 464 | 176 | 176 | 64 | 22 | 11 | 5 |

* The OMNUC G5-series Servo Drives also use IN and OUT bytes. The factory default of the PDO communications size is 29 bytes.

# Functional Specifications

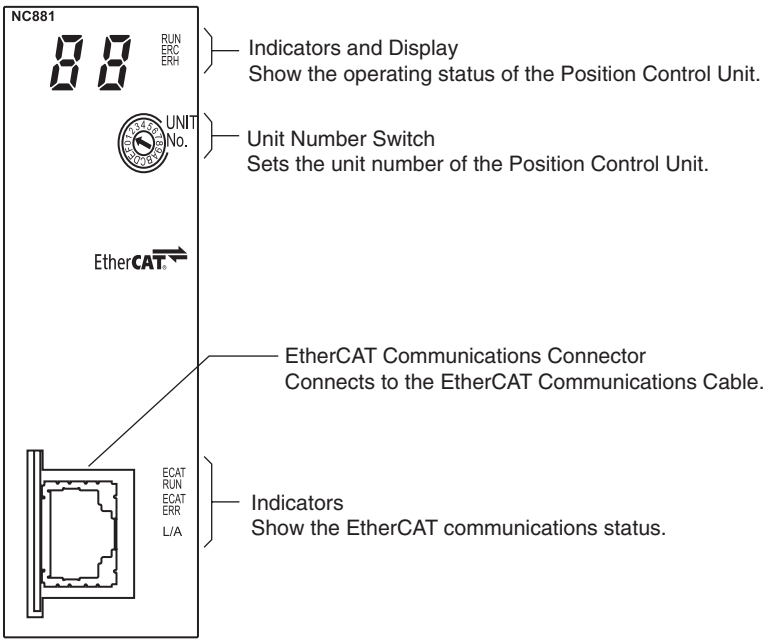
The following functions are supported when the Position Control Unit is connected to an EtherCAT-compatible OMNUC G5-series Servo Drive.

| Function | | | Description |
|---|---|---|---|
| Control functions | Single axis control | Absolute movements | Positioning is performed by specifying the absolute or relative target position and target speed directly from the ladder program. |
| | | Relative movements | |
| | | Speed control | Feeding at a specified speed is performed by specifying the target speed directly from the ladder program. Speed control is implemented using speed feeding with position control. |
| | | Interrupt feeding | Interrupt feeding can be used to move a specified amount when an interrupt input is received during an absolute movement, a relative movement, or speed control. |
| | | Rotation axis control | Rotation axes that are suitable for feeder and index table control can be controlled. Forward and reverse positioning and shortest route operations are possible. |
| | | Changing target positions and target speeds | The target position or target speed can be changed during an absolute movement, a relative movement, or speed control. |
| | Multi-axis control | Linear interpolation | The operation of more than one axis is started and stopped simultaneously to move in a straight line to the target position from the starting point of each axis. Linear interpolation is possible for up to four axes. |
| | | Circular interpolation | The operation of any two axes is controlled to move in a circular arc.<br>Any of three methods can be used to specify a circular arc: specifying the target position and center point, specifying the target position, radius, and direction and specifying the target position and passing point. |
| | Memory operation | Automatic continuous operation | The target positions, speeds, and operation patterns can be set in advance in the Position Control Unit to automatically perform a series of operations.<br>Continuous positioning and speed changes are also possible. |
| | | Sequence functions | Memory operation data provides sequence functions, including repetition of a given operation and starting/stopping operation data by using external inputs.<br>Therefore, the Position Control Unit can perform various operation sequences without affecting the ladder programming in the CPU Unit. |
| Manual operation | Origin searches | | External sensors and other means are used to detect the mechanical origin of the system.<br>You can select the origin search operation that is best for your system from 15 different origin search operation patterns. |
| | Origin returns | | You can return to the point that was defined as the mechanical origin. |
| | Presetting the present position | | The present position can be changed to a specified value to define the origin. |
| | Deceleration stops and emergency stops | | An axis that is in operation can be decelerated to a stop or stopped immediately. |
| | Jogging | | You can jog either forward or in reverse. |
| | Inching | | You can inch either forward or in reverse. |
| Synchronous Data Link | | | The CJ1W-NC□82 (unit version 1.3 or later) can perform data exchange between the CPU and Position Control Unit at regular intervals when used in conjunction with a CJ2H CPU (unit version 1.4 or later).<br>In addition, you can use this function to perform synchronous feeding position, synchronous feeding velocity, and synchronous feeding torque control. Also, optional commands are available for torque feedforward data, torque limit data, and velocity limitation value. |
| Auxiliary control functions | Command unit setting | | You can set the unit of control for each axis according to the machine. |
| | Acceleration/deceleration control | Automatic acceleration/deceleration control | The acceleration/deceleration curve can be automatically created during operation. You can select either a trapezoidal curve or an S curve based on a tertiary function. |
| | | Changing acceleration/deceleration rates | You can change the rate of acceleration/deceleration during acceleration/deceleration. |
| | | Switching acceleration/deceleration points | You can select one of three methods to connect speeds between different operation patterns during continuous memory operation. |
| | Overrides | | You can increase or decrease the operating speed of the system by a specified factor. |
| | Backlash compensation | | You can compensate for mechanical play using a parameter. |
| | M codes | | M codes can be output during memory operation to interlock with external devices. |
| | Zone settings | | You can set zones and assess when the present position is in a zone. Up to three zones can be set for each axis. |
| | Support for absolute encoders | | You can build an absolute positioning system by using a Servomotor with an Absolute Encoder. The Position Control Units can be used together with OMRON's OMNUC G5-series Servomotors with Absolute Encoders. |
| | Teaching | | You can save the present position as position data for memory operation.You can use either the command present position or feedback present position. |
| | Torque limit outputs | | The torque limit outputs can be used to switch the torque limits of the Servo Drive. They can be turned ON and OFF directly from a ladder program. Torque limits can be automatically switched by using holding for an origin search operation.<br>In addition, you can change the torque limit data via the Synchronous Data Link by using the CJ1W-NC□82 (unit version 1.3 or later) in conjunction with a CJ2H-CPU (unit version 1.4 or later) and OMNUC G5-series Servo Drive (version 2.0 or later).<br>Also, you can change the torque limit data via the Memory Area by using the CJ1W-NC□81/ -NC□82 (unit version 1.3 or later) in conjunction with an OMNUC G5-series Servo Drive (version 2.0 or later). |
| | Monitoring functions | Software limits | You can set forward and reverse software limits for axis operation.<br>If the target position exceeds a software limit, it will be detected in the command value check that is performed at startup. |
| | | Monitoring position/speed deviations | The Position Control Unit monitors the position or speed deviation between the present command position and present feedback position. You can stop axis operation if the deviation is too large. |
| | | Monitoring deviation between axes | The deviation between axes is also monitored during linear interpolation. You can stop axis operation if the deviation is too large. |

