



CCM

Conveyor Control Motor

First Step Guide First Edition

Thank you for purchasing our product. Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use. This Instruction Manual is original.

Warning : Read the instruction manual carefully and follow the instruction manual when handling this equipment. Please download the user's manual from our website. You can download it free of charge. User registration is required for first time users. URL: www.iai-robot.co.jp/data_dl/CAD_MANUAL/ Keep a printout of the introduction manual near the equipment in which this product is installed so that it can be checked at all times, or display it on your computer, tablet terminal, etc. so that you can check it immediately. If you need a bound copy of the instruction manual, order it from the nearest sales office listed in the First Step Guide or at the end of the instruction manual. It will be provided for a fee.

- Using or copying all or part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

In this document, this product (the conveyor control motor) is described as "CCM".

Product Check

This product is comprised of the following parts if it is of standard configuration. If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts (The option is excluded.)

No.	Part Name	Model	Quantity	Remarks
1	CCM Main Body	Refer to How to read the model plate and How to read the model No.	1	
Accessories				
2	Encoder Robot Cable	CB-EC-PWBIO□□□-RB	1	Components included as selected in the model number
	Power & I/O connector	1-1871940-6(Tyco Electronics)		
3	Safety Guide	M0194	1	

2. How to Read the Model Plate

Model → MODEL: CCM-VRB7-M-5-WL2
 Serial number → S/N: X01234500 DATE: 15/07/2022
 MADE IN JAPAN

3. How to Read the Model No.

Series name: CCM - Type: [] - Gear ratio: M - Cable length: [] - Options: ([])

Type

RB7 ...Round Belt Driven
Motor Area Width 73mm

VB7 ...V-Belt Driven
Motor Area Width 73mm

VRB7 ...V-Ribbed Belt Driven
Motor Area Width 73mm

Gear ratio

M ... Gear ratio 1/4

Cable length

0 ... With No Cable
(Enclosed with Terminal Connector when "ACR" not Selected)

1~10 ... 1m to 10m
(Enclosed with Standard Connector Equipped Cable)

S1~S10 ... 1m to 10m
(Enclosed with 4-Way Connector Equipped Cable)

Options

No Description ...NPN specification, no option

ACR ...RCON-EC connection specification *1

PN ...PNP specification *1

TMD2 ...2-circuit power supply specification *1

WL ...Wireless communication specification

WL2 ...Wireless axis operation specification

(ENG ... Terminal block connector English description)
 → Only when ACR not selected and cable length 0.
 (ENG2 ... Terminal block connector 2-circuit power supply English description)
 → Only when ACR not selected and cable length 0.
 Make sure to describe it together option "TMD2".

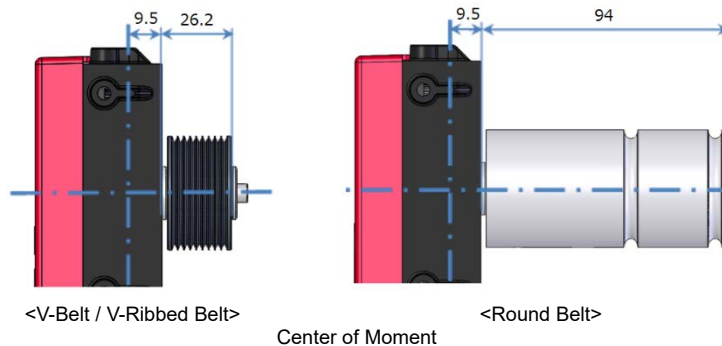
*1 When "ACR" is selected, "PN" or "TMD2" option not available to select (I/O in "ACR" option is NPN only, power supply applicable for 2-circuit system in standard)

Basic Specifications

1. Mechanical Specifications

Item	Content
Drive system	Timing belt
Motor / Speed reducer joint	Oldham coupling
Dynamic allowable moment (Output axis)	16N·m ⁻¹
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)
Storage temperature	0 to 50°C (Within 1 month, 0 to 60 °C is acceptable)
Degree of protection	Electrical Driven Part: IP50 or Equivalent, Reducer Part: IP20 or Equivalent
International standard compliance	CE Marking, RoHS3 Directive
Overvoltage category	III / IEC 60664-1
Electric shock protection class	I / IEC 60335-1
Motor type	Pulse motor
Controller	Built in controller

*1 Usage with load exceeding values above may drop product life or damage the product.



Item	Content	
Gear ratio	1/4	
Max. torque (N·mm)	1605	
* The output torque should vary depending on rotation speed.		
Motor rotation speed / Acceleration/deceleration time (guideline)	Min. rotation speed [rpm]	75
	Max. rotation speed [rpm]	1575
	Rated acceleration/deceleration time [s]	1.0
	Rated acceleration/deceleration time setting range [s]	1.0 to 2.5
Operation	Unlimited rotation	

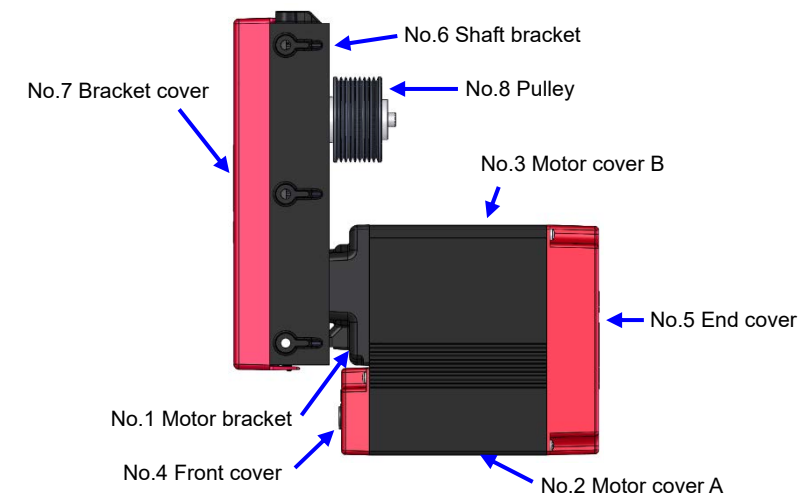
2. Electrical Specifications

Item	Content
Number of controlled axes	1 axis
Power supply voltage	24V DC±10%
Power supply current (Note 1)	Rated 2.2A
Generated heat	5W
Inrush current (Note 2)	8.3A (with in-rush current limit circuit)
Momentary power failure resistance	Max. 500µs
Motor size	□56
Motor output rated current	1.2A
Motor control method	Field weakening type vector control
Encoder type	Incremental
Encoder resolution	800 pulse/rev
Teaching port specifications	RS-485 1ch (Modbus protocol compliant)
Interface specifications (power input common with body)	Input × 3 : Start/stop, rotation direction, alarm reset or CCW, CW, alarm reset Output × 3 : During rotation, rotation direction, alarm
Data setting and input methods	PC software (IA-OS)/ Teaching pendant TB-02, TB-03
Insulation resistance	500V DC 10MΩ
Electric shock protection mechanism	Class I basic insulation
Cooling method	Natural air cooling

Note 1 The power supply current includes 0.3A of the control power supply.

Note 2 Inrush current will flow for approximately 5ms after the power is turned on (at 40°C). The value of inrush current differs depending on the impedance of the power supply line.

Names of the Parts



No.	Part name	Content
1	Motor bracket	Painted Aluminum Die-Cast (ADC12)
2	Motor cover A	Black Anodized Aluminum Extrusion (A6063SS-T5 or Equivalent)
3	Motor cover B	Black Anodized Aluminum Extrusion (A6063SS-T5 or Equivalent)
4	Front cover	Resin (PBT)
5	End cover	Resin (PBT)
6	Shaft bracket	Painted Aluminum Die-Cast (ADC12)
7	Bracket cover	Resin (PBT)
8	Pulley	A5056

Precautions for Handling

- The Safety Guide attached with the product is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.
- Do not attempt any handling or operation that is not indicated in this document.
- Make sure to secure the CCM properly in accordance with this document and instruction manual (ME3817). If the CCM is not securely fixed, this may lead to abnormal noise, vibration, breakdown or shortened product life.
- Make sure to observe the usage conditions and environment of the product. Operation outside the warranty could cause decreased performance or product breakdown. Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Rotational speed/ acceleration/deceleration time	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Allowable load moment		
Torque		

Environments for Installation, Preservation Environment

1. Installation Environment

- Please attempt to avoid installing the product to such places as listed below.
- Where the unit receives radiant heat from strong heat sources such as heat treatment furnaces
 - Where the ambient temperature exceeds the range of 0 to 40°C
 - Where the temperature changes rapidly and condensation occurs
 - Where the relative humidity is lower than 20% RH or above 85% RH
 - Where the unit receives direct sunlight
 - Where the unit is exposed to corrosive or combustible gases
 - Where the ambient air contains a large amount of dust, salt or iron (at levels exceeding those typical of an assembly plant)
 - Where the unit is subject to splashed water or oil (including oil mist or cutting fluid) or chemical solutions
 - Where the body receives impact or vibration
 - Where the altitude is more than 1,000m

Also, provide sufficient work space for the following maintenance and inspection:

- Space to insert the teaching tool connector
- Space to replace the motor or controller

If the unit is used in any of the following locations, provide sufficient shielding measures:

- Where noise is generated due to static electricity, etc.
- Where the unit is subject to a strong electric or magnetic field
- Where the unit is subject to ultraviolet or radiation

2. Storage and Preservation Environment

- For the storage and preservation environment, see the installation environment. However, give especial consideration to the prevention of condensation during long-term storage/preservation.

- Unless especially specified, desiccant is not included in the package at shipping. If the product is to be stored/preserved in an environment where condensation is anticipated, take condensation preventive measures.
- For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50°C or less.
- The product should be settled in the horizontal orientation while in storage and reservation. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

Precautions for Transportation

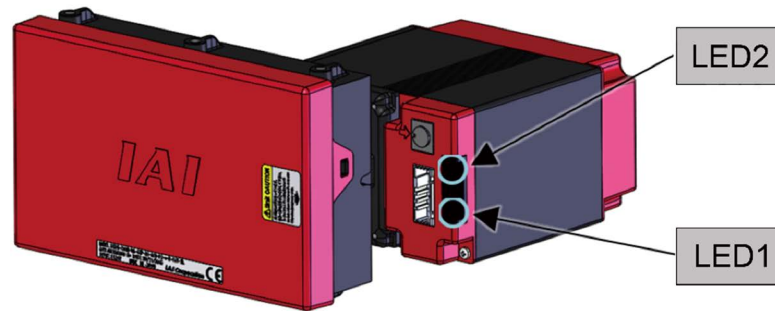
1. Handling the package

- Do not damage or drop the package.
- The package is not specially designed to withstand dropping or shock due to collision.
- Keep the unit in horizontal position for storage or transportation.
- Do not climb onto the package.
- Do not put anything that could deform the package on it.