# External Interface

## Part Names

CJ1W-NC281/-NC481/-NC881/-NCF81/-NC482/-NC882/-NCF82




## Indicators

| Indicator | Display color | Status | Description |
|---|---|---|---|
| RUN | Green | ON | Normal operation. |
| | | OFF | The power supply is OFF, a hardware error has occurred, or the PLC has detected a Position Control Unit error. |
| ERC | Red | ON | An error has occurred. |
| | | OFF | Other than the above |
| ERH | Red | ON | There is an error in the PLC. |
| | | OFF | Other than the above |
| ECAT RUN | Green | OFF | Initialized state |
| | | Blinking | Pre-Operational state |
| | | Single flash | Safe-Operational state |
| | | ON | Operational state |
| ECAT ERR | Red | OFF | No error |
| | | Blinking | Communications setting error |
| | | Single flash | Synchronization error or communications data error |
| | | Double flash | Application WDT timeout |
| | | Flickering | Boot error |
| | | ON | PDI WDT timeout |
| ECAT L/A | Green | OFF | Link not established in physical layer. |
| | | ON | Link established in physical layer. |
| | | Flickering | In operation after establishing link. |

## EtherCAT Communications Connector

This connector is used to connect the EtherCAT twisted-pair cable.

## Connector Specifications

| Specification | Description |
|---|---|
| Electrical characteristics | Conforms to IEEE 802.3 standards. |
| Connector structure | RJ45 8-pin modular connector (Conforms to ISO 8877.) |

## Pin Assignments

| Pin No. | Signal name | Abbreviation | Signal direction |
|---|---|---|---|
| 1 | Transmission data + | TD+ | Output |
| 2 | Transmission data - | TD- | Output |
| 3 | Reception data + | RD+ | Input |
| 4 | Not used. | --- | --- |
| 5 | Not used. | --- | --- |
| 6 | Reception data - | RD- | Input |
| 7 | Not used. | --- | --- |
| 8 | Not used. | --- | --- |
| Hood | Frame ground | FG | --- |

## EtherCAT Communications Cables

Use a category 5 or higher cable with double, aluminum tape and braided shielding.

**Note:** The maximum distance between any two nodes is 100 m. Some cables, however, are not rated for 100 m. Generally speaking, the transmission performance of stranded wires is worse than that of solid wire. Cables with stranded wires generally are not rated for 100 m.

## Connector (Modular Plug) Specifications

Use a category 5 or higher, shielded connector.