2. Handling after unpacking

- Carry by the whole product (Motor unit, Speed reducer part)
- Do not damage or drop the package during transportation.
- Do not apply excessive force to any part of the product.
- The teaching port and power & I/O connector are connected to the built-in controller, so be especially careful not to apply external force.

LED Display



Position	Display information	LED status	Content
LED1	Controller status display (SV/ALM)	Green light ON	Servo ON
		Green light blinking	Free run status *1
		Red light ON	Alarm generated or stop sent from teaching pendant
		Green/Red alternating blinking	Light malfunction alarm output *2
		Orange light ON	Under initialization of power boot (Both green & red ON)
		Light OFF	Servo OFF
LED2	Wireless communication status display (WL)	Green light blinking	Wireless connection status
		Red light blinking	Wireless hardware error
		Orange light ON	Under initialization of power boot (Both green & red ON)
		Light OFF	Wireless hardware in initializing process, wireless not connected or in connection process to TP port

Stop is effective only when a teaching pendant is wire-connected.

*1 It should blink in 0.5Hz during free run stop.

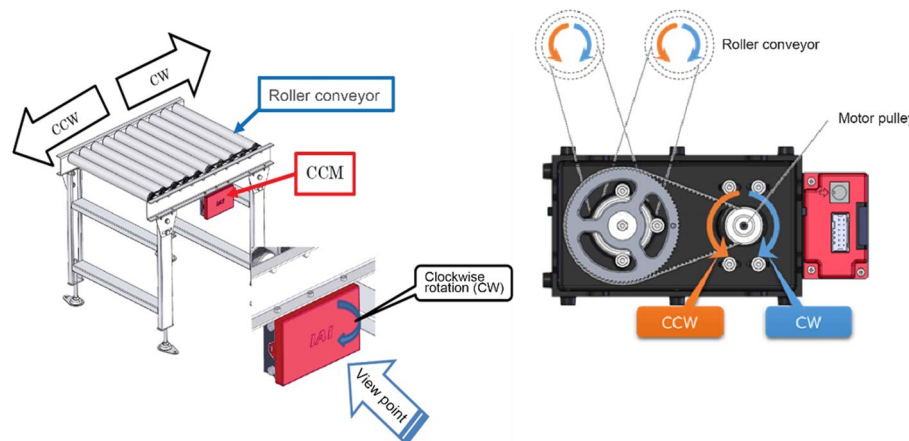
*2 Green and red blink in turns in every 500ms in a light malfunction alarm output.

Definition of Rotary Directions

The definition of rotary directions for CCM should be as shown in the figure below.

* CW, clockwise rotation and normal rotation mean the same rotary direction.

* CCW, counterclockwise rotation and reversed rotation mean the same rotary direction.



Specifications of Roller Conveyor

In order to select CCM, it is necessary to calculate the tangential force necessary for your conveyed objects. Also, be aware that the described values for tangential force and friction coefficient are reference. Consider enough margin for your design.

Specifications of applicable roller conveyors	
Roller diameter [mm]	Φ48.6
Roller length [mm]	300 to 1000
Applicable pitch [mm]	75 / 100 / 150
Max. linked pieces *1	10 pcs
Joint belt *2	Round belt
	V-belt
	V-Ribbed belt

*1 When a curve unit (tapered roller) is to be used, the maximum linked pieces should be 8 pcs.

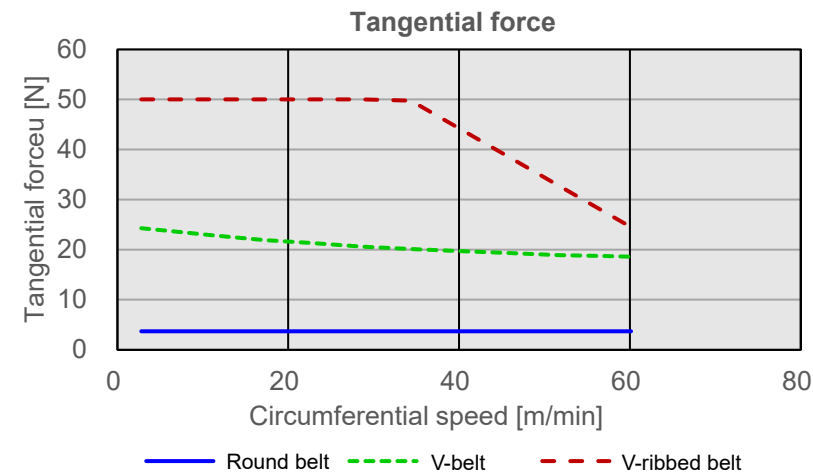
*2 The joint belt is one recommended by manufacturer.