**Note:** When selecting a connector, make sure that it is suitable for the cable that you are using. The following items must be confirmed: conductor size, whether connector is solid or stranded wire, whether there are 2 wire pairs or 4, the outside diameter, etc.

# Unit Versions and Programming

## Unit Versions

❍: Exist, ---: Does not exist

| Unit | Model | Unit Versions | | |
|---|---|---|---|---|
| | | Ver. 1.0 | Ver. 1.1 | Ver. 1.3 |
| Position Control Units with EtherCAT | CJ1W-NC281 | ❍ | ❍ | ❍ |
| | CJ1W-NC481 | ❍ | ❍ | ❍ |
| | CJ1W-NC881 | ❍ | ❍ | ❍ |
| | CJ1W-NCF81 | --- | ❍ | ❍ |
| | CJ1W-NC482 | --- | ❍ | ❍ |
| | CJ1W-NC882 | --- | ❍ | ❍ |
| | CJ1W-NCF82 | --- | --- | ❍ |
| Compatible CX-Programmer version | | Version 9.11 or higher | Version 9.12 or higher | Version 9.32 or higher |

## Function Support According to Unit Versions

**CJ1W-NC□81**

❍: Supported, ---: Not supported

| Function | Unit Versions | | |
|---|---|---|---|
| | Ver. 1.0 | Ver. 1.1 | Ver. 1.3 |
| Status Word Expanded Monitor Type | --- | ❍ | ❍ |
| I/O communications as type of slave that can be connected | --- | ❍ | ❍ |
| Enabling/disabling registered slaves | --- | ❍ | ❍ |
| Clearing input data to zero when there is a communications error with a remote I/O slave | --- | ❍ | ❍ |
| Electronic gear ratio setting range expanded | --- | --- | ❍ |
| Origin Position Latch | --- | --- | ❍ |
| Ad hoc change of torque limit data by use of Allocated Memory Areas *1 | --- | --- | ❍ |
| Ad hoc change of torque limit data / torque feedforward data by use of the Synchronous Data Link *1 *2 | --- | --- | --- |
| Synchronous Data Link function (Electric Shaft function) *1 *2 | --- | --- | --- |
| Synchronous Data Link function (synchronous feeding velocity function) *1 *2 | --- | --- | --- |
| Synchronous Data Link function (synchronous feeding torque function) *1 *2 | --- | --- | --- |

*1. Whether or not this function is supported depends on the version of the OMNUC G5-series Servo Drive. For more information, refer to Function Support According to OMNUC G5-series Servo Drive Versions.
*2. Whether or not this function is supported depends on the version of the OMNUC G5-series Servo Drive. For more information, refer to Function Support According to CPU Unit Versions.

**CJ1W-NC□82**

❍: Supported, ---: Not supported

| Function | Unit Versions | | |
|---|---|---|---|
| | Ver. 1.0 | Ver. 1.1 | Ver. 1.3 |
| Status Word Expanded Monitor Type | --- | ❍ | ❍ |
| I/O communications as type of slave that can be connected | --- | ❍ | ❍ |
| Enabling/disabling registered slaves | --- | ❍ | ❍ |
| Clearing input data to zero when there is a communications error with a remote I/O slave | --- | ❍ | ❍ |
| Electronic gear ratio setting range expanded | --- | --- | ❍ |
| Origin Position Latch | --- | --- | ❍ |
| Ad hoc change of torque limit data by use of Allocated Memory Areas *1 | --- | --- | ❍ |
| Ad hoc change of torque limit data / torque feedforward data by use of the Synchronous Data Link *1 *2 | --- | --- | ❍ |
| Synchronous Data Link function (Electric Shaft function) *1 *2 | --- | --- | ❍ |
| Synchronous Data Link function (synchronous feeding velocity function) *1 *2 | --- | --- | ❍ |
| Synchronous Data Link function (synchronous feeding torque function) *1 *2 | --- | --- | ❍ |

*1. Whether or not this function is supported depends on the version of the OMNUC G5-series Servo Drive. For more information, refer to Function Support According to OMNUC G5-series Servo Drive Versions.
*2. Whether or not this function is supported depends on the version of the OMNUC G5-series Servo Drive. For more information, refer to Function Support According to CPU Unit Versions.