Round Belt Bando Chemical Industries, Ltd. / BANDORD Round Belt #480 Φ5

V-Belt Bando Chemical Industries, Ltd. / BANCOLLAN V-Belt VC Type No.6

V-Ribbed Belt Gates Unitta Asia Company / Micro V-Belt 3EPJ or Hutchinson / ConveyXonic 3PJ

Conveying Capability (Tangential Force)



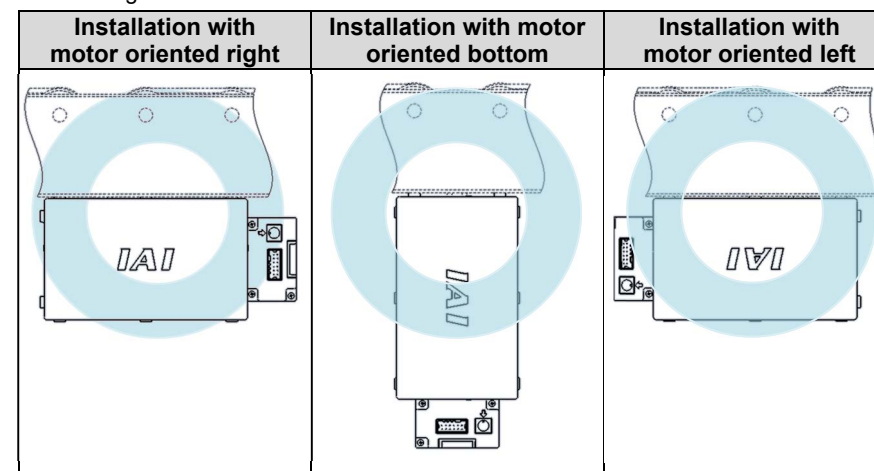
* For how to select the number of linked rollers, refer to [CCM Instruction Manual 1.4.3].

Mounting

For details on the Mounting Method, refer to [Chapter 2 Installation in CCN Instruction Manual (ME3817)].

1. Mounting Orientation

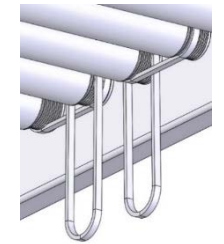
○: Available for Installation



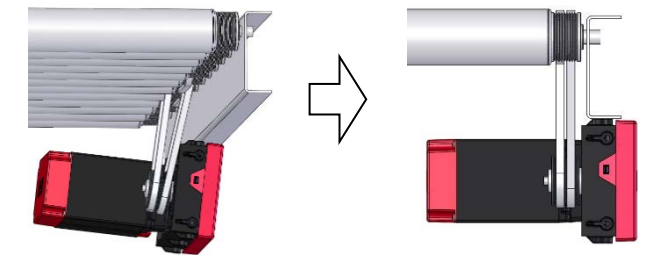
2. Body Mounting

The unit has a screw hole at the body side for mounting. Utilize the tapped mounting holes for installation. Before tightening screws, hang a belt on the free rollers and pulley of CCM as shown below in advance.

Process 1. Hang the belt on the pulley on the free roller side. The belt hung on the CCM pulley should be fell on the side of the free rollers.

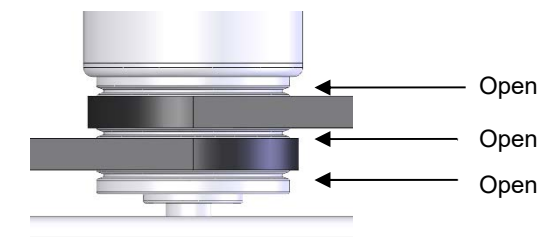


Process 2. Hang the belt on the CCM pulley and attach it to align the attachment holed opened on the frame.



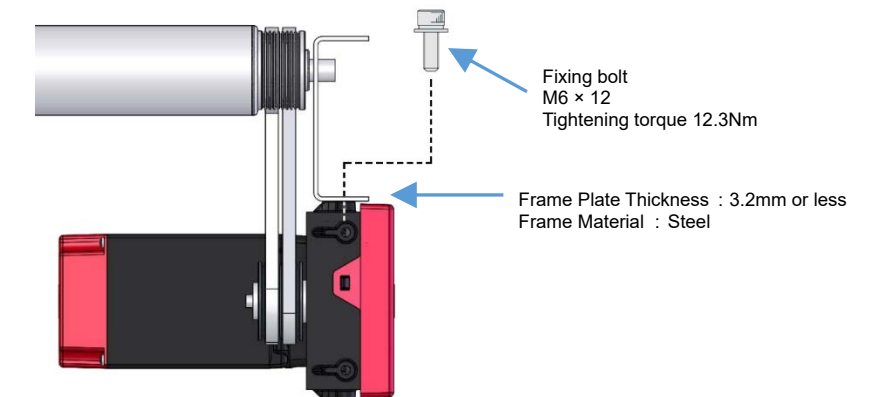
At this time, pay attention to the positions of grooves on the free rollers and CCM pulley when hanging the belt on so the grooves get aligned.

For V-ribbed belt, hang the belt with the grooves on the both sides open. When hanging two pieces of V-ribbed belts, have the belts hung with the grooves on the both sides and center on both the free rollers side and CCM side as shown in the figure below.



3. Fixing Bolt

- The bolts for fixing CCM on the installation surface are to be prepared by the customer.
- Use high-strength bolts of the ISO-10.9 or higher.