## Function Support According to OMNUC G5-series Servo Drive Versions

As indicated in the table below, functions supported by CJ1W-NC□82 Position Control Units (unit version 1.3 or later) differ depending on the version of the G5 series servo drive used in conjunction with the Position Control Unit:

❍: Supported, ---: Not supported

| Function | | Drive version | |
|---|---|---|---|
| | | Ver. 1.□ | Ver. 2.0 or later |
| Synchronous Data Link function (Synchronous feeding functions) | Synchronous Feeding Position (Electric Shaft) function | ❍ | ❍ |
| | Synchronous Feeding Velocity function | --- | ❍ |
| | Synchronous Feeding Torque function | --- | ❍ |
| Ad hoc change of torque limit data by use of Allocated Memory Areas | | --- | ❍ |
| Ad hoc change of torque limit data / torque feedforward data by use of the Synchronous Data Link | | --- | ❍ |

## Function Support According to CPU Unit Versions

As indicated in the table below, functions supported by CJ1W-NC□82 Position Control Units (unit version 1.3 or later) differ depending on the version of the CPU unit used in conjunction with the Position Control Unit:

❍: Supported, ---: Not supported

| Function | | CJ2H | | CJ1-H/CJ1/ CJ1M/CJ2M |
|---|---|---|---|---|
| | | Ver. 1.3 or earlier | Ver. 1.4 or later | |
| Synchronous Data Link function (Synchronous feeding functions) | Synchronous Feeding Position (Electric Shaft) function | --- | ❍ | --- |
| | Synchronous Feeding Velocity function | --- | ❍ | --- |
| | Synchronous Torque Command function | --- | ❍ | --- |
| Ad hoc change of torque limit data / torque feedforward data by use of the Synchronous Data Link | | --- | ❍ | --- |

# Function List of Function Block Library (FBL)

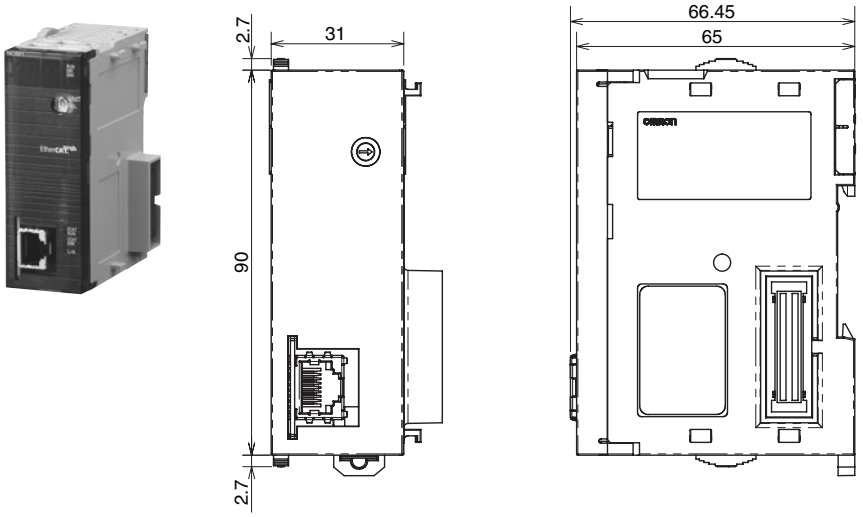
## Functional Function Block Library (FBL)

| | | | |
|---|---|---|---|
| **1** | Move Absolute | **14** | Read Status |
| **2** | Unlimited Move Absolute | **15** | Read Parameter |
| **3** | Move Relative | **16** | Read Error |
| **4** | Speed Control | **17** | Read Present Position |
| **5** | Origin Search | **18** | Present Position Latch |
| **6** | Origin Return | **19** | Write Parameter |
| **7** | Deceleration Stop | **20** | Save Parameter |
| **8** | Operation Command | **21** | Teaching |
| **9** | Error Reset | **22** | Present Position Preset |
| **10** | Deviation Counter Reset | **23** | Override Setting |
| **11** | Run Program | **24** | Torque Limits |
| **12** | Interrupt Feeding | **25** | Absolute Encoder Setup |
| **13** | Jogging / Inching | **26** | Absolute Encoder's Origin Position Offset Setting |

# Dimensions

**(Unit: mm)**

**CJ1W-NC281/-NC481/-NC881/-NCF81/-NC482/-NC882/-NCF82**




# Related Manuals

| Manual | Cat. No. | Model | Application | Description |
|---|---|---|---|---|
| **CJ-series Position Control Unit Operation Manual** | W487 | CJ1W-NC281<br>CJ1W-NC481<br>CJ1W-NC881<br>CJ1W-NCF81<br>CJ1W-NC482<br>CJ1W-NC882<br>CJ1W-NCF82 | Information on CJ1W-NC281/-NC481/ -NC881/-NCF81/-NC482/ -NC882/-F82 Position Control Units | Describes the setting and application procedures for the Position Control Units. |
| **CX-Programmer Operation Manual** | W446 | CXONE-AL□□C-V□ /-AL□□D-V□ | Support Software for Windows computers CX-Programmer operating procedure | Describes operating procedures for the CX-Programmer. |

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