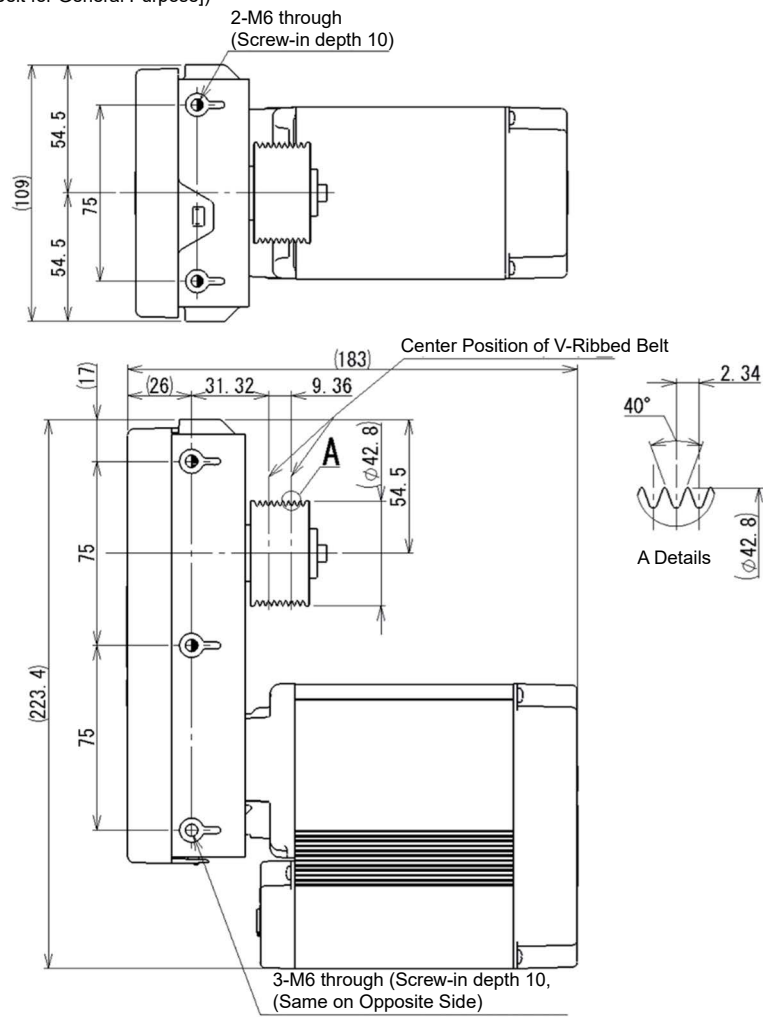
Type	Fixing bolt	Tightening torque
RB7 VB7 RVB7	M6 (Coarse) x 12 (When frame thickness is 3.2mm or less)	12.3 N·m (When material of frame to install is steel)

⚠ Note: • Be careful with regard to the length of the fixing bolt. The use of screw-in depth greater than that of the tapped mounting holes may damage internal components, leading to decreased accuracy or unexpected accidents.

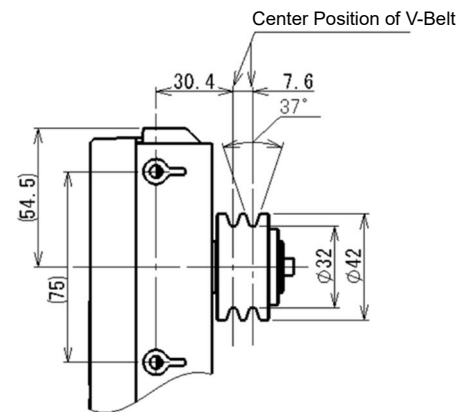
Dimensions for Attachment Holes

1. V-Ribbed Belt Type

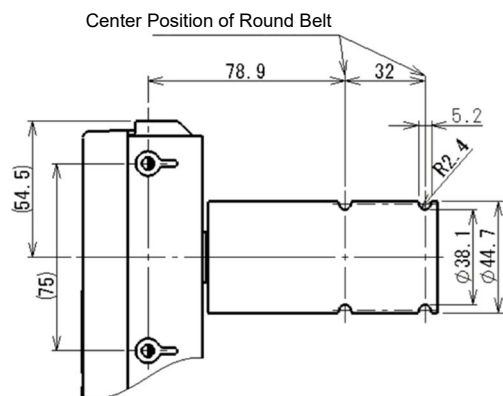
(* The details of groove profile should comply with JIS B 1858 [V-Ribbed Belt Transmission - Pulley and Belt for General Purpose])



2. V-Belt Type

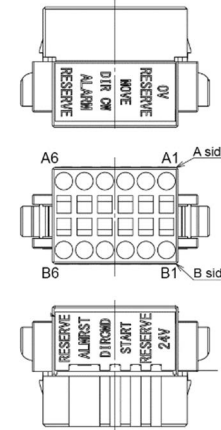
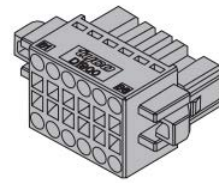


3. Round Belt Type



Wiring

1. Connector wiring (When the Connector is connected)

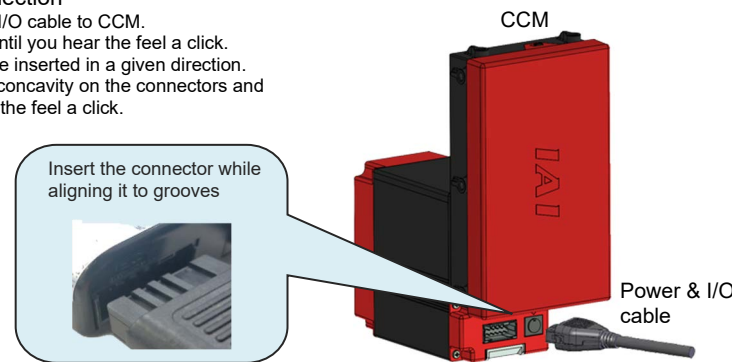


Name	Power & I/O connector
Model	1-1871940-6
Manufacturer	Tyco Electronics
Quantity	1 piece

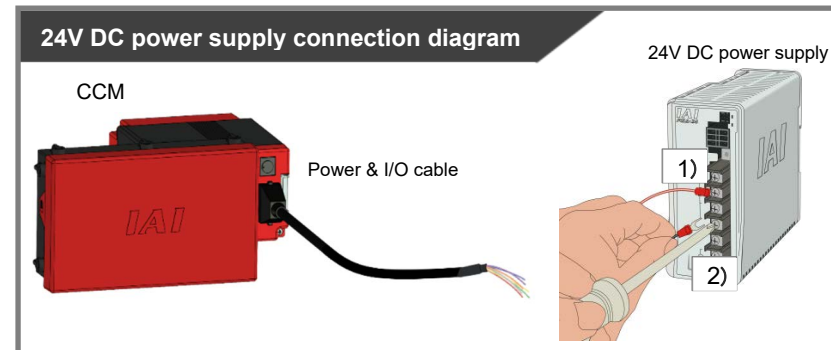
Pin No.	Signal name	Function
A1	0V	Ground
A2	Reserve (CP24V : 2-circuit power supply specification)	Reserve (When 2-circuit power supply specification, 24V input for control power supply)
A3	In-rotation	Motor rotation status display (stop/rotation)
A4	Direction display	Rotary direction display (CCW / CW)
A5	Alarm	Alarm output (*b-contact output)
A6	Reserve	Reserve
B1	24V (MP24V : 2-circuit power supply specification)	24V power supply (When 2-circuit power supply specification, 24V input for motor power supply)
B2	Reserve	Reserve
B3	Rotation command	On/off indication for rotation
B4	Direction command	Rotary direction display (CCW / CW)
B5	Alarm release	Alarm release signal input
B6	Reserve	Reserve

2. I/O Cable Connection

Connect the power & I/O cable to CCM.
Insert the connector until you hear the feel a click.
The connector must be inserted in a given direction.
Align the convex and concavity on the connectors and insert it until you hear the feel a click.

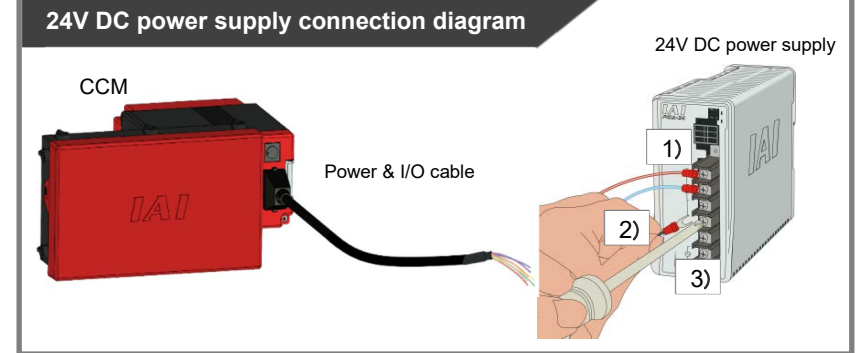


3. Wiring for Power Supply Standard Type



No.	Connector pin No.	Cable wiring color	Signal abbreviation	Function overview	Required specifications
1)	B1	Red	24V	Power supply input	Power supply voltage: 24V DC ±10% Power current: 2.2A Cable length: Within 10m
2)	A1	Black	0V	Ground	

4. 2-Circuit Power Supply Specification TMD2 (Option)



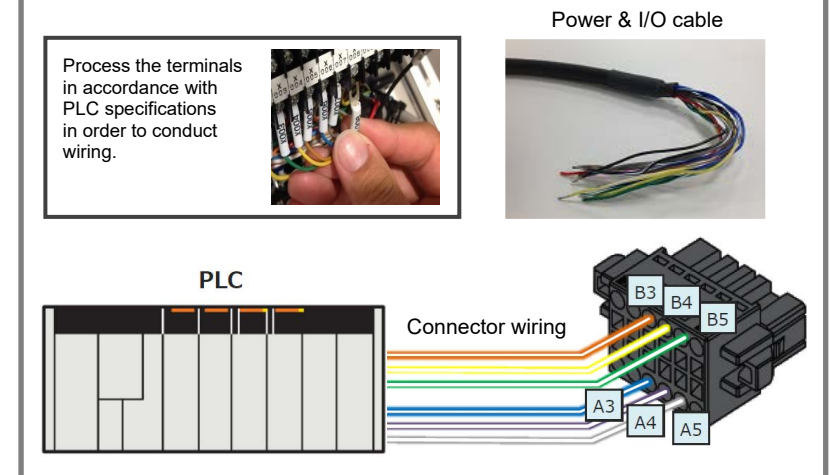
No.	Connector pin No.	Cable wiring color	Signal abbreviation	Function overview	Required specifications
1)	B1	Red	24V (Driving Source)	Driving source power supply input	Power supply voltage: 24V DC ±10% Power current: 2.2A Cable length: Within 10m
2)	A2	Light Blue	24V (Control)	Control power supply input	
3)	A1	Black	0V	Ground	

5. PLC Wiring

For I/O between the PLC and signals, the wiring of the power & I/O cable must be connected to the PLC.
Connect the 1) to 6) wiring to the PLC terminal block while referring to the connection diagram.

- 1) Connect the "orange" cable wire and the "Start /stop" output terminal.
- 2) Connect the "yellow" cable wire and the "Rotary directions" output terminal.
- 3) Connect the "green" cable wire and the "Alarm clear" output terminal.
- 4) Connect the "blue" cable wire and the "During rotation" input terminal.
- 5) Connect the "purple" cable wire and the "Rotary directions" input terminal.
- 6) Connect the "gray" cable wire and the "Alarm" input terminal.

PLC connection diagram

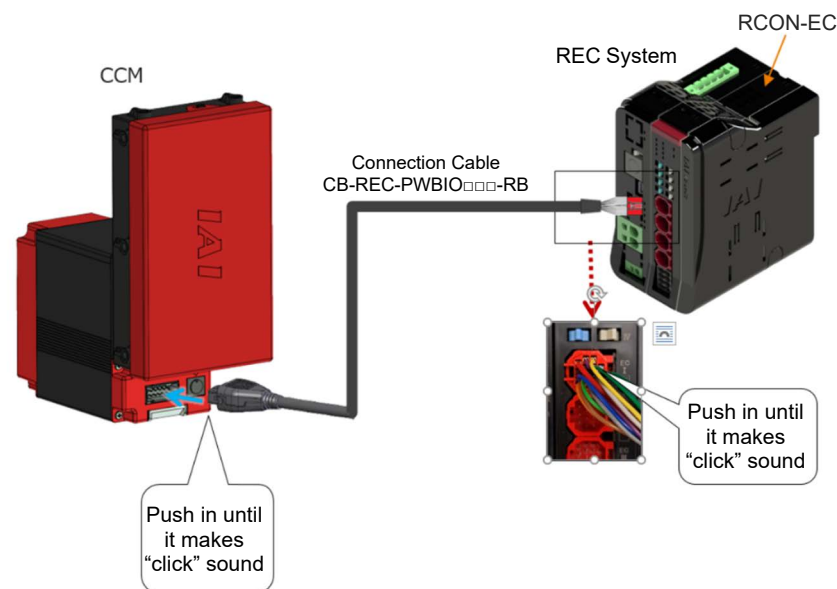


Pin No.	Signal name	Signal abbreviation	Compatible wire diameter	Function overview
B3	Start/ Stop	RTSS	KIV0.20mm ² (AWG24)	Rotation/stop command OFF : Stop, ON: Rotation
B4	Rotary directions	RDIR		Rotary direction indication OFF : Counterclockwise (CCW) ON : Clockwise (CW)
B5	Alarm clear	RES		On to reset alarm
A3	During rotation	RTST		In-rotation output OFF : In Stop, ON: In Rotation
A4	Rotary directions	RDST		Output rotary direction OFF : Counterclockwise (CCW) ON : Clockwise (CW)
A5	Alarm (b-contact)	*ALM		Alarm detection (b-contact) OFF : In Normal Operation, ON : Alarm Generated

* B3 and B4 may differ the signal names depending on the setting in Parameter No. 7.

6. Wiring for RCON-EC

Refer to the example of connection below to insert the connectors to CCM and EC connection unit.
Push the connectors inward till it makes "click" sound.
The axis number should be determined by the position of the connector on the EC connection unit.



Operation

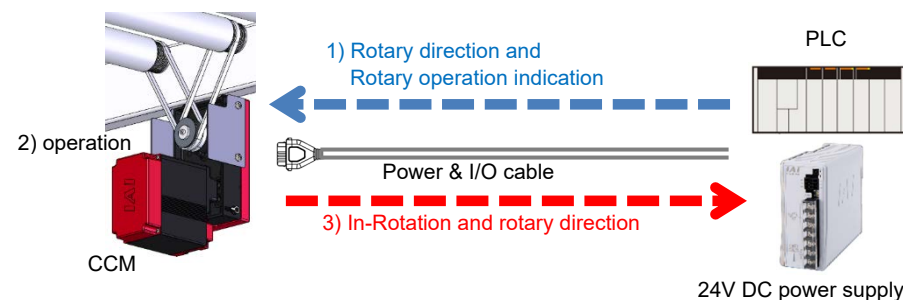
For details on the Operating Method, refer to [Chapter 4 Operation in CCM Instruction Manual (ME3817)].

1. Basic Operation

An input signal from a master device to the CCM triggers operation of the CCM.
The CCM status can also be determined when the master device receives signal output from the CCM.

Connection image PLC/CCM connection

- 1) Input the rotary direction and the rotary operation indication signals from PLC.
(Rotary operation indication)
- 2) The CCM operates
- 3) The in-rotation and rotary direction signals should be output from CCM.
(In rotary operation)



Reference

- CCM starts rotary operation when the rotation command signal turns on.
- Rotation continues in the indicated direction constantly while the rotation command signal is on.
- The operation should be cancelled once the rotation command signal is turned off, and starts deceleration and stops.

2. Teaching Tool

The teaching pendants below should be available for setup and operation of CCM.

◆Touch Panel Teaching Pendant

Applicable version: Ver.3.91 or later



TB-03 (Wireless/Wired)

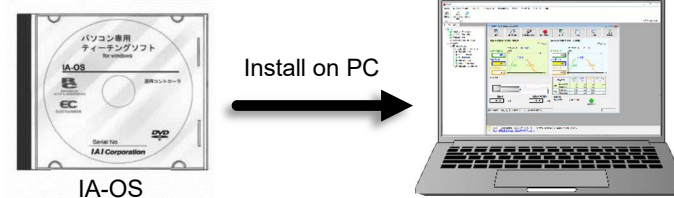


TB-02 (Wired)

For how to use, refer to [Teaching pendant TB-03 Instruction manual (Wireless: ME0375/ Wired: ME0376/ME0377)] or [Teaching pendant TB-02 Instruction manual (ME0355/ME0356)].

◆IA-OS (PC software)

Applicable version: Ver. 12.00.00.00 or later



For how to install, refer to [IA-OS First Step Guide (ME0391)].
For how to use, refer to [IA-OS help screen].

Parameters

Shown below is a list of the parameters

For details of each parameter, refer to [Chapter 5 Parameter in CCM Instruction Manual (ME3817)].

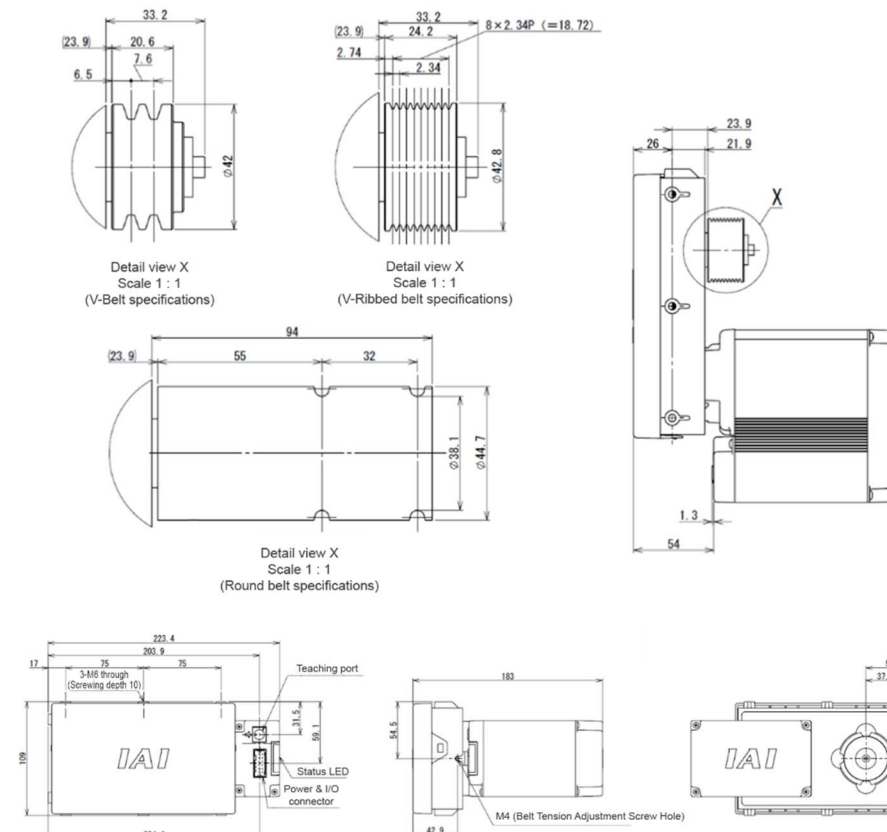
No.	Name	Unit	Input range	Default setting at shipping
1	Rotation speed	rpm	75 to 1575	525
2	Acceleration time	s	1.0 to 2.5	1.0
3	Deceleration time	s	1.0 to 2.5	1.0
4	Select stop system	-	0 : Decelerate and stop 1 : Free Run	0 : Decelerate and Stop
5	Wireless function setting	-	0 : Enabled 1 : Disabled	0 : Enabled
7	Select command system	-	0 : Rotation/directions 1 : CCW/CW	0 : Rotation/directions

No.5 Wireless function setting parameter is not displayed on CCM without wireless circuit boards (no WL, WL2 in the option model number).

Life

The product life (reference) of CCM is 10,000 hours of operation period.
However, the product life fluctuates drastically depending on the condition of use, environment and condition of maintenance.

External Dimensions



Troubleshooting

If a problem occurs, check the following points first in order to ensure quick recovery and prevent recurrence of the problem.

- [1] Check in status LED (SV/ALM LED): Refer to LED Display section.
- [2] Check in status LED (Wireless status LED): Refer to LED Display section.
- [3] Check for abnormality in the master device (PLC, etc.)
- [4] Check the voltage of the main power supply (24V DC)
Check for momentary power failure, voltage drop, power failure, etc.
- [5] Confirm the generated alarm
Check the alarm information with the teaching tool.
- [6] Check the connectors for disconnection or incomplete connection
- [7] Check the cables for connection error, disconnection or snagging
Cut off the main power supply of the equipment (to avoid electric shock) and remove the cables around the measurement point (to avoid conductivity through the surrounding circuit) before checking the conductivity.
- [8] Check the I/O signals
Use the master device and CCM teaching tool to check for inconsistency or abnormality in the input/output signal status of the two units.
- [9] Check the noise elimination measures (grounding, connection of noise suppressor, etc.)
- [10] Check the events leading to the occurrence of the problem, as well as the operating conditions at the time of occurrence
- [11] Analyze the cause
- [12] Countermeasures

For details, refer to [Chapter 6 Troubleshooting in CCM Instruction Manual (ME3817)].

Maintenance and Inspection

Refer to [Chapter 7 Maintenance and Inspection in CCM Instruction Manual for maintenance and inspection].



